

Fundamentals of Social Statistics and Social Development

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Pk. Md. Motiur Rahman



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Author

Pk. Md. Motiur Rahman

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This book is dedicated to
my grand daughter Adiya

About the book

This book is the outcome of my teaching notes for the undergraduate students of Applied Statistics at the Institute of Statistical Research and Training (ISRT), University of Dhaka. I developed an extensive set of notes in order to fulfill my students' need in a simplest form. However, the basic objective of this book is to provide the graduate and undergraduate students of Applied Statistics, Sociology, Population Science etc. with a certain amount of theoretical understanding as well as solution of practical problems relating to income distribution, income inequality, poverty and social development. Other social concerns and issues like population, education, health, nutrition, employment, crimes, culture, social welfare, level of living etc. have also been critically analysed in this book. A number of books on social statistics have been written, but those books are often too advanced for undergraduate students and official statisticians with an ordinary mathematical and statistical background.

This book is also intended to be used as guideline for official statisticians, social researchers, development economists, policy makers, and planners who are engaged in social development planning in Bangladesh.

Preface

The rapid development of various social aspects in recent years has brought about the study of social statistics. Many applications to social problems, economic research, business and many other fields call for such study. In order to keep abreast of social developments, undergraduate courses in social statistics are gradually becoming part of applied statistics, sociology, anthropology, criminology, economics, business and population study curricula. For a long time, the need of a book on social statistics has been felt to have for graduate students in social sciences, social planners, policy makers, social researchers specially those who are interested in research on economic inequality, poverty, income distribution and other social aspects such as education, health, population, level of living, culture, crime etc. This book on ‘Social Statistics and Social Development’ is designed to provide tools to measure, describe and analyze national accounting inequality, welfare based inequality, entropy class indices of inequality and poverty. It also provides background materials for social development planning and poverty reduction strategies.

Because of the usual classroom time limitations, I feel that emphasis should be given on a solution of practical problem rather than on a technical theory. Acquiring skill of reading and manipulating formulae will probably be of more lasting value because it will provide the students with a strong basis for later studies. However, since it is recognized that most students of applied statistics, statistics and social sciences will be users of this book, they will be more interested in applied knowledge rather than theory. Those students who are interested in rigorous proofs will find advanced references listed at the footnotes and references given in the book. As a further assistance to students, numerous hypothetical examples have been worked out and the students may see the mechanics of the theories from the worked out problems. In that sense this book will also be helpful to social policy makers, planners, researchers, ministries who are engaged in social development and NGOs.

At first, I would like to express my indebtedness to Dr. Nayeem Sultana, Professor, Department of Development Studies, University of Dhaka, for writing one chapter on anthropology (Chapter 20), That chapter added more lasting value to this book because it will provide the students of applied statistics about basic idea of anthropology.

I am also indebted to Dr. Tamanna Howlader, Professor, Dr. M. Shahed Masud, Associate Professor of the Institute of Statistical Research and Training (ISRT), and Mr. Paritosh Kumar Roy, Assistant Professor of ISRT for their help in computation in computer and many other suggestions to me from time to time when required. Thanks are also due to Mr. A.F.M. Ahnaf of SURCH for his valuable efforts of going through the whole text and giving many helpful suggestions. I would like to express my thanks to Mr. Zobdul Hoque, Ex. Director, National Accounting Division, Bangladesh Bureau of Statistics (BBS) for his suggestions on national accounting sections. I thank to Mr. Mahbubul Hoque, Sr. Software Engineer of SAMSUNG for his help in different ways.

Last - but not least – my special thanks to Mr. Md. Abdul Aziz for laborious and excellent job of typing the entire manuscript. Of course, I am alone is responsible for any errors or omission.

Finally, I will be happy indeed if this book is of help to those who are interested in studying and doing research on social statistics, inequality, poverty and social development in Bangladesh.

Pk. Md. Motiur Rahman
Supernumerary Professor
ISRT, University of Dhaka

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Chapter 1

Concepts of Statistics and Social Statistics

1.1 Meaning of Statistics

The term *Statistics* has come from the Latin word *Status* which means a political state but originally meant information useful to the state. For example, total population of a country, total agricultural land and its distribution by size, total number of armed forces etc. The word statistics has now acquired different meanings from different authors and researchers. First, the word *Statistics* refers to numerical data relating to an aggregate of facts. For example, price statistics, birth and death statistics, statistics of crimes, educational statistics, health statistics etc. Here statistics denotes a collection of numerical data in the respective fields. Secondly, the word statistics refers to a body of procedure and techniques used to collect data, process and analyze data to make inference about population parameters. Thirdly, the word statistics is used as the plural of the word statistic, which means some numerical value calculated from sample observations. From these perspectives, statistics may be regarded as a method of dealing with data and thus statistics is a tool concerned with the collection, organisation, and analysis of numerical facts or observations. Thus statistics as a subject has its own right and philosophy.

1.2 Importance of Statistics

The subject of statistics has widespread applications and it is perhaps a subject that is used by everybody. This is indicated by the fact that statistics courses are taught in degree programs of a wide variety of disciplines such as Dentistry, Engineering, Sociology, Psychology, Public Health, Education, Liberal Arts, Business Administration, Geography, Zoology, Microbiology, Bio-chemistry, Physics, Chemistry, Agriculture, Industry and so on. The course content is basically the same but the major difference lies in applications and examples used. In spite of this fact, there are many misconceptions concerning the nature of this rapidly developing discipline. Statistics is not only taught in different subjects but we all also apply statistical concepts in our daily lives. For example, to start the day in the bathroom you turn on the shower and then put your hand to sample the

temperature. Then you decide to add more hot water or more cold water for your bath. As a second example, to purchase rice in the market you take a sample of rice to judge the quality of it and then decide which rice you will buy. Thus statistics clearly plays a central role in different fields, especially in applied sociology, economics, business, industry etc.

1.3 Types of Statistics

Statistics as a subject may be divided into two types. One is descriptive statistics and the other one is inferential statistics. Descriptive statistics is a branch of statistics that deals with condensation, summarisation and description of the important aspects of numerical data. The area of descriptive statistics also consists of representation and summarisation of data, using graphical presentations and the computation of a few numerical quantities that provide information about the centre of the data. When social scientists conduct a study, it usually collects a great deal of information or data about the social problem at hand. The data may take a variety of forms such as marriage rate, divorce rate, number of cases over time etc. In performing the descriptive function, the social scientists employ rules and procedures for presenting raw data in a more usable and meaningful form. Thus, in short, descriptive statistics is the methods of organising, summarizing, and presenting data in an informative way. The main methods of evaluating descriptive statistics are:

1. Graphical representation
2. Frequency distribution
3. Measures of central tendency: (i) Arithmetic mean (ii) Geometric mean (iii) Harmonic mean (iv) Median, Mode (v) Quantiles
4. Measures of dispersion. The main measures of dispersion are:
 - i. The Range
 - ii. The Semi-Interquartile Range or the Quartile Deviation
 - iii. The Mean Deviation
 - iv. The variance and Standard Deviation
5. Correlation and Regression
6. Measures of Association
7. Nonparametric Methods

Inferential or inductive statistics on the other hand, deals with methods and techniques for drawing inferences about the characteristics of population or parameters based upon the knowledge derived from a sample taken from that population. Inferential statistics is thus mainly

concerned with generalizing the information or more specifically, with making inference about population characteristics. This area of statistics includes the estimation of population parameters and testing of statistical hypothesis, which is based on probability theory since inferences are made on the basis of sample observations. Therefore, this cannot be done with absolute certainty. The main Inferential statistics are:

1. Estimation of Parameters (Point and Interval)
2. Analysis of Variance
3. Test of Statistical Hypothesis (Parametric Tests of Significance)
4. Test of Statistical Hypothesis (Nonparametric Tests of Significance)
5. Statistical Inference with categorical variables

Descriptions of methodologies of different descriptive and inferential statistics have not been discussed in this book. This is because all these statistics have been discussed in details in all books on statistics.

1.4 Why Study Statistics in Sociology?

To answer this question we need to know why statistics is required in sociology and its related disciplines. The first reason is that numerical information is required in almost everywhere. Sociology focuses on aggregates rather than individuals and thus it affords us the opportunity to analyse private and public social issues. Similarly, statistics also deals with aggregate and it helps analyse different social aspects and problems. Here is one example:

In our country, there have been certain changes in primary education policy. With recent changes, primary school students of grade five are now required to take standardized examination called primary school examination (PSE) to measure achievement and to determine whether they should be promoted to the next grade (grade 6) or held back. As a result, parents are receiving official result reports about their children's academic performance. It might be that certain aspects of the children's report indicate that their performances are below the minimum standards, suggesting serious problems. Now the question is whose problem this is; is it the problem of the students or lack of support at home or examination system is responsible for the failing of children? Many of the parents take these poor reports of results personally, concluding that there is something wrong with preparation of student, motivation, capacity to learn and support at home. Thus the statistics of incidence of failure to get promotion emerges as a social concern that requires generating social statistics to improve the situation.

In summary, there are at least three reasons for studying statistics: (1) data are necessary to understand every social aspect of life (2) statistical techniques are used to make many decisions that affect our social lives, and (3) no matter what our future line of work is, we will make decisions about social lives that involve data. The study of statistical methods will help us make these decisions more effectively.

1.5 What is Social Statistics?

Social statistics is largely concerned with the study of the well-being of the population in all its aspects. This would obviously include many aspects of interest such as education, health and nutrition, employment, culture, level of income and its distribution, consumption etc. It covers whole range of activities of the individuals and the households and aims at a comprehensive measure of the well-being.

The term Social Statistics has long been used for social indicators that are relevant for the analysis of the situation in a particular social field or for society as a whole. Similarly, economic statistics for economic analysis are referred to as economic indicators. However, social statistics refers to statistics that is used to study different aspects of human behavior in the context of social environment. In other words, social statistics are a set of data that relates to the welfare of people and social well-being. Social scientists uses social statistics for many purposes. The main purpose is to evaluate the quality of life of people, examine behaviors of groups of people, and to determine wants of people. Through social statistics we can measure the social condition of a country and compare its social status with other countries. Incremental change in social conditions, on the other hand, indicates progress in achieving national objectives and goals and helps to evaluate the actual or potential impact of policies or programs on social development of a country. Moreover, in each Five Year Plan, the removal of poverty is one of the major objectives along with economic and social development of the country. Consequently, there has been a growing recognition of the importance of social statistics to the formulation of social policies. Nevertheless, the social statistics available at present in the country are not adequate to provide information on several social issues. Thus, the need has arisen to expand the Statistical System to make social statistics available in a timelier manner and more relevant to the requirement of policy makers and planners. Social statistics is now employed in many disciplines such as economics, psychology, political science, sociology and anthropology. Social statistics, particularly in developing countries are deficient not only in coverage, but in methods of analysis and

interpretation. There should be a standardized and universally accepted way of analysing the present confusing array of descriptive data to arrive at a new set of data and to represent the state of society.

The use of social statistics is now so widespread that many universities, UN bodies and government organisations have developed separate institutes/departments/sections focusing on statistical methods for gathering and analyzing social statistics. Among the institutes, Harvard's Institute for Quantitative Social science, Centre for Statistics and Social Science, University of Washington, Social Statistics Division, University of Southampton, U.K., UN Statistics Division, the ESCAP and the United Nations Children's Fund (UNICEF), Central Statistical Organisation of different countries may be mentioned. But still very little up-to-date and reliable information is available on social statistics and social issues such as education, health, poverty, inequality, unemployment, under-employment, religion, regional disparities and gender disparities in the level of living. In view of the growing concern for social development and improving the quality of life of people, several social statistics and social indicators are in great need to the social planners, policy makers and social researchers.

Social Statistics cover a wide range of social situations, sometimes called the domains or areas of social concerns. Social statistics are both complex and multidimensional. For an analysis of any social problem, or to recommend a policy decision, one must understand the phenomenon with the help of social statistics. Therefore, social statistics should be available at the national level and for different regions (divisions) and sub-regions such as districts within divisions as well as for urban and rural areas, weaker sections of the population such as daily wage labors, small cultivators, carpenter, black smith etc. The following are the major domains or areas of social concern which generate social statistics.

- i. Population growth and distribution, family formulation, family composition, migration, divorce etc.
- ii. Education by sex
- iii. Health and Nutrition
- iv. Housing
- v. Water and sanitation
- vi. Electricity
- vii. Employment by sex
- viii. Social welfare and social security

- ix. Crime and justice
- x. Community development statistics
- xi. Statistics of backward classes
- xii. Statistics of Children, Youth and Women
- xiii. Income, wealth and Consumption
- xiv. Cultural diversity, bilingualism, natives, etc.

Each field has several social indicators that measure the broad aspects of social conditions and relate to a specific purpose. Most of the indicators can be compiled separately for urban and rural areas and at a regional level. Some indicators can be compiled at regular intervals through Censuses and Surveys and others can be compiled on an annual basis. The majority of the indicators are concerned with population and households; some are related to weaker sections of people. However, all types of indicators should be relevant to planning. Finally, social indicators should reflect the present conditions of living and therefore, they should be based on current information. The potential economic and social benefits of adequate and accurate social statistics on the above aspects could be much larger than foreign aid if concerted efforts are given to improve the field of social statistics.

1.6 The main objective of the book

The main objectives of this book are to provide the student with a certain amount of theoretical understanding as well as solution of practical problems on social statistics.

Another important objective of this book is to introduce social statistics to undergraduate and graduate students, social researchers, and statisticians in different government and non-government organisations. The rapid changes and social development in the recent years has brought about increased application of social statistics to problems of socio-economic research and study in many other fields. In order to keep abreast with these developments, undergraduate programs in statistics, sociology, and population science etc. are gradually introducing social statistics as part of their curricula.

While teaching social statistics and social development in the Institute of Statistical Research and Training (ISRT), University of Dhaka, I developed an extensive set of notes in order to fulfill my students' need of a simplest form. These notes have been revised and expanded into the present book. It is also intended to be used as a guideline for official statisticians, policy makers and planners. A number of books have been written, but these books are often too

advanced for undergraduate students and official statisticians with an ordinary mathematics and statistics background.

1.7 Organisation of the Book

This book has been divided into four parts. The first part (Chapter 1-6) comprises the introductory materials and explains basic concepts of variables and levels of measurement, uses of rates and ratios in describing social statistics, concepts of household and national income, measurement of income inequality, theoretical distribution of income and basic concepts of poverty and its measurements. The second part (Chapters 8-16) presents currently available social statistics of various social concerns such as education, health and welfare of people, population and demography of labor force, level of living, culture and crime. These social statistics are provided for taking stock of the current situation and fulfilling the data requirements of social planners, policy makers and administrators, Part three (Chapter 18-19) contains objective plans for social development and describes the role of non-government organisations (NGOs) in social development, status of current micro-credit disbursement by these NGOs for social development and poverty alleviation. Part four (Chapter 20) provides a brief overview of anthropology and its sub-disciplines.

Chapter 2

Types of Variables and Levels of Measurement

2.1 Variables

A characteristic that varies with an individual or an object is called variable. For example, height is a variable as it varies from one individual to another. A variable can take a number of values. A set of all possible values from which the variable takes on a value, is called its domain. If for a particular problem, the domain of a variable contains only one value, then the variable is referred to as a constant. A constant does not vary across observations or individuals. It is a certain number that is the same for everyone in a data set. For example, number of head of a person and it does not vary across individuals. Therefore, the number of head is referred to as a constant. In short, a variable must vary-across individuals or countries or organizations and it must take on different values.

2.2 Types of Variables

Variable may be classified into two basic types. One is quantitative and another one is qualitative. A variable is said to be quantitative when a characteristic can be expressed numerically such as age, height, weight, number of children in a family etc. On the other hand, a variable is said to be qualitative when a characteristic is non-numerical such as beauty, eye-colour, sex, intelligence, poverty etc. A qualitative characteristic is also called attribute that describes the variation in the characteristic. For variable *gender* the attributes are male and female. For the variable *poverty* the attributes are poor and non-poor. For variable *levels of formal education* the attributes are no education, primary education, secondary education and so on.

2.3 Discrete and Continuous Variables

A quantitative variable may be classified into discrete or continuous according to the form of observation. A discrete variable is one that can take only a discrete set of integers or whole numbers. It represents countable number such as number of student in a class, number of persons in a family, number of rooms in a school building, number of birth in a year, number of accident in a month etc. On the otherhand, a variable is said to be continuous if it can take any value-fractional or

integral-within a given interval i.e. its domain is an interval with all possible values without break or gap. A continuous variable represents measurable data such as height or weight of a person, temperature at a place, age of a person, height of a plant etc.

2.4 Sociological Variable

Sociological variable includes several characteristics among which biological, social stratification, group, geographical, knowledge, attitudinal, practices etc. are important. Some of the sociological variables on these characteristics are briefly described below:

1. Biological Characteristics : People by Gender, age, number of children by sex etc.
2. Social group characteristics : People by Ethnic membership, marital status, religion affiliation, occupation etc.
3. Social stratification characteristics : Wealth, Political Power, Prestige, income, employment status etc.
4. Geographical characteristics : Place of birth, residence, migration history
5. Knowledge characteristics : Level of education, degree to which one is aware about current issue, history, local affairs, etc.
6. Attitudinal characteristics : Political orientation, attitudes on issues and events
7. Practice characteristics : Mosque attendance, book reading, TV watching, radio listening etc.

2.5 Level of Measurements

Data can be categorised according to levels of measurement. The level of measurement of the data often refers to calculations that can be done to summarize and present the data. It also dictates the statistical tests that should be done. For example, there are six colours of marble in a box of marbles. Suppose we assign the white marble a value of 1, red 2, yellow 3, blue 4, green 5, and brown 6. Let us add the assigned colour values and divide by the number of marbles and find that the mean value of colour is 3.5. Does this mean that the average colour is red or green? Most researchers refer to four levels of measurement. These are (i) nominal, (ii) ordinal, (iii) interval, and (iv) ratio. The lowest or primitive level of measurement is the nominal level of measurement while the highest, or the observation, is the ratio level of measurement (Douglas A. Lind et al. 2000). The idea of levels of measurement came from a famous paper of psychologist S.S. Stevens (Stevens, 1946). If we use the term measurement ordinarily used in science such as physics, mathematics, chemistry (e.g. the measurement

of length, breadth, time, mass, density etc.) there is little or no problem in the choice of a mathematical system. But if the term measurement used in social science including sociology, the whole problem becomes complex. However, the data can be classified according to level of measurement. Summarization and presentation of data also depend on the level of measurements. Statistical tests that should be performed also depend on the level of measurement. However, the four levels of measurement are briefly described below:

2.5.1 Nominal Level Data

The statistical data can broadly be classified as categorical and numerical. The categorical data are of two types, namely nominal and ordinal. On the other hand, numerical data are measured in interval scale and ratio scale.

In nominal level of measurement of a qualitative variable, we simply assign observation to categories and there is no ordering among the categories. Categories may be designated by names such as male and female or numerical statement such as September 10, Roll Number 20. In our example the variable 'gender' which has usually two attributes such as male and female. These attributes have no special numerical value and cannot be rank ordered in any meaningful way. But sometimes numbers are assigned to the nominal categories of a variables, such as 1, female and 2, male, Assignment of numbers to a nominal variable are more convenient in computer programming for statistical analysis. The numbers do not imply rank ordering, but are arbitrary. We could also assign male equal to 1 and female equal to 2. Thus number assigned does not matter and there is no natural order. Likewise, we might assign numbers for marital status of household heads obtained from a survey of 2009 as follows:

Table 2.1 Distribution of household heads by marital status

Marital Status	frequency	Percent
Married	1088	89.8
Unmarried	20	1.7
Widow/Widower	93	7.7
Abandoned/Separated	6	0.5
Divorced	5	0.4
Total	1212	100.0

Thus the marital status is the nominal variables. It is found that the nominal variables are the classification systems which are applied to

qualitative information. Table 1 indicates the major feature of the nominal level of measurement. There is no particular order to the categories and the categories are mutually exclusive and exhaustive.

2.5.2 Ordinal Level Data

The next higher level of data is the ordinal level. In ordinal level data, there is an ordered relationship among the classifications or categories. But we do not know from the rank order how far apart the ranks are. However, in ordinal data the assigned numbers mean more than they do in a nominal scale, since we are not able to distinguish the magnitude between the groups. Suppose a teacher of social statistics class makes a list of rating of student's knowledge of that class. The variable rating explains the use of the ordinal scale of measurement. (In this case one classification is higher or better than the next one). The hypothetical rating of classification of knowledge of third year students of applied statistics is as follows:

Rating	Frequency
1. Excellent	6
2. Good	30
3. Average	10
4. Poor	4

Here *Excellent* is better than *Good*. *Good* is better than *Average*. *Average* is better than *poor*. But we are unable to measure the magnitude of difference between an excellent and a good knowledge. We cannot assume that the difference in knowledge between an excellent and a good is the same as between the average and the poor performance (even if we consider 1 for excellent, 2 for good, 3 for average and 4 for poor, we may think the distances are the same). If we add up a 1 for each "excellent", a 2 for each "good", a 3 for each "average" and a 4 for each poor and divide by the number of observations we may get the average, say, 2.56. But it is not clear what that average (2.56) number means since this is ordinal data. Ordinal level of measurement is not easy to analyze, or doing arithmetic operations, but this type of measurement is very common in opinion or attitude surveys.

The basic difference between nominal level data and ordinal level data is that ordering in the ordinal level data means more than the nominal level which is an additional property among the categories of ordinal level data. On the other hand, with nominal levels of measurement it is not legitimate to perform with arithmetic operation on variables, since the number assigned to the category are simply

arbitrary and it is not possible to perform arithmetic on words. However, nominal level data categories are not ordered logically.

2.5.3 Interval Level Data

The interval level of measurement is the next highest level. The interval level data are expected in regular numbers and in fact they are numerical and quantitative variable. These numbers indicate how far apart they are. Interval level data includes all the characteristics of the nominal and ordinal level data and in addition the difference in observations can be determined and it has unit of measurement. And for all practical purposes we can perform some arithmetic operation with interval level data and can get meaningful results. More specifically, interval data can be added, subtracted, multiplied and divided without affecting the relative distances among the scores. Another important characteristic of interval variable is that it does not have zero point. But in practical purposes in some cases zero point is arbitrarily defined. An example of the interval level of measurement is temperature. Suppose the average temperature on three consecutive months in Dinajpur district is 45, 52 and 55 Fahrenheit. These temperatures can easily be ranked and we can also determine the difference between temperatures. Equal differences between two temperatures are the same, regardless of their position on the scale. The difference between 15 degree Fahrenheit and 20 degree is 5 degrees, while the differences between 45 degree Fahrenheit and 50 degree is also 5 (constant). It is also being noted that 0 is just a point on the scale but that does not mean absence of heat. This is because zero degree Fahrenheit does not mean that heat is zero but it is about 18 degrees on the Celsius scale. The time data and IQ measurement in psychological test also represents interval scale.

2.5.4 Ratio Level Data

The ratio level is the *highest* level of measurement. The ratio level of measurement has all the properties of interval data with exception that ratio data have a natural zero point. That is 0 point is meaningful and the ratio between two numbers is also meaningful. As an example, if Mr. Karim earns Tk. 20,000 per months and Mr. Rahim earns Tk.10,000 per month, then Mr. Karim earns twice as much as Mr. Karim. On the other hand, if you earn 0 taka, then you have no money. In measuring distances between two places in feet or meters, a zero distance means that the absence of any distance. Height, weight, age, family size etc. are ratio type variables. In short numerical data are measured in ratio scale.

If we compare the four levels of measurement, it may be concluded that nominal and ordinal measurement are categorical, while interval and ratio level measurements are numerical. The main distinction between nominal and ordinal variable is that ordinal variables represent rank ordering but in nominal scale there is no such rank ordering property. An interval measure is similar to ordinal measure and both follow ordinal property but interval level data are generated through measuring and counting process. It is to be noted that interval variable can be used as a nominal and an ordinal variable but nominal and ordinal variables cannot be used as an interval variable. On the other hand, ratio level measurement or variable has all the properties of nominal, ordinal and interval variables with an additional property of having absolute zero.

Chapter 3

Use of Proportions, Percentages, Rates and Ratios in Describing Social Statistics

3.1 Introduction

In social science and scientific research the proportion, percentage, rate and ratio are required in many occasions. For instance, we have obtained some data that, in course of conducting statistical analysis, we are to divide one number by another. There will be innumerable occasions in social science particularly in the education, health, population and poverty studies where we need to calculate proportions, percentages, rates and ratios. And we are frequently concerned with these measures in different socio-economic and demographic fields. In this chapter, definition and distinction among them have been discussed with example.

3.2 Proportion

A proportion is calculated by dividing the quantity of one category by the total of all categories. In household income and expenditure survey (HIES), the most frequent and common disease found in rural areas was Gastric Ulcer. During that year 39,10,510 persons suffered from gastric ulcer and a total of 1,59,59,779 persons suffered from 15 leading diseases. Given this information, we can calculate that proportion of people suffered from gastric ulcer in 2010 attributable to the 15 leading diseases equaled to 0.24 by dividing 39,10,510 by 1,59,59,779. The value of proportion ranges from 0 to 1. The value 0 means there is no cases in a category, while the value 1 means a category contains all the cases. It is to be noted that the total of proportion associated with the 15 categories is 1.00 because the categories of diseases are mutually exclusive and exhaustive. Therefore, the categories constitute a nominal level of measurement. Table 3.1 illustrates the proportion and percentage of people exposed to different diseases. Column 1-3 of Table 3.1 shows the proportion of people suffered from different diseases by sex.

Table 3.1 Distribution of Population Suffered During Last 12 Months from Chronic Diseases in Bangladesh, 2010

Type of Illness	Proportion			Percentage		
	Both Sex	Male	Female	Both Sex	Male	Female
	1	2	3	4	5	6
Total	1.00	1.00	1.00	100.00	100.00	100.00
Chronic Fever	0.0285	0.0318	0.0256	2.85	3.18	2.56
Injury/Disability	0.0391	0.0500	0.0298	3.91	5.00	2.98
Chronic Heart Disease	0.0734	0.0746	0.0723	7.34	7.46	7.23
Asthma/Respiratory	0.0887	0.1020	0.0770	8.87	10.20	7.70
Chronic Dysentery	0.0148	0.0188	0.0113	1.48	1.88	1.13
Gastric Ulcer	0.2402	0.2377	0.2423	24.02	23.77	24.23
High/Low Pressure	0.1053	0.0776	0.1291	10.53	7.76	12.91
Rheumatic Fever	0.1401	0.1142	0.1622	14.01	11.42	16.22
Eczema	0.0159	0.0158	0.0160	1.59	1.58	1.60
Diabetic	0.0540	0.0670	0.0429	5.40	6.70	4.29
Cancer	0.0042	0.0029	0.0053	0.42	0.29	0.53
Leprosy	0.0036	0.0050	0.0025	0.36	0.50	0.25
Paralysis	0.0222	0.0256	0.0193	2.22	2.56	1.93
Epilepsy	0.0043	0.0053	0.0034	0.43	0.53	0.34
Other	0.1659	0.1716	0.1611	16.59	17.16	16.11

Source: Report of the Household Income & Expenditure Survey, 2010, BBS

3.3 Percentage

A proportion can be converted into a percentage when multiplied by 100. Consider again Table 3.1. We can convert proportion of people suffered from gastric ulcer (0.2402 in column 4) to a percentage by multiplying the proportion 0.2402 by 100 which becomes 24.04 percent. In the similar way, 2.85 percent suffered from chronic fever, 14.01 percent from rheumatic fever, and 5.4 percent from diabetic and so on (in col.4 of Table 3.1). There are many uses of calculating percentages but frequently we are interested in knowing percentage change. Two time periods are involved in calculating percentage change. For instance, if the total population in Bangladesh is 130.52 million in 2001 and increased to 149.7 million in 2011 population census, then how to calculate the percentage change? In our example, the first time period is 2001 and the second time period is 2011. Using this information and by applying the following procedure, we can easily calculate change:

$$\text{Percentage change} = \frac{(\text{Quantity in time 2}) - (\text{Quantity in time 1})}{(\text{Quantity in time 1})}$$

$$\begin{aligned} \text{Percentage change in population} &= \frac{(\text{Population in 2011}) - (\text{Population in 2001})}{(\text{Population in 2001})} \\ &= \text{between 2001 and 2011} \\ &= \frac{149.47 - 130.52}{130.52} = +15\% \end{aligned}$$

This procedure works equally, if the percentage is negative. That means if the quantity at time 2 is less than the time 1, we anticipate the percentage change is negative. For example, the percentage change in Bangladesh poverty head count rate is observed to be negative and shown in Table 3.2.

Table 3.2 Percentage Change in Poverty Head Count Rate

Region	Poverty Head Count Rate		Percentage Change in Poverty Head Count Rate 2005 – 2010
	2005	2010	
National	40.0	31.5	– 21%
Urban	28.4	21.3	– 25%
Rural	43.8	35.2	– 20%

Source: Report of the Household Income & Expenditure Survey, 2005 and 2010, BBS

Table 3.2 illustrates the negative percentage change in poverty head count rates between 2005 and 2010.

3.4 Rate

The rate allows us to examine our data in another way. Rates are always reported for a specific number of cases, normally per 100, per 1,000 or per 10,000. For example, the birth rate can be calculated in different ways including rate of live births per 1,000 populations, birth rate per 1,000 women of child-bearing age (normally for 15 to 44 ages) or age-specific birth rate. The age-specific birth rate is the rate of live births per 1,000 women in specific age group. The rate may be defined as the ratio of the occurrence in a group category to the total number of elements in the group with which we are connected.

$$\text{Rate} = \frac{\text{number of occurrence in a group category}}{\text{total number of elements in the group}}$$

This ratio is then multiplied by a given number (normally 100, 1,000, 100,000) to calculate the rate of a given number of persons or events. Another example is the total fertility rate which is defined as the average number of children a woman would bear in course of her lifetime if current age-specific fertility rates remained constant through

her child bearing years (normally between the ages of 15 and 49). Table 3.3 shows the age-specific fertility rate per 1000 women in 2007.

Table 3.3 Age Specific Fertility Rate Per 1000 Women, 2000-2011

Year	Total Fertility Rate (Per women)	Age-Specific Fertility Rate (Per 1000 Women)						
		15-19	20-24	25-29	30-34	35-39	40-44	45-49
2000	2.59	39	159	162	89	50	15	4
2001	2.56	44	152	159	87	49	15	4
2002	2.56	57	153	134	88	47	21	13
2003	2.57	64	163	135	82	42	19	9
2004	2.51	59	165	130	71	50	21	8
2005	2.46	57	160	131	71	48	18	8
2006	2.41	54	159	121	72	47	22	7
2007	2.39	59	148	123	79	44	16	8
2008	2.30	60	142	116	73	38	15	9
2009	2.15	62	137	113	68	33	12	4
2010	2.12	59	136	113	66	36	11	5
2011	2.11	65	142	110	62	30	9	4

Source: Statistical Yearbook of Bangladesh 2012, BBS, Statistics and Informatics Division, Ministry of Planning

Similarly, we can calculate literacy rate per 100 populations of age 7 years and over. Table 3.4 illustrates the literacy rate for 2001 by division of Bangladesh.

Table 3.4 Trends in Literacy Rate of Population of Age 7 Years and Over
(Percent)

Year	Both Sex	National	Rural	Urban
2000	Both Sex	48.40	43.50	66.90
	Male	53.90	48.00	71.30
	Female	40.70	37.90	62.50
2001	Both Sex	46.15	41.42	60.72
	Male	50.27	45.12	65.15
	Female	41.80	37.64	55.53
2002	Both Sex	48.80	45.70	63.10
	Male	52.80	49.70	67.30
	Female	44.50	41.40	58.80
2003	Both Sex	49.10	45.70	63.20
	Male	53.10	49.70	67.40
	Female	50.00	41.40	58.90
2004	Both Sex	49.90	46.60	64.20
	Male	53.70	50.20	68.10
	Female	46.20	42.90	60.20

contd.

Year	Both Sex	National	Rural	Urban
2005	Both Sex	52.10	48.30	63.50
	Male	55.40	51.60	67.00
	Female	48.80	45.00	60.00
2006	Both Sex	52.50	48.70	64.00
	Male	55.80	51.90	67.50
	Female	49.10	45.30	60.50
2007	Both Sex	56.06	52.19	67.78
	Male	59.41	55.53	71.06
	Female	52.69	48.67	64.52
2008	Both Sex	57.68	51.49	68.63
	Male	60.76	54.54	71.80
	Female	54.56	48.41	65.44
2009	Both Sex	56.70	52.70	68.870
	Male	59.60	55.70	71.90
	Female	53.80	49.70	65.40
2010	Both Sex	56.80	52.80	59.00
	Male	59.80	55.80	72.10
	Female	53.90	49.90	66.00
2011	Both Sex	51.77	47.16	66.40
	Male	54.11	49.01	69.30
	Female	49.44	45.38	63.22

Source: Statistical Yearbook of Bangladesh 2012, BBS, Statistics and Informatics Division, Ministry of Planning

3.5 Ratio

Ratio is one of the important indicators and is commonly used by social scientists and other researchers. For example, sex ratio and dependency ratio are commonly used by the demographers to examine the population characteristics. The sex ratio is defined as the number of males per 100 females in a population which reflects the gender balance or imbalance depending on the value of the sex ratio. We may get ratio from dividing one quantity by another but in case of the sex ratio the quantities are multiplied by 100 to eliminate the decimal. The sex ratio may be calculated for a total population or for a specific age group. Let us compute the sex ratio in Bangladesh in 2001 when there were 64.09 million males and 60.26 million females according to population census report 2001:

$$\begin{aligned}
 \text{Sex ratio} &= \frac{\text{number of males}}{\text{number of females}} \times 100 \\
 &= \frac{64.09 \text{million male}}{60.26 \text{million females}} \times 100 = 106
 \end{aligned}$$

The computed result of sex ratio is interpreted as 106 males per 100 females indicating that the number of males in Bangladesh is higher than the number of females. We can observe the sex ratio by division in Table 3.5. If we calculate the sex ratio by division, we would observe that the sex ratio in Dhaka division is the highest.

Table 3.5 Sex Ratio by Division in 2001

Division	Sex Ratio (M/F)
Barisal	104
Chittagong	104
Dhaka	109
Khulna	106
Rajshahi	106
Sylhet	106
Bangladesh	106

Source: Statistical Year Book of Bangladesh, 2008.

The trends in sex ratio by region are shown in Table 3.6.

Table 3.6 Trends in Sex Ratio by Region

Area	2000	2005	2010
National	103.2	101.2	98.2
Rural	103.4	102.0	97.6
Urban	102.1	99.0	100.1

Source: Report of the Household Income and Expenditure Survey 2010, BBS

Another ratio used by the demographer or social scientists is the total dependency ratio which indicates the number of individuals per 100 younger than 15 or older than 64 years to those between the ages of 15 and 64. The total dependency ratio is the sum of the youth dependency ratio and the old age dependency ratio. The youth dependency ratio is defined as the number of persons aged 0 to 14 years per hundred persons 15 to 64 years, while the old-age dependency ratio is defined as the number of persons aged 65 years and over per one hundred people aged 15 to 64 years. The dependency ratio of a household is an important factor affecting economic activity of that household. In Bangladesh the total population was 124.36 million persons in 2001 of which 53.45 million were under the age of 15 years and 4.88 million were over the age of 64 years. The dependency ratio for 2001 in Bangladesh was approximately 75.4 and the calculation is shown below:

$$\begin{aligned}
 \text{Dependency Ratio} &= \frac{\text{Persons Younger than 15} + \text{older than 64}}{\text{Persons 15 to 64 years}} \times 100 \\
 &= \frac{48570 \text{ thousand} + 4880 \text{ thousand}}{70905 \text{ thousand}} \times 100 = 68.5 \\
 &= \frac{53450}{70905} = 75.4
 \end{aligned}$$

$$\text{Youth Dependency Ratio} = \frac{4880}{70905} \times 100 = 68.5$$

$$\text{Old-age Demography-Ratio} = \frac{4880}{70905} \times 100 = 6.9$$

The trends in total dependency ratio by region may be seen in Table 3.7.

Table 3.7 Trends in Dependency Ratio by Region

Area	2000	2005	2010
National	77.6	77.5	65.3
Rural	81.5	82.2	78.1
Urban	63.4	61.1	60.3

Source: Report of the Household Income and Expenditure Survey, 2010, BBS.

A more common use of ratio involves comparing one quantity to another. Female headed households in Bangladesh constituted approximately 4.59 million in 2010 and male headed households constituted 28.44 million (HIES, 2010). We can express the ratio of female headed households to male headed households as 4.59 : 28.44 or 1 : 6.2. It is important to note that ratios provide the basis for proportions, percentages and rates in that all measures are based on the relationship between two categories or quantities.

Chapter 4

Household Income and National Income: Concepts and Meaning

4.1 Concepts of Income

The term 'income' refers to the flow of economic compensation received in a given time period. Most income comes in the form of a paycheck. It is also defined as 'income in a given period is the amount an individual could have spent while maintaining the value of his wealth intact'. In addition to earnings from wages and salaries, an individual may get income from other sources such as rent, dividend and interest payment, profit, overtime payments, capital gain, capital receipts, transfers, bonuses etc. Income is distinguished from wealth. Income is a flow of receipts, while wealth represents a stock of value of accumulated possessions such as home, a farm or business, bonds etc. (Schiller, B.R., 2008).

'Personal income' is generally defined as the income that an individual receives in the form of wages or salaries etc. from different sources by working somewhere. It also includes income if any he received from an un-incorporated business enterprise such as agriculture, rent, interest and dividends and current transfers etc. Likewise 'Household income' is, defined as the sum of the income receives by all the earning members in a household. Income data are collected in census or surveys for large number of recipients but they are not presented for each individual or household. If they are presented individually this form of data is called ungrouped or raw data on income. But it is unwise to present the details income for each household individually. However, wage or salaries for most of the people are the major source of income. There are two types of income, viz. monetary income and non-monetary income. Wages, salaries, dearness allowances, house rent and transport allowances, over time payment; commissions, gratuities, tips, bonuses etc. are the major sources of monetary income. On the other hand, transaction in kind covers goods, housing, and other commodities that are provided to employees free of charge or at reduced prices in lieu of payment of wages and salaries is known as non-monetary income. Transaction in kind plays an important role in the economic activities of households in most of the developing countries, particularly in rural areas. However,

it is difficult to get a proper, sharp and clear cut impression of the earnings which are available in the form of individual income measurement. The earning of income largely depends on the personal characteristics of an individual.

A.B. Atkinson in his book entitled ‘The Economics of Inequality’ has briefly explained the link between earnings and personal characteristics of an individual such as family’s socio-economic background, genotypic IQ, measured childhood IQ and year of schooling. Apart from these personal characteristics, there is a random event (chance) that may influence earnings. The author also illustrates the relationships between personal characteristics and earnings schematically which is reproduced in Figure 4.1.

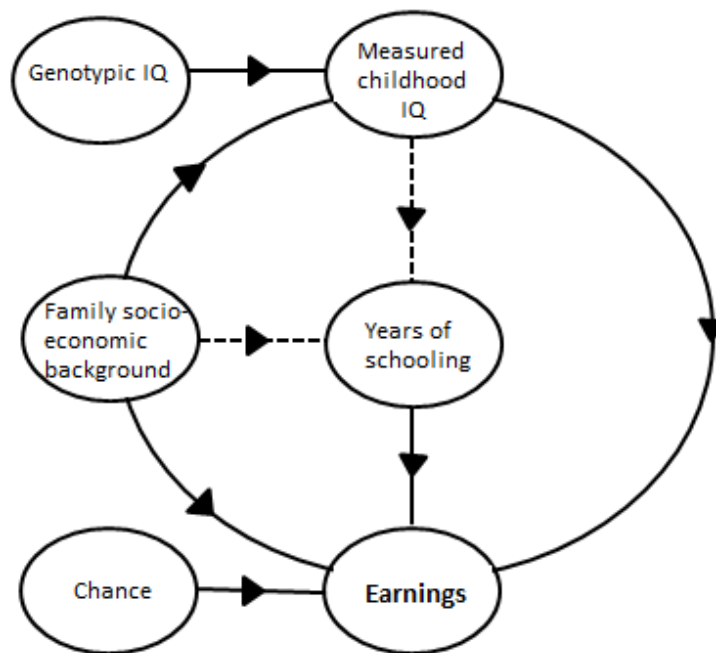


Figure 4.1 shows the explanation of earnings.

Source: Atkinson, A.B. (1978). *The Economics of Inequality*, Oxford University Press, U.K

4.2 Problems in Measurement of Income in Bangladesh

There are serious problems in estimating household income accurately particularly in a developing country like Bangladesh, while it is easier to some extent to estimate income more accurately in developed countries. This is because, most of the transactions in developed countries are made in monetary terms and most people maintain some sort of accounts, which is not maintained in developing countries. However, some of the problems faced in Bangladesh in estimating income have been identified and described below:

First, a considerable amount of the money that a household or an individual receives does not represent income since sometimes his/her receipts are due to non-economic purpose such as dowry, gift which may not be strictly considered as income receipts.

Secondly, the economy of Bangladesh is based on agriculture and it is less monetised and some proportion of income is received in non-monetary term. For instance, agriculture labour receives wage partly in cash and partly in kind. Large number of small and marginal households produces commodities and use mainly for their own consumption without going through the market. Thus, non-monetary receipts and own production must be valued at certain imputed price in order to get monetary value of income.

Thirdly, large proportions of labour force are engaged in agriculture particularly in rural areas as unpaid family workers where the employment is highly seasonal and irregular. And as such, the income from this sector should be estimated separately for the whole period of the season since it varies considerably between lean and peak periods.

Finally, because of inadequate transport and infrastructure facilities, great variation in commodity prices is observed between urban and rural and across different regions. As a result, differences in money income do not correspond to the differences in real income (H. Sharif, 2007).

4.3 Concepts of Income Distribution

In economics, income distribution refers to how a nation's total income (GDP) is distributed amongst its population. Modern economists are more concerned with the distribution of income across individuals and households, while classical economists such as Adam Smith, Thomas Malthus and David Ricardo were mainly concerned with the factor income distribution that is income between the factors of population, land, labour and capital (Wikipedia). Income data need to be organized and condensed into an easily comprehensive form for convenience of computation of income indicators. Incomes of individuals or households are classified into different groups or categories and numbers of individuals or households falling in each group or category are presented in summary form. This type of classification and presentation of income data is called income distribution. Income distributions are presented in summary form, with the observations grouped in some way or other. There are many aspects of income distribution. We are interested to know the total amount of income earned by an individual or household, where it was earned, how much

of it is earned from different sources, and what are socio-economic characteristics of the income earners. Data in Table 4.1 illustrates an observed distribution of units – households by size of income. The distribution of income is typically unimodal and positively skewed, with a long tail to the right. For convenience of presentation, the class intervals are usually widened as one goes up the income scale. At national level the highest percentages of households (9.84%) have monthly income between Tk. 4,000 to Tk. 4,999. Of course about 9.69 percent households have income between Tk. 10,000 and Tk. 12,499. The highest percentage of households (11.51%) in urban area have monthly income between Tk. 10,000 and Tk. 12,999, while the highest percentage of households (11.34%) in rural area have income between Tk. 4,000 and Tk. 4,999. The distributional pattern of household monthly income indicates a wide disparity in income distribution between urban and rural areas.

Table 4.1 Distribution of Households, average monthly income and expenditure per household by monthly household income groups, and residence, 2010

Monthly household income groups (in Tk.)	Number of household	% of house-hold	Average monthly income per household	% of monthly income (total)
National				
< 1500	899708	2.72	981.81	0.23
1500 — 1999	722085	2.19	1758.07	0.33
2000 — 2499	1001584	3.03	2252.71	0.60
2500 — 2999	1243259	3.76	2754.59	0.90
3000 — 3999	3058604	9.26	3490.23	2.82
4000 — 4999	3248717	9.84	4497.96	3.85
5000 — 5999	2848093	8.62	5459.85	4.10
6000 — 6999	2616635	7.92	6478.93	4.47
7000 — 7999	2124357	6.43	7472.24	4.19
8000 — 8999	1729835	5.24	8455.53	3.86
8000 — 9999	1498640	4.54	9489.98	3.75
10000—12499	3200563	9.69	11158.30	9.42
12500—14999	2052878	6.22	13630.33	7.38
15000—17499	1490295	4.51	16179.75	6.36
17500—19999	1081676	3.28	18627.74	5.31
20000—24999	1393177	4.22	22089.56	8.12
25000—29999	776071	2.35	27275.93	5.58
30000—34999	630548	1.91	32146.44	5.35
35000+	1411289	4.27	62799.55	23.38
All groups	33028014	100.00	11479.47	100.00

Monthly household income groups (in Tk.)	Number of household	% of house-hold	Average monthly income per household	% of monthly income (total)
Urban				
< 1500	115015	1.30	1078.65	0.08
1500 — 1999	70656	0.80	1704.04	0.08
2000 — 2499	93652	1.06	2207.56	0.14
2500 — 2999	126083	1.42	2747.40	0.24
3000 — 3999	444765	5.05	3476.33	1.06
4000 — 4999	508763	5.74	4513.44	1.57
5000 — 5999	611053	6.90	5427.71	2.27
6000 — 6999	595452	6.72	6432.77	2.62
7000 — 7999	529232	5.97	7435.65	2.70
8000 — 8999	486583	5.49	8429.74	2.81
8000 — 9999	424911	4.80	9492.16	2.76
10000—12499	1019803	11.51	11158.39	7.80
12500—14999	731016	8.25	13581.59	6.80
15000—17499	604300	6.82	16179.89	6.70
17500—19999	410360	4.63	18690.41	5.25
20000—24999	591088	6.67	21936.69	8.88
25000—29999	347883	3.93	27497.13	6.55
30000—34999	316866	3.58	32035.60	6.95
35000+	830263	9.37	61024.43	34.71
All groups	8860147	100.00	16474.94	100.00
Rural				
< 1500	784693	3.25	967.62	0.33
1500 — 1999	651428	2.70	1763.93	0.49
2000 — 2499	907933	3.76	2257.37	0.88
2500 — 2999	1117175	4.62	2755.41	1.32
3000 — 3999	2611439	10.81	3492.61	3.91
4000 — 4999	2739954	11.34	4495.09	5.28
5000 — 5999	2237040	9.26	5468.63	5.25
6000 — 6999	2021182	8.36	6492.53	5.63
7000 — 7999	1595125	6.60	7484.37	5.12
8000 — 8999	1243252	5.14	8465.62	4.51
8000 — 9999	1073729	4.44	9489.11	4.37
10000—12499	2180760	9.02	11158.26	10.44
12500—14999	1321862	5.47	13657.29	7.74
15000—17499	885995	3.67	16179.66	6.15
17500—19999	671316	2.78	18589.43	5.35
20000—24999	802089	3.32	22202.22	7.64
25000—29999	428188	1.77	27096.22	4.98
30000—34999	313681	1.30	32258.40	4.34
35000+	581024	2.40	653336.14	16.28
All groups	26167867	100.00	9648.09	100.00

Source: Report of the Household Income & Expenditure Survey 2010, BBS

The percentage share of income of households by decile group shows a wide unequal distribution of income (Table 4.2). At the national level in 2010, the poorest 10 percent of households share only 2 percent of the total income, while the richest 10 percent of the households share more than 36 percent of the total income. This figure for rural area is 2.23 percent and 34 percent and for urban area it is 1.98 percent and 35 percent respectively. High degree of income inequality is the main descriptive feature of such a distribution. The most noteworthy feature of income distribution is that the share of income of bottom 50 percent households is less than that of top 10 percent households. The Gini index which measures inequality in income distribution and varies from 0 to 1 indicates a slight decrease in 2010 compared to 2005.

Table 4.2 Percentage Share Income of Households by Decile Group and Gini Co-efficient

Household Income Group	2010			2005		
	Total	Rural	Urban	Total	Rural	Urban
01	02	03	04	05	06	07
National	100.00	100.00	100.00	100.00	100.00	100.00
Lower 5%	0.78	0.88	0.76	0.77	0.88	0.67
Decile 1	2.00	2.23	1.98	2.00	2.25	1.80
Decile 2	3.22	3.53	3.09	3.26	3.63	3.02
Decile 3	4.10	4.49	3.95	4.10	4.54	3.87
Decile 4	5.00	5.43	5.01	5.00	5.42	4.61
Decile 5	6.01	6.43	6.31	5.96	6.43	5.66
Decile 6	7.32	7.65	7.64	7.17	7.63	6.78
Decile 7	9.06	9.31	9.30	8.73	9.27	8.53
Decile 8	11.50	11.50	11.87	11.06	11.49	10.18
Decile 9	15.94	15.54	16.08	15.07	15.43	14.48
Decile 10	35.85	33.89	34.77	37.64	33.92	41.08
Top 5%	24.61	22.93	23.39	26.93	23.03	30.37
Gini Co-efficient	0.458	0.431	0.452	0.467	0.428	0.497

Source: Report of the Household Income & Expenditure Survey 2010, BBS

4.4 Concepts of National Income Accounting

In previous section we have discussed about micro-economics. It means we are looking the economy at an individual or household level. For instance per capita income, disposable income, personal income etc. the role of micro-economics is both positive and normative. In positive sense it tells us how the economy operates among the people, while in normative sense it tells us how the economy should be operated to promote welfare of people. But the national accounting

helps us monitoring the current macro performance of the national economy and evaluating the performance of our economic system. To look at the national economy in terms of how rapidly it is growing, how stable it is, or how it allocates its productive resources to different end products. To know answers of all these questions we need some measure of output and income. However, in-order to obtain national output and income we are to add up all the goods and services produced in the country in a year. The system of adding up all goods and services is called national income accounting. The most important calculations in national income accounting are referred to as gross domestic product (GDP), gross national product (GNP), gross national expenditure (GNE) which is the value of all goods and services produced annually in the country. Although we have defined GDP as the total value of all final goods and services produced by a certain number of sectors in a year but literally there are hundreds of different kinds of final goods and services which make up the GDP.

4.5 Approaches of National Accounting

We know that the end result of economic activity is the production of goods and services and the distribution of those goods and services to the members of the society. So each branch of economics is concerned in one way or another with output and income. Through literature survey we observe that there are three broad approaches for national income accounting. They are:

- (a) Production approach
- (b) Expenditure approach, and
- (c) Income approach

However, which approach is adopted in calculating the national income of a country depends on the nature and condition of the economy as well as availability of data. We discuss below briefly the three methods of estimating national income.

(a) Production Approach

According to this approach GDP is measured from production side. In this approach the whole economy is divided into several industrial sectors such as agriculture, forestry, fishing, manufacturing, mining and quarrying, construction, power, gas and water, whole sale and retail trade, transport, communication, social service etc. The gross value added (GVA) of these sectors is calculated by adding up gross value of output (GO) minus intermediate consumptions (IC) under different sectors during a given year. That is $GDP \text{ or } GVA = GO - IC$.

When we add up income of rest of the world (ROW) to values of all sectors of the economy we will get the Gross National Income (GNI). Symbolically we may write as:

$$\text{GNI} = \text{GDP} + \text{ROW}.$$

This approach of GDP measurement is relatively easier in those countries where there exists a census data on different sectors such as agriculture census, manufacturing census, economic census and census on other sectors. But it is difficult to get census data of all sectors and other social services in a country. As a result, this approach along with other approaches is used to arrive at the GDP estimates of a country. Whatever disadvantages or problems are found in this approach we can examine the relative importance of different sectors of the economy by calculating the respective contribution to the national income (Dewett, K.K. and Chand, A. 1992).

According to 1993 SNA the gross domestic product (GDP) is a measure of market value of all goods and services produced during a given period of time. Concept of GDP is not same as GNP and national income. GDP is a measure of aggregate product of goods and services and these products come from the production activity of all resident institutional units of the country and are available for final use. That is $GO - IC$. There are diverse products in the economy as a result all products cannot be added up all together directly. Due to this difficulty common denominator (money) is used. Therefore, GDP can be defined as the money value of all the final goods and services produced within a country in a year. Gross domestic product at basic prices plus indirect taxes minus subsidies is termed as GDP at market prices (BBS, 1997).

(b) Expenditure Approach

The second approach of measurement is prescribed when one tries to answer questions where the production of all sectors goes. All goods and services produced in the economy must go some where. That is, it must be paid for by an individual who takes possession of goods and services for private and collective consumption. Households purchase goods and services for consumption purposes. Businessmen purchase goods and services for investment. Governments also purchase some goods and services. The rest of the world (ROW) gets our exports minus the imports which may be called net imports. Hence, the gross domestic expenditure (GDE) is obtained by adding up

- i. Both private and public consumption expenditure made by individuals, households, government and other units (C),
- ii. Both private and public investment and gross fixed capital formation (I),
- iii. Net imports (exports (X) – imports (M)) and symbolically we can write as:

$$\text{GDE} = \text{C} + \text{I} + (\text{X} - \text{M}).$$

In other words, the gross domestic expenditures (GDE) are the sum of private consumption expenditures, government expenditures for goods and services, investment expenditure and exports minus imports. The gross national expenditures must be equal to gross domestic product. That means

$$\text{GDP} = \text{GDE}$$

(c) Income Approach

The third approach of GDP measurement is the income approach which is often used. This approach measures gross national product from the distribution side. That means this approach measures the national income after it has been distributed among the individuals and receiving as income by individuals. Actually, individuals earn income by contributing their own services and the services given by their property such as land, building and capital to the national production. Thus, individuals earn income in the form of wages and salaries, rent, profit and interest and dividends etc. Therefore, according to this approach GDP is calculated by adding up the wage and salaries of employees (CE), rent of land and building, interest on capital, profits from entrepreneurship, income earned from share market and income of self-employed people. By this approach we can easily decompose the national product by different social and income groups such as landlords, landless, capitalists, workers etc. (Dewett, K.K. and Chand, A. 1992). For the lack of income data on all elements covering payments, the developing countries including Bangladesh could not compile GDP by income method.

To sum up, the Gross Domestic Product (GDP) is same as gross domestic expenditure (GDE). We have seen that GDE is equal to GDP since both of them measure goods and services but in different forms. GDE measures total expenditure for buying them and GDP measures

the total values of producing them. GNI is equal to GDE because the expenditures are made from income flow and the total flow of money is known as GNI.

4.6 Methods of National Accounting in Bangladesh

The Bangladesh Bureau of Statistics (BBS) has been engaged in compiling national income during the last four decades. National accounts estimation is one of the core activities of the Bangladesh Bureau of Statistics (BBS). In Bangladesh two methods namely, production method and expenditure method are used for compilation of GDP. According to the International Standard Industrial Classification (ISIC) Rev.3 the whole economy is divided into 15 mutually exclusive sectors (industry). In fact the estimates of gross domestic product and other aggregates of national accounts are compiled by the BBS largely based on the SNA 1993 framework. All economic activities are covered by the 15 sectors and for estimation of GDP the following sectors are considered by the BBS since 1995. In each sector, there are several components or sub-sectors. These are shown below:

Name of Sector/Industry	Components of each sector	Method for estimating Gross value added
1. Agriculture and forestry	Major crops, Paddy, Other major crops, Minor crops, Horticulture. Milk and milk products, Meat, Hide & skin, Eggs, Others. Major products, Timber, Fire-wood, Bamboo, Minor products.	Value added is made by production method and is based on value of gross production of crops and other output by products minus intermediate consumption or production inputs.
2. Fishing	Marine catch, Inland catch.	The gross value added is estimated by production method. This involves estimation of total value of output in producer prices minus input costs in the process of production.
3. Mining and quarrying	Natural gas & crude petroleum, Other mining & quarrying coal.	The estimates of value added are based on production method.

Name of Sector/Industry	Components of each sector	Method for estimating Gross value added
4. Manufacturing	Food manufacturing, Beverage industries, Tobacco manufacturing, Animal feeds by products, Manufacturing of textile, Textile manufacturing, Wearing apparels, Lather & its products, Footwear except rubber, Grinding pressing & emb. of text. goods, Wood & cork products, Furniture & manufacturing, Paper & its products, Printing & publishing, Drug & pharmaceuticals, Industrial chemical, Other chemical products, Petroleum refining & pet products, Rubber products, Plastic products, Pottery & chinaware, Glass & its products, Non-metallic mineral products, Iron & steel, Metal products, Fabricated mineral products, Non-electrical machinery, Electrical machinery, Transport equipment, Scientific, precision etc. Photographical optical goods, Sports goods manufacturing, Decorative handicrafts, Other mfg. products, small, cottage and handloom	The estimates of gross value added are made by production method.
5. Electricity, gas and water supply	Electricity, gas and water.	The gross value added is estimated by production method. The estimates of gross value added for water supply are derived from sale of water and sewerage services and intermediate consumption in the generation of these services.

Name of Sector/Industry	Components of each sector	Method for estimating Gross value added
6. Construction	Construction of Pucca and semi pucca building, public residential and non-residential building, private pucca and semi pucca building, private agriculture construction, installation cost of irrigation, public sector other construction, construction other than buildings, land improve-ment.	Commodity flow method is used to estimate the value of output of this sector. The commodity flow means estimation of quantity and value of commodities used in construction.
7. Whole sale and retail trade	Cereal, beverage, fibers, fruits, oil seeds, pulses, spices, sugarcane, vegetables, other crops, fisheries, livestock, mining products, manufactured products, imported goods.	Production method is used to estimate cost of value added. Commodity flow method and trade margins are used to estimate the output of this sector.
8. Hotel and restaurant	Sales of hotel and restaurant, service charge	The estimates of gross value added are made by production method. The output of hotels and restaurants is measured by the service charge after netting out food cost. Receipts from other services given, rental income etc. are included to get the total value added of gross output
9. Transport, storage and communication	Land transport, Water transport, Air transport, Support transport service storage, Post and telecommunication.	Sales and other receipts for services are taken as gross output and the gross value added is estimated by deducting intermediate consumption used up in the process of providing services. The value added of the unorganised non-mechanised transport such as rickshaws, push carts, horse carts, country boats etc. is obtained by net income (earnings minus

Name of Sector/Industry	Components of each sector	Method for estimating Gross value added
		intermediate consumption) per vehicle. The value added of Post office and Telegraph and Telephone Board is obtained from total receipts for the services minus the intermediate consumption.
10 Financial Intermediation (monetary intermediation)	Financial intermediation: Banks; public and private insurance activities and other financial auxiliaries such as stock exchange, financial leasing companies etc.	The value added of this sector is obtained through production method. The gross output of banks and other sub-sectors is calculated on the basis of net interest and profit receipts. This means total interests received minus total interest paid plus actual service charges (rental income, communication and other fees). When intermediate consumption is subtracted from net interest receipts we will get value added at current price.
11 Real estate, Renting and business activities	Ownership of dwellings (occupied residential houses), real estate services, renting and business services.	Production method is used to estimate value added of this sector.
12 Public administration and Defense	Services rendered by the administrative department of central government, local government and defense services	The gross value added of this sector is obtained by adding the estimated consumption of fixed capital (CFC) to compensation of employees (wages and salaries). The value added of defense is obtained from the wages and salaries paid to the defense personnel.

Name of Sector/Industry	Components of each sector	Method for estimating Gross value added
13 Education	All Public and Private educational institutions.	The gross value added is taken as the same as the total wages and salaries of teachers and other non-academic employed in educational institution and other income obtained from education services.
14 Health and Social Services	All Public and Private health related institutions and human health services	The gross value added is taken as equivalent to the budget expenditure on salaries and wages of doctors and other medical staff of the government and the total incomes of the medical professionals are taken into account for estimation of value added for private health sector.
15 Community, social and personal services	Personal, social and recreational services provided to individuals and households (Law/legal services, household domestic services, engineering and related services, religious services, personal services (washer-man, barber) rest recreation and entertain-ment services, other miscellaneous professional (maid etc.).	Earning per person of the benchmark year is multiplied by the number of respective professionals and other service personnel is taken as the value added of those components. Value added of each component is summed up to get total value added of this sector.

4.7 Problems in Compilation of National Accounts in Bangladesh

There are some definitional and conceptual difficulties that arise when compilation of national income is started. Except definitional and conceptual difficulties, there are difficulties such as statistical, welfare measurement and externalities. However, a brief discussion has been made on some difficulties that arise during compilation of GDP.

- i. The first and core problem for national accounting is the dearth of reliable and adequate data. Due to lack of data, BBS is mainly confined to compilation of GDP by industrial origin and GDP by expenditure components. As a result, estimation of GDP becomes underestimated. Under coverage of various sectors and sub-sectors of the economy is another important reason for underestimation of GDP.

- ii. The second problem relates to the treatment of non-monetised transactions. For instance, housewives and other family members give services at home and own farm and the value as well as output of their services is being excluded while compiling the national income. On the other hand, a portion of farm output which is consumed at home has no reliable information and is not accurately included in the estimates of national income and face problem in finding a suitable measure for this part of output.
- iii. The third problem arises in respect of treatment of income coming from activities of foreign farms working in the country. It is difficult to get reliable information on this aspect.
- iv. Most of the people engaged in farming are illiterate. As a result they cannot keep their accounts in respect of quantity of output they produced and the part of output does not come to the market and consumed at home. Things produced but not sold are left out of GDP. The main reason is that there is no market value to apply to that quantity. Another example is that a meal prepared at home is not counted, although the same meal eaten in a restaurant would be counted. This creates problem of getting reliable information on output from large number of farm households. The GDP would be higher if it would be possible to count the value of non-marketed production.
- v. There are hundreds of formal and informal occupations and occupational specialisation in Bangladesh is still incomplete and the persons engaged in informal occupation do not keep their income accounts. Another problem is that an individual may earn income partly from small farm and partly from manual labour in non-farm activities in slack season. This makes it a more difficult task of getting reliable information on income of several informal occupational groups.
- vi. There is no effort and system to count the value of illegal goods and services, even though these are just as much a part of the economy as the others. For instance, a number of commodities are coming from and going illegally to neighboring countries and there is no system of accounting their quantity and income earned from them. There are two main reasons for not getting information about illegal activities such as graft, gambling, floating prostitution, illegal drug sales and other underworld activities. First, there is an element of coercion in some illegal matters which is not present in an open market. Second, the government is not in a position to

recognize and measure these underground activities though it is trying to control or stop these. The GDP would be higher if income earned from these activities would be estimated.

- vii. Compilation of GDP alone fails to measure social welfare of people in the absence of distributional aspect. It is difficult to identify outputs which should produce a better life-style.
- viii. In compiling GDP, various types of negative externalities such as pollution, bad environment etc. is overlooked.
- ix. Finally, there is a lack of regular and adequate statistical data on these sectors and sub-sectors and that create problems in estimating national income.

4.8 Importance of Estimation of National Income

There are several economic and social importance of national income statistics. Though it is a single figure but in estimating national income we can find the contribution of several components of national income to the economy of the country. It also sheds light on the functioning and performance of the economy. However, the following are the brief discussions of economic importance and uses of national income estimates:

- i. The national income estimate provides insights of the production flow of the economy in a year. Per capita income obtained by dividing national income by the population of the country depicts the picture of standard of living of the people.
- ii. From the estimates of national income over a period of time we can easily know the changes of the economy. That means whether the economy is growing; remain stagnant or deteriorating over the periods. Moreover, by comparing the per capita income over the periods, we can see the changes of level of living and economic welfare of the people.
- iii. By estimating national income we can judge the relative contribution of various sectors of the economy such as agriculture, industry, mining and quarrying, construction, electricity, gas and water etc.
- iv. National income estimate gives us the idea of distribution of national income among different income groups and social groups such as big land owners and landless labour, businessmen and artisans, wages, profit and interest etc. We can examine share of income received by these groups.

- v. From the estimation of national income we can know about consumption expenditure, saving and investment for assessing economic progress of the country. Development Planning is not possible without knowing these statistics.
- vi. The national income estimate of various countries helps us comparing the standard of living of people in those countries. Further, different countries are usually classified as developed, underdeveloped or least developed according to their per capita income.
- vii. National accounts statistics are useful when compiled regularly in the form of time series. These data are mostly used in economic analysis, policy formulation, model building and forecasting of economic trend.
- viii. National accounts statistics are used to measure economic effects of government policies and can provide a comprehensive framework for designing and evaluating various aspects of public policies.
- ix. They are important for price analysis, poverty analysis and productivity analysis.
- x. Indicators obtained from national accounts are important for estimating the growth rate of different sectors and sub-sectors and for examining economy's source of strength and weakness.
- xi. National accounts Statistics at current and constant prices can provide a comprehensive picture of inflation in the country.
- xii. It is needless to say that without national income estimate preparation of development plans is not possible. It is an essential and useful guide for economic policy formulation of a country.

4.9 Key Indicators of National Accounts

- **National Income Accounting (NIA):** It is the Process of measuring and reporting money value of the various goods and services produced in the economy of the country during an accounting period.
- **Gross Domestic Product (GDP):** The GDP means the total of all final products in an economy. There are diverse products in the economy and they cannot be added up directly, so we need to express them in a common denominator (money value). Therefore, GDP can be defined as sum of money value of all final products and services produced within a country in a year. The GDP can be classified into two categories, namely, (i) GDP at basic price, and

(ii) GDP at market price. In former category of GDP, the gross domestic products are valued at basic prices and minus the intermediate consumption valued at purchaser's prices. In later category of GDP, the gross domestic products are valued at basic prices plus indirect tax and minus subsidies.

Symbolically, we can express GDP by the following:

$$\text{GDP} = C + I + X - M$$

Where, C = Consumption (Private and Public)

I = Investment/gross fixed capital formation
(Private + Public investment)

X = Exports of goods and non-factor service

M = Import of goods and non-factor service

- **Net Domestic Product (NDP):** When depreciation of fixed capital is subtracted from the GDP figure we get the net domestic product (NDP) figure. Thus net domestic product is defined as GDP minus depreciation.
- **Gross National Income (GNI):** It is defined as an aggregate value of the gross balances of primary income obtained from all institutional sectors of the economy during an accounting period. In other words, it is the sum of all payments to the factors of production used to produce GDP during period of time plus other charges or cost of production and depreciation. In short, GNI is equal to GDP plus net primary income from abroad.
- **Net National Product (NNP):** It is a measure of the net value of total output minus the depreciation of the national's capital stock. In other words, the amount of product available after used up of capital goods; $\text{NNP} = \text{GNP} - \text{Capital consumption allowance}$.
- **National Income (NI):** The total amount of income earned by all factors of production-land, labour, capital, wages, rents, interest payment and profits and so-on. It is also a measure of net production which equals to net national product minus indirect business taxes (property and sales taxes).
- **Personal Income (PI):** It is the total income received by households from all sources. Personal income can be derived from national income by subtracting corporate profits, profit taxes and contribution to social insurance. These elements are subtracted because they do not reach to households and they are not part of national income.

- **Disposable Personal Income (DPI):** The DPI is the sum of all income and transfer of payments received by households after taxes payment and therefore available for using by the households. In other words, it is simply personal income after personal taxes, the income available to households to spend for consumption or to save. Disposable income equals consumption plus savings (Schuitze. C.L., 1967).
- **Depreciation:** It is the amount of capital goods which wear out or are used up during a year. More specifically, the capital goods, such as equipment, machinery, etc. wear out or fall in values as a result of consumption or use in production process is called depreciation.
- **Price Index (PI):** It is a listing of price values for different years where all values are given in terms of a base year and the base year is assigned value 100.

$$\text{Price index} = \frac{\text{Current Year Value}}{\text{Base Year Value}} = 1.2 \text{ (say)}$$

- **Deflator:** It is an index of price level changes, which is used to adjust nominal GDP to real GDP.

$$\text{Real GDP} = \frac{\text{Nominal Value of GDP}}{\text{Price index (1.2 say)}}$$

- **Inflation:** It is a problem of rising prices in general and it happens when people want to buy more goods and services than the economy can produce. This means “too much money chasing too few goods”. It may be the result of a sudden increase in the amount of money available. This type of inflation is called Demand-Pull inflation. Another type of inflation occurs when suppliers are able to raise their prices to other producers who pass along the higher prices to consumers. This type of inflation is known as cost-push inflation. There is another type of inflation known as structural inflation. This type of inflation occurs for a unique event and is not associated with business cycle (Chisholm, R. and McCarty, M., 1978).
- **Deflation:** Inflation occurs due to long-term trend in price rise of goods and services, while the opposite trend that means long-term decreasing trend of the price level, is called deflation. Deflation can also cause great problems in the economy of a country.

- **National Accounting Matrix (NAM):** It is defined as the presentation of national accounts in a matrix format. The presentation of national accounts is explained on the basis of an illustrative matrix framework covering the full system. Although the NAM has a long and distinguished tradition, it has some limitations also. As a result, further elaboration and extension have been made in the later period in respect of linkages between a supply and use table or input-output table to show the entire circular flow of income at a meso-level and is renamed as a Social Accounting Matrix (SAM).
- **Social Accounting Matrix (SAM):** It is defined as a matrix representation of all transactions and transfers between different activities of production, factors and institutional units (households, corporate sector and government) within the economy during an accounting period. In short we can say that SAM is a comprehensive accounting framework which captures all transactions in the economy in a matrix format. The SAM addresses a particular limitation of the national accounting framework by providing for an extension of data on households and household groups and as a result extends its potential for socio-economic and distribution analysis. A SAM has three important features. First, the accounts are represented as a square matrix form and each row gives receipts of an account and column represents the expenditure. The total of each row is supposed to be equal to the corresponding column total. Second, SAM is a comprehensive accounting framework, in the sense that it shows all the economic activities such as consumption, production, accumulation and distribution. Thirdly, the SAM is flexible and there is a scope of large flexibility in respect of disaggregation of economic activities (Round, J.). Furthermore, the structure of SAM is country specific and amongst other relationships, shows, how incomes from specified sources are distributed between particular groups and the way these groups allocate their expenditures (SNA, 1993).

4.10 Some Selected GDP related Statistics

Table 4.3 shows the trend of gross domestic product of Bangladesh by major activity at constant producer's price and at constant market price of 1995--96, while Table 4.4 provides information on GDP at current market price by broad activity categories. The gross domestic products,

gross national income and gross disposable income at market price compiled by expenditure method is shown in Table 4.5, while these estimates at current market price following expenditure method are shown Table 4.6. Selected share of GDP at constant market price and current market price are shown in Table 4.7 and Table 4.8. It is interesting to note that agriculture and forestry sub-sector share about 18.22 percent of the total GDP which was the highest share among 15 sectors and industry sector receives the second highest (15.97%) share. But in 2011-2012 share of industry sector ranks first (19%) and agriculture and forestry rank second (15%) in respect of share of GDP. The rate at which the GDP grows is of special interest to everyone. It indicates how the economy is performing. Annual growth rate of GDP for agriculture and forestry sector decreases from 3.29 percent in 2003-2004 to 1.72 percent in 2011-2012, while the growth of industry sector increases from 6.75 percent to 10 percent over the same period (Table 4.9). Table 4.10 shows the GDP deflators with 1995-96 as base year and it is found 132 in 2003-04 as the index of current year. Then we can say that prices have risen in current year by 32 percent over the base year (1995-96 = 100).

Table 4.3 Gross Domestic Products of Bangladesh at Constant Prices by Major Industry Activity (Base: 1995-96=100)
(Million Taka)

Activity Sector	2003-04	2004-05	2005-06	2006-07	2007-08	2008-09	2009-10	2010-11	2011-12(p)
1. Agriculture and forestry	434495	442298	465449	487297	501567	522152	551174	579226	589206
a. Crops	319875	320339	336439	351327	360717	375200	398194	429672	424696
b. Animal farming	70348	75434	80075	84470	86532	89542	92588	95787	99037
c. Forest & related services	44272	46525	48936	51500	54318	57410	60412	6276	85543
2. Fishing	123660	128069	133083	138499	144285	150287	156519	164741	173607
3. Mining and quarrying	26840	29090	31783	34430	37509	41199	44824	46976	49911
a. Natural gas & crude petroleum	16325	17797	19492	21057	22797	24884	26904	27187	27989
b. Other mining & quarrying	10515	11293	12291	13373	14712	16315	17920	19789	21922
4. Industry	390688	422690	468197	513722	550772	587539	625707	684818	751645
a. Large scale	275723	298605	332682	365071	391572	417350	442298	490699	543590
b. Small scale	114965	124085	135515	148651	159200	170189	183409	194119	208055
5. Electricity, gas and water supply	38491	41915	45129	46075	49193	52101	55893	59598	68008
a. Electricity	32337	35110	37726	38133	40680	42872	45964	49335	57208
b. Gas	4263	4641	5076	5450	5871	6365	6843	6899	7107
c. Water	1891	2164	2327	2492	2642	2863	3086	3363	3693
6. Construction	213465	231195	250418	267964	283177	299308	317298	337952	366725
7. Wholesale and retail trade	337698	361552	385961	416996	445434	473085	500878	532493	553827
8. Hotel and restaurant	16345	17509	18814	20228	21756	23405	25186	27087	29146
9. Transport, storage and communication	226764	255522	275922	298093	323566	349487	376366	397784	423946
a. Land transport	168296	175448	1852719	190365	199012	209306	221828	230996	244357
b. Water transport	23456	23915	24382	24804	25436	26062	26325	26602	27107

Contd.

Activity Sector	2003-04	2004-05	2005-06	2006-07	2007-08	2008-09	2009-10	2010-11	2011-12(p)
c. Air transport	3015	3090	3252	3318	3524	3784	4129	4470	4944
b. Support transport ser. storage	7889	8119	8616	9386	10179	11161	12070	19492	12927
c. Post and telecommunication	34107	44949	56952	70219	85415	99174	112014	123223	134611
10. Financial Intermediation	39826	43380	47068	51391	55960	50993	68093	74658	81766
a. Monetary intermediation (banks)	29797	32512	35175	34459	41681	45454	50211	54749	59902
b. Insurance	8513	9223	10068	10895	11988	12993	14926	16655	18289
c. Other financial intermediation	1616	1645	1825	2037	2291	2546	2956	3254	3575
11. Real estate, renting and business ser.	200681	208009	215687	223805	232205	241062	250446	260370	270910
12. Public Administration and defense	63508	68604	74198	80436	85432	91423	99060	108638	115237
13. Education	57979	62569	68221	74331	80129	86581	94578	103430	112338
14. Health and social services	53708	57682	62174	66926	71627	76782	83001	89934	97074
15. Community, social and personal ser.	183399	190824	198630	207725	217314	227534	238266	249474	261349
16. GDP at constant producer's price	2417447	2560898	2740734	2927918	3099926	3282937	3487288	3717178	3954695
17. Import duty	102233	108842	105991	101791	117334	119031	12115	133324	139080
18. GDP at constant producer's price	2519680	2669740	2846726	3029709	3217260	3401968	3608446	385057	4093775
19. Net primary income from abroad	132827	136315	186306	226200	285224	309329	335748	350461	402486
20. GNI at constant market price	2652506	2806055	3033031	2355910	3502483	3711298	3944194	4200965	4496261
21. NNI at constant market price	2453827	2596661	2809647	3019055	3252881	3448751	3667846	3906994	4185234
Population (in million)	135.2	137.0	138.8	140.6	142.4	1442	146.1	149.7	151.6
Per capita GDP at M.P.	18637	19489	20512	21550	22593	23588	24705	25030	27007
Per capita GNI at M.P.	19619	20484	21854	23159	24596	25733	27003	28072	29663
Per capita NNI at M.P.	18149	18955	20245	21474	2284	23912	25111	26108	27611

Note: p Denotes provisional

Source: Statistical Year Book of Bangladesh 2012, Bangladesh Bureau of Statistics

Table 4.4 Gross Domestic Product of Bangladesh at Current Market Prices by Economic Sector

(Million Taka)

Activity /Sector	2003-04	2004-05	2005-06	2006-07	2007-08	2008-09	2009-10	2010-11	2011-12(p)
1. Agriculture and forestry	524192	461674	622233	701242	802015	894264	1005880	1135819	1238774
a. Crops & Horticulture	388835	414819	461182	524676	605784	672467	753391	852379	925081
b. Animal farming	79155	86796	96821	107803	121182	140022	162188	184700	204936
c. Forest & related services	56202	60057	64231	68763	75049	81775	90301	98741	108756
2. Fishing	147833	154564	163168	177827	197901	218064	242229	269962	309988
3. Mining and quarrying	36435	40411	46431	53217	61517	70910	81141	90531	103184
a. Natural gas & crude petroleum	20854	22948	25683	28453	31641	35900	40393	42624	46307
b. Other mining & quarrying	15581	17463	20748	24764	29876	35010	40748	48007	56877
4. Manufacturing	515268	587952	689227	811780	939008	1064453	1201081	1355505	1565903
a. Large & medium scale	363641	415350	489736	576881	667587	756104	848991	971208	1126253
b. Small scale	151627	172602	199491	234899	271421	308049	352090	384297	439650
5. Electricity, gas and water supply	44245	49090	53915	55899	60704	65421	71945	82113	97730
a. Electricity	36832	40654	44551	45671	49551	53109	58398	67781	82302
b. Gas	4801	5320	5940	6612	7162	7929	8762	9078	9547
c. Water	2612	3116	3424	3716	3991	4383	4786	5285	5880
6. Construction	253966	290608	327970	375432	438538	501253	556581	639815	754647
7. Wholesale and retail trade	441031	502782	569842	660113	782203	882764	1002948	1159585	1348600
8. Hotel and restaurant	22021	25117	28532	32893	38889	44598	51501	59975	71780
9. Transport, storage and communication	344444	382890	432056	489084	509074	642803	718796	854647	1000533
a. Land transport	268602	293741	328407	368526	428575	483648	541588	660878	788546
b. Water transport	28858	29942	31370	33067	3211	39330	42137	45322	49865
c. Air transport	4385	4669	5003	5094	5461	5892	6491	7219	8125

Contd.

Activity /Sector	2003-04	2004-05	2005-06	2006-07	2007-08	2008-09	2009-10	2010-11	2011-12(p)
b. Support transport ser. storage	10695	11712	12604	14199	15689	17582	19380	20669	22013
c. Post and telecommunication	31903	42826	54672	68198	83137	96452	109201	120630	131984
10. Financial Intermediation	51974	59343	66839	77436	89548	102453	122998	144843	169846
a. Monetary intermediation (banks)	38885	44508	49948	57969	68564	76135	90631	106213	124296
b. Insurance	11109	12590	14295	16397	19300	22010	27016	32310	37950
c. Other financial intermediation	1979	2245	2595	3070	3684	4308	5351	6320	7400
11. Real estate, renting and business ser.	276006	297443	321569	349286	380580	416164	456830	503373	555465
12. Public Administration and defense	86237	96374	110355	127432	144270	163604	187569	223806	954494
13. Education	78733	87882	99345	117760	135315	154940	179064	213078	248092
14. Health and social services	71969	81043	90220	103066	1187191	133908	151424	175822	203371
15. Community, social and personal ser.	300278	338763	382832	435676	502002	5836643	684655	778758	914852
16. GDP at current producer's price	3194631	3555937	4004536	4568144	5259755	5939243	6714660	7687734	8837059
17. Import duty	135100	151133	152744	156626	198469	208709	228583	27936	310783
18. GDP at current market price	3329731	3707070	4157279	4724769	5458224	6147962	6943243	7967040	9147842
19. Net primary income from abroad	175629	189280	272075	352755	483895	559012	646035	725136	899385
20. GNI at current market price	3505260	3896360	4429364	5077524	5942119	6706964	7589279	8692175	10047221
21. NNI at current market price	3242708	3605595	4102964	4707989	5518610	6231984	7057179	8084194	9352214
Population (in million)	135.2	137.0	138.8	140.6	142.4	144.2	146.1	149.7	151.6
Per capita GDP at M.P.	24628	27061	29955	33607	3830	42628	47536	53238	60350
Per capita GNI at M.P.	25926	28443	31915	38116	41728	46504	51959	58083	60283
Per capita NNI at M.P.	23984	26320	29564	33488	37754	43210	48316	54021	61698

Note: p Denotes provisional

Source: Statistical Year Book of Bangladesh 2012, Bangladesh Bureau of Statistics

Table 4.5 Gross Domestic Product by Expenditure Categories at Current Prices

(Million Taka)

	FY2003	FY2004	FY2005	FY2006	FY2007	FY2008	FY2009	FY2010	FY2011	FY2012
Domestic Demand (1) + (2)	3149214	3479129	3874361	4340318	4919076	5671036	6411306	7242817	8433997	9704074
Consumption (1)	2445697	2679274	2965119	3315523	3763172	4349713	4912913	5547710	6430219	7376309
Private	2294988	2495207	2759817	3085199	3502116	4061404	4589386	5174992	5969353	6858190
General Govt.	160709	184067	205303	230324	261056	288310	323527	372718	460866	518119
Investment (2)	703517	799905	909241	1024795	1155904	1321322	1498393	1695107	2003777	2327765
Private	517169	593673	679182	775464	898618	1050900	1209417	1346905	1554436	1751041
Public	186348	206232	230059	249331	257285	270422	288976	348201	449391	576723
Resource balance (3) – (4)	(-)174982	(-)178093	(-)239642	(-)260703	(-)327225	(-)459139	(-)438028	(-)458953	693896	944639
Exports (3)	427239	514938	614681	788788	934403	1110181	1194401	1277985	1824521	2286490
Imports (4)	602221	693031	854323	1049491	1261628	1569320	1632429	1736938	2518417	3231129
Gross Domestic Exp. at m.p.	2974232	3301086	3634719	4079615	4591851	5211897	5973278	6783864	7740107	8759434
Gross Domestic Product at m.p. (5)	3005801	3329731	3707070	4157279	4724769	5458224	6147952	6943243	7967040	9147842
Statistical Discrepancy (6)	31569	28645	72351	77664	132919	248327	174674	159379	226939	388408
Net factor income from abroad (7)	165831	175529	189280	272075	352755	483895	559012	646035	725136	899385
Gross National Income at m.p. (8)=(5)+(7)	3171632	3505260	3896350	4429354	5077524	5942119	6706964	7589278	8692175	10047227
Net current transfers from abroad (9)	21583	21207	26808	36529	39885	56713	24069	42479	31015	18721
Gross Disposable National Income (10)=(8)+(9)	3193215	3526467	3923158	4465883	5117409	5998832	6731033	7631757	8723190	1006548
Gross Domestic saving (11)=(5) – (1)	560104	650457	741951	841756	961597	1108511	1235039	1395533	1536821	1771533
Gross Nations saving (12)= (10) – (1)	747518	847193	958039	1150360	1354237	1649119	1818120	2084047	2292971	2689639
Current Account Balance (13)=(12)–(2)–(6)	12432	18643	23554	47901	65415	81469	145053	229561	67254	26534
Consumption	81.37	80.47	79.99	79.75	79.65	79.69	79.91	79.90	80.71	80.63
Private	76.02	74.94	74.21	74.21	74.12	74.41	74.65	74.53	74.93	74.97

Contd.

	FY2003	FY2004	FY2005	FY2006	FY2007	FY2008	FY2009	FY2010	FY2011	FY2012
General Govt.	5.36	5.53	5.54	5.54	5.53	5.28	5.26	5.37	5.78	5.66
Investment	23.41	24.02	24.55	24.65	24.46	24.21	24.37	24.41	25.15	25.45
Private	12.21	17.83	18.65	18.65	19.02	19.25	19.57	19.40	19.51	19.14
Public	6.20	6.19	6.00	6.00	5.45	4.95	4.70	5.01	5.64	6.30
Exports of goods & services	14.21	15.46	18.97	18.97	19.78	20.34	19.43	18.41	22.90	24.99
Imports of goods & services	20.04	20.81	25.24	25.24	26.70	28.75	26.55	25.02	31.61	35.32
Gross Domestic saving	18.63	19.53	20.25	20.25	20.35	20.31	20.09	20.10	19.29	19.37
Gross National saving	24.87	25.44	27.67	27.67	28.66	30.21	29.57	30.02	28.78	29.40

Source: Statistical Year Book of Bangladesh 2012, Bangladesh Bureau of Statistics

Table 4.6 Gross Domestic Product by Expenditure Categories at Constant Prices (Base: 1995-96=100)

(Million Taka)

	FY2003	FY2004	FY2005	FY2006	FY2007	FY2008	FY2009	FY2010	FY2011	FY2012
Domestic Demand (1) + (2)	2427619	2550071	2699063	2846800	3035197	3167322	3357603	3561374	3815685	3997776
Consumption (1)	1825410	1892671	1971299	205871	2180383	2297081	2433535	2563998	3722861	2822998
General Govt.	122482	135553	146144	154860	164777	170729	180790	196842	2509664	2597849
Private	1702927	1757118	1825155	1903856	2015606	2126352	2252745	2367156	213187	225149
Investment (2)	602210	657400	727764	788083	854814	870241	924068	997376	1092884	1174778
Public	155546	175956	186258	193016	187279	181171	182759	210338	842591	876851
Private	44664	481444	541506	595067	667535	689070	741309	787038	250243	297926
Resource balance (3) – (4)	- 43272	- 41303	- 062344	- 40074	- 63160	- 4939	12783	14601	20096	9410
Imports (4)	381732	422196	502661	594085	689087	674917	657358	661850	874921	1024912
Exports (3)	338461	380893	440317	554011	625927	669978	670141	675105	854826	1015501
Gross Domestic Exp. at m.p.	2384348	2508768	2636719	2806726	2972038	3162383	3370385	3575975	3836780	4007186

Contd.

	FY2003	FY2004	FY2005	FY2006	FY2007	FY2008	FY2009	FY2010	FY2011	FY2012
Gross Domestic Product at m.p. (5)	2371006	2519680	2669740	2669740	3029709	3217260	3401968	3608446	3850504	4093775
Statistical Discrepancy (6)	- 13342	10912	33021	40000	57672	54877	31583	32471	14724	86589
Net factor income from abroad (7)	130809	132827	136315	186305	226200	285224	309329	335748	350461	402486
Gross National Income at m.p. (8)=(5)+(7)	2501815	2652507	2806055	3033031	3255910	3502484	3711298	3944194	4200965	4496261
Net current transfers from abroad (9)	17025	16048	19306	25013	25576	33429	13319	22077	14990	8378
Gross Disposable National Income (10)=(8)+(9)	2518840	2668554	2825361	3058045	3281485	3535912	3724616	192.42	4215954	4504639
GDP Deflator	126.77	132.15	135.86	146.04	155.95	169.65	180.72	218.62	20691	263.99
(Implicit deflators: base=1995-96)										
Final consumption expenditure:										
Consumer Price index (Rebased)	134.18	142.01	151.21	162.05	173.75	191.00	203.72	189.35	237.85	263.99
CPI (Government Employee, Rebased)	131.21	135.79	140.48	148.73	158.43	168.87	178.95	173.51	216.18	230.12
Gross Capital Formulation:										
Construction Material (Building Material Price Index)	115.49	118.26	124.88	129.75	138.85	152.90	1165.90	188.28	187.48	204.17
Other Construction (Kutchra)	122.00	120.40	128.25	130.27	146.12	167.48	176.88	188.28	200.30	215.14
Planted Machinery	108.48	109.38	112.59	119.94	126.03	132.47	132.83	138.96	151.80	160.14
Transport Equipments	142.75	148.60	159.94	163.78	174.81	180.07	193.34	203.17	221.04	234.11
Other Capital Goods	108.68	99.06	98.83	109.44	145.77	155.11	157.01	167.04	173.98	182.73
Unit Price Index Export-Import	126.23	135.19	139.60	142.38	149.28	165.70	178.23	188.93	208.54	223.09
Annual percentage change	157.76	164.15	169.96	176.66	183.09	232.52	248.33	262.44	294.61	318.18
Final Consumption expenditure	3.52	3.18	3.87	4.31	5.87	5.49	5.94	5.36	6.02	3.51

Contd.

	FY2003	FY2004	FY2005	FY2006	FY2007	FY2008	FY2009	FY2010	FY2011	FY2012
Household final consumption (expenditure)	13.19	10.67	7.81	5.96	6.40	3.61	5.39	8.88	8.30	5.61
Gross capital formation	7.87	9.16	10.70	8.29	8.05	1.80	6.19	7.93	9.57	7.50
Exports of goods & services	6.87	12.54	15.60	25.82	12.98	7.04	0.02	0.74	29.34	17.14
Imports of goods & services	7.40	10.60	19.06	18.19	15.99	- 2.06	- 2.60	- 0.66	29.76	18.80

Source: Statistical Year Book of Bangladesh 2012, Bangladesh Bureau of Statistics

Table 4.7 Sectorial Shares of Gross Domestic Product at Constant Prices (Base: 1995-96=100)

		(Percentage)									
Activity Sector		2002-2003	2003-2004	2004-2005	2005-2006	2006-2007	2007-2008	2008-2009	2009-2010	2010-2011	2011-12(p)
1.	Agriculture and forestry	18.22	17.97	17.27	16.98	16.64	16.18	15.91	15.81	15.58	14.80
	a. Crops	13.43	13.23	12.51	12.28	12.00	11.64	11.43	11.42	11.32	10.74
	b. Animal farming	2.93	2.91	2.95	2.92	2.88	2.79	2.73	2.65	2.58	2.50
	c. Forest & related services	1.86	1.83	1.82	1.79	1.76	1.75	1.75	1.73	1.69	1.86
2.	Fishing	5.25	5.11	5.00	4.86	4.73	4.65	4.58	4.49	4.43	4.39
3.	Mining and quarrying	1.09	1.11	1.14	1.16	1.18	1.21	1.25	1.29	1.26	1.26
	a. Natural gas & crude petroleum	0.66	0.68	0.69	0.71	0.72	0.74	0.76	0.77	0.73	0.71
	b. Other mining & quarrying	0.44	0.43	0.44	0.45	0.46	0.47	0.50	0.51	0.53	0.55
4.	Industry	15.97	16.16	16.51	17.08	17.55	17.77	17.90	17.94	18.42	19.01
	a. Large scale	11.29	11.41	11.66	12.14	12.47	12.68	12.71	12.68	13.20	13.75
	b. Small scale	4.68	4.76	4.85	4.94	5.08	5.14	5.18	5.26	5.22	5.26
5.	Electricity, gas and water supply	1.54	1.59	1.64	1.65	1.57	1.59	1.59	1.30	1.60	1.72
	a. Electricity	1.30	1.34	1.37	1.38	1.30	1.31	1.31	1.32	1.33	1.45
	b. Gas	0.17	0.18	0.18	0.19	0.19	0.19	0.19	0.20	0.19	0.18
	c. Water	0.08	0.08	0.08	0.08	0.09	0.09	0.09	0.09	0.09	0.09

Contd.

Activity Sector		2002- 2003	2003- 2004	2004- 2005	2005- 2006	2006- 2007	2007- 2008	2008- 2009	2009- 2010	2010- 2011	2011- 12(p)
6.	Construction	8.63	8.83	9.03	9.14	8.15	9.13	9.12	9.10	9.09	9.27
7.	Wholesale and retail trade	13.37	13.97	14.12	14.08	14.24	14.37	14.41	14.30	14.33	14.26
8.	Hotel and restaurant	0.67	0.68	0.68	0.69	0.69	0.70	0.71	0.72	0.73	0.74
9.	Transport, storage and communication	9.76	9.79	9.98	10.07	10.18	10.44	10.85	10.79	10.70	10.72
a.	Land transport	6.95	6.96	6.858	6.67	6.50	6.42	6.38	6.36	6.21	6.18
b.	Water transport	1.03	0.97	0.93	0.89	0.85	0.82	0.79	0.75	0.72	0.69
c.	Air transport	0.13	0.12	0.12	0.12	0.11	0.11	0.12	0.12	0.12	0.13
b.	Support transport ser. storage	0.36	0.33	0.32	0.31	0.32	0.33	0.34	0.35	0.34	0.33
c.	Post and telecommunication	1.30	1.41	1.76	2.08	2.40	2.76	3.02	3.21	3.31	3.40
10.	Financial Intermediation	1.63	1.65	1.69	1.72	1.76	1.81	1.86	1.95	2.01	2.01
a.	Monetary intermediation (banks)	1.22	1.23	1.27	1.28	1.31	1.34	1.38	1.44	1.47	1.51
b.	Insurance	0.34	0.35	0.36	0.37	0.37	0.39	0.40	0.43	0.45	0.46
c.	Other financial intermediation	0.06	0.06	0.06	0.07	0.07	0.07	0.08	0.08	0.09	0.09
11.	Real estate, renting and business ser.	8.48	8.30	8.12	7.87	7.64	7.49	7.34	7.18	7.00	6.85
12.	Public Administration and defense	2.60	2.63	2.68	2.71	2.75	2.76	2.78	2.84	2.82	2.91
13.	Education	2.36	2.40	2.44	2.49	2.54	2.58	2.64	2.71	2.78	2.84
14.	Health and social services	2.21	2.22	2.25	2.27	2.29	2.31	2.34	2.38	2.42	2.45
15.	Community, social and personal ser.	7.72	7.59	7.45	7.25	7.09	7.01	6.90	6.63	6.71	6.61
GDP at constant price		100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00

Note: p Denotes provisional

Source: Statistical Year Book of Bangladesh 2012, Bangladesh Bureau of Statistics

Table 4.8 Sectorial Shares of Gross Domestic Product at Current Market Prices

(Percentage)

Activity/Sector	2003-2004	2004-2005	2005-2006	2006-2007	2007-2008	2008-2009	2009-2010	2010-2011	2011-2012(p)
1. Agriculture and forestry	15.41	15.80	15.54	15.35	15.25	15.06	14.98	14.77	14.02
a) Crops & Horticulture	12.17	11.67	11.52	11.49	11.52	11.32	11.22	11.09	10.47
b) Animal farming	2.48	2.44	2.42	2.36	2.30	2.36	2.42	2.40	2.32
c) Forest & related services	1.76	1.69	1.60	1.51	1.43	1.38	1.34	1.28	1.23
2. Fishing	4.63	4.35	4.07	3.89	3.76	3.67	3.61	3.51	3.51
3. Mining and Quarrying	1.14	1.14	1.16	1.16	1.17	1.19	1.21	1.18	1.17
a) Natural gas & crude petroleum	0.65	0.65	0.64	0.62	0.60	0.60	0.60	0.56	0.52
b) Other mining & quarrying	0.49	0.49	0.52	0.54	0.57	0.59	0.61	0.62	0.64
4. Manufacturing	15.13	16.53	17.21	17.77	17.85	17.92	17.80	17.63	17.72
a) Large and medium scale	11.38	11.68	12.23	12.63	12.69	12.73	12.64	12.63	12.74
b) Small scale	4.75	4.85	4.98	5.14	5.16	5.19	5.24	5.00	4.98
5. Electricity, gas and water supply	1.38	1.38	1.35	1.22	1.15	1.10	1.07	1.07	1.11
1) Electricity	1.15	1.14	1.11	1.00	0.964	0.89	0.87	0.88	0.93
2) Gas	0.15	0.15	0.15	0.14	0.14	0.13	0.13	0.12	0.11
3) Water	0.08	0.09	0.09	0.08	0.08	0.07	0.07	0.07	0.07
6. Construction	7.95	8.17	8.19	8.22	8.34	8.44	8.29	8.32	8.54
7. Wholesale and retail trade	13.81	14.14	14.23	14.45	14.87	14.86	14.94	15.08	15.26
8. Hotel and restaurant	0.69	0.71	0.71	0.72	0.74	0.75	0.77	0.78	0.81
9. Transport, storage and communication	10.78	10.77	10.79	10.71	10.82	10.82	10.70	11.12	11.32
1) Land transport	8.41	8.26	8.20	8.07	8.15	8.14	8.07	8.60	8.92
2) Water transport	0.90	0.84	0.78	0.72	0.69	0.86	0.63	0.59	0.56

Contd.

Activity/Sector	2003-2004	2004-2005	2005-2006	2006-2007	2007-2008	2008-2009	2009-2010	2010-2011	2011-2012(p)
3) Air transport	0.14	0.13	0.12	0.11	0.10	0.10	0.10	0.09	0.09
4) Support transport ser. storage	0.33	0.33	0.31	0.31	0.30	0.30	0.20	0.27	0.25
5) Post and telecommunication	1.00	1.20	1.37	1.49	1.58	1.62	1.63	1.57	1.49
10. Financial intermediation (banks)	1.63	1.67	1.67	1.70	1.70	1.73	1.83	1.88	1.92
1) Monetary intermediation (banks)	1.22	1.25	1.25	1.27	1.27	1.28	1.35	1.38	1.41
2) Insurance	0.35	0.35	0.36	0.36	0.37	0.37	0.40	0.42	0.43
3) Other financial intermediation	0.06	0.06	0.06	0.07	0.07	0.07	0.08	0.08	0.08
11. Real estate, renting and business ser.	8.64	8.36	8.03	7.65	7.24	7.01	6.80	6.55	6.29
12. Public Administration and defense	2.70	2.71	2.76	2.79	2.74	2.75	2.79	2.91	2.88
13. Education	2.46	2.47	2.48	2.58	2.57	2.61	2.67	2.77	2.81
14. Health and social services	2.25	2.28	2.25	2.26	2.25	2.25	2.26	2.29	2.30
15. Community, social and personal ser.	9.40	9.53	9.56	9.54	9.54	9.83	10.20	10.13	10.35
Total	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00

Note: p Denotes provisional

Source: Statistical Year Book of Bangladesh 2012, Bangladesh Bureau of Statistics

Table 4.9 Annual Growth of GDP by Sectors at Constant Price (Base: 1995-96=100)

		(Percentage)								
Activity Sector	2002-2003	2003-2004	2004-2005	2005-2006	2006-2007	2007-2008	2008-2009	2009-2010	2010-2011	2011-12(p)
1. Agriculture and forestry	3.29	4.38	1.80	5.23	4.69,,	2.93	4.10	5.56	5.09	1.72
a. Crops	2.88	4.27	0.15	5.03	4.43	2.67	4.02	6.13	5.65	0.94
b. Animal farming	4.51	4.98	7.23	6.15	5.49	2.44	3.49	3.38	3.48	3.39
c. Forest & related services	4.43	4.18	5.09	5.18	5.24	5.47	5.69	5.23	3.90	4.42
2. Fishing	2.33	3.09	3.65	3.91	4.07	4.18	4.16	4.15	5.25	5.38

Contd.

Activity Sector		2002- 2003	2003- 2004	2004- 2005	2005- 2006	2006- 2007	2007- 2008	2008- 2009	2009- 2010	2010- 2011	2011- 12(p)
3.	Mining and quarrying	7.17	7.66	8.38	9.26	8.33	8.94	9.84	8.80	4.80	6.25
	a. Natural gas & crude petroleum	8.91	8.98	9.02	9.52	8.03	8.26	9.15	8.12	1.05	2.95
	b. Other mining & quarrying	4.66	5.68	7.40	8.84	8.80	10.01	10.90	9.84	10.43	10.78
4.	Industry	6.75	7.10	8.19	10.77	9.72	7.21	6.68	6.50	9.45	9.76
	a. Large scale	6.56	6.95	8.30	11.41	9.74	7.26	6.58	5.98	10.94	10.78
	b. Small scale	7.21	7.45	7.93	9.21	6.69	7.10	6.90	7.77	5.84	7.18
5.	Electricity, gas and water supply	8.02	9.09	8.90	7.67	2.10	6.77	5.91	7.28	6.63	14.11
	a. Electricity	7.29	9.19	8.58	7.45	1.08	6.68	5.39	7.21	7.33	15.96
	b. Gas	8.77	8.81	8.87	9.37	7.37	7.72	8.42	7.51	0.82	3.01
	c. Water	20.01	8.00	14.44	7.55	7.08	6.00	8.39	7.77	8.99	9.82
6.	Construction	8.09	8.25	8.31	8.31	7.01	5.68	5.70	6.01	6.51	8.51
7.	Wholesale and retail trade	6.09	6.57	7.06	6.75	8.04	6.82	6.21	5.87	6.31	5.88
8.	Hotel and restaurant	7.00	7.05	7.12	7.45	7.52	7.55	7.58	7.61	7.55	7.60
9.	Transport, storage and communication	6.85	6.21	7.92	7.98	8.03	8.55	8.01	7.69	5.69	6.58
	a. Land transport	6.64	6.02	4.25	4.14	4.18	4.54	5.17	5.98	4.13	5.78
	b. Water transport	0.07	0.16	1.96	1.96	1.73	2.54	2.46	1.01	1.05	1.90
	c. Air transport	-1.35	0.84	2.49	5.25	2.01	6.20	7.38	9.13	8.26	10.61
	b. Support transport ser. storage	-1.17	--1.35	2.92	6.13	8.93	8.45	9.64	8.15	3.50	3.48
	c. Post and telecommunication	17.89	14.56	31.79	26.70	23.29	21.64	16.11	12.95	10.01	9.24
10.	Financial Intermediation	6.67	7.02	8.92	8.50	9.18	8.89	8.99	11.64	9.64	9.52
	a. Monetary intermediation (banks)	5.91	6.73	9.11	8.19	9.34	8.38	9.05	10.47	9.04	9.41
	b. Insurance	10.29	8.06	8.34	9.16	8.21	10.03	8.38	14.88	11.58	9.81
	c. Other financial intermediation	2.32	6.91	8.51	10.94	11.62	12.47	11.13	16.10	10.08	9.86

Contd.

Activity Sector	2002-2003	2003-2004	2004-2005	2005-2006	2006-2007	2007-2008	2008-2009	2009-2010	2010-2011	2011-12(p)
11. Real estate, renting and business ser.	3.52	3.58	3.65	3.69	3.76	3.75	3.81	3.89	3.96	4.05
12. Public Administration and defense	5.24	7.06	8.02	8.15	8.41	6.21	7.01	8.35	9.67	6.07
13. Education	7.60	7.69	7.90	9.05	8.96	7.80	8.05	9.24	9.36	8.81
14. Health and social services	5.63	6.17	7.40	7.79	7.64	7.02	7.20	8.10	8.35	7.94
15. Community, social and personal services.	3.32	3.97	4.05	4.09	4.58	4.62	4.70	7.70	4.70	4.76
GDP at constant price	5.26	6.27	5.96	6.63	6.43	6.19	5.74	6.07	6.71	6.32

Note: p Denotes provisional

Source: Statistical Year Book of Bangladesh 2012, Bangladesh Bureau of Statistics

Table 4.10 Implicit GDP and Sectorial Deflators (Base: 1995-96=100)

Activity /Sector	2003-04	2004-05	2005-06	2006-07	2007-08	2008-09	2009-10	2010-11	2011-12(p)
1. Agriculture and forestry	120.64	126.99	133.68	143.90	159.90	171.28	182.50	196.09	201.24
a. Crops	121.56	129.49	137.08	1498.34	167.94	179.23	189.20	202.62	217.88
b. Animal farming	112.52	115.06	120.91	127.62	140.04	156.38	175.21	192.82	206.93
c. Forest & related services	126.95	129.09	131.28	133.52	138.17	142.44	149.48	157.31	165.93
2. Fishing	119.54	120.69	122.61	128.40	137.16	145.10	154.76	163.87	178.56
3. Mining and quarrying	135.75	138.92	148.09	154.57	154.01	172.12	181.02	192.93	206.74
a. Natural gas & crude petroleum	127.74	128.94	131.76	135.12	138.79	144.27	150.14	156.78	165.45
b. Other mining & quarrying	148.18	154.64	168.81	185.18	203.07	214.59	227.39	242.59	259.45
4. Industry	131.89	139.10	147.21	158.02	170.49	181.17	191.96	197.94	208.33
a. Large scale	131.89	139.10	147.21	158.02	170.49	181.17	191.95	197.92	207.19
b. Small scale	131.89	139.10	147.21	158.02	170.49	181.18	191.97	197.97	211.31

Contd.

Activity /Sector	2003-04	2004-05	2005-06	2006-07	2007-08	2008-09	2009-10	2010-11	2011-12(p)
5. Electricity, gas and water supply	114.95	117.12	119.47	121.32	123.40	125.57	128.72	137.78	143.70
1. Electricity	113.90	115.79	118.09	119.77	121.81	123.88	127.05	137.33	143.87
2. Gas	112.62	114.63	117.03	119.49	122.00	124.57	128.03	131.58	134.34
3. Water	138.13	143.99	147.10	149.10	151.07	153.07	155.09	157.14	159.21
6. Construction	118.97	125.70	130.97	140.11	154.86	167.47	175.41	189.32	205.78
7. Wholesale and retail trade	130.60	139.06	147.64	158.30	175.60	186.60	200.24	217.77	239.19
8. Hotel and restaurant	134.72	143.45	151.66	162.61	178.75	190.55	204.48	221.41	246.28
9. Transport, storage and communication	145.48	149.85	158.59	164.07	175.88	183.93	190.98	214.85	236.00
1. Land transport	159.60	167.42	179.73	193.59	215.35	231.07	244.15	286.10	322.70
2. Water transport	123.03	125.20	128.66	133.31	142.36	150.53	160.06	170.37	183.96
3. Air transport	145.45	151.10	153.83	153.53	154.99	155.72	157.19	161.50	164.33
4. Support transport ser. storage	135.57	144.25	146.28	151.27	153.13	157.53	160.56	165.69	170.28
5. Post and telecommunication	93.54	95.28	96.00	97.12	97.33	97.26	97.49	97.81	98.05
10. Financial Intermediation	130.50	136.80	142.01	150.68	160.02	167.98	180.63	194.01	207.48
1. Monetary intermediation (banks)	130.50	136.90	142.00	150.73	159.70	167.50	180.50	194.00	207.50
2. Insurance	130.49	136.51	141.99	150.50	160.99	169.40	181.00	194.00	207.50
3. Other financial intermediation	130.54	136.47	142.19	150.71	160.80	169.21	181.02	194.22	206.99
11. Real estate, renting and business ser.	137.53	143.00	149.09	156.07	163.90	172.64	182.41	193.33	205.04
12. Public Administration and defense	135.79	140.48	148.73	158.43	168.87	178.95	189.35	206.01	220.84
13. Education	135.80	140.48	148.62	158.43	168.87	178.95	189.35	206.01	220.84
14. Health and social services	134.00	140.50	145.11	154.00	165.01	174.40	182.44	195.50	209.50
15. Community, social and personal services.	163.73	177.53	192.74	209.74	231.00	256.51	287.35	312.18	380.05
GDP at constant price	132.15	138.86	146.04	155.95	169.65	180.72	192.42	206.91	223.40

Note: p Denotes provisional

Source: Statistical Year Book of Bangladesh 2012, Bangladesh Bureau of Statistics

Chapter 5

Theoretical Distribution of Income

5.1 Introduction

It is useful to find a theoretical distribution which fits the observed income data well. With the help of theoretical distribution, we can find out suitable statistical model for a good description of the observed income data and for many areas of scientific and statistical investigations. Several theoretical distributions are found in the economic and statistical literature among which Pareto, log-normal, Exponential, Weibull are important. These distributions are useful to fit the observed data reasonably well and can also be considered as statistical model for various analytical purposes. But all distributions do not always fit well for the graduation of size distributions of income and expenditure data for all countries and for all income groups. For instance, Pareto distribution fits well the upper tail of the observed distribution. The two-parameter lognormal distribution fits well over the entire range of income but poorly fits over the lower and the upper tails of the income distribution and is found to be negatively skewed. However, these two distributions and some other distributions which are useful for graduation of income and expenditure distributions are discussed below:

5.2 Pareto Distribution of Income

Back in 1897, Italian economist Vilfredo Pareto (1848–1923) examined size distributions of income in different countries. And he was one of those who first found certain regularity in the distribution of incomes in the capitalist countries. On the basis of his findings, he wanted to draw certain conclusions regarding economic and social nature (Lange, O. 1978). Based on the statistics of various countries Pareto constructed cumulative frequency distribution and the distribution indicated how many persons had income not below certain amount of it. He also drew diagrams of the frequency distribution, plotting income x along the horizontal axis (abscissa) and the number of persons having income x and more along vertical axis (ordinate). In most cases Pareto observed that the distributions showed like a hyperbolic shape. Moreover, the empirical studies showed that the Pareto law is suitable only for higher incomes and does not fit well for low income countries like Bangladesh. These findings have led a

number of authors to find alternative distribution for the whole range of incomes.

5.3 The Pareto Law

The Pareto Law of income distribution states that in all places and at all times, the distribution of income gives approximately to a hyperbola the equation of which is given by the empirical formula:

$$H_x = A(x - x_0)^{-\alpha} \quad \dots \dots \dots \dots \dots (5.1)$$

Where x_0 is the lowest income (threshold income) at which the curve begins, x denotes income, H_x is the number of income units (in person/household) having incomes $\geq x$, while A and α are parameters. The graph shown in Fig. 5.1 is called the Pareto curve.

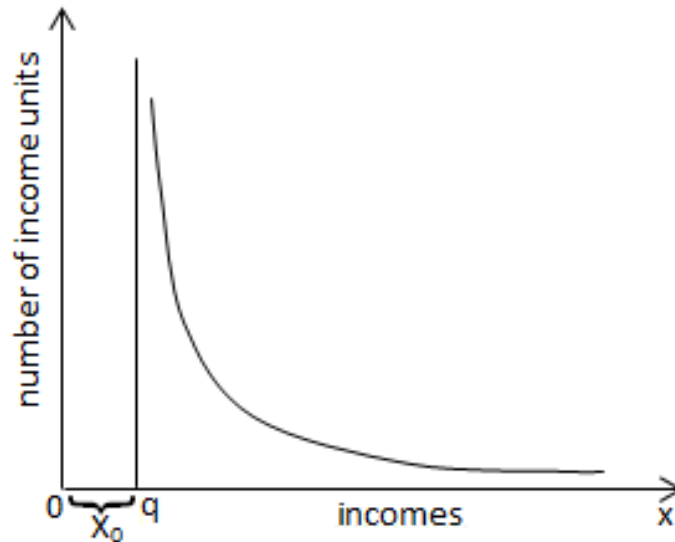


Figure 5.1: Pareto Curve

It appears from equation (5.1) that when $x \rightarrow x_0$, then $H_x \rightarrow \infty$ and when $H_x \rightarrow \infty$ then $x \rightarrow 0$. It implies that Pareto curve has two asymptote $x = x_0$ and $H_x = 0$ (Lange, 0, 1978). If we move the H_x axis to the point q corresponding to the lowest income $x_0 = 0$ then the equation for the Pareto curve becomes

$$H_x = \frac{A}{x^\alpha} \text{ or } H_x = Ax^{-\alpha} \quad \dots \dots \dots \dots \dots (5.2)$$

Generally, we do not have information about the number of persons with small incomes. As a result, we use the simplified form (5.2) for the Pareto curve. This simplified form of the Pareto curve can be presented in the logarithmic form as:

$$\log H_x = \log A - \alpha \log x$$

The graph of this curve on the double logarithmic scale ($\log H_x$ against $\log x$) shown in Figure 5.2 is a negatively sloped straight line with the slope $-\alpha$ (Lange, O. 1978).

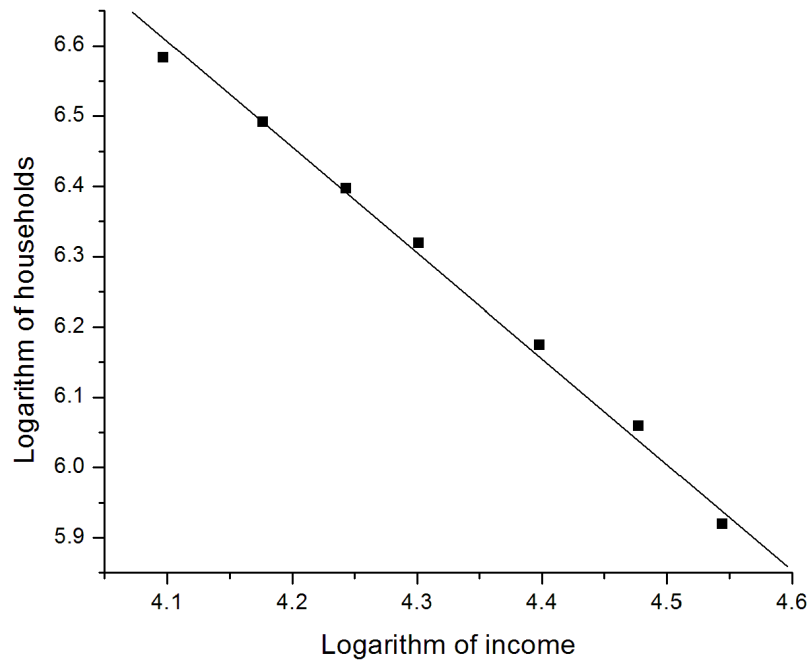


Figure 5.2: Pareto Curve in Double Logarithm Scale

This graphical test can be used to examine whether or not an income distribution is Paretean and if it follows Paretean then over what range of income. The curve would be bent at the lowest income and cut the straight line at $x = x_0$. Thus, the Pareto law is not suitable for low income countries like Bangladesh. This can also be shown by finding the first derivatives of the density function as $\frac{df(x)}{dx} = -\frac{d}{dx} \left(\alpha x_0^\alpha x^{-(\alpha+1)} \right) = -\alpha(1+\alpha)x_0^{-2-\alpha}$ which is negative for all positive values of α . Thus, the Pareto density function decreases monotonically for all values of x greater than x_0 . This finding illustrates that the Pareto law is valid only for the range of income for which the density is decreasing (Kakawani, N. 1980).

5.4 The Probability Distribution Function

The cumulative function $F(x)$ of a random variable x , is given by

$$\begin{aligned}
 F(x) &= P_r (x \leq x_0) \\
 &= 1 - P_r (x > x_0) \\
 &= 1 - H_x \\
 \therefore F(x) &= 1 - Ax^{-\alpha}, \quad 0 \leq x_0 < \infty \quad \dots \dots \dots (5.3)
 \end{aligned}$$

Then the density $f(x)$ is obtained by

$$\begin{aligned} f(x) &= \frac{dF(x)}{dx} = \frac{d(1 - Ax^{-\alpha})}{dx} \\ &= \alpha Ax^{-\alpha-1} \\ \therefore f(x) &= \alpha Ax^{-\alpha-1} \quad \dots \dots \dots (5.4) \end{aligned}$$

Since x_0 is the lower limit of this distribution, we can write

$$\begin{aligned} \int_{x_0}^{\infty} f(x) dx &= 1 \\ &= \int_{x_0}^{\infty} \alpha A x^{-\alpha-1} dx \\ &= A\alpha \left[\frac{x^{-\alpha-1+1}}{-\alpha-1+1} \right]_{x_0}^{\infty} = 1 \\ &= A\alpha \left[\frac{x^{-\alpha}}{-\alpha} \right]_{x_0}^{\infty} = 1 \\ &= A\alpha \left[0 - \frac{x_0^{-\alpha}}{-\alpha} \right] \\ &= -A\alpha \frac{x_0^{-\alpha}}{-\alpha} \\ &= A x_0^{-\alpha} = 1 \end{aligned}$$

$$\therefore A = x_0^{\alpha}.$$

Therefore, the probability density function of the Pareto distribution becomes:

$$\begin{aligned} f(x) &= \alpha x_0^{\alpha} x^{-(\alpha+1)}, \quad \text{when } x > x_0 \\ &= 0, \quad \text{when } x < x_0 \end{aligned}$$

5.5 Mean and Variance of the Distribution

5.5.1 The Mean

The mean of the distribution exists if $\alpha > 1$, and the variance exists if $\alpha > 2$. We know from the previous section that the density function of Pareto law of income distribution is:

$$f(x) = \alpha x_0^{\alpha} x^{-(\alpha+1)}$$

$$\begin{aligned}
\text{Now the mean} &= \mathbf{E(x)} = \int_{x_0}^{\infty} x f(x) dx \\
&= \alpha x_0^{\alpha} \int_{x_0}^{\infty} x \cdot x^{-\alpha-1} dx \\
&= \alpha x_0^{\alpha} \int_{x_0}^{\infty} x^{-\alpha} dx \\
&= \alpha x_0^{\alpha} \left[\frac{x^{-\alpha+1}}{-\alpha+1} \right]_{x_0}^{\infty} \\
&= \alpha x_0^{\alpha} \frac{x_0^{-\alpha+1}}{(\alpha-1)} = \frac{\alpha x_0}{(\alpha-1)}
\end{aligned}$$

Thus mean $\mathbf{E(x)} = \frac{\alpha x_0}{\alpha-1}$ which will exist if $\alpha > 1$ and the mean of the Pareto distribution is found to be proportional to the income x_0 .

5.5.2 The Variance

The variance $V(x) = E(x^2) - \{E(x)\}^2$.

$$\begin{aligned}
\text{Now, } \mathbf{E(x^2)} &= \int_{x_0}^{\infty} x^2 f(x) dx \\
&= \int_{x_0}^{\infty} x^2 \alpha x_0^{\alpha} x^{-(\alpha+1)} dx \\
&= \alpha x_0^{\alpha} \int_{x_0}^{\infty} x^2 x^{-\alpha-1} dx \\
&= \alpha x_0^{\alpha} \int_{x_0}^{\infty} x^{-\alpha+1} dx \\
&= \alpha x_0^{\alpha} \left[\frac{x^{-(\alpha-2)}}{2-\alpha} \right]_{x_0}^{\infty} \\
&= \alpha x_0^{\alpha} \frac{x_0^{-(\alpha-2)}}{(\alpha-2)} \\
&= \frac{\alpha x_0^2}{\alpha-2} \\
\therefore V(x) &= \mathbf{E(x^2)} - \{\mathbf{E(x)}\}^2 \\
&= \frac{\alpha x_0^2}{\alpha-2} - \left(\frac{\alpha x_0}{\alpha-1} \right)^2 \\
&= \frac{\alpha x_0^2}{\alpha-2} - \frac{\alpha^2 x_0^2}{(\alpha-1)^2} \\
&= \frac{\alpha x_0^2}{(\alpha-1)^2 (\alpha-2)}
\end{aligned}$$

This will be finite only if $\alpha > 2$. But Pareto observed that the value of α is approximately 1.5 which indicates that the variance of the Pareto distribution will not be finite (Kakwani, N. 1980).

From Bhattacharya and Coondoo (1992), the equation of the Lorenz curve for Pareto distribution is found to be

$F_1 = 1 - (1 - F)^{(\alpha-1)/\alpha}$, and the Lorenz ratio is:

$$G = \frac{1}{(2\alpha - 1)}.$$

5.6 Illustration of Graphical Test and Fitting of Pareto Curve

5.6.1 Graphical Test

Let us take a closer look at the Pareto curve from the monthly household income data for urban area of Bangladesh obtained from HIES, 2010 and is shown in Table 5.1.

Table 5.1 Distribution of Households of Urban Areas by monthly household income groups, 2010

Monthly household income group (in Tk.)	No. of household	% of household
< 1500	115015	1.30
1500 – 1999	70656	0.80
2000 – 2499	93652	1.06
2500 – 2999	126083	1.42
3000 – 3999	447165	5.05
4000 – 4999	508763	5.74
5000 – 5999	611053	6.90
6000 – 6999	595452	6.72
7000 – 7999	529232	5.97
8000 – 8999	486583	5.49
9000 – 9999	424911	4.80
10000 – 12499	1019803	11.51
12500–14999	731016	8.25
15000–17499	604300	6.82
17500–19999	410360	4.63
20000–24999	591088	6.67
25000–29999	347883	3.93
30000–34999	316866	3.58
35000+	830265	9.37

Source: Report of the Household Income and Expenditure Survey, 2010, Bangladesh Bureau of Statistics, Statistics Division, Ministry of Planning

In order to test whether or not the given distribution of income follows Pareto law, we can verify first by the graphical test. The first step of graphical test is to compute cumulative frequencies of greater type (H_x) for successive class limits of monthly household income x . These figures are shown in cols. 1 and 2 of Table 5.2.

Table 5.2 Cumulative of Greater Type of H_x for Successive of Monthly Household Income in Urban Area, 2010

Monthly Household Income (x)	Cumulative (Urban) Frequency (\geq) H_x
1,500	8631131
2,000	8560475
2,500	8466823
3,000	8454740
4,000	8007576
5,000	7498812
6,000	6887759
7,000	6392307
8,000	5763075
9,000	5276492
10,000	4851581
12,500	3831778
15,000	3100762
17,500	2496462
20,000	2086102
25,000	1495014
30,000	1147131
35,000	830265

In the second step, the values of $\log H_x$ (log of number of household/person having income $\geq x$) are plotted against $\log x$ and is shown in Figure 5.3. The plotted graph shows a bend curve at lower income level but approximate linearity (straight line) is found over high values of income. It is observed from figure 5.3 that 7 points, from the point for the Pareto $x =$ BDT 12,500 upward the curve is straight line, while on the left (incomes below 12,5000) does not fit well and the curve becomes bend. It is, therefore, decided to fit the Pareto law over the range of household monthly income $x \geq 12500$.

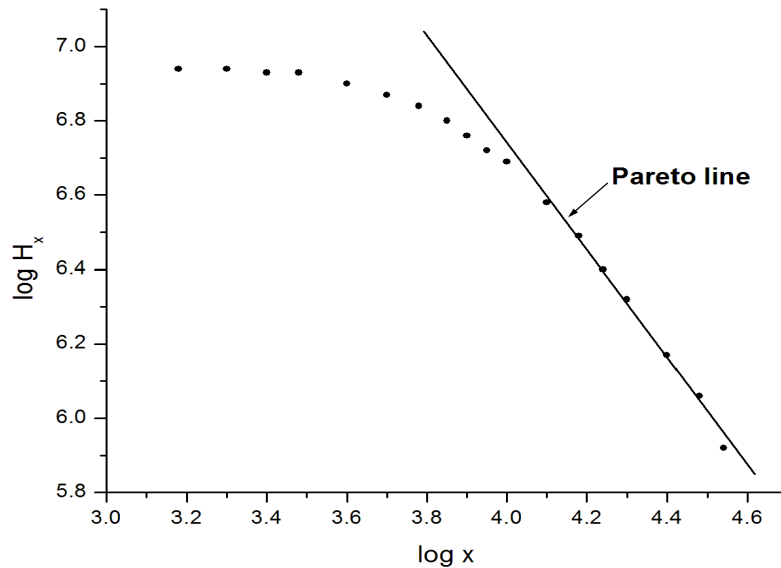


Figure 5.3: Pareto Curve for Graphical Test

5.6.2 Fitting of Pareto Curve

For fitting of Pareto curve, the following steps are needed:

- (i) From the graph of $\log H_x$ and $\log x$ find threshold income level (say x_0) above which the Pareto curves is approximately straight line or collinear.
- (ii) Judged the points from the point for x_0 and upward.
- (iii) To fit the Pareto curve over the range $x \geq x_0$, consider the pairs of $(\log H_x, \log x)$ values only and ignores the other pairs below the income x_0 .
- (iv) Draw a demarcation line which separates the two groups of pairs in the Table 5.2.
- (v) Apply the least square method to Pareto law in double-logarithmic form as:

$$\log H_x = \log A - \alpha \log x \quad \dots \dots \dots (5.5)$$

- (vi) Estimate $\log A$ and α by minimizing the sum squares

$$\sum (\log H_x - \log A + \alpha \log x)^2 \quad \dots \dots \dots (5.6)$$

By differentiating the equation (5.6) with respect to $\log A$ and α and putting it equal to zero we get the following normal equations

$$\sum \log H_x = n \log A - \alpha \sum \log x \quad \dots \dots \dots (5.7)$$

and

$$\sum (\log H_x)(\log x) = \log A \sum \log x - \sum (\log x)^2 \quad \dots \dots \dots (5.8)$$

These sums are based on the number of pairs of observations above the x_0 . By solving two normal equations (5.7) and (5.8) we can get estimate of $\log A$ and α to fit the Pareto curve.

Example 5.1

Fitting of Pareto curves have been illustrated in Tables 5.3—5.5 by considering three threshold values of monthly household income x , such as BDT 9,000, BDT 10,000 and BDT 12,5000. It appears that the Pareto curve is better fit for over the range $x \geq 12,500$ but the fit is not good for $x \geq 9,000$ and $x \geq 10,000$. Thus for higher incomes the Pareto curve fits better to the given frequency distribution of incomes. However, the estimated value of $\log H_x$ or H_x and α is estimated for threshold values of $x \geq 12,000$ are given below:

(i) The estimated values are:

$$\Sigma \log x = 30.2362$$

$$\Sigma \log H_x = 43.945$$

$$\Sigma (\log x)^2 = 130.7617$$

$$\Sigma (\log x) (\log H_x) = 189.587$$

The normal equations are therefore:

$$43.945 = 7 \log A - 30.2362\alpha$$

$$189.587 = 30.2362 \log A - 130.7617\alpha$$

The solutions are:

$$\hat{\alpha} = 1.4680, \log \hat{A} = 12.6187 \Rightarrow \hat{A} = 10^{12.6187}$$

Hence the Pareto equation fits to the data $x \geq 12500$

$$\log \hat{H}_x = 12.6187 - 1.4680 \log x$$

$$\text{or } \hat{H}_x = 10^{12.6787} x^{-1.4680}$$

From the fitted equation of Pareto curve we can easily compute the expected values of $\log H_x$ which may be denoted by $\log \hat{H}_x$. Col. 5 of Table 5.3 shows the computed values of $\log H_x$, while col. 6 gives the anti-logarithms of $\log H_x$ and is denoted by \hat{H}_x . Col. 7 gives the differences between successive values of \hat{H}_x which indicates the expected frequencies for different class intervals of income computed from Pareto distribution, while col. 8 gives corresponding observed frequencies obtained from Table 5.1.

Table 5.3 Graphical Test of Paretean Form and Filling of Pareto Curve over the Range $x \geq 12500$ for Size Distribution of Urban Income of Bangladesh 2010

Monthly House-hold Income (x)	Cum. freq(\geq) H_x	$\log x$	$\log H_x$	$\log \hat{H}_x = \log \hat{A} - \hat{\alpha} \log x$	\hat{H}_x	$\Delta \hat{H}_x = \text{exp. freq.}$	obs. freq.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
1500	8745131	3.176091	6.941766				
2000	8674475	3.301030	6.938243				
2500	8080823	3.397940	6.933529				
3000	8454740	3.477121	6.927100				
4000	8007575	3.602060	6.903501				
5000	7498812	3.698970	6.874992				
6000	6887759	3.778151	6.838078				
7000	6292307	3.845098	6.798810				
8000	5763075	3.903090	6.760654				
9000	5276492	3.954243	6.722345				
10000	4851581	4.000000	6.685883				
12500	3831778	4.096910	6.583400	6.604436	4021945	944445	731016
15000	3100762	4.176091	6.491468	6.488198	3077500	623242	604300
17500	2496462	4.243038	6.397325	6.389920	2454258	436877	410360
20000	2086102	4.301030	6.319336	6.304788	2017381	563516	591088
25000	1495014	4.397940	6.174645	6.162524	1453865	225291	347883
30000	1147131	4.477121	6.059613	6.046286	1112464	225291	316866
35000	830265	4.544068	5.919217	5.948008	887173	887173	830265
* Total	--	--	43.945	43.944	--	--	--

* Totals are over last 7 rows.

(ii) The estimated values of parameters for the threshold income $x \geq 10,000$ are given below:

$$\Sigma \log x = 34.2362$$

$$\Sigma \log H_x = 50.63089$$

$$\Sigma (\log x)^2 = 146.7617$$

$$\Sigma (\log x) (\log H_x) = 216.3305$$

The normal equations are therefore:

$$50.631 = 8 \log A - 34.2362\alpha$$

$$216.331 = 34.236 \log A - 146.762\alpha$$

The solutions are:

$$\hat{\alpha} = 1.3828, \log \hat{A} = 12.246 \Rightarrow \hat{A} = 10^{12.246}$$

Hence the Pareto equation fits to the data $x \geq 10,000$

$$\log \hat{H}_x = 12.246 - 1.3828 \log x$$

$$\text{or } \hat{H}_x = 10^{12.246} x^{-1.3828}$$

Cols. 5, 6, 7 and 8 of Table 5.4 show $\log \hat{H}_x, \hat{H}_x$, expected frequencies and the corresponding observed frequencies respectively.

Table 5.4 Graphical Test of Paretean Form and Fitting of Pareto Curve over the Range $x \geq 10000$ for Size Distribution of Urban Income of Bangladesh 2010

Monthly House-hold Income (x)	Cum. freq(\geq) H_x	$\log x$	$\log H_x$	$\log \hat{H}_x = \log \hat{A} - \hat{\alpha} \log x$	\hat{H}_x	$\Delta \hat{H}_x = \text{exp. freq.}$	obs. freq.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
1500	8745131	3.176091	6.941766				
2000	8674475	3.301030	6.938243				
2500	8580823	3.397940	6.933529				
3000	8454740	3.477121	6.927100				
4000	8007575	3.602060	6.903501				
5000	7498812	3.698970	6.874992				
6000	6887759	3.778151	6.838078				
7000	6292307	3.845098	6.798810				
8000	5763075	3.903090	6.760654				
9000	5276492	3.954243	6.722345				
10000	4851581	4.000000	6.685883	6.714800	5185612	1376771	1019803
12000	3831778	4.096910	6.583400	6.580793	3808841	848778	731016
15000	3100762	4.176091	6.491468	6.471301	2960063	568251	604300
17500	2496462	4.243038	6.397325	6.378727	2391812	403266	410360
20000	2086102	4.301030	6.319336	6.298536	1988546	527955	591088
25000	1495014	4.397940	6.174645	6.164529	1460591	325484	347883
30000	1147131	4.477121	6.059613	6.055037	1135107	217910	316866
35000	830265	4.544068	5.919217	5.962463	917197	917197	830265
* Total	--	--	50.631	50.619	--	--	--

(iii) The estimated values of parameters for the threshold income $x \geq 9,000$ are given below:

$$\sum \log x = 38.1904$$

$$\sum \log H_x = 57.3532$$

$$\sum (\log x)^2 = 162.3977$$

$$\sum (\log x) (\log H_x) = 242.9123$$

The normal equations are therefore:

$$57.353 = 9 \log A - 38.1904\alpha$$

$$242.9123 = 38.1904 \log A - 162.398\alpha$$

The solutions are:

$$\hat{\alpha} = 1.3408, \log \hat{A} = 12.0619 \Rightarrow \hat{A} = 10^{12.0619}$$

Hence the Pareto equation fits to the data $x \geq 9,000$

$$\log \hat{H}_x = 12.0619 - 1.3408 \log x$$

$$\text{or } \hat{H}_x = 10^{12.0619} x^{-1.13408}$$

Like Table 5.3 and Table 5.4, cols. 5, 6, 7 and 8 of Table 5.5 indicate $\log \hat{H}_x$, \hat{H}_x , expected frequencies, and the corresponding observed frequencies.

Table 5.5 Graphical Test of Paretean Form and Filling of Pareto Curve over the Range $x \geq 9,000$ for Size Distribution of Urban Income of Bangladesh 2010

Monthly House-hold Income (x)	Cum. freq(\geq) H_x	$\log x$	$\log H_x$	$\log \hat{H}_x = \log \hat{A} - \hat{\alpha} \log x$	\hat{H}_x	$\Delta \hat{H}_x = \text{exp. freq.}$	obs. freq.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
1500	8745131	3.176091	6.941766				
2000	8674475	3.301030	6.938343				
2500	8580823	3.397940	6.933529				
3000	8454740	3.477121	6.927100				
4000	8007575	3.602060	6.903501				
5000	7498812	3.698970	6.874992				
6000	6887759	3.778151	6.838078				
7000	6292307	3.845098	6.798810				
8000	5763075	3.903090	6.760654				
9000	5276492	3.954243	6.722345	6.760052	5755084	758192	424911
10000	4851581	4.000000	6.685883	6.698700	4996892	1292107	1019803
12000	3831778	4.096910	6.583400	6.568763	3704785	803457	731016
15000	3100762	4.176091	6.491468	6.462597	2901328	541749	604300
17500	249662	4.243038	6.397325	6.372835	2359579	386797	410360
20000	2086102	4.301030	6.319336	6.295079	1972782	510126	591088
25000	1495014	4.397940	6.174645	6.165142	1462656	317207	347883
30000	1147131	4.477121	6.059613	6.058976	1145449	213883	316866
35000	830265	4.544068	5.919217	5.969214	931566	931566	830265
Total	--	--	57.353	57.351	--	--	--

Table 5.6 shows the summary results of the estimated parameters of the fitted Pareto curve in logarithmic form (col.2), non-logarithmic form (col.3), elasticity (col.5) and Gini coefficients for the three threshold income levels (col.1).

Table 5.6 Summary Results of the Estimated Parameters, Elasticity and Lorenz Ratio

Threshold level $\geq x$	Fitted curve in logarithmic form	Fitted curve in non-logarithmic form	Elasticity of the function of income distribution	Lorenz Ratio
1	2	3	4	5
12,500	$\log \hat{H}_x = 12.6187 - 1.4680 \log x$	$\hat{H}_x = 10^{12.6787} \cdot x^{-1.4680}$	$\alpha = 1.4680$	0.5165
10,000	$\log \hat{H}_x = 12.6460 - 1.3828 \log x$	$\hat{H}_x = 10^{12.2460} \cdot x^{-1.3828}$	$\alpha = 1.3828$	0.5664
9,000	$\log \hat{H}_x = 12.0619 - 1.3408 \log x$	$\hat{H}_x = 10^{12.0619} \cdot x^{-1.3408}$	$\alpha = 1.3408$	0.5947

The parameter $-\alpha$ stands for the slope of the straight line and α is the elasticity of the number of income unit (households/persons) of the income distribution function with respect to the lower limit of the income x . The expression of the elasticity can be written as:

$$-\frac{d \log H_x}{d \log x} = \alpha$$

Where α indicates the elasticity of the number of households/persons H_x with respect to the lower limit of income x . Further let us differentiate the income distribution $H_x = A x^{-\alpha}$; we get

$$\frac{dH_x}{dx} = -A \alpha x^{-\alpha-1} \text{ or } dH_x = -A \alpha x^{-\alpha-1} dx. \text{ Therefore, the relative}$$

(increment or decrease in the number of persons due to raise in income level is

$$\frac{dH_x}{H_x} = \frac{-A \alpha x^{-\alpha-1}}{A x^{-\alpha}} dx = -\alpha x^{-1} dx = -\frac{\alpha}{x} dx.$$

It appears from Table 5.6 that the elasticity for $x \geq 12,500$, $x \geq 10,000$ and $x \geq 9,000$ is 1.468, 1.3828 and 1.3408 respectively. It is interesting to note that the elasticity (α) increases with the increase of income level. Let us consider $\alpha = 1.3828$ for $x \geq 10,000$ and if we raise the lower limit of BDT 10,000 by 10 percent or $dx = 1000$ i.e. we shift from BDT 10,000 to BDT 11,000, then the number of households/persons earning BDT 11,000 and more will be 13.83

percent smaller than the number of persons earning BDT 10,000. The value of the parameter α may also be considered as a measure of inequality and higher the value of α the greater is the difference between incomes of the various classes of population (Lange, O. 1978). The value of α can also be used for measuring the Lorenz ratio from the following expression:

$$G = 1/(2\alpha - 1)$$

It appears from the last column of Table 5.6 that as α rises, the Lorenz curve moves inward and Lorenz ratio falls.

5.7 The Lognormal Distribution (Two-Parameter)

5.7.1 Introduction

A large number of density functions are found in the literatures to describe income distribution. The most distributions of income (per household or per capita) are found to be unimodal and skewed to the right. But one of the popular parametric forms of skew distribution in economics is the lognormal. Although well-known normal distribution is widely used to describe the probability behaviour of a large number of random phenomena, it is not suitable to represent income distribution in the presence of income inequality. But the income distribution becomes approximately normal and symmetrical if logarithms of income (or expenditure) are taken instead of taking value of income (or expenditure) in arithmetic scale. It is observed from the logarithm table that towards the greater end the given differences in arguments are associated with small differences in logarithms, while at smaller end the same differences in argument are associated with the larger differences in logarithms. The logarithmic scale thus compresses the distribution of income at higher levels and stretches the distribution at lower levels. This logarithmic transformation would be likely to change a skew curve with a right-hand tail into a symmetrical curve. Thus, lognormal distribution is a popular parametric form of skewed distribution and it gives better explanation at lower income values (Klien, L.R., 1969).

5.7.2 Derivation of Probability Density Function of the Lognormal Distribution

Let y is the income/expenditure following normal distribution with mean μ and variance σ^2 and if $y = \log x$, then x is said to follow lognormal distribution with mean μ and variance σ^2 . Symbolically it can be written as if $\ln x \sim N(\mu, \sigma^2)$, thus $x \sim LN(\mu, \sigma^2)$. We know that

the probability distribution of the normal variate y with mean μ and variance σ^2 is

$$f(y; \mu, \sigma^2) = \frac{1}{\sigma\sqrt{2\pi}} e^{-\frac{1}{2}\left(\frac{y-\mu}{\sigma}\right)^2}; \quad -\infty < y < \infty$$

We can then deduce probability density function (pdf) of lognormal variate as follows:

$$\text{Let } y = \log x, \text{ then } dy = \frac{dx}{x}$$

$$\text{when } y = -\infty, x = 0 \text{ and when } y = \infty, x = \infty$$

Thus, the density function for the lognormal distribution of income can be derived by considering the ordinary normal distribution of the logarithm of income x and let us call it $\log x$. The probability density function on the scale of x is:

$$f(x; \mu, \sigma) = \frac{1}{x\sqrt{2\pi}\sigma} e^{-\frac{1}{2\sigma^2}(\log x - \mu)^2}; \quad 0 < x < \infty \quad \dots \dots (5.9)$$

The parameters of this distribution like normal distribution are μ and σ i.e. population mean of $\log x$ is μ and the population variance of $\log x$ is σ^2 (Roy, M.K., 1996). In other words, for lognormal distribution we can make similar calculations of normal distribution as:

$$\text{est } \mu = \frac{1}{N} \sum_{i=1}^N \log x_i = \overline{\log x}$$

$$\text{est } \sigma^2 = \frac{1}{N} \sum_{i=1}^N (\log x_i - \overline{\log x})^2$$

5.7.3 The Mean and Variance of Lognormal Distribution

5.7.3.1 The Mean

For lognormal distribution

$$f(x) = \frac{1}{x\sqrt{2\pi}\sigma} e^{-\frac{1}{2\sigma^2}(\log x - \mu)^2}$$

By definition, $\mu'_r = E(x^r)$, the r th moment about origin

$$\mu'_r = \int_0^{\infty} \frac{x^r}{x\sqrt{2\pi}\sigma} e^{-\frac{1}{2\sigma^2}(\log x - \mu)^2} dx$$

Now, let

$$\begin{aligned} \log x = y & \quad \text{and} \\ x = e^y & \quad dx = e^y dy \end{aligned}$$

x	0	∞
y	$-\infty$	∞

Then,

$$\begin{aligned} \mu'_r &= \int_{-\infty}^{\infty} \frac{1}{\sigma\sqrt{2\pi}} \frac{e^{ry}}{e^y} e^{-\frac{1}{2\sigma^2}(y-\mu)^2} e^y dy \\ &= \frac{1}{\sigma\sqrt{2\pi}} \int_{-\infty}^{\infty} e^{ry} e^{-\frac{1}{2\sigma^2}(y-\mu)^2} dy \\ &= e^{-\frac{1}{2\sigma^2}(y-\mu)^2 + ry} \\ &= \frac{1}{\sigma\sqrt{2\pi}} \int_{-\infty}^{\infty} e^{-\frac{1}{2\sigma^2}\{(y-\mu)^2 - 2\sigma^2 ry\}} dy \\ &= \frac{1}{\sigma\sqrt{2\pi}} \int_{-\infty}^{\infty} e^{-\frac{1}{2\sigma^2}\{(y-\mu-\sigma^2 r)^2 - (\sigma^2 r)^2 - 2\mu r\}} dy \\ &= \frac{1}{\sigma\sqrt{2\pi}} \int_{-\infty}^{\infty} e^{-\frac{1}{2\sigma^2}\{(y-\mu-\sigma^2 r)^2 - 2\mu r^2 - r^2 \sigma^4\}} dy \\ &= \frac{1}{\sigma\sqrt{2\pi}} \int_{-\infty}^{\infty} e^{-\frac{2}{2\omega^2}(y-\mu-\sigma^2 r)^2} e^{-\frac{1}{2\sigma^2}\{-\sigma^4 r^2 - 2\mu\sigma^2 r\}} dy \\ &= \frac{1}{\sigma\sqrt{2\pi}} \int_{-\infty}^{\infty} e^{-\frac{1}{2\sigma^2}(y-\mu-\sigma^2 r)^2} dy \cdot e^{\left(r\mu + \frac{1}{2}r^2\sigma^2\right)} \\ &= e^{r\mu + \frac{1}{2}r^2\sigma^2} \int_{-\infty}^{\infty} \frac{1}{\sigma\sqrt{2\pi}} e^{-\frac{1}{2\sigma^2}(y-\mu-\sigma^2 r)^2} dy \\ &= e^{r\mu + \frac{1}{2}r^2\sigma^2} ; \text{ since } \frac{1}{\sigma\sqrt{2\pi}} \int_{-\infty}^{\infty} e^{-\frac{1}{2\sigma^2}(y-\mu-\sigma^2 r)^2} dy = 1 \\ \therefore \mu'_r &= e^{r\mu + \frac{1}{2}r^2\sigma^2} \quad (\text{for details see Roy, M.K. 1996}) \end{aligned}$$

$$\text{Mean} = \mu'_1 = e^{\mu + \frac{1}{2}\sigma^2}$$

$$\mu'_2 = e^{2\mu + 2\sigma^2}$$

5.7.3.2 The Variance

$$\text{Variance} = \mu'_2 - (\mu'_1)^2$$

$$= e^{2\mu + 2\sigma^2} - e^{2\mu + \sigma^2}$$

$$= e^{2\mu} \cdot e^{2\sigma^2} - e^{2\mu} \cdot e^{\sigma^2}$$

$$= e^{2\mu} e^{\sigma^2} (e^{\sigma^2} - 1)$$

$$= e^{2\mu + \sigma^2} (e^{\sigma^2} - 1).$$

The Gini Coefficient (G) for measuring inequality can be estimated from the following expression:

$$G = 2\Phi\left(\frac{\sigma}{\sqrt{2}}\right) - 1$$

5.8 Graphical Test and Fitting of Two-Parameter Lognormal Distribution

5.8.1 Graphical Test:

For testing whether or not the given distribution of household monthly income follows approximately two-parameter lognormal, we can perform graphical test at the first step. The procedure for graphical test is explained below:

- (i) Obtain the cumulative proportion of households (H_x) or persons (P_x) having monthly income \leq each upper limit of monthly income (x). In the present context, cumulative proportion, graphical test and fitting of lognormal for size distribution of monthly household income for national, urban and rural areas obtainable from HIES, 2010 is considered.
- (ii) Compute fractile (t_p) of order P in $N(0, 1)$ which may be defined as:

$$P = \int_{-\infty}^{t_p} \frac{1}{\sqrt{2\pi}} e^{-\frac{x^2}{2}} dx \quad \dots \dots \dots (5.10)$$

Then t_p is called the normit of p . For better understanding let us illustrate to as $t_{0.5}=0$, $t_{0.95}=1.645$ and $t_{0.975}=1.96$.

Then the income x_p , the fractile of order p of LN (μ, σ^2) is given by:

$$x_p = \exp(\mu + \sigma t_p)$$

- (iii) The computation for the graphical test of lognormality for national, urban and rural is shown in Tables 5.7, 5.8 and 5.9

Table 5.7 Computation for the graphical test of lognormality for national, 2010

Upper limit of Household income (x)	Log x	Cum. prop. of Persons (\leq)	t_p
0	$-\infty$	0.00000000	$-\infty$
1500	3.176091	0.02724075	-1.92298839
1999	3.300813	0.04910356	-1.65360835
2499	3.397766	0.07942884	-1.40892384
2999	3.476976	0.11707140	-1.18975472
3999	3.601951	0.20967776	-0.80753986
4999	3.698883	0.30804023	-0.50141305
5999	3.778079	0.39427287	-0.26819952
6999	3.845036	0.47349759	-0.06648063
7999	3.903036	0.53781744	0.09493669
8999	3.954194	0.59019222	0.22803947
9999	3.999957	0.63556704	0.34663450
12499	4.096875	0.73247153	0.62030510
14999	4.176062	0.79462719	0.82258221
17499	4.243013	0.83974934	0.99342821
19999	4.301008	0.87249960	1.13828667
24999	4.397923	0.91468129	1.37015844
29999	4.477107	0.93817863	1.53966212
34999	4.544056	0.95726994	1.71984776
∞	∞	1.00000000	∞

Table 5.8 Computation for the graphical test of lognormality for urban, 2010

Upper limit of Household income (x)	Log x	Cum. prop. of Persons (\leq)	t_p
0	$-\infty$	0.00000000	$-\infty$
1500	3.176091	0.01298116	-2.2267748
1999	3.300813	0.02095575	-2.0343978
2499	3.397766	0.03152578	-1.8588278
2999	3.476976	0.04575613	-1.6874739

Contd.

Upper limit of Household income (x)	Log x	Cum. prop. of Persons (\leq)	t_p
3999	3.601951	0.09622539	-1.3033632
4999	3.698883	0.15364690	-1.0209169
5999	3.778079	0.22261337	-0.7633969
6999	3.845036	0.28981904	-0.5539135
7999	3.903036	0.34955079	-0.3865335
8999	3.954194	0.40446896	-0.2417964
9999	3.999957	0.45242652	-0.1195331
12499	4.096875	0.56752654	0.1700804
14999	4.176062	0.65003263	0.3854086
17499	4.243013	0.71823692	0.5776119
19999	4.301008	0.76455219	0.7210226
24999	4.397923	0.83126531	0.9591774
29999	4.477107	0.87052911	1.1288958
34999	4.544056	0.90629218	1.3182629
∞	∞	1.00000000	∞

Table 5.9 Computation for the graphical test of lognormality for rural, 2010

Upper limit of Household income (x)	Log x	Cum. prop. of Persons (\leq)	t_p
0	$-\infty$	0.00000000	$-\infty$
1500	3.176091	0.03246845	-1.8456923
1999	3.300813	0.05942275	-1.5596378
2499	3.397766	0.09699053	-1.2988918
2999	3.476976	0.14321617	-1.0659808
3999	3.601951	0.25127035	-0.6704975
4999	3.698883	0.36464214	-0.3460778
5999	3.778079	0.45720472	-0.1074784
6999	3.845036	0.54083569	0.1025393
7999	3.903036	0.60683759	0.2710861
8999	3.954194	0.65827995	0.4077733
9999	3.999957	0.70270791	0.5322048
12499	4.096875	0.79294178	0.8166711
14999	4.176062	0.84763681	1.0263505
17499	4.243013	0.88429685	1.1967442
19999	4.301008	0.91207407	1.3536381
24999	4.397923	0.94526231	1.6005557
29999	4.477107	0.96297956	1.7863607
34999	4.544056	0.97595882	1.9766398
∞	∞	1.00000000	∞

- (iv) Then, plot t_p , the normit¹ of p against $\log x$ instead of plotting P against x . The monthly household income distribution for national, urban and rural areas can be taken as two-parameter lognormal if the graphs of t_p against $\log x$ are approximately linear.
- (v) The plotted graphs of t_p against $\log x$ are shown in Figure 5.4. It appears from Fig. 5.4 that the relationship between t_p and $\log x$ for national and urban is found to be curved, while for rural area, it is nearly linear. Thus two parameter lognormal distributions are fitted for rural area only.

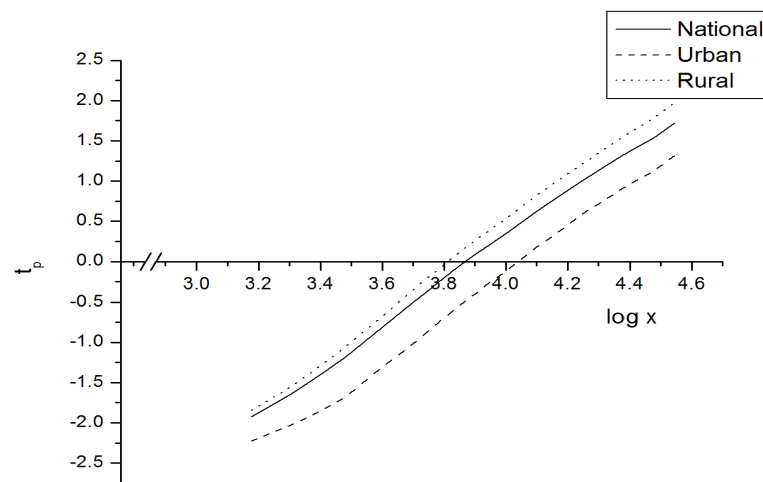


Figure 5.4 Graphical Test for lognormality (two parameters) for the size distribution of monthly household income in National, Urban and Rural Bangladesh, 2010.

5.8.2 Fitting of Lognormal Distribution for Rural Area

In case of $x \sim \Lambda(\mu, \sigma^2)$ or $\log x \sim N(\mu, \sigma^2)$, the estimate of μ and σ^2 can be obtained from two quantiles of different orders but the orders close to 0.05 and 0.95 are found to be more relevant and the equations for this order are:

$$\ln 26810 = \mu + \sigma t_{0.95}, \text{ and}$$

$$\ln 2428 = \mu + \sigma t_{0.05}$$

$$\text{or } 10.197 = \mu + 1.645\sigma$$

$$7.795 = \mu - 1.645\sigma, \text{ since } t_{0.95} = -t_{0.05}$$

Solving these two equations we get

$$\hat{\mu} = 8.996 \text{ and } \hat{\sigma} = 0.7298$$

¹ t_p is the fractile of order p of $N(0,1)$ which is defined by $p = \int_{-\infty}^{t_p} \frac{1}{\sqrt{2\pi}} e^{-\frac{x^2}{2}} dx$ then t_p is called the normit of p (for details see, Bhattacharya and Coondoo, 1992).

Thus the distribution of monthly household income in rural Bangladesh is LN $(8.996, 0.7298^2)$. The fitting of the distribution based on the estimated parameters to the observed data for rural areas is shown in Table 5.10 and it appears from the table that the fit seems to be satisfactory.

Table 5.10 Fitting of LN $(8.996, 0.7298^2)$ to the size distribution of household income in rural area, 2010

x	ln x	$t = \frac{\ln x - \hat{\mu}}{\hat{\sigma}}$	$\phi(t)$	$\Delta \phi(t) =$ expected proportion	Observed proportion
(1)	(2)	(3)	(4)	(5)	(6)
0	$-\infty$	$-\infty$	0.00000000	—	—
1500	7.313220	-2.30580928	0.01056065	0.01056065	0.03246845
1999	7.600402	-1.91230154	0.02791876	0.01735811	0.02695430
2499	7.823646	-1.60640459	0.05409252	0.02617376	0.03756778
2999	8.006034	-1.35648920	0.08747178	0.03337926	0.04622564
3999	8.293800	-0.96218196	0.16797911	0.08050733	0.10805419
4999	8.516993	-0.65635356	0.25579833	0.08781922	0.11337179
5999	8.699348	-0.40648388	0.34219355	0.08639522	0.09256258
6999	8.853523	-0.19522806	0.42260721	0.08041366	0.08363097
7999	8.987072	-0.01223375	0.49511956	0.07251235	0.06600190
8999	9.104869	0.14917613	0.55929267	0.06417311	0.05144236
9999	9.210240	0.29356038	0.61545307	0.05616040	0.04442796
12499	9.433404	0.59934766	0.72552946	0.11007639	0.09023387
14999	9.615739	0.84918993	0.80211219	0.07658273	0.05469503
17499	9.769899	1.06042617	0.85552462	0.05341243	0.03666004
19999	9.903438	1.24340580	0.89314083	0.03761621	0.02777722
24999	10.126591	1.54917937	0.93933070	0.04618987	0.03318824
29999	10.308919	1.79901251	0.96399165	0.02466095	0.01771725
34999	10.463075	2.01024222	0.97779722	0.01380557	0.01297926
∞	∞	∞	1.00000000	0.02220278	0.02404118
Total	—	—	—	1.00000000	1.00000000

5.8.3 Fitting of Lognormal Distribution for Urban Area

Although the relationship between t_p and $\log x$ for urban and national data are not linear, the fitting of the distribution based on estimated parameters to the observed data for urban and national has also been made and shown in Table 5.11 for urban and Table 5.12 for national income data.

The estimate of μ and σ^2 is based on two quantiles with order close to 0.05 and 0.95. In the present case the following equations are used

$$\ln 56850 = \mu + \sigma t_{0.95}$$

$$\text{and } \ln 3091 = \mu + \sigma t_{0.05}$$

$$\text{or } 10.948 = \mu + 1.645\sigma$$

$$\text{and } 8.036 = \mu - 1.645\sigma$$

The solution is:

$$\hat{\mu} = 9.4922 \text{ and } \hat{\sigma} = 0.8851$$

Table 5.11 Fitting of LN ($9.4922, 0.8851^2$) to the size distribution of household income in urban area, 2010

x	ln x	$t = \frac{\ln x - \hat{\mu}}{\hat{\sigma}}$	$\phi(t)$	$\Delta \phi(t) =$ expected proportion	Observed proportion
(1)	(2)	(3)	(4)	(5)	(6)
0	$-\infty$	$-\infty$	0.000000000	—	—
1500	7.313220	-2.46184568	0.006911206	0.006911206	0.012981163
1999	7.600402	-2.13738297	0.016283428	0.009372222	0.007974586
2499	7.823646	-1.88515882	0.029704200	0.013420772	0.010570029
2999	8.006034	-1.67909369	0.046566893	0.016862693	0.014230352
3999	8.293800	-1.35397174	0.087872696	0.041305803	0.050469259
4999	8.516993	-1.10180412	0.135273419	0.047400723	0.057421514
5999	8.699348	-0.89577667	0.185186026	0.049912607	0.068966471
6999	8.853523	-0.72158789	0.235273944	0.050087918	0.067205665
7999	8.987072	-0.57070183	0.284100890	0.048826946	0.059731747
8999	9.104869	-0.43761299	0.330833425	0.046732535	0.054918170
9999	9.210240	-0.31856246	0.375029162	0.044195737	0.047957562
12499	9.433404	-0.06642874	0.473518244	0.098489082	0.115100022
14999	9.615739	0.13957611	0.555502540	0.081984296	0.082506090
17499	9.769899	0.31374875	0.623144063	0.067641523	0.068204294
19999	9.903438	0.46462270	0.678899163	0.055755100	0.046315264
24999	10.126591	0.71674512	0.763234309	0.084335146	0.066713122
29999	10.308919	0.92274243	0.821929276	0.058694967	0.039263800
34999	10.463075	1.09690969	0.863659564	0.041730288	0.035763068
∞	∞	∞	1.000000000	0.136340436	0.093707824
Total	—	—	—	1.000000000	1.000000000

5.8.4 Fitting of Lognormal Distribution for National Level Data

The estimate of μ and σ^2 is based on the two quantiles for national data with order close to 0.05 and 0.95.

In the present case the following equations are used:

$$\begin{aligned} \text{In } 34999 &= \mu + \sigma t_{0.95} \\ \text{and In } 2014 &= \mu + \sigma t_{0.05} \\ \text{or } 10.463 &= \mu + 1.645\sigma \\ \text{and } 7.608 &= \mu - 1.645\sigma \end{aligned}$$

The solution is:

$$\hat{\mu} = 9.035 \text{ and } \hat{\sigma} = 0.8681$$

Table 5.12 Fitting of LN(9.035, 0.8851²) to the size distribution of household income for national, 2010

x	In x	$t = \frac{\ln x - \hat{\mu}}{\hat{\sigma}}$	$\phi(t)$	$\Delta \phi(t) =$ expected proportion	Observed proportion
(1)	(2)	(3)	(4)	(5)	(6)
0	$-\infty$	$-\infty$	0.00000000	—	—
1500	7.313220	-1.9834	0.02366202	0.02366202	0.02724075
1999	7.600402	-1.6526	0.04920901	0.02554699	0.02186280
2499	7.823646	-1.3954	0.08144635	0.03223734	0.03032529
2999	8.006034	-1.1853	0.11794786	0.03650151	0.03764256
3999	8.293800	-0.8538	0.19660261	0.07865475	0.09260636
4999	8.516993	-0.5967	0.27534940	0.07874679	0.09836247
5999	8.699348	-0.3867	0.34950721	0.07415781	0.08623264
6999	8.853523	-0.2090	0.41720409	0.06769688	0.07922472
7999	8.987072	-0.0552	0.47798540	0.06078131	0.06431985
8999	9.104869	0.0804	0.53207410	0.05408870	0.05237478
9999	9.210240	0.2019	0.57998948	0.04791538	0.04537481
12499	9.433404	0.4589	0.67686059	0.09687111	0.09690449
14999	9.615739	0.6689	0.74824488	0.07138429	0.06215566
17499	9.769899	0.8466	0.80137988	0.05313500	0.04512215
19999	9.903438	1.0004	0.84143882	0.04005894	0.03275026
24999	10.126591	1.2574	0.89570437	0.05426555	0.04218168
29999	10.308919	1.4675	0.92887723	0.03317286	0.02349736
34999	10.463075	1.6450	0.95002106	0.02114383	0.01909131
∞	∞	∞	1.00000000	0.04997894	0.04273006
Total	—	—	—	1.00000000	1.00000000

It appears from Tables 5.11 and 5.12; the fittings of the income distribution for urban and national level are less satisfactory compared to income distribution in rural area.

5.9 The Three-Parameter Lognormal Distribution

5.9.1 Introduction

The three parameter lognormal model is nothing but lognormal two-parameter model with a change of origin. There is one additional parameter x_0 , the minimum or threshold value of income is included in three-parameter lognormal distribution in addition to mean μ and variance σ^2 . Now if x denote income and x_0 the minimum income level and if $(x - x_0) \sim \text{LN}(\mu, \sigma^2)$, then one can say that x follows three-parameter lognormal distribution with parameters x_0 , μ and σ^2 and in symbol it can be written as $x \sim \text{LN}(x_0, \mu, \sigma^2)$. When $x_0 = 0$, the two-parameter lognormal distribution becomes the special case of the three-parameter lognormal distribution $\text{LN}(0, \mu, \sigma^2)$. However, the three-parameter lognormal distribution is more difficult to fit and test graphically if x_0 is not a known priori. On the other hand, if x_0 is known then fitting and graphical test can be done with simple modification of the graphical test of two-parameter lognormal distribution. However, the density function of three-parameter lognormal model $\text{LN}(x_0, \mu, \sigma^2)$ is given by:

$$f(x) = \frac{1}{\sqrt{2\pi}\sigma(x-x_0)} e^{-\frac{1}{2} \left[\frac{(\ln(x-x_0)-\mu)^2}{\sigma^2} \right]}; \quad x_0 < x < \infty \quad \dots (5.11)$$

And the corresponding distribution is given by

$$F(x) = \text{Prob}(x \leq x) = \phi(z), \quad \text{where } z = \frac{\ln(x-x_0)-\mu}{\sigma}$$

The mean and variance can be computed from the following expressions

$$\begin{aligned} \text{Mean} &= x_0 + e^{\left(\mu + \frac{1}{2}\sigma^2\right)} \\ \text{and variance} &= e^{\left(2\mu + \sigma^2\right)} \left(e^{\sigma^2} - 1 \right) \end{aligned}$$

5.9.2 Graphical Test:

In this case, if x_0 is known then one can plot t_p , the normit of p in $N(0, 1)$ against $\log(x-x_0)$ instead of against $\log x$ and observe whether the graph is reasonably linear. If x_0 is not known, one should try for several values of x_0 on trial basis and determine value of x_0 for which

the graph is approximately linear, then the three-parameter lognormal distribution can be used for that particular value of x_0 . The graph is shown in figure 5.5 for national, urban and rural areas. The calculation for t_p^2 is shown in Tables 5.13, 5.14 and 5.15 for rural, urban and national respectively.

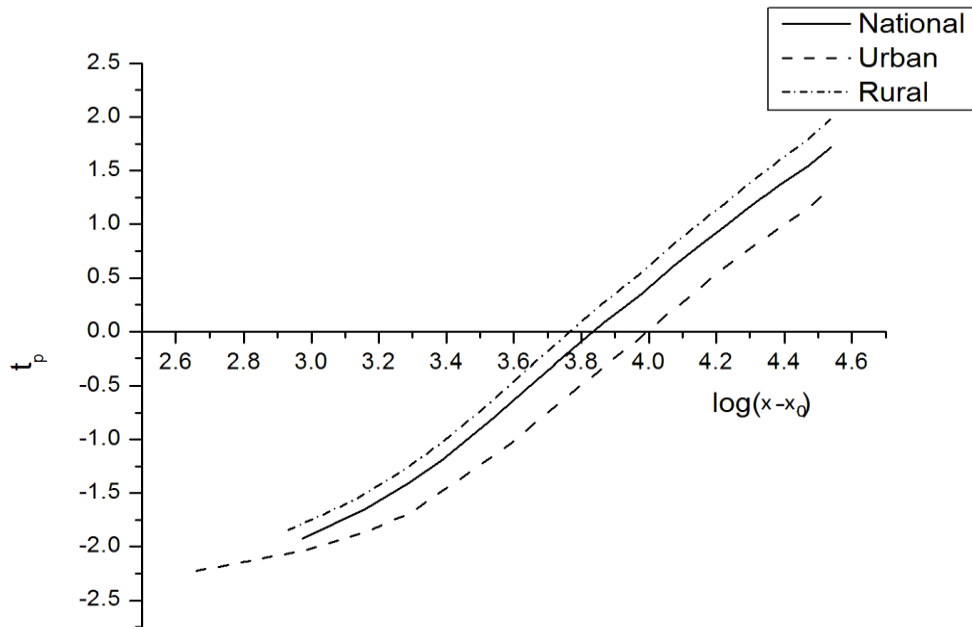


Fig. 5.5 Graphical test of lognormality (three-parameter) for the size distribution of monthly household income in national, urban and rural, 2010.

Table 5.13 Computation for the Graphical Test of Lognormality for Rural Area, 2010.

Upper limit of household income (x)	Cum. Prop. of Persons (\leq) (p)	t_p
0	0.00000000	$-\infty$
1500	0.03246845	-1.8456923
1999	0.05942275	-1.5596378
2499	0.09699053	-1.2988918
2999	0.14321617	-1.0659808
3999	0.25127035	-0.6704975
4999	0.36464214	-0.3460778

Contd.

² t_p denotes the fractile of order p in $N(0,1)$ and is defined by

$$p = \int_{-\infty}^{t_p} \frac{1}{\sqrt{2\pi}} e^{\left(\frac{-x^2}{2}\right)} dx \text{ and } t_p \text{ is called the normit of } p.$$

Upper limit of household income (x)	Cum. Prop. of Persons (\leq) (p)	t_p
5999	0.45720472	-0.1074784
6999	0.54083569	0.1025393
7999	0.60683759	0.2710861
8999	0.65827995	0.4077733
9999	0.70270791	0.5322048
12499	0.79294178	0.8166711
14999	0.84763681	1.0263505
17499	0.88429685	1.1967442
19999	0.91207407	1.3536381
24999	0.94526231	1.6005557
29999	0.96297956	1.7863607
34999	0.97595882	1.9766398
∞	1.00000000	∞

Table 5.14 Computation for the Graphical Test of Lognormality for Urban Area, 2010.

Upper limit of household income (x)	Cum. Prop. of Persons (\leq) (p)	t_p
0	0.00000000	$-\infty$
1500	0.01298116	-2.2267748
1999	0.02095575	-2.0343978
2499	0.03152578	-1.8588278
2999	0.04575613	-1.6874739
3999	0.09622539	-1.3033632
4999	0.15364690	-1.0209169
5999	0.22261337	-0.7633969
6999	0.28981904	-0.5539135
7999	0.34955079	-0.3865335
8999	0.40446896	-0.2417964
9999	0.4524652	-0.1195331
12499	0.56752654	0.1700804
14999	0.65003263	0.3854086
17499	0.71823692	0.5776119
19999	0.76455219	0.7210226
24999	0.83126531	0.9591774
29999	0.87052911	1.1288958
34999	0.90629218	1.3182629
∞	1.00000000	∞

Table 5.15 Computation for the Graphical Test of Lognormality National, 2010.

Upper limit of household income (x)	Cum. Prop. of Persons (\leq) (p)	t_p
0	0	$-\infty$
1500	0.02724075	-1.92298839
1999	0.04910356	-1.65360835
2499	0.07942884	-1.40892384
2999	0.11707140	-1.18975472
3999	0.20967776	-0.80753986
4999	0.30804023	-0.50141305
5999	0.39427287	-0.26819952
6999	0.47349759	-0.06648063
7999	0.53781744	0.09493669
8999	0.59019222	0.22803947
9999	0.63556704	0.34663450
12499	0.73247153	0.62030510
14999	0.79462719	0.82258221
17499	0.83974934	0.99342821
19999	0.87249960	1.13828667
24999	0.91468128	1.37015844
29999	0.93817863	1.53966212
34999	0.95726994	1.71984776
∞	1.0000000	∞

5.9.3 Estimation of Parameters and Fitting of the Curve

Although, the maximum likelihood and other methods have been discussed in the literatures for estimation of parameters, but for survey data with complex sampling design, the simple method of quantiles is suggested (Aitchison and Brown, 1957). In this method, one uses three sample quantiles and equate them to theoretical expression for corresponding three quantiles. Suppose the sample three quantiles are $1-p$, $1/2$, and p , where p is greater than $1/2$, the three equations are then obtained as:

$$x_{1-p} = x_0 + e^{\left(\mu - t_p \sigma\right)}$$

$$x_{0.5} = \hat{x}_0 + e^{\left(\hat{\mu}\right)}$$

$$x_p = \hat{x}_0 + e^{\left(\mu + t_p \sigma\right)}$$

where t_p is the normit of order p in $N(0,1)$. Now the three parameters can be estimated by solving the above three equations and the solutions are found in Bhattacharya and Coondoo (1995) as:

$$\hat{\sigma} = \frac{1}{t_p} \ln \left(\frac{x_p - x_{0.5}}{x_{0.5} - x_{1-p}} \right)$$

$$\hat{\mu} = \ln(x_{0.5} - x_{1-p}) - \ln \left(1 - e^{-t_p \hat{\sigma}} \right)$$

$$\hat{x}_0 = x_{0.5} - e^{\hat{\mu}}$$

However, Aitchison and Brown (1957) suggested to use three quantiles of order 0.05, 0.5 and 0.95 for this purpose. For the sake of illustration these quantiles of 0.05, 0.5 and 0.95 have been used. The results are shown below:

(i) For Rural Area

The three sample quantiles are

$$x_{0.05} = 2499 + \frac{(2999 - 2499)(0.1 - 0.097)}{(0.1432 - 0.057)} = 2531$$

$$x_{0.5} = 5999 + \frac{(6999 - 5999)(0.5 - 0.452)}{(0.5409 - 0.457)} = 6512$$

$$x_{0.95} = 17499 + \frac{(19999 - 17499)(0.9 - 0.8943)}{(0.91207 - 0.077)} = 18901$$

Using these three sample quantiles and since, $t_{0.95} = 1.28155$, one can get the following three estimates as:

$$\hat{\sigma} = 0.8859, \hat{\mu} = 8.6769, \hat{x}_0 = 646.165$$

(ii) For Urban Area

The three sample quantiles are

$$x_{0.05} = 3999 + \frac{(4999 - 3999)(0.1 - 0.0962)}{(0.1535 - 0.0962)} = 4065$$

$$x_{0.5} = 9999 + \frac{(12499 - 9999)(0.5 - 0.452)}{(0.5675 - 0.4524)} = 11042$$

$$x_{0.95} = 29999 + \frac{(34999 - 29999)(0.9 - 0.8705)}{(0.90629 - 0.8705)} = 34124$$

Using these three sample quantiles and since, $t_{0.9} = 1.28155$, one can get the following three estimates as:

$$\hat{\sigma} = 0.9336, \hat{\mu} = 9.2103, \hat{x}_0 = 1042.404$$

(iii) For National level data

The three sample quantiles are

$$x_{0.05} = 1999 + \frac{(2499 - 1999)(0.05 - 0.0491)}{(0.0794 - 0.0491)} = 4065$$

$$x_{0.5} = 6999 + \frac{(7999 - 6999)(0.5 - 0.473)}{(0.538 - 0.473)} = 7414$$

$$x_{0.95} = 29999 + \frac{(349999 - 29999)(0.9 - 0.8705)}{(0.90629 - 0.8705)} = 34856$$

Using these three sample quantiles and since, $t_{0.95} = 1.28155$, one can get the following three estimates as:

$$\hat{\sigma} = 0.94236, \hat{\mu} = 8.8327, x_0 = 559.230$$

Based on the three prescribed quantiles and estimated parameters fitting of the size distribution of monthly household income in rural, urban and national level is shown in Tables 5.16, 5.17 and 5.18 respectively.

Table 5.16 Fitting LN(646.1658.6769,0.8829²) to the Size Distribution of MOI in Rural, 2010

MOI (Tk.) x	$x - x_0$	$t = \frac{\ln(x - x_0) - \hat{\mu}}{\hat{\sigma}}$	$\varphi(t)$	$\Lambda \varphi(t) =$ Epected proportlor	Observed proportion
(1)	(2)	(3)	(4)	(5)	(6)
535.197	0	∞	0		
1500	853.535	-2.175372	0.0148011	0.0148011	0.0324685
1999	1352.835	-1.655878	0.0488733	0.0340721	0.0269543
2499	1852.835	-1.300855	0.096654	0.0477807	0.0375678
2999	2352.835	-1.031181	0.1512279	0.0545739	0.0462256
3999	3352.835	-0.631378	0.2638964	0.1126686	0.1080542
4999	4352.835	-0.336739	0.3681567	0.1042603	0.1133718
5999	5352.835	-0.103305	0.4588602	0.0907035	0.0925626
6999	6352.835	0.0900287	0.5358678	0.0770076	0.083631
7999	7352.835	0.2550415	0.6006545	0.0647867	0.0660019
8999	8352.835	0.3989799	0.655046	0.0543915	0.0514424
9999	9352.835	0.5266224	0.7007721	0.0457261	0.044428
12499	11052.835	0.7940201	0.7864081	0.085636	0.0902339
14999	14352.835	1.0100494	0.8437642	0.0573561	0.054695
17499	16852.835	1.1913017	0.8832324	0.0394682	0.03666
19999	19352.835	1.3474367	0.9110802	0.0278478	0.0277772
24999	24352.835	1.6068445	0.9459558	0.0348756	0.0331882
29999	29352.835	1.8176368	0.9654402	0.0194844	0.0177173
34999	34352.835	1.9951911	0.976989	0.0115488	0.0129793
∞	∞	∞	1	0.023011	0.0240412
Total	-	-	-	1.000000	1.000000

Table 5.17 Fitting LN(1042.40,9.2103,0.9336²) to the Size Distribution of Monthly Household Income in Urban Area, 2010

MOI (Tk.) x	$x - x_0$	$\frac{t = \ln(x - x_0) - \hat{\mu}}{\hat{\sigma}}$	$\phi(t)$	$\Lambda \phi(t) =$ Epected proportior	Observed proportion
(1)	(2)	(3)	(4)	(5)	(6)
535.197	0	∞	0		
1500	457.596	-3.3036775	0.0004771277	0.0004771277	0.012981163
1999	956.596	-2.5138377	0.0059712695	0.0054941417	0.007974586
2499	1456.596	-2.0634560	0.0195346624	0.0135633930	0.010570029
2999	1956.596	-1.7473634	0.042871589	0.0207524965	0.014230352
3999	2956.596	-1.3051694	0.0959175925	0.0556304336	0.050469259
4999	3956.596	-0.9931027	0.1603299592	0.0644123667	0.057421514
5999	4956.596	-0.7517411	0.2261033795	0.0657734203	0.068966471
6999	5956.596	-0.5548903	0.2894848632	0.0633814837	0.067205665
7999	6956.596	-0.3886616	0.3487632551	0.0592783919	0.059731747
8999	7956.596	-0.24479980	0.4033064055	0.0545431504	0.054918170
9999	8956.596	-0.1179889	0.4530382096	0.0497318040	0.047957562
12499	11456.596	0.1456951	0.5579189414	0.1048807319	0.115100022
14999	13956.596	0.3571203	0.6394991240	0.0815801825	0.082506090
17499	16456.596	0.5336136	0.7031955484	0.0636964244	0.068204294
19999	18956.596	0.6850977	0.7533588680	0.0501633196	0.046315264
24999	23956.596	0.9358387	0.8253218681	0.0719630001	0.066713122
29999	28956.596	1.1388746	0.8726222631	0.0473003950	0.039263800
34999	33956.596	1.3094884	0.9048155231	0.0321932600	0.035763068
∞	∞	∞	1.000000000	0.0951844769	0.093407824
Total	—	—	—	1.0000000000	1.000000000

Table 5.18 Fitting LN (559.230,8.8327,0.9423²) to the Size Distribution of Monthly Household Income in National level 2010

MOI (Tk.) x	$x - x_0$	$\frac{t = \ln(x - x_0) - \hat{\mu}}{\hat{\sigma}}$	$\phi(t)$	$\Lambda \phi(t) =$ Epected proportior	Observed proportion
(1)	(2)	(3)	(4)	(5)	(6)
559.230	0	$-\infty$	0.00000000	—	—
1500	940.77	-2.10761043	0.01753235	0.01753235	0.02724075
1999	1439.77	-1.65601331	0.04885956	0.03132721	0.02186280
2499	1939.77	-1.33967453	0.09607559	0.04131603	0.03032529
2999	2439.77	-1.09629730	0.13647434	0.04629875	0.03764256

Contd.

MOI (Tk.) x	$x - x_0$	$\frac{t = \ln(x - x_0) - \hat{\mu}}{\hat{\sigma}}$	$\phi(t)$	$\Lambda \phi(t) =$ Epected proportior	Observed proportion
3999	3439.77	-0.73176283	0.23215667	0.09568233	0.09260636
4999	4439.77	-0.46093829	0.32242144	0.09026477	0.09836247
5999	5439.77	-0.24536553	0.40308671	0.08066527	0.08623264
6999	6439.77	-0.06627602	0.47357904	0.07049233	0.07922472
7999	7439.77	0.08690992	0.53462844	0.06104940	0.06431985
8999	8439.77	0.22074746	0.58735546	0.05272702	0.05237478
9999	9439.77	0.33958070	0.63291384	0.04555838	0.04537481
12499	11939.77	0.58891024	0.72203926	0.08912541	0.09690449
14999	14439.77	0.79066272	0.78542958	0.06339033	0.06215566
17499	16939.77	0.96011821	0.83150214	0.04607256	0.04512215
19999	19439.77	1.10620423	0.86568093	0.03417880	0.03275026
24999	24439.77	1.34911069	0.91134929	0.04566836	0.04218168
29999	29439.77	1.54664307	0.93902533	0.02767604	0.02349736
34999	34439.77	1.71311396	0.95665421	0.01762888	0.01909131
∞	∞	∞	1.00000000	0.04334579	0.04273006
Total	–	–	–	1.00000000	1.00000000

5.10 Other Parametric Distributions

The Paretean and lognormal distributions are by far the most useful for description or graduation of income distributions. It is found that the Pareto distribution gives a better fit and explanation of the upper tail of income values, while the lognormal distribution fits well on middle ranges but gives poor fit at upper tail of income values. However, other curves and distributions have also been suggested for the graduation of income distribution, more generally, for skew phenomena in economics. Among others, the exponential, Gamma, Champernowne, Weibull distribution, generalized Beta distribution of second kind (GB2) etc. may be mentioned. These distributions have been suggested and employed in the income size distributional literature. Brief descriptions of these distributions are given below. These distributions also provide the method for the computation of Gini coefficient (G) for measuring inequality (Shakeel, M. et.al., 2015).

5.10.1 Exponential distribution:

The exponential distribution is a class of continuous probability distribution. They are often used to model the time between events that happen at a constant average rate. Many researchers used exponential

form to fit income distribution. The exponential probability density function with one parameter for a continuous random variable X is given by:

$$f(x;\lambda) = \lambda e^{-\lambda x} \quad ; \quad \lambda > 0 \text{ and } x > 0 \\ = 0, \text{ otherwise}$$

Properties:

(i) Mean of $x = \frac{1}{\lambda}$

(ii) Variance of $x = \frac{1}{\lambda^2}$

(iii) Median of $x = \frac{1}{\lambda} \log 2$

(iv) Mode of the distribution is at the lowest value.

Proof:

If X is an exponential variate with pdf,

$$f(x;\lambda) = \lambda e^{-\lambda x} \quad ; \quad x > 0 \\ \lambda > 0$$

then, the moment generating function (mgf) of X is,

$$\begin{aligned} M_x(t) &= E[e^{tx}] \\ &= \int_0^{\infty} e^{tx} \lambda e^{-\lambda x} dx \\ &= \lambda \int_0^{\infty} e^{-x(\lambda-t)} dx \\ &= \lambda \left[\frac{e^{-x(\lambda-t)}}{-(\lambda-t)} \right]_0^{\infty} \\ &= \frac{\lambda}{-(\lambda-t)} [e^{\infty} - e^0] \\ &= \frac{\lambda}{-(\lambda-t)} [0 - 1] \\ &= \frac{\lambda}{-(\lambda-t)} (-1) \\ &= \frac{\lambda}{\lambda-t} = \frac{1}{\frac{\lambda-t}{\lambda}} = \left(1 - \frac{t}{\lambda}\right)^{-1} \end{aligned}$$

Now, the cumulate generating function, cgf of X is

$$\begin{aligned} K_x(t) &= \log M_x(t) \\ &= \log \left(1 - \frac{t}{\lambda} \right)^{-1} \\ &= -\log \left(1 - \frac{t}{\lambda} \right) \\ &= \frac{t^1}{\lambda^1!} + \frac{t^2}{2\lambda^2} + \frac{t^3}{3\lambda^3} + \frac{t^4}{4\lambda^4} + \dots + \frac{t^r}{r\lambda^r} + \dots \end{aligned}$$

By definition, K_r = co-efficient of $\frac{t^r}{r!}$ in $K_x(t)$

$$\therefore K_r = \frac{(r-1)!}{\lambda^r}$$

$$K_1 = \frac{1}{\lambda} = \text{mean}$$

$$K_2 = \frac{1}{\lambda^2} = \text{variance}$$

$$\text{Median} = \frac{1}{\lambda} \log 2.$$

The Gini coefficient (G) can be computed from the following expression:

$$G = \frac{1}{2}.$$

5.10.2 The Gamma Distribution

The Gamma distribution derives its name from the well known Gamma which is very important in many areas of probability theory. The Gamma distribution belongs to Karl Pearson's type III and it is a skew curve which can be used in graduating income distribution. If x is a Gamma variate, then the density function of Gamma distribution is as follows:

$$f(x; \alpha) = \frac{\lambda}{\Gamma \alpha} e^{-x} x^{\alpha-1}; \quad \alpha > 0, x \geq 0$$

where α is the positive parameters and $\Gamma \alpha$ denotes gamma function. Some of the researchers used this distribution to fit income distribution and illustrated better fit than the lognormal distribution (Bhattacharya

and Condo, 1992). The mean and variance of the Gamma distribution are equal to the parameter α . The Gini coefficient (G) can be computed from the following expression:

$$G = \frac{\Gamma\left(\alpha + \frac{1}{2}\right)}{\Gamma(\alpha + 1)\sqrt{\pi}}$$

5.10.3 Weibull Distribution

The Weibull distribution is a two parameter distribution where all moments exist. Some of the researchers attempted to fit the income distribution by this distribution. The cumulative distribution function for the Weibull distribution function is:

$$\begin{aligned} F(x; K, \lambda) &= 1 - e^{-\left(\frac{x}{\lambda}\right)^k}, \text{ for } x \geq 0 \\ &= 0 \text{ for } x < 0 \end{aligned}$$

The probability density function of Weibull distribution for the random variable x is

$$\begin{aligned} f(x; \lambda, k) &= \frac{k}{\lambda} \left(\frac{x}{\lambda}\right)^{k-1} e^{-\left(\frac{x}{\lambda}\right)^k} \text{ for } x \geq 0 \\ &= 0 \end{aligned}$$

Where $k > 0$ is the shape parameter for $x < 0$. The form of the density function of the Weibull distribution changes drastically with the value of shape parameter.

The r-th moments around zero are given by

$$\mu_r = \frac{\Gamma\left(1 + \frac{r}{\alpha}\right)}{k^r}$$

where $\Gamma\alpha$ is the gamma function defined by

$$\Gamma\alpha = \int_0^{\infty} v^{\alpha} \exp(-v) dv$$

As we have the direct expression of the distribution, the Gini-coefficient is directly available from the following expression:

$$\text{Gini index} = 1 - \left(1/2^\alpha\right).$$

5.10.4 Champernowne Distribution

Champernowne suggested this distribution in 1952 with the following density function of $t = \log x$, called income power:

$$f(t) = \frac{N}{\cosh\{\alpha(t - t_0)\} + \lambda}$$

where $\cos \theta = \lambda$, $\alpha > 0$, $0 \leq \theta < \pi$. This distribution is known as *the Champernowne distribution*. Champernowne examined its properties and proposed different methods of fitting it to observe nature of data. It is important to note that as $x \rightarrow \infty$, $1 - F(x) \rightarrow \frac{\sin \theta}{\theta} \left(\frac{x}{x_0} \right)^{-\alpha}$, which is

Paretean with slope parameter α .

If in the Champernowne distribution, $\theta \rightarrow 0$, then the limiting form is:

$$F(x) = \frac{1}{1 + \left(\frac{x}{x_0} \right)^{-\alpha}} = \frac{1}{1 + e^{-\alpha(\log x - \log x_0)}}$$

which is called the log-logistic distribution. The Gini coefficient may be obtained for this distribution is:

$$G = 1/\alpha.$$

5.10.5 Generalized Beta Distribution of the Second Kind (GB2)

The density function for GB2³ distribution is given by

$$GB2(y; a, b, p, q) = \frac{|a|y^{ap-1}}{b^{ap}B(p, q) \left(1 + \left(\frac{y}{b} \right)^a \right)^{p+q}}$$

Where,

$B(p; q)$ is the beta function, $b > 0$ is a scale parameter, $p > 0$; $q > 0$ and $a > 0$ are shape parameters.

The parameter a represents the overall shape, p governs the left tail and q - the right tail

Let $I_z(p, q)$ be the incomplete beta function ratio, given by

$$I_z(p, q) = \frac{1}{B(p, q)} \int_0^z u^{p-1} (1-u)^{q-1} du, \quad 0 \leq z \leq 1$$

The distribution function of a GB2 variable can be written as

$$F(x; a; b; p; q) = I_z(p; q)$$

Where $z = y = (1 + y)$ and $y = (x = b)a$.

The log likelihood function of GB2 can be expressed as a weighted mean of the log density evaluated at the data points.

$$\log L = \frac{\sum w_i \log f(x_i; a, b, rs, (1-r)s)}{\sum w_i}$$

³ GB2- Generalized Beta distribution of Second Kind:

https://en.wikipedia.org/wiki/Generalized_beta_distribution#Generalized_beta_of_the_second_kind_.28GB2.29

Where, $f(.)$ is the GB2 density. The Gini coefficient of this distribution may be obtained from the following expression:

$$\frac{B(2q-1/a, 2p+1/a)}{B(p,q)B(p+1/a, q-1/a)} \left\{ \left(\frac{1}{p}\right) {}_3F_2\left(\begin{matrix} 1, p+q, 2p+1/a; 1 \\ p+1, 2(p+q); \end{matrix}\right) - \frac{1}{p+1/a} {}_3F_2\left(\begin{matrix} 1, p+q, 2p+1/a; 1 \\ p+1/a+1, 2(p+q); \end{matrix}\right) \right\}$$

Where, ${}_3F_2$ is given by

$${}_3F_2\left(\begin{matrix} a_1, \dots, a_p; x \\ b_1, \dots, b_q; \end{matrix}\right) = \sum_{i=1}^{\infty} \frac{(a_1)_i \dots (a_p)_i}{(b_1)_i \dots (b_q)_i} \frac{x^i}{i!}$$

5.11 Empirical Illustration

In order to find the best fit for the distribution of household income data set for national, urban and rural area of Bangladesh, the possible use of above mentioned distribution and their relative performance have evaluated through likelihood ratio test, Bayesian information criterion (BIC), Akaike information criterion, chi-square goodness of fit and Gini coefficient. Likelihood ratio test is also used for selecting the best fitted income distribution.

Table 5.19 Estimated parametric models for national income data

Distribution	Parameter	Estimates	Standard Error	log-likelihood	Chi-square	AIC	BIC	Gini
Gamma	shape	1.173	0.326	-117.84	0.381	239.68	241.671	0.47
	rate	0.009	0.003					
Champer nowne	α	1.674	0.284	-209.792	1.342	427.584	431.566	0.597
	x_0	8972.754	2128.742					
	λ	0.997	0.053					
Weibull	scale	137.271	30.936	-117.949	0.315	239.897	241.889	0.483
	shape	1.051	0.175					
Log-normal	meanlog	4.416	0.23	-117.245	0.705	238.49	240.481	0.532
	sdlog	1.027	0.162					
GB2	Shape1	0.718	0.124	-117.282	0.591	239.565	240.948	0.521
	Scale	205.200	20.516					
	Shape2	3.171	0.012					
	Shape3	5.645	1.012					
Exponential	rate	0.007	0.002	-117.993	0.287	237.985	238.981	0.5

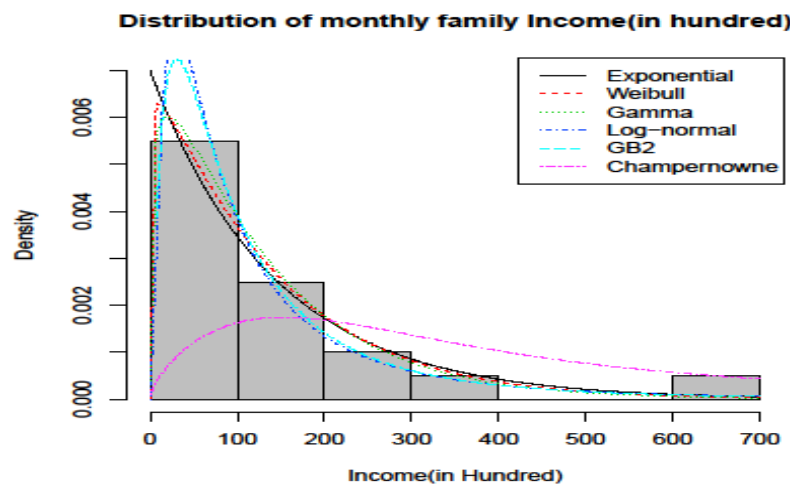


Figure 5.6 Fitted distribution for monthly national income data

The Gini coefficient (G) is investigated to measure inequality of income distribution through parametric measures of inequality of the above cited income distribution models. Table 5.19 shows the estimated above mentioned parameters for national income data based on HIES-2010, while Table 5.20 sets out the estimated parameters for urban income data and Table 5.21 shows the estimated parameters for rural; income data. Figure 5.6 shows the fitted distribution of monthly household income at national level.

Table 5.20 Estimated parametric distributions for urban income data

Distribution	Parameter	Estimates	Standard Error	log-likelihood	Chi-square	AIC	BIC	Gini
Gamma	shape	1.187	0.33	-118.043	0.432	240.087	242.078	0.467
	rate	0.009	0.003					
Champernowne	α	1.658	0.283	-210.235	1.241	428.476	432.458	0.60
	x_0	8960.949	2197.962					
	λ	0.997	0.024					
Weibull	scale	139.519	30.99	-118.149	0.329	240.298	242.29	0.478
	shape	1.066	0.179					
Log-normal	meanlog	4.434	0.23	-117.603	0.812	239.206	241.198	0.533
	sdlog	1.028	0.163					
GB2	Shape1	0.708	0.378	-117.640	0.875	239.280	240.263	0.516
	Scale	249.193	25.481					
	Shape2	3.147	0.871					
	Shape3	6.262	0.941					
Exponential	rate	0.007	0.002	-118.218	0.239	238.436	239.432	0.50

Figure 5.7 shows the distribution of monthly household income for urban area and Figure 5.8 illustrates the distribution of monthly household income for rural areas.

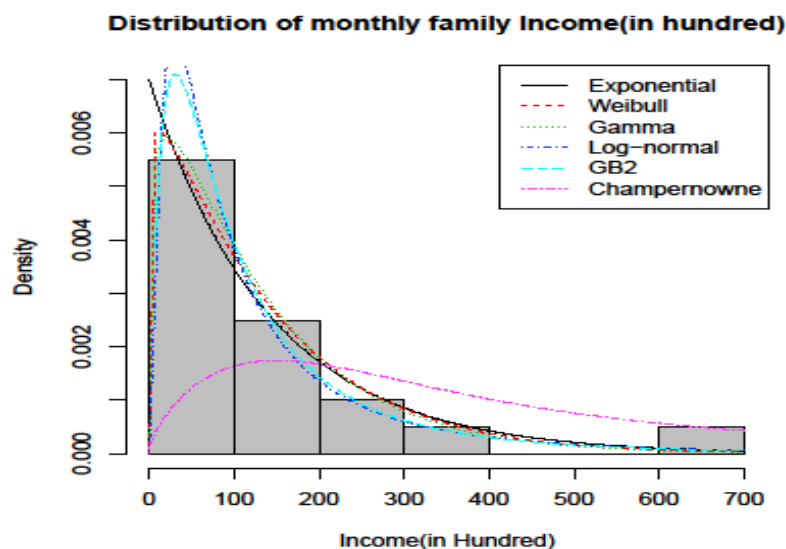
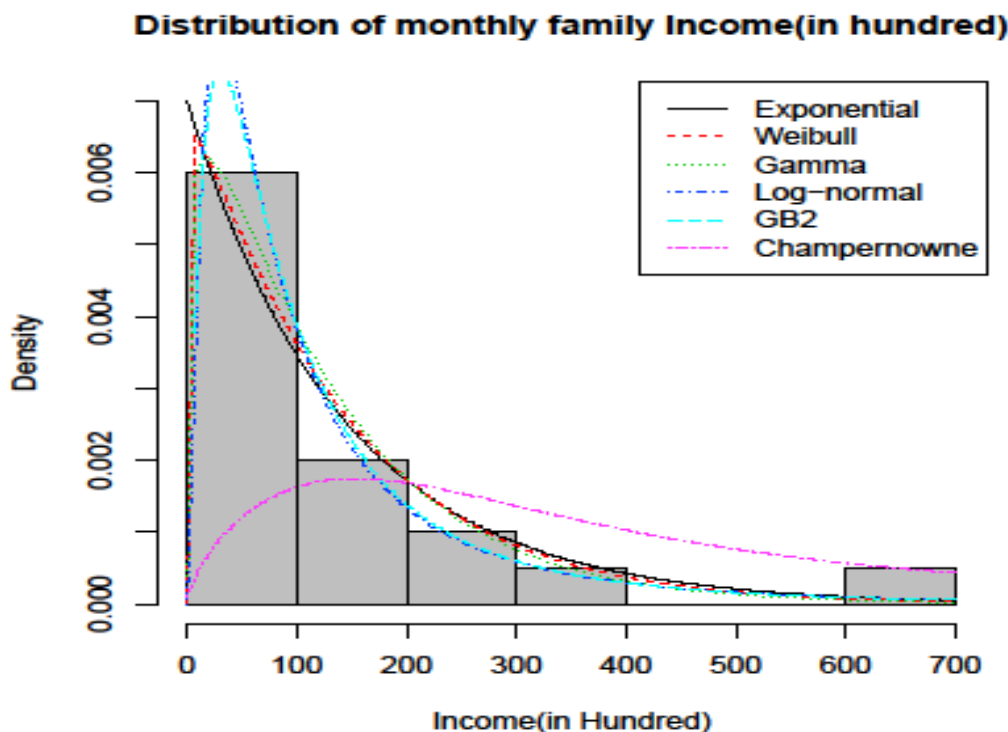


Figure 5.7 Fitted distributions for monthly urban income data

Table 5.21 Estimated Parametric distributions for rural income data

Distribution	Parameter	Estimates	Standard Error	log-likelihood	Chi-square	AIC	BIC	Gini
Gamma	shape	1.153	0.319	-117.929	1.403	239.858	241.85	0.473
	rate	0.009	0.003					
Champernowe	α	1.672	0.285	-209.695	1.289	427.39	431.372	0.598
	x_0	8977.364	2166.999					
	λ							
Weibull	scale	136.752	31.295	-118.029	1.392	240.057	242.049	0.488
	shape	1.035	0.171					
Log-normal	meanlog	4.409	0.23	-117.168	1.257	238.336	240.328	0.534
	sdlog	1.03	0.163					
GB2	Shape1	0.653	0.314	-117.210	1.181	242.420	246.403	0.526
	Scale	182.711	20.897					
	Shape2	3.912	0.741					
	Shape3	6.253	0.248					
exponential	rate	0.007	0.002	-118.05	1.385	238.101	239.097	0.50

**Figure 5.8** Fitted distributions for monthly rural income data

From the above results, based on the chi-squared value, we may not reject our null hypothesis that the data might have come from the respective distribution. AIC and BIC show that for national level income data log-normal distribution is the best, as it gives the nearly lowest AIC and BIC values. From this, we can easily decide that the log-normal distribution fits the national income data well. But for

urban income data, we see that GB2 distribution is the best fit as log-likelihood value is the highest and AIC, BIC values are very close to the lowest value of other distributions.

For rural income data, these results suggest that exponential distribution is the best as log-likelihood value is near to the highest and AIC and BIC have the lowest value.

Previously many studies showed that in most cases GB2 distribution performs well. In the present context, only GB2 distribution can be used to fit for urban income data. This is mainly because the urban income data are higher compared to national and rural income data.

Chapter 6

Measures of Inequality

6.1 Concepts of Inequality

The term ‘inequality’ refers to cases where incomes are simply different or unequal, while according to Oxford English Dictionary ‘inequality’ means disparity in magnitude. Kuznets in his pioneering study on income distribution sets out it by saying that ‘income inequality’ is simply differences in income among individuals (Atkinson, A.B. 1978).

A measure of inequality should indicate how much of the income of n persons (x_1, x_2, \dots, x_n) in a community vary among themselves. Inequality measures are useful in assessing the changes in the degree of inequality in the same community over time. They are also useful for comparisons of income inequality across regions (urban and rural) or across socio-economic groups (farming, business, services, etc.) or across countries (Bangladesh, India, Nepal, Pakistan etc.). Many people think inequality as a synonym for unfair distribution of income among the individuals. Inequality of income distribution has both bad and good consequences in the society. Among the bad consequences, inequality may foster resentment and breed crime in the society. The income inequality leads to social discrimination which restricts access to better schools, jobs and reduce the chances for moving up the income ladder. Social discrimination, again translates into substantial social, educational, health, nutrition, and political inequalities and inequalities also lead loss of social welfare. For instance, if money buy access to better schools, then unequal educational opportunity also becomes a source of unequal income opportunity. Further, rich people who can afford talented lawyers may get better and different justice than might act the poor people. Thus, income inequality leads to loss of social welfare among people and creates “inequality traps” which keeps poor households destitute. On the contrary, some economists emphasize that inequalities can be a powerful motivation for working, studying, or investing. An individual who works harder, studies longer, and gives more efforts will naturally earn more income than those who give lesser efforts (Schiller, B.R., 2008). Schiller, B.R. also noted that inequalities are also the by-product of incentive for more earning, savings and investing. Unequal abilities and opportunities also create unequal earning opportunities.

The distribution of income during a period of time largely depends on the production system, structure of production, source of earnings and social structure of the community. For instance, a school teacher is likely to earn three times more than a farm labourer. A specialized doctor again is likely to earn many times more than a top executives. The average monthly income of broad occupational groups is set out in Table 6.1 which illustrates variation of income share by sources.

Table 6.1 Percentage Share of Household Income by Sources

Decile of Household	Total	Agriculture	Business & Commerce	Professional Wages and Salary	Housing Services	Gift & Remittance	Others
1	2	3	4	5	6	7	8
National							
2010	100.0	20.44	19.16	35.55	7.27	13.62	3.93
2005	100.0	20.0	23.1	31.3	6.7	9.8	8.7
2000	100.0	18.0	25.9	29.4	7.8	10.9	8.0
1995-96	100.0	26.3	20.3	30.3	6.8	9.1	7.2
1991-92	100.0	33.4	14.8	24.3	9.4	10.3	7.8
Rural							
2010	100.0	29.73	15.05	29.57	5.18	17.28	3.16
2005	100.0	28.7	17.3	28.1	5.1	12.0	8.7
2000	100.0	25.5	22.4	27.7	5.0	11.0	8.4
1995-96	100.0	35.4	14.7	27.7	6.5	9.6	6.1
1991-92	100.0	40.1	12.4	21.1	9.1	10.6	6.7
Urban							
2010	100.0	5.56	25.75	45.14	10.63	7.75	5.15
2005	100.0	5.8	33.1	36.9	9.5	5.9	8.7
2000	100.0	3.7	32.4	32.6	13.1	10.6	7.5
1995-96	100.0	4.8	33.4	36.6	7.4	7.9	9.9
1991-92	100.0	5.9	24.7	37.9	11.0	9.1	11.4

Source: Report of the Household Income & Expenditure Survey 2010, BBS

6.2 Measures of Inequality

In discussion of concepts of income and income distribution, reference is made repeatedly in respect of inequality and concentration of income. Thus, it is important to examine whether the degree of inequality is large or small. There are a number of inequality measures that have been proposed in the literature. These measures are of two type's viz. positive measures and normative measures. The positive measures of inequality proposed from a semi-intuitive statistical angle

without explicit use of any concept of social welfare while the normative measures of inequality are based on the concept of social welfare and the loss incurred from unequal distribution (Sen, A, 1972). The following are the most important positive measures of inequality:

- (i) Gini coefficient,
- (ii) Range
- (iii) Relative mean deviation,
- (iv) Coefficient of variation,
- (v) Standard deviation of logarithms (s.d. log),
- (vi) Theil measures,
- (vii) Elteto-Frigyes measures

6.3 Lorenze Curve and Gini Coefficient

In order to compare and analyze income and wealth inequality for different regions, social groups and countries, Lorenz proposed a curve in 1905. And since then this curve is known as Lorenz curve. This curve is a good graphical device and widely used to represent and analyze the size distribution of income and wealth. Its derivation from certain well-known income distributions has been propounded by Kakwani and Podder (1973). An alternative definition of the Lorenz curve was also suggested by Gastwirth (1971).

Among the positive measures, the Gini co-efficient is widely used to measure the extent of inequality. The Gini co-efficient is attributed to Gini (1912) and then work has been done on it by Ricci (1916) and then by Dalton (1920), Yntema (1933), Atkinson (1970), Newbery (1970), Sheshinski (1972) and many others (Sen, A. 1978). The Loreenze Curve is the proportion of population arranged from the poorest to the richest is represented on the horizontal axis, while the proportion of income enjoyed by the bottom to top of the population is represented on the vertical axis. It is customary to use cumulative proportion of population (F) and cumulative proportion of income (F_1) for drawing Lorenz curve (LC). More specifically, arrange the incomes of n persons in increasing order and then find (i) the cumulative proportion of persons (F) having income $\leq x$ and (ii) cumulative share of income (F_1) in the aggregate income for different values of income x . Then one can plot F against F_1 to get the Lorenz curve of the given income distribution. Both F and F_1 rise from 0 to 1 and F_1 is a monotone function of F . It is, however, customary to complete the square and to draw a diagonal line which is called the egalitarian line where proportion of income and proportion of persons are equal. This means 0 percent people enjoy 0 percent of the total income; 100 percent people enjoy 100 percent of the total income. This implies that

there is no income inequality. Figure 6.1 shows the Lorenz curve, area of concentration and egalitarian line.

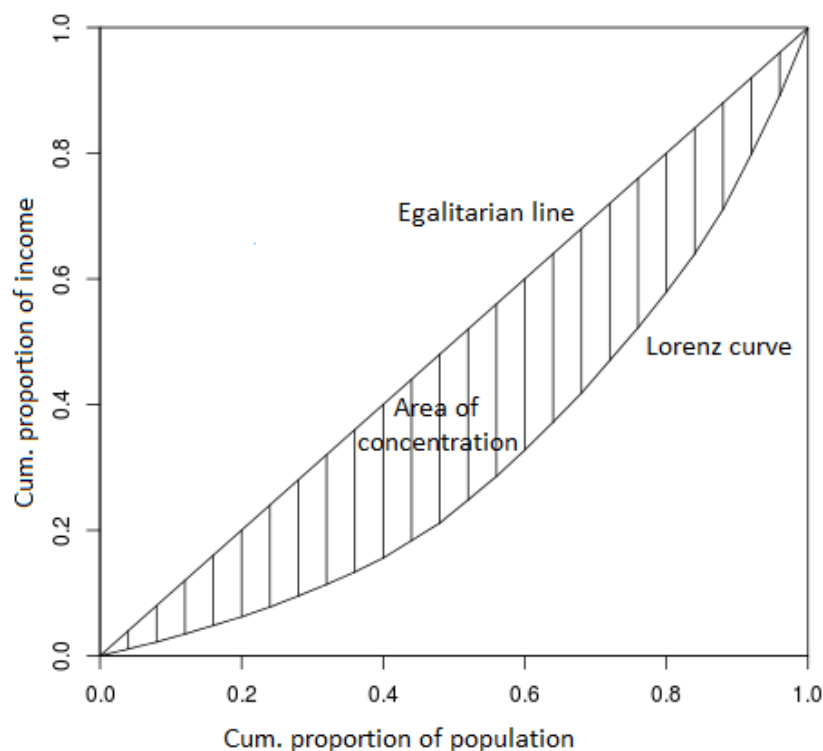


Figure 6.1 The Lorenz Curve and Area of Concentration

It appears from the diagram 6.1 that Lorenz curve rises monotonically from the point (0.0) to the point (1, 1) and it is always convex towards horizontal axis. Lorenz curve (LC) generally lies below the egalitarian line and the area between the egalitarian line and the Lorenz curve is called area of concentration while the Lorenz ratio (G) is defined as:

$$\begin{aligned}
 G &= 2 \times \text{area of concentration} = (\text{area of concentration}) \div \frac{1}{2} \\
 &= (\text{area of concentration}) \div (\text{area of triangle below the egalitarian line} = \frac{1}{2}) \\
 &= 2 \times (\frac{1}{2} - \text{area below Lorenz curve})
 \end{aligned}$$

when all incomes are exactly equal, the LC coincides with the egalitarian line indicating the case of perfect equality and the area of concentration becomes zero. On the other hand, when one person possesses all incomes and all others have zero income; it indicates the extreme inequality. In such a case LC approaches to 'L' shape and coincides with horizontal axis but inside the (1,1) point. In that case the area of concentration will be maximum and its value becomes $\frac{1}{2}$. The value of G varies with the variation of area of concentration and it takes the value 0 in the case of perfect equality (every person has equal income), and 1 in the case of extreme inequality (all incomes are in one hand).

6.4 The Mathematical Specification of LC

Assuming that income X of a unit (say, a household) is a random variable which ranges from zero to infinity and the function $F(x)$ is defined as

$$F(x) = \text{Pr} [x \leq x], \quad \dots \dots \dots \dots (6.1)$$

The function $F(x)$ is the probability that a unit (say, a household) selected at random will have an income less than or equal to x . This function has the following important properties:

- (i) $\lim_{x \rightarrow \infty} F(x) = F(\infty) = 1;$
- (ii) $\lim_{x \rightarrow 0} F(x) = F(0) = 0;$
- (iii) $F(x)$ is monotone, non-decreasing function of x .

Thus, the function $F(x)$ has the domain $(0, \infty)$ and the counter domain $(0,1)$ and if we assume that $F(x)$ is continuous then the derivative of this function is as follows

$$\frac{dF(x)}{dx} = f(x) \quad \dots \dots \dots \dots (6.2)$$

where $f(x)$ is the probability density function and $f(x) \geq 0$. The fundamental theorem of integral calculus gives

$$F(x) - F(0) = \int_0^x f(x)dx \quad \dots \dots \dots \dots (6.3)$$

As we know $F(0) = 0$, then $F(x) = \int_0^x f(x)dx$ and its derivative yields

$$\frac{dF(x)}{dx} = f(x) \quad \dots \dots \dots \dots (6.4)$$

where $F(x)$ may be interpreted as the proportion of units (say, a households) having an income less than or equal to x , which varies from 0 to 1. Let us assume that mean μ of the distribution exists, which is given by

$$\mu = \int_0^{\infty} x f(x) dx$$

and the first-moment distribution function of X is defined as

$$F_1(x) = \frac{1}{\mu} \int_0^x x f(x)dx \quad \dots \dots \dots \dots (6.5)$$

where the function $F_i(x)$ is interpreted as the proportional share of total income of the units having income less than or equal to x . $F_i(x)$ also varies from zero to one. The derivative of $F_i(x)$ exists and is given by

$$\begin{aligned} \frac{dF_1(x)}{dx} &= \frac{1}{\mu} \frac{d}{dx} \left[\int_0^x x f(x) \right] \\ &= \frac{1}{\mu} [x f(x)]_0^x = \frac{1}{\mu} x f(x) \quad \dots \dots \dots \dots (6.6) \end{aligned}$$

This implies that $F_i(x)$ is a monotonically non-decreasing function of x .

The Lorenz curve is the relationship between $F_1(x)$ and $F(x)$ and is obtained by plotting the values of $F(x)$ in abscissa and $F_1(x)$ in ordinate and the curve is represented by a units square (Fig.6.2).

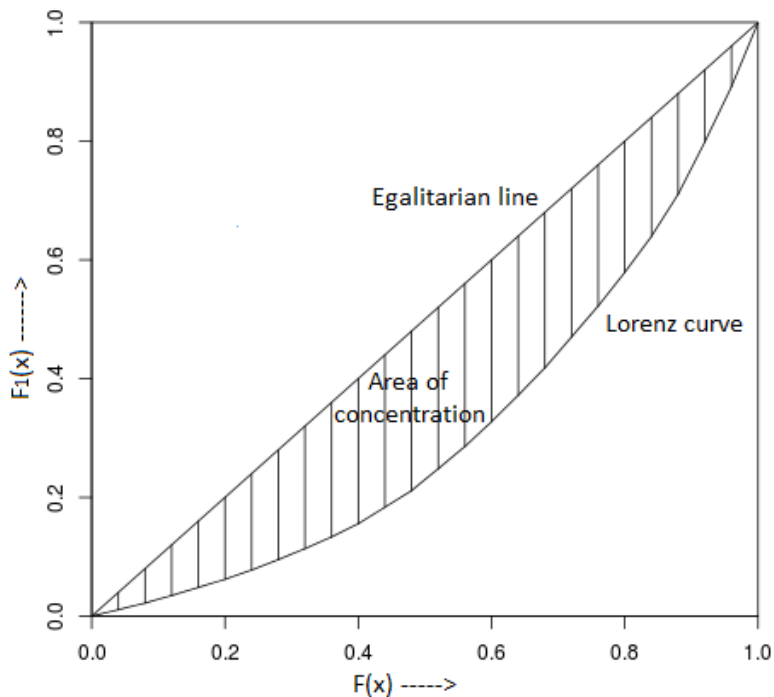


Fig. 6.2 The Lorenz Curve and Area of Concentration

6.5 The slope of the LC

With the help of (6.4) and (6.6), we can obtain the slope of the Lorenz curve as

$$\begin{aligned} \frac{dF_1}{dF} &= \frac{dF_1}{dx} / \frac{dF}{dx} = \frac{xf(x)}{\mu} / f(x) \\ &= \frac{x}{\mu} \quad \dots \dots \dots \dots (6.7) \end{aligned}$$

which is obviously positive for positive income.

The second derivative of $\frac{dF_1}{dF}$ of the curve is

$$\begin{aligned}
 \frac{d^2F_1}{dF^2} &= \frac{d}{dF} \left(\frac{dF_1}{dF} \right) = \frac{d}{dF} \left(\frac{x}{\mu} \right) \\
 &= \frac{1}{\mu} \cdot \frac{dx}{dF} \\
 &= \frac{1}{\mu} \cdot \frac{1}{\frac{dF}{dx}} \\
 &= \frac{1}{\mu} \cdot \frac{1}{f(x)} > 0
 \end{aligned}$$

The first and second derivatives indicate that the slope of the LC is positive and increases monotonically implying that the curve is convex to the F-axis (Kakwani, N.C., 1980).

6.6 Computation of Lorenz Ratio/Gini Co-efficient

The main problem in computation of Lorenz ratio lies with the estimation of area of concentration of the given distribution of income. However, there are two methods of computation of Lorenz ratio. One is graphical method and the other one is numerical method.

6.6.1 Graphical Method:

In this method Lorenz curve is plotted on a graph paper with small squares and is used to compute Lorenz ratio. From the graph the number of small squares within the egalitarian line and the Lorenz curve is to be counted and the area of concentration is computed by the method as suggested by Bhattacharya and Coondoo (1992). The method of computation of area of concentration is briefly described below:

$$\text{Area of concentration} = \left(n_1 + n_2 + \frac{1}{2}n_3 \right)$$

where n_1 = no. of small squares falling wholly inside the area between egalitarian line and LC

n_2 = no. of small squares falling more than half inside the area between egalitarian line and LC

n_3 = no. of small squares falling exactly half inside the area between egalitarian line and LC

The area of the triangle formed by diagonal line can be computed by simply taking half of the total number of Small Square falling in the square Lorenz diagram. The small squares less than half inside area are ignored and it is like avoiding rounding error of decimals. It may be noted that for getting accurate results, the LC should be plotted on a

Example 6.1 Computed Absolute Difference of Each Pair

Sl. No.	Absolute difference of each pair
1.	$ 350 - 350 = 0$
2.	$ 350 - 400 = 50$
3.	$ 350 - 375 = 25$
4.	$ 350 - 450 = 100$
5.	$ 400 - 350 = 50$
6.	$ 400 - 400 = 0$
7.	$ 400 - 375 = 25$
8.	$ 400 - 450 = 50$
9.	$ 375 - 350 = 25$
10.	$ 375 - 400 = 25$
11.	$ 375 - 375 = 0$
12.	$ 375 - 450 = 75$
13.	$ 450 - 350 = 100$
14.	$ 450 - 400 = 50$
15.	$ 450 - 375 = 75$
16.	$ 450 - 450 = 0$
$\sum_i \sum_j y_i - y_j = 650$	

Hear, $n = 4$, $n^2 = 16$

$$\bar{y} = 397.75 \text{ and } \sum_i \sum_j |y_i - y_j| = 650$$

$$\therefore G = \frac{650}{2 \cdot 16 \cdot 397.75} = \frac{650}{5200} = 0.0516$$

Again, the Gini coefficient (G) using alternative formula (6.9) for the same income data of four individuals is as follows:

$$\begin{aligned} G &= 1 + \frac{1}{4} - \frac{2}{16 \cdot 397.75} (450 + 2 \times 400 + 3 \times 375 + 4 \times 350) \\ &= 1 + 0.25 - \frac{7550}{6300} = 1.25 - 1.1984 \\ &= 0.0516 \end{aligned}$$

It is interesting to note that the estimated value of Gini index (G) obtained by the two methods is same (0.0516).

Example 6.2: Estimation of Lorenz Ratio/Gini Coefficient from Grouped Data

In this method the Gini coefficient/Lorenz ratio can be illustrated from the data collected from the Household income and Expenditure Survey (HIES), 2010 which shows the percentage distribution of household and percentage share in aggregate monthly income per household falling in different income groups (Table 6.2).

Table 6.2 Computation of Lorenz Ratio and Lorenz Curve of the Monthly Household Income Distribution, 2010.

Monthly household income group (in Tk.)	% of household (p)	% share in aggregate income (m)	Cumulative Percentage		M+M ₋₁	p(M+M ₋₁)
			of person (P)	of share in aggregate income (M)		
1	2	3	4	5	6	7
< 1500	2.72	0.23	2.72	0.23	0.23	0.63
1500 — 1999	2.19	0.33	4.91	0.56	0.79	1.73
2000 — 2499	3.03	0.60	7.94	1.16	1.72	5.21
2500 — 2999	3.76	0.90	11.70	2.06	3.22	12.11
3000 — 3999	9.26	2.82	20.96	4.88	6.94	64.26
4000 — 4999	9.84	3.85	30.80	8.73	13.61	133.92
5000 — 5999	8.62	4.10	39.42	12.83	21.56	185.85
6000 — 6999	7.92	4.47	47.34	17.30	30.13	238.63
7000 — 7999	6.43	4.19	53.77	21.49	38.79	249.42
8000 — 8999	5.24	3.86	59.01	25.35	46.84	245.44
8000 — 9999	4.54	3.75	63.55	29.10	54.45	247.20
10000—12499	9.69	9.42	73.24	38.52	67.62	655.24
12500—14999	6.22	7.38	79.46	45.90	84.42	525.09
15000—17499	4.51	6.36	83.97	52.26	98.16	442.70
17500—19999	3.28	5.31	87.25	57.57	109.83	360.24
20000—24999	4.22	8.12	91.47	65.69	123.26	520.16
25000—29999	2.35	5.58	93.82	71.27	136.96	321.86
30000—34999	1.91	5.35	95.73	76.62	147.89	282.47
35000+	4.27	23.38	100.00	100.00	176.62	754.17
All	100.00	100.00	--	--	--	--

Col. (2) indicates percentage of household in different monthly household income groups, while Col. (3) shows the shares of aggregate income. Col. (4) and Col. (5) were obtained by cumulating the figures in Col. (2) and Col. (3). The last Col. (6) shows the total of two successive figures each in Col. (5). The figure in first row of col. (6), is the same as that in Col. (5), since its preceding figure is known to be 0.

Now, plotting figures in Col. (4) and Col. (5) in a graph paper and joining the points successively by straight line or smooth curves we may get Lorenz curve. Before plotting it is better to convert figures in col.(4) and col.(5) in terms of proportion by dividing 100 for drawing Lorenz curve. The points (0, 0) and (1, 1) are also used for drawing the LC. The curve shown in Figure 6.3 describes the percentage shares of different ordinal groups of households, based on ranking of monthly household income. To sum up, the shares of the ordinal groups can also be determined from the Lorenz curve and the Lorenz ratio can be estimated by counting the number of small squares falling between egalitarian line and LC. For further explanations and refinements of numerical methods Kakwani (1980) may be seen.

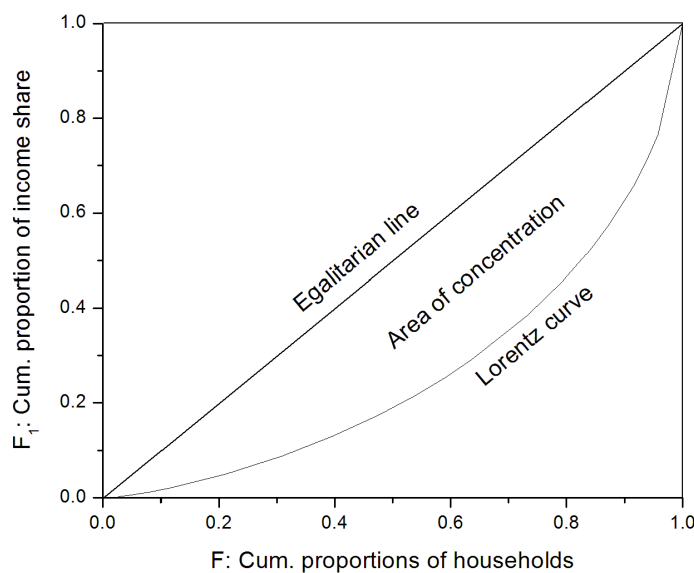


Figure 6.3 The Lorenz Curve and Area of Concentration

However, the Lorenz ratio is computed by using figures in col. (2) and col (6) by the following formula as suggested by Bhattacharya and Coondoo (1992).

$$\begin{aligned}
 \text{Lorenz ratio} &= 1 - \frac{\sum p(M + M_{-1})}{10000} \dots \dots \dots (1.1) \\
 &= 1 - \frac{5246.33}{10000} \\
 &= 1 - 0.5246 \\
 &= 0.4754
 \end{aligned}$$

The reasons for dividing by 10000 to $\sum p (M + M_{-1})$ are that both m and p are expressed in percentages rather than proportions. The table 6.2 has other interesting features and we can easily find shares of ordinal groups like bottom 50 percent or top 25 percent in aggregate household income by interpolation using either the Lorenz curve or the columns for P and M. Based on linear interpolation on the columns for

P and M of Table 6.2 we can get easily the share of income of bottom 50 percent and top 25 percent of the households by the following way:

$$\begin{aligned}
 \text{(i) Share of bottom 50 percent} &= 17.30 + \frac{50 - 47.34}{53.77 - 47.34} \times (21.49 - 17.30) \\
 &= 17.30 + \frac{2.66}{6.43} \times 4.19 \\
 &= 17.30 + 1.73 = 19.03 (\%)
 \end{aligned}$$

Therefore, bottom 50 percent of the households share only 19 percent of the total income.

Similarly, we can compute the income share of top 25 percent households as follows:

$$\begin{aligned}
 \text{(ii) Let us first compute the Share of bottom 75 percent} \\
 &= 38.52 + \frac{75 - 73.24}{79.46 - 73.24} \times (45.90 - 38.52) \\
 &= 38.52 + \frac{1.76}{6.22} \times 7.38 \\
 &= 38.52 + 2.08 = 40.6
 \end{aligned}$$

Then the share of top 25 percent = $100 - 40.6 = 59.4 (\%)$

Therefore, share of top 25 percent of the households is 59.4 percent of the total income.

6.7 Other Positive Measures of Inequality

6.7.1 The Range

Let x_1, x_2, \dots, x_n be the income of n persons and x_i be the income of i th person. Then range R , is simply the difference between the largest and the smallest observation in a set of data. Symbolically we can write:

$$R = x_{\max} - x_{\min}$$

As a measure of inequality it can be defined as the difference between the largest and the smallest income as a ratio of mean income (Sen, A. 1973). Symbolically the range is given by the relation

$$R = \left(x_{\max} - x_{\min} \right) / \mu \quad \dots \dots \dots (4.3)$$

where x_{\max} stands for the largest income and x_{\min} stands for smallest income. When the income data are grouped into a frequency distribution, the range is equal to the difference between the upper boundary of the highest class and the lower boundary of the lowest class. The range is a simple concept of inequality measure and is easy to compute but it has two disadvantages. First, it ignores the

distribution of income between the extremes. Second, as its value depends only on the two extreme values of income, it may be seriously affected by one unusual observation. If income is divided absolutely equally, then clearly $R = 0$. At the other extreme if one person possesses all the income, then $R = n$. Thus R lies in general between 0 and n . It is, therefore, is not a good measure of inequality. The relative measure of range known as the coefficient of dispersion is defined by the following relation:

$$\text{Coefficient of Dispersion} = \frac{x_{\max} - x_{\min}}{x_{\max} + x_{\min}}$$

This is a pure number and is used for the purposes of comparison.

Example 6.3

The per capita/day incomes in BDT of 10 persons are given below:

450, 320, 370, 460, 390, 360, 410, 480, 360, 300

Find the range and coefficient of dispersion

Solution:

Here the highest income i.e. $x_{\max} = 480$

and the lowest income i.e. $x_{\min} = 300$

$$\therefore \text{Range}(R) = x_{\max} - x_{\min} = 480 - 300 = 180 \text{ income in}$$

Taka

$$\begin{aligned} \text{Coefficient of Dispersion} &= \frac{x_{\max} - x_{\min}}{x_{\max} + x_{\min}} \\ &= \frac{480 - 300}{480 + 300} = \frac{180}{780} = 0.23 \end{aligned}$$

6.7.2 The Relative Mean Deviation

The mean deviation (M.D) of a set of income data x_1, x_2, \dots, x_n is defined as the arithmetic mean of the deviations measured either from mean or median ignoring the algebraic signs. This is done to avoid the difficulty arising from the property that the sum of the deviations taken from the mean is zero. Symbolically we can write mean deviation from the mean as:

$$\text{MD} = \frac{\sum |x_i - \bar{x}|}{n}, \text{ for sample data}$$

where $|x_i - \bar{x}|$ is absolute deviations of the observations from the mean and n is the number of observation.

When the data are grouped into a frequency distribution having K classes with mid-points x_1, x_2, \dots, x_n and the corresponding frequencies f_1, f_2, \dots, f_n and $\sum f_i = n$ the deviation of the sample is given by :

$$MD = \frac{\sum_{i=1}^k f_i |x_i - \bar{x}|}{n}$$

Mean deviation is an absolute measure of dispersion. Its relative measure, known as the coefficient of mean deviation, is obtained by dividing the mean deviation by the average or median. Thus coefficient of MD = $\frac{MD}{\text{Mean}}$ or $\frac{MD}{\text{Median}}$.

Another way of looking at the entire distribution is to sum the absolute values of all the differences and take this as a proportion of total income (Sen, A. 1973). This gives the relative mean deviation (RMD) as:

$$RMD = \frac{\sum_{i=1}^n |\bar{x} - x_i|}{n\bar{x}}$$

If all incomes are equal $RMD = 0$, and if all incomes possessed by one person only, then $RMD = 2(n-1)/n$.

The main problem to take RMD as measure of inequality is that it is not sensitive to transfers from a poorer person to a richer person as long as their incomes lie on the same side of the mean income (Sen, A. 1973).

Example 6.4

Using the income data of example 4.3, we find that

$$MD = \frac{\sum_{i=1}^n |x_i - \bar{x}|}{n} = \frac{480}{10} = 48.0 \text{ income in Taka}$$

The coefficient of mean deviation is

$$\text{Coefficient of MD} = \frac{\sum_{i=1}^n |x_i - \bar{x}|}{\bar{x}} = \frac{48}{390} = 1.2308, \text{ and}$$

$$\text{Relative mean deviation (RMD)} = \frac{\sum_{i=1}^n |x_i - \bar{x}|}{n\bar{x}} = \frac{48}{3900} = 0.1231$$

6.7.3 The Variance

The variance of a set of income observations per household in a year is defined as the mean of the squares of deviations of all the observations from their mean. When it is calculated from the entire population, the variance is called the population variance and it is traditionally denoted by σ^2 . For sample observations it denoted by S^2 . The variance is the common statistical measure of variation and symbolically defined as

$$\sigma^2 = \sum_{i=1}^N (x_i - \mu)^2 / N, \text{ for population data}$$

$$s^2 = \sum_{i=1}^n (x_i - \bar{x})^2 / n, \text{ for sample data}$$

It appears that any transfer of income from poorer person to a richer person, keeping other things same, always increases the variance. This appears to be an attractive property of an inequality measure (Sen, A. 1973). However, the variance is a common statistical measure of dispersion but usually it is not used as a measure of inequality since it has some limitations (for details see Sen, A. 1973).

Example 6.5

Using the income data of example 6.3, we find the variance

$$s^2 = \sum_{i=1}^n (x_i - \bar{x})^2 / n$$

$$s^2 = 4782.4, \quad s = 69.16$$

6.7.4 The coefficient of variation (C.V.)

The coefficient of variation is widely used as a measure of inequality. It is not related to the Lorenz curve and it cannot be seen by visual picture. The variance of two or more than two sets of data such as income and land holding cannot be compared unless it is expressed in relative term. For this purpose Karl Pearson (1957–1936) suggested a relative measure of variation, known as the coefficient of variation (C.V.). This is expressed as the standard deviation as a percentage of the arithmetic mean. Symbolically, it is defined as:

$$C.V. = \frac{S}{\bar{x}} \times 100, \text{ for sample data}$$

$$= \frac{\sigma}{\mu} \times 100, \text{ for population data}$$

The advantage C.V. is that it can be used to compare two sets of data or distributions which are expressed in different units of measurements.

The lower limit of CV is zero when all individuals have equal income. The upper limit of the CV is $\sqrt{n-1}$, when one individual receives all

the income. The upper limit tends to infinity as the number of income receivers increases. In addition, the CV is equally sensitive to transfers at all levels of income (Kakwani, N.C., 1980).

Example 6.6

Using the income data of example 6.3, we find the coefficient of variation (C.V)

$$\text{C.V.} = \frac{S}{\bar{x}} \times 100 = 600.52$$

6.7.5 The Standard Deviation of Logarithms

The standard deviation of logarithms of income is another important positive measure of inequality. It attaches greater importance to income transfers to lower end due to taking logarithmic transformation of incomes which staggers the income levels. It has some attractive features in other respects (for details see Sen, A, 1973). In fact, a logarithmic transformation tends to soften the blow in reflecting inequality. However, Sen, A. (1972) has explained some limitations of using logarithm as transformation of income. However, the S.D. of log x values are defined as:

$$\begin{aligned} \text{S.d.}(\log x) &= \sqrt{\sum_{i=1}^n (\log x_i - \log \bar{x})^2 / n} \\ &= \sqrt{\sum_{i=1}^n \{\log(x_i / \bar{x})\}^2} \end{aligned}$$

This S.d. (log x) can be written in more correct form but it is not generally used in practice. However, the formula of S.d. (log x) in correct form is as

$$\text{S.d.}(\log x) = \sqrt{\frac{1}{n} \sum_{i=1}^n \log \left(\frac{y_i}{G} \right)^2}$$

where G is the geometric mean of x_1, x_2, \dots, x_n and the $\log G = \frac{1}{n} \sum_{i=1}^n \log x_i$, the arithmetic mean of $\log x_i$. If the income distribution follows log-normal distribution, then S.d. (log x) has following important features:

- (i) S.d. (log) determines the population of the LC, and
- (ii) All indices of inequality would be monotone functions of the S.d. (log) [Bhattacharya and Coondoo (1992)].

Example 6.7

Using the income data of example 6.3, we find that

$$\begin{aligned} \text{S.d.}(\log x) &= \sqrt{\frac{\sum_{i=1}^n (\log x_i - \log \bar{x})^2}{n}} \\ &= 0.0672 \end{aligned}$$

6.7.6 Theil's Measure of Inequality from the Notion of Entropy

Before discussion of Theil's entropy measure of inequality, let us have a brief idea of entropy of information theory.

6.7.6.1 Conceptual Background of Entropy

A random event E with probability $P(E)$ is said to contain

$$I(E) = \log \frac{1}{P(E)} = -\log P(E) \quad \dots \dots \dots (6.10)$$

units of information. If $P(E) = 1$ (that is, the event always occurs), $I(E) = 0$ and no information is attributed to it. Because no uncertainty is associated with the event, no information would be transferred by communicating that the event has occurred.

The base of the logarithm in (6.10) determines the unit used to measure information. If the base m logarithm is used, the measurement is said to be in m -array units. If the base 2 is selected, the unit of information is the bit. For example, if $P(E) = \frac{1}{2}$, $I(E) = -\log_2 \left(\frac{1}{2} \right) = 1$ bit. That is, 1 bit is the amount of information conveyed when one of two possible equally likely events occurs. A simple example is flipping a coin and communicating the results.

Given a source of statistically independent random events from a discrete set of possible events $\{a_1, a_2, \dots, a_J\}$ with associated probabilities $\{P(a_1), P(a_2), \dots, P(a_J)\}$, the average information of the source output, called the entropy of the source (Gonzalez and Woods, 2002) and it is measured by

$$H(a) = - \sum_{j=1}^J P(a_j) \log P(a_j).$$

This concept is also used in the study of thermodynamics and entropy and it is a measure of disorder, but in the study of income distribution, entropy has the meaning of deviations from perfect equality of income distribution.

6.7.6.2 Theil's Measure of Inequality

Theil's index is used to measure inequality of income, wealth and some other economic attributes. This index was proposed in 1967 by econometrician Henri Theil, a successor of Jan Tinbergen at the Erasmus University, Rotterdam. He suggested an interesting measure of inequality which is based on the notion of entropy¹ in information

¹ Entropy means the expected information content of the situation can be viewed as the sum of the information content of each event weighted by the respective probabilities (quoted from Sen, A. 1972).

theory. Let x_i be the fraction of total income earned by the i th person. Then $x_i \geq 0$ and $\sum_{i=1}^n x_i = 1$ when n is the number of individual in the data set. The entropy of income shares can then be defined as

$$H(\mathbf{x}) = \sum_{i=1}^n x_i \log \frac{1}{x_i}, \quad i=1,2,\dots,n$$

This indicates that the $H(\mathbf{x})$ is the weighted average of the logarithm of the reciprocal of each income share x_i . Here the weights are determined by x_i . When each share x_i equals to $1/n$, the maximum value of $H(\mathbf{x})$ is obtained and it becomes $\log n$. It happens only when all persons will have equal income. Conversely, the value of $H(\mathbf{x})$ will be the minimum, if one person receives all the income in that case the minimum value of $H(\mathbf{x})$ will be zero. Thus, the value of $H(\mathbf{x})$ varies from $\log n$ to zero which looks like a measure of equality. But if we subtract the entropy $H(\mathbf{x})$ of an income distribution from its maximum value $\log n$, then we can get a measure of inequality and this measure is known as Theil's measure of inequality (Sen, A., 1972). Symbolically the Theil's measure is defined as

$T = \log n - H(\mathbf{x})$, then we can write

$$\begin{aligned} T &= \left(\sum_{i=1}^n x_i \log n - \sum_{i=1}^n x_i \log \frac{1}{x_i} \right), \quad \text{since } \sum x_i = 1 \\ &= \sum_{i=1}^n x_i \left(\log n - \log \frac{1}{x_i} \right) \\ &= \sum_{i=1}^n x_i (\log n + \log x_i) \\ &= \sum_{i=1}^n x_i \log (n x_i) \end{aligned}$$

where T varies from zero to $\log n$ and it is termed as Theil's index.

The interesting property of Theil's index is that a shift of income from a richer to a poorer person lowers T and it satisfies the Pigou–Dalton condition (Sen, A., 1972). A high value of Theil index indicates that the total income is not distributed evenly among individuals. The decomposability property of the Theil index is more popular than that of Gini coefficient. The Gini coefficient does not offer such decomposability property.

Example 6.8

Using the income data of example 6.3, we find Theil index of inequality

Solution:

Using computer MATLAB/R language we can easily find Theil index (T) and the result is given below:

$$\begin{aligned} T &= \sum_{i=1}^n x_i \log(nx_i) \\ T &= \mathbf{0.0046} \end{aligned}$$

6.7.6.3 Generalised Entropy Measures of Inequality

There are a number of positive measures of inequality that does not satisfy all desirable properties of a good measure of inequality except Theil index and the mean log deviation measure of inequality. These two indices satisfy all desirable properties and belong to the class of generalised entropy (GE) measures of inequality. The definition of a generalised inequality measure² is the following:

$$GE(\alpha) = \frac{1}{n(\alpha^2 - \alpha)} \sum_{i=1}^n \left[\left(\frac{x_i}{\bar{x}} \right)^\alpha - 1 \right] \quad \dots \dots \dots (6.11)$$

Expression (6.11) defines a class because the index $GE(\alpha)$ assumes different form depending on the assigned positive value of α , the parameter which represents the weight given to distances between incomes at different sections of the income distribution. A positive value of α indicates the sensitivity of the GE index to a specific section of the income distribution. For large value of α , GE will be more sensitive to the changes of upper tail of the income distribution, while for small α , GE index will be more sensitive to the changes of bottom tail of the income distribution. The value of α may take the value from $-\infty$ to $+\infty$ i.e. it can take all possible real values but for operation point of view, α is usually taken as non-negative, as for $\alpha < 0$ then (6.11) is undefined³. However, two particular cases of (6.11) are of interest for inequality measurement, namely, for $\alpha = 0$ and $\alpha = 1$

² See Easypol Module 051: Describing Income Inequality Theil Index and Entrophy Class Indices by Bellu, L. Gand Liberati, P. This document is prepared for the Food and Agriculture Organization of the United Nations, FAO

³ See Easypol Module 051: Describing Income Inequality Theil Index and Entrophy Class Indices by Bellu, L. Gand Liberati, P. This document is prepared for the Food and Agriculture Organization of the United Nations, FAO

Expression (6.11) for $\alpha = 0$ becomes:

$$GE(0) = -\frac{1}{n} \sum_{i=1}^n \ln\left(\frac{x_i}{\bar{x}}\right) \quad \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots (6.12)$$

and for $\alpha = 1$, the expression (6.11) becomes:

$$GE(0) = -\frac{1}{n} \sum_{i=1}^n \ln\left(\frac{x_i}{\bar{x}}\right) \quad \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots (6.12)$$

and for $\alpha = 1$, the expression (6.11) becomes:

$$GE(1)^4 = -\frac{1}{n} \sum_{i=1}^n \ln\left(\frac{x_i}{\bar{x}}\right) \quad \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots (6.13)$$

GE (0) index is called the mean logarithmic deviation known as Theil's L and GE(1) is called the Theil Index T.

Empirical Illustration: Per person/day income of 10 individuals is given below. From the given income, Theil's index GE(1) and mean logarithmic deviation GE(0) are estimated and shown in Table 6.3.

Table 6.3 Estimated Measures Theil Indices

Measures	Individuals income									
	1	2	3	4	5	6	7	8	9	10
Income (x_i)	250	255	260	263	265	270	280	290	305	335
Mean income (\bar{x})	$\bar{x} = 277.3$									
x_i/\bar{x}	0.90	0.92	0.94	0.95	0.96	0.97	1.01	1.05	1.10	1.21
$\ln\left(\frac{x_i}{\bar{x}}\right)$	-0.10	-0.08	-0.06	-0.05	-0.04	-0.03	.009	.04	0.09	0.19
Product: $\left(\frac{x_i}{\bar{x}}\right) \times \ln\left(\frac{x_i}{\bar{x}}\right)$	-0.094	-0.076	-0.058	-0.048	-0.039	-0.0300	.009	.051	.104	.231
GE(1), Theil's index T	0.0049									
GE (O) ⁴ , mean logarithmic deviation, Theil's L	0.0028									

Source: Author's own calculation

⁴ See Easypol Module 051: Describing Income Inequality Theil Index and Entrophy Class Indices by Bellu, L. Gand Liberati, P. This document is prepared for the Food and Agriculture Organization of the United Nations, FAO

6.7.7 Elteto-Frigyes Measures

A set of three inequality measures are found in the literature which are proposed by Elteto and Frigyes (1968) and these measures are known as Elteto-Frigyes' inequality measures (Kakwani, N.C. 1980). These measures are defined as follows:

Let \bar{x} is the overall mean of incomes, \bar{x}_1 is the mean of incomes (x_1, x_2, \dots, x_n) lower than \bar{x}_2 is the mean of income higher than \bar{x} and \bar{x}_2 of income. The measures of incomes inequality are defined as follows:

$$(i) I_1 = \frac{\bar{x}}{\bar{x}_1}, (ii) I_2 = \frac{\bar{x}_2}{\bar{x}_1}, \text{ and } (iii) I_3 = \frac{\bar{x}_2}{\bar{x}}$$

$$\text{Therefore, } I_2 = I_1 \times I_3 = \frac{\bar{x}}{\bar{x}_1} \times \frac{\bar{x}_2}{\bar{x}} = \frac{\bar{x}_2}{\bar{x}_1}$$

Example 6.9

The following data show the per capita/day income in Taka of 11 individuals in urban areas. Compute Elteto-Frigyes index

500, 600, 700, 800, 900, 1000

1250, 1500, 1750, 2000, 2500

Solution: from the above data we find

$$\bar{x} = 1227.27, \bar{x}_1 = 750, \bar{x}_2 = 1800$$

$$I_1 = \frac{\bar{x}}{\bar{x}_1} = \frac{1227.27}{750} = 1.6363, I_2 = \frac{\bar{x}_2}{\bar{x}_1} = \frac{1800}{750} = 2.40, I_3 = \frac{\bar{x}_2}{\bar{x}} = \frac{1800}{1227.27} = 1.4667$$

6.7.8 Desirable Properties of a Measure of Inequality

Ordinary measures of dispersion like variance, standard deviation or mean deviation are not good measures of inequality. This is because for a good measure of inequality (I) should possess the following six important properties

(i) Mean-independence and Scale independence

This means if one distribution is a scalar multiple of another, then the measure of inequality should not be changed. Symbolically it can be expressed as $I(ax_1, ax_2, \dots, ax_n) \cong I(x_1, x_2, \dots, x_n) \dots \dots \dots (6.14)$

In other words, if a set of incomes (x_1, x_2, \dots, x_n) increase or decrease in the same proportion, then they have same relative inequality. For example, in two countries ten-person income sets in A and B are

Country A = {2, 4, 6, 8, 10, 12, 14, 16, 18, 20}, and

Country B = {4, 8, 12, 16, 20, 24, 28, 32, 36, 40}

Every one in B has twice as much income as in A, and the total income (220) and mean income (22) in B is twice as high as in A. But in both A and B the poorest person's income is 10 percent of that of the richest persons, the second poorest person's income is 20 percent and so on. Thus, this example illustrates that the distribution of absolute income between the two countries A and B differs while the relative inequality does not. The estimated Gini index for the country A and B is found to be

Gini Index for the country A = 0.30 and Gini Index for the country B = 0.30

Thus the income distribution of A and B have the same inequality and the Gini index inequality measure fulfils both the mean-independence and scale-independence properties.

(ii) Population Size Independence

If the population of any event were to change, the measure of inequality should not be changed, all else being equal. The Gini index of inequality satisfies this criterion.

(iii) Symmetry

If one distribution of income is a permutation of another income distribution, then the relative inequality in the two distributions is the same. For example, let us suppose that per day per head incomes of 10 agricultural labours in rural Bangladesh are as follows:

105, 120, 125, 115, 128, 123, 124, 130, 102, 104

The Gini index for the above distribution is found to be

$$G = 0.0468$$

Two permutations of the above distribution is

Permutation (i) 120, 105, 123, 102, 124, 130, 128, 104, 125, 115

and

the Gini index is found to be

$$G = 0.0468$$

Permutation (ii) 104, 102, 130, 124, 123, 128, 115, 125, 120, 105

and

the Gini index is found to be

$$G = 0.0468$$

These results fulfill the properties of symmetry and the Gini index inequality satisfies this criterion.

(iv) Pigou–Dulton Principle of Transfer

This property requires that if some amount of income is transferred from relatively richer person to a poorer person without changing their relative position, then the index of inequality (**I**) based on changed distribution will decrease than the original distribution.

Example 6.10: Suppose per day income of 10 agricultural labour of rural Bangladesh is as follows assuming poverty line of Tk.126 per day/person.

Given distribution: 102, 104, 114, 115, 120, 125, 127, 132, 140, 145.

If we transfer 5% income from the richest person to the poorest person and from the second richest person to the second poorest person keeping the rank order position same, the new distribution after transfer becomes:

109.25, 111, 114, 115, 120, 125, 127, 128, 133, 137.75

Gini coefficient (given distribution) = 0.0629

Gini coefficient (new distribution) = 0.0442

These results satisfy the Pigou-Dulton principle of transfer and the Gini index of inequality satisfies this too.

Many measures of inequality are found in the literature. But not all of them satisfy all the properties. For instance, variance does not satisfy the condition (6.14). The relative mean deviation fails to satisfy the PIgou-Datton criterion, while the coefficient of variation (C.V.), the Lorenz ratio and the s.d. (log) satisfy all the criteria. But, the C.V. is equally affected by income transfers at all levels. The Lorenz ratio is seriously affected by income transfer at the middle levels. The s.d. (log) satisfies all the criteria but it may not if the transfer of income occurs at very high levels of income (Bhattacharya and Coondoo, 1992).

Example 6.11: Suppose 10 individuals have the following income per day:

80, 150, 250, 275, 305, 400, 450, 490, 600 and 650

Now we may be interested to examine whether the Gini coefficient (G), Coefficient of Variation (CV), Theil Index (T) and SD log (H) follow Pigou-Dalton principle if we transfer 5 percent income from the richest to the poorest person. We can easily estimate G, CV, T and H by using R computer language and the estimated results are shown in Table 6.4.

Table 6.4 Estimated Values of Different Measures of Inequality to Test Pigou-Dulton Criterion

Measure of Inequality	Estimated Value without transfer of income	Estimated value with 5% income transfer from richest to poorest	Estimated value with 5% transfer from 2 richest to 2 poorest persons
Gini (G)	0.2767	0.2607	0.2492
CV (C)	51.084	48.1480	45.914
Theil (T)	0.0555	0.0482	0.0437
SD log (H)*	0.2829	0.2477	0.2344

Source: Author's own calculation.

*Although reduction is found in SD log (H) due to transfer from richer to poorer person, it is possible for H to rise at a very high level of income transfer (Sen, A. 1973). This means H can violate the Pigou Dalton condition.

(v) Decomposability

Total inequality may be decomposed by population groups (say, urban and rural), income source, social groups, or other sub-groups. The Gini index of inequality is not strictly decomposable or additive across groups. In other words, the total Gini coefficient is not equal to the sum of the Gini coefficients of its sub-groups.

(vi) Statistical Testability

One should be able to perform test for the significance of changes in the inequality index over time or across sub-groups.

6.8 Normative Measures of Inequality

A large body of literature is devoted to the measurement of positive and normative inequality. Some of the earliest measures of inequality such as range, relative mean deviation, coefficient of variation (C.V.), s.d. (log) and the most widely used measure like Gini-coefficient are primarily descriptive in nature. These measures of inequality are done without taking into consideration of explicit specification of value judgment and social norms about distributive justice. And these measures are viewed in the purely statistical sense of dispersion in the frequency distribution of income, wealth, land holding and some other economic attributes. Besides descriptive measures of inequality, some measures of inequality have been developed and derived from a pre-specified social welfare function (SWF). This measure is proposed by introducing distributional objectives through an explicit parameter. These measures are known as normative measures of inequality (Osman, S.R. 1978). The most widely used and popular normative measure of inequality has been developed by British economist

This index is 1 minus the ratio of the equally distributed equivalent level of income to the mean of the actual distribution and it also depends on the parameter of inequality aversion (ε). This measure has the convenient property of lying between 0 (when income is equally distributed) and 1 (complete inequality) and since $U(x)$ is taken to be concave, i.e. with non-increasing marginal utility, x_{EDE} cannot be larger than the mean income \bar{x} (Sen, A., 1972). Moreover, this tells us how much income we can dispose to have equal incomes. If $A(\varepsilon) = 0.4$, for instance, it allows us to say that if income is equally distributed, we need only 60 percent of the present total income to achieve the same level of social welfare. But for an Atkinson's index of inequality, it is necessary to have an expression for EDE. We may get the expression for EDE from (6.14) as

$$U(x_{EDE}) = \frac{1}{1-\varepsilon} (x_{EDE})^{1-\varepsilon} \quad \dots \dots \dots (6.16)$$

It is observed analytically that the social welfare as in expression (6.13) must be the same with (6.14) and (6.16)⁵. That means

$$W = \frac{1}{n} \sum \frac{x_i^{1-\varepsilon}}{1-\varepsilon} = \frac{1}{n} \frac{(x_{EDE})^{1-\varepsilon}}{1-\varepsilon} \quad \dots \dots \dots (6.17)$$

From (6.17) we can directly get an expression for the EDE

$$x_{EDE} = \left[\frac{1}{n} \sum x_i^{1-\varepsilon} \right]^{\frac{1}{1-\varepsilon}} \quad \dots \dots \dots (6.18)$$

Holding the same reasoning for $\varepsilon = 1$ gives:

$$x_{EDE} = \prod_i (x_i)^{\frac{1}{n}} = \text{Geometric means} \quad \dots \dots \dots (6.19)$$

For any given income distribution, EDE can easily be calculated for different values of ε . The value of x_{EDE} will be different for different values of ε . If we choose $\varepsilon = 0$, the EDE is simply the average income level \bar{x} . On the other hand, if $\varepsilon > 0$, x_{EDE} decreases but $A(\varepsilon)$ increases.

A significant feature of the Atkinson's index is that it allows us to derive a social evaluation function by solving (6.14) for x_{EDE} that yields:

$$x_{EDE} = \bar{x}(1 - A(\varepsilon)) = W \quad \dots \dots \dots (6.20)$$

It is obvious that for any income distribution, if we know the mean income \bar{x} and the value of $A(\varepsilon)$, the level of welfare can be determined for different values of ε . Thus, x_{EDE} is a direct measure of welfare.

Empirical Illustration

Let us suppose that per day/person incomes of 10 individuals are as follows:

250, 300, 375, 400, 450, 500, 600, 650, 700, 750 and the mean income is found to be Tk.497.50. From the above income data and their mean income figure, the level of welfare is estimated by using formula (6.20) for different values of ϵ and is shown in Table 6.5.

Table 6.5 Estimated Level of Welfare (W)

Value of inequality aversion parameter (ϵ)	Atkinson's inequality $A(\epsilon)$	Level of welfare (W)
1.5	0.085	455.71
2.0	0.114	440.78
2.5	0.142	426.86
3.0	0.168	413.92

Source: Author's own calculation.

6.8.2 Another Approach to Measure Atkinson's Index

Atkinson index for income data can be turned into a normative measure by imposing an explicit inequality aversion parameter ϵ . The parameter ϵ represents the weight given by the society to inequality in the distribution. It varies from 0 to infinity. The value of $\epsilon=0$ means that society is indifferent about the distribution, while $\epsilon=\infty$ means that the society is concerned only with the position of the lowest income group. When ϵ approaches to 1 the Atkinson index becomes more sensitive to changes at the lower end of the income distribution. On the other hand, when ϵ approaches to 0 the Atkinson index becomes more sensitive to changes in upper end of the income distribution. However, the Atkinson formula of normative measure of inequality suggested by Atkinson (1975) is given below:

$$I_A = 1 - \left[\sum_{i=1}^n \left(\frac{x_i}{\bar{x}} \right)^{1-\epsilon} f_i \right]^{\frac{1}{1-\epsilon}} \text{ for } \epsilon \neq 1 \dots \dots (6.21)$$

where x_i is the income of i-th individual ($i = 1, 2, \dots, n$) and \bar{x} is the mean income. For ungrouped data $f_i = \frac{1}{n}, i = 1, 2, \dots, n$.

When $\epsilon = 1, I_A = 1 - \frac{\text{geometric mean}}{\text{arithmetic mean}} \dots \dots \dots (6.22)$

The Atkinson index I_A has a very interesting interpretation in respect of the proportion of the present total income that would be required to

achieve the same level of social welfare existed at present if incomes were equally distributed.

Example 4.12

Monthly household per capita income of 18 households is given below:

500 599 699 799 899 999 1249 1499 1749
1999 2499 2999 3499 3999 4499 5999 6999

Estimate Atkinson index for the given income data for the inequality aversion parameters: $\epsilon = 0.15, 0.25, 0.50, 1.50, 2.00, 2.50, 3.00$ and 3.50 .

Solution

The Atkinson index (I_A) is obtained by using expression (6.21) for different values of ϵ and is shown in Table 6.6.

Table 6.6 Atkinson Index for Measuring Inequality

Value of ϵ	Value of index (I_A)
0.15	0.0411
0.25	0.0686
0.50	0.1369
1.50	0.3778
2.00	0.4641
2.50	0.8275
3.00	0.5737
3.50	0.6077

A value of $I_A = 0.1369$ for inequality aversion parameter $\epsilon = 0.50$ indicates that we can reach the same level of social welfare with only $(1.00 - 0.1369) = 86.31$ percent of the given total income. It can be interpreted in an alternative way that the gain from redistribution to bring about equality would be equivalent to raising total income by 13.69 percent. For the lowest value of $\epsilon = 0.15$, the highest proportion $(1.00 - 0.0411) = 95.89$ percent of the total income is required to achieve the same level of social welfare as at present if incomes were equally distributed. Conversely, for the highest value of $\epsilon = 3.50$, about $(1.00 - 0.6077) = 39.23$ percent of the total income is required to achieve the same level of social welfare as it presents if incomes were equally distributed.

Atkinson index (I_A) can also be estimated from the grouped data with slight modification of the expression (6.21) and the modified formula is shown below:

$$I_A = 1 - \left[\sum_{i=1}^n \left(\frac{\bar{x}_i}{\bar{x}} \right)^{1-\epsilon} \cdot f_i \right]^{\frac{1}{1-\epsilon}} \quad \dots \dots \dots (6.23)$$

where \bar{x}_i is the mean income of those in the i -th income group, f_i is the proportion of the population with income in the i -th income group, \bar{x} is the overall mean, n is the number of income groups.

Example 6.13

Distribution of household, average monthly income and proportion of household is shown in Table 6.7.

Table 6.7 Distribution of household, average monthly income and proportion of households by monthly household income groups, 2010.

(Rural Area)

Monthly household income groups (in Tk.)	Proportion of household (f_i)	Average monthly income per household (\bar{x}_i)
(1)	(2)	(3)
< 1500	0.0325	0967.62
1500 – 1999	0.0270	1763.93
2000 – 2499	0.0376	2257.37
2500 – 2999	0.0462	2755.41
3000 – 3999	0.1081	3492.61
4000 – 4999	0.1134	4495.09
5000 – 5999	0.0926	5468.63
6000 – 6999	0.0836	6492.53
7000 – 7999	0.0660	7484.37
8000 – 8999	0.0514	8465.62
9000 – 9999	0.0444	9489.11
10000 – 12499	0.0902	11158.26
12500 – 14999	0.0547	13657.29
15000 – 17499	0.0367	16179.66
17500 – 19999	0.0278	18.589.43
20000 – 24999	0.0332	22202.22
25000 – 29999	0.0177	27096.22
30000 – 34999	0.0130	32258.40
35000 +	0.0240	65336.14
All groups	1.0000	9648.09

Source: Report of the HIES, 2010, BBS

The estimated value of Atkinson index (I_A) for the given values of ϵ using expression (6.23) is shown in Table 6.8.

Table 6.8 Atkinson Index (I_A) for Grouped Income Data

Value of ϵ	Value of Index (I_A)
0.15	0.0564
0.25	0.0915
0.50	0.1715
1.50	0.4103
2.00	0.4984
2.50	0.5726
3.00	0.6369
3.50	0.6829

The table 6.7 reflects the fact that as ϵ rises, more weight is attached to the lower income groups and the value of I_A increase. The estimated value of I_A suggests that there is a scope for raising welfare by redistribution of income. Sensitivity of I_A for the variation of value of ϵ may be observed in Figure 6.3.

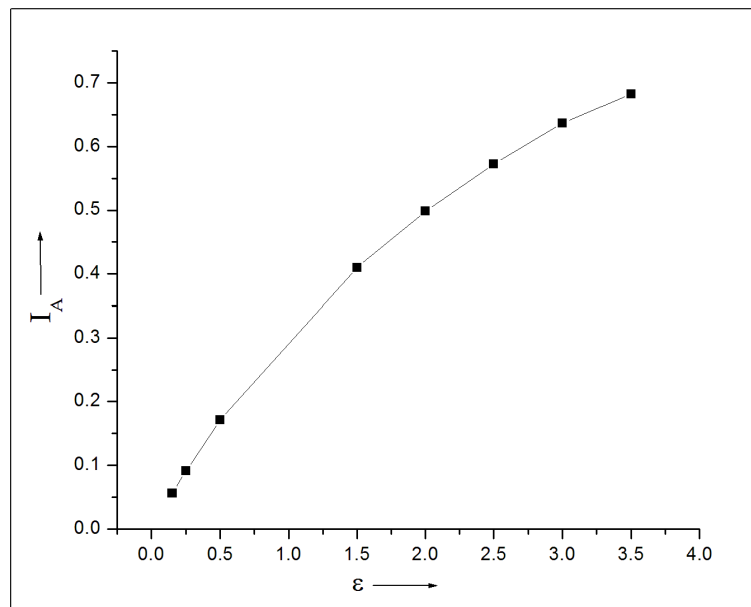
**Figure 6.3** Sensitivity of I_A to variation of ϵ

Figure 6.3 illustrates graphically the sensitivity of I_A to changes in equality aversion parameter ϵ . This is important for decision making about the value of ϵ to be attached by the society.

Chapter 7

Concepts, Definitions and Measurement of Poverty

7.1 Concepts of Poverty

The Concept of Poverty is no doubt complex. However, one must have a clear understanding of the underlying concept if one is to formulate programs for poverty alleviation, or if one is to understand the processes through which poverty is being generated and perpetuated. An appropriate concept is therefore essential to define and measure poverty. The concept of poverty has been exclusively discussed over the years, interpreted in many ways and it has been developed over the time. Rowntree in his study in York, U.K. in 1901 first discussed the conceptual issues of underlying poverty and problems involved in it. Orshansky in her study in the U.S. also raised some conceptual issues about poverty (Atkinson, 1975). The concept of poverty varies across different societies, cultures and nations. It also changes from one period to another. For instance, Adam Smith (1776) pointed out that in most parts of Europe in his days, even a day labourer would feel shy to appear in public without a linen shirt. This indicates that a linen shirt was one of the criteria used in measuring the standard of living in Europe in those days. But the people of Greek and Roman possessed no linen shirt and their standards of livings were not measured by it though they lived quite comfortably (Bhattacharya and Coondoo, 1992). However, this notion of poverty no longer exists in Europe today. Thus it is important to note that the concept of poverty evolves over time must be explained in relation to a particular society and culture at a particular time.

Rein (1970) explained three broad concepts of poverty, which are:

- (a) Subsistence concept of poverty,
- (b) Relative concept of poverty, and
- (c) Externality concept of poverty

(a) Subsistence Concept of Poverty:

The subsistence concept of poverty is related to the minimum dietary needs to maintain health and working capacity of an individual in the society. Rowntree attempted first to define poverty in subsistence

terms. According to the concept, individuals or families were treated as poor if their incomes were not sufficient to fulfill the minimum dietary needs for the maintenance of mere physical efficiency [Rowntree (1901)].

The subsistence standard first came to fruition in the U.K. through the work of household surveys carried out by Rowntree (1901 and 1918), and a report on social security prepared in the war years (1939—45) by Sir William, and then by Lord Beveridge [Townsend (1993)]. It is important to note that the idea of a subsistence standard varies across countries, across regions, across social groups, across economic classes etc. For instance, the subsistence standard in developing countries like Bangladesh, India, Nepal, Pakistan, etc. connotes a lack of minimum necessities with reference to ‘mere physical needs’, while, in developed countries like the U.S.A., U.K., Japan etc., it connotes a lack of ‘sociably acceptable’ with reference to standard of living. Moreover, tastes and social conventions determine the eating habits of people in different societies and culture for which the subsistence standard again varies.

The subsistence concept of poverty has some limitations and many authors amongst whom Rein (1970) and Townsend (1962, 1970, and 1979 a) may be mentioned. The main argument of their criticism was that the subsistence standard is considered in terms of mere human physical needs like food, shelter, fuel, etc. ignoring social needs such as rights in employment, integration into community, recreational facilities, education, etc. It was further criticized because of the difficulty in specifying the minimum needs for non-food items such as clothing, shelter, fuel, household sundries, etc. Such problem arises because the subsistence standard varies from developed to developing nations, and even within the same country, from one income group to another. Even in the case of food, which is the most important item for determining the subsistence level, it is difficult to determine the minimum requirements with precision. This is because there is no single level of food intake for subsistence. Moreover, an individual’s nutritional need varies with his level of activity. Another problem to this approach lies in finding an exhaustive list of the requirements. In his first study, Rowntree (1901) prepared a list that included food, clothing, housing, fuel, and household sundries. His second list included additional items like newspapers, union subscriptions and travel expenses. Thus, Rowntree’s provisions were quite subjective and it is very difficult to determine the minimum level of requirements objectively. Some observations of Adam Smith and Marx, however,

explained the view that the minimum needs for non-food items are fixed according to social customs in a given region and in a given period [Bhattacharya and Coondoo (1992)].

(b) Relative Concept of Poverty:

The relative concept of poverty is mainly concerned with the relative position of a reference group compared with the rest of the society. In other words, relative poverty may be defined as “the inability to afford a standard of living enjoyed by the reference group”. People below a certain income level (say, below median income group) cannot afford the diets, nor can they enjoy the opportunities, comforts, self-respect and activities consistent with the society’s standard of living. The relative is creped in from deprivation concept due to factors such as uneven distribution of income and wealth, unequal income opportunity, imperfect capital market, etc. The main source and causes of relative poverty other than income inequality are old age, sickness, unemployment, large number of children, social discrimination, etc. Under this concept, poverty is interpreted in relation to the living standards of a society. Hence, relative poverty exists even in the developed countries like U.K., U.S.A., France, Japan etc. because there are people in the lower layer of the society who face conditions of deprivation relative to the rest of the society. It is to be noted that people living in relative poverty in developed countries are much better off than most people of developing countries. For instance in 1988, the United States had an income per person approximately 28 times that of Bangladesh. Even the poorest 20 percent of the United States population had an income per person six times higher than the Bangladesh average [Townsend (1993)]. It is therefore very difficult to eradicate relative poverty from any society.

(c) Externality Concept of Poverty:

The externality concept of poverty refers to the reflection of poverty through various consequences created out of it. The loss of social welfare and the extent of anti-social activities in society are often considered as indicators of poverty. As an illustration of the externality concept of poverty, it may be noted that more than 1000 girls registered as prostitutes in the Anandabazar brothel alone, following the famine of 1974 [Zarina and Arefeen (1989)]. It has also been observed that increase in landlessness, unemployment, economic disasters and crisis, push a large number of men and women into anti-social activities and crimes. Therefore, under this concept, poverty is not measured in terms of human needs or the relative position of a

reference group to the rest of the society, but rather in terms of the degradation of social values.

Besides, the above three broad concepts of poverty, there is yet another important concept that is mainly concerned with the human 'basic needs'. Basic needs include certain minimum requirements of a family for private consumption, such as adequate food, shelter, clothing, household sundries, etc. and in addition they include certain community services such as safe drinking water, sanitation, public transport, health care, education and cultural activities [Townsend (1993)]. The concept of basic needs is in fact an elaboration of the subsistence concept, in the sense that it takes into account community based facilities rather than emphasizing solely on individual or family requirements for physical efficiency.

7.2 Criticisms on Concept of Poverty

However, like subsistence, the 'basic needs' approach in defining poverty is also difficult. The first problem is to identify acceptable criteria for the choice of items to be included and that nature of social services required by local community. The second problem is to obtain an exhaustive list of basic needs. The next problem lies in finding the minimum quantity of non-food consumption as well as food intake, food being the most important item of basic needs.

Thus, there are variations in the concept of poverty. None of these concepts are free from criticisms and problems of measurement. The subsistence and basic need concepts ignore income distribution and social consequences, whereas, the relative and externality concepts disregard the minimum calorie or resource requirements to maintain minimal standard of living.

7.3 Definition of Poverty

Poverty is normally defined in terms of a shortfall in resources in relation to a set of legitimate needs. Poverty has been defined, discussed and elaborated in the related literature by different authors and researchers, especially since the 70's, when it was realized that in spite of considerable growth of GDP in the developing countries, a large number of people continue to have a low level of living. However, some of the experts have defined poverty as "a situation in which basic needs are not adequately met. Some others have described as "a matter of deprivation". Poverty has also been defined as the "inability to maintain a minimal standard of living". Until the 1990's, poverty was considered in an absolute term, which is measured as the population living below a certain income level or threshold income

[ESCAP, 1993]. Thus the concept and definition of poverty is complex and vary with the variation of time and space.

7.4 Approaches for Poverty Measurement:

There are two important approaches to the measurement of poverty. One is a *subjective* approach while the other is *objective approach*. Poverty assessment through the conception as perceived by the individual refers to the subjective approach of measurement. People can be asked some subjective questions such as, what is the minimum requirement on which their household can manage. They can also be asked to specify the items they consider as necessities of life, and whether they have the capacity to acquire those with the income they earn. The fundamental problem of the subjective approach is that certain socially perceived necessities may not be perceived by more than a few or may be underestimated/ overestimated universally by the population. Among the difficulties to using this approach is the selection of “society perceived necessities”, the lack of which indicates poverty. Moreover, the perceived conception regarding poverty varies from one individual to another, from one economic class to another class and from one social group to another. However, there has been a drive for measuring poverty by subjective approach in many countries. Participatory poverty appraisal (PRA) is one such method for poverty assessment.

Poverty in terms of the subsistence level of living seeks to describe poverty objectively as lack of income needed to acquire the minimum dietary needs (calorie out-off point) for the maintenance of mere physical efficiency and other necessities of life, such as clothing, shelter, education, health care, etc. It does not reflect the perception of the poor themselves. A person with 2122 Kcal intake per person per day might not think himself/herself as being poor. His or her perception of poverty might have different dimensions. With varying dimensions across people, it becomes difficult to measure poverty precisely within a coherent framework. Therefore, neither the objective nor the subjective approach is adequate to assess poverty. Both approaches have suffered from problems in measurement and have therefore been criticized.

7.5 Approaches for Drawing Absolute Poverty Line:

To measure poverty, there should have a predetermined and well-defined standard of goods and services that are essential for normal level of living. This is called the ‘poverty line’. A person must reach that standard if he or she is not to be deemed poor. The poverty line

which is fixed in terms of the living standards over the entire domain of the comparison is termed as the “absolute poverty line” [Ravillion, M. (1992)]. A number of authors have suggested several methods of drawing the absolute poverty line, amongst them Rowntree (1901), Orshaansky (1965), Friedman (1965), and Watts (1967) may be mentioned. Voluminous literatures are available in the United States, Europe and other developed countries on this topic. In the late twentieth century, a large amount of work has been done on deciding how to draw the poverty line. Nonetheless, serious difficulties still exist – both conceptual and operational – in defining the poverty line in general, and the absolute line in particular. A review of literature shows that there are several approaches to drawing the poverty line but they are found to be contentious and none are free from criticisms. However, among the broad approaches to drawing the poverty line, the following are assumed to be important:

- (a) Consumption Basket Approach
- (b) Food Energy Intake Approach
- (c) Consumption Function Approach, and
- (d) Engel Coefficient Approach

(a) Consumption Basket Approach:

Rowntree (1901) followed the Consumption Basket Approach while he was drawing an absolute poverty line in Britain. The poverty line based on this approach usually consists of two components viz (i) food and (ii) non-food expenditure. Cost of minimum food basket at market prices gives the poverty line for food items, and may be expressed as:

$$Z = \sum p_i q_i \quad \dots \dots \dots \dots \dots \dots \dots \dots \dots \dots (7.1)$$

where, q_1, q_2, \dots, q_n is the vector of minimum requirement of quantities of food items defined in physical terms, and p_1, p_2, \dots, p_n is the vector of prices.

This approach is, however, not free from criticisms and problems in estimation. Firstly, it is difficult to obtain an exhaustive list of subsistence needs. Secondly, the specification of costs for meeting minimum dietary needs in any society is difficult. The determination of items and their quantity for fulfilling the predetermined nutritional requirement of 2122 Kcal, as suggested by the FAO/WHO (1973) experts, for a moderately active person per day is also difficult. The preference for food items and the need of an individual, however, depend upon the judgment of the individual who uses it. Thus, it is

difficult and sometimes impossible to select a universally acceptable standard package of food items and their minimum quantity. Standard package of food refers to what is actually needed to fulfill the nutritional requirement and not what one can afford to consume. However, the standard normative food bundle and its corresponding nutritional value (in Kcal per person per day), as prescribed by Wodon T.Q. (1996) and the World Bank is as follows:

Table 7.1: Normative Food Bundle and Nutritional Value in Terms of Kcal

Food Item	Daily Per Capita Requirement	
	Quantity (in gm)	Kcal
Rice	397	1386
Wheat	40	139
Pulses	40	153
Milk	58	39
Oil (Mustard)	20	180
Meat (Beef)	12	14
Fresh Water Fish	48	51
Potato	27	26
Other Vegetables	150	36
Sugar	20	82
Fruits (Banana)	20	6
Total	832	2112

Source: Table 3, p.71, Wodon, T.Q. (1986), *A profile of Poverty in Bangladesh: 1982—1983*, FUNDP Namur (Belgium) and Policy Research Department, The World Bank

The classified food items prescribed above are those generally consumed by the common people and associated with the food norms of Bangladesh. The use of fixed quantity in estimating the total cost of package may again calls for criticism because it ignores the possibilities of variations due to age, sex, occupation and socio-economic status of an individual. As for example, a minor may need less energy than an adult may and a man requires more energy than a woman does.

On the other hand, the minimum needs are hard to specify for non-food items such as clothing, fuel, housing and household sundries. This is because consumption of these items varies widely from one society to another, from one income group to another and so on. Thus costing of generally acceptable standard of non-food items is more difficult to specify accurately. An ideal way to solve this problem is to determine

the minimum requirement of each non-food item and then to compute expenditure. This approach, indeed, is difficult to implement since it is hard to determine minimum requirements of so many items [ESCAP (1993)]. Moreover, Orshandky (1965) has pointed out that there is no generally acceptable standard of adequacy for essentials of living, except in the case of food [Rein, M. (1970)]. Rowntree used the minimum actually observed among poor families covered in his study. Adam Smith and Marx pointed out that the minimum needs for non-food items of the poor are determined by social customs in a given region and period. However to overcome this constraint, they suggested that one way of operationalizing it is to assume that a specified portion of total income as revealed by the household expenditure survey will be spent on non-food items. This notion was also used in the pioneering work done by Orshansky [Battacharya and Coondoo (1992)].

Although the drawing of an absolute poverty line by the consumption basket approach is still clouded with conceptual and operational problems, and suffers from arbitrariness, this approach has wide acceptance and it is more appropriate for developing countries. This is because this approach assigns a central focus to malnutrition in the study of poverty and incidence of malnutrition is very common in most of the developing countries.

(b) Poverty Line by Food Energy Intake (FEI) Method:

In this approach, we proceed by first fixing a food energy intake cut-off point of calories (say 2122 Kcal per person per day) and then estimating the consumption expenditure level at which an individual attains the predetermined calorie intake. This can be obtained from a regression of calorie intake (c) against consumption expenditure or income (x). In theory, many functional forms can be used to estimate a calorie-expenditure or income equation that yields declining calorie elasticity (η) as expenditure or income rises. Some of the functions and the corresponding elasticity equations are as follows:

Function	Functional form	Electricity	
Semilog	: $C = \alpha + \beta \ln x,$	$\eta = \beta/C$ (7.2)
Double log	: $\ln C = \alpha + \beta \ln x,$	$\eta = \beta$ (7.3)
Inverse	: $C = \alpha + \beta(1/x),$	$\eta = (B/C)x$ (7.3)
log inverse	: $\ln C = \alpha + \beta(1/x),$	$\eta = \beta/x$ (7.4)

There is, however, little basis for choosing between the functional forms based on statistical goodness-of-fit criteria. Nonetheless, some functional forms are more plausible than others are.

The main advantage of this method over previous ones is that it automatically makes an allowance for non-food consumption. Moreover, it gives a poverty line that is consistent with local tastes and prices. But it does have one disadvantage [Ravillion, M. (1992)]. This approach is good for setting a single poverty line, but for comparison purpose across regions, sectors, social groups or dates, it gives a misleading interpretation unless the poverty line is expressed in terms of constant purchasing power [based on consumer price index (CPI) or cost of living index appropriate to the poor].

(c) Consumption Function Approach:

The relation between consumption expenditure and income can be used for drawing the poverty line and one can compute the exact relationship between them by the following simple regression equation:

$$y_i = \alpha + \beta x_i$$

where y_i is the consumption expenditure, and x_i is the income of i -th household, and α and β are two parameters. By determining the point that equates income and consumption expenditure, we can derive the benefit of such a function. This point can be obtained as $(\alpha/1-\beta)$, and can be termed as the “break even” or “Wolf point” [Bronfenbrenner (1971)]. The implication of this point is that the consumer has sufficient income to bear consumption expenditure without having to dispose of his existing wealth or incur debt. The break-even income is, thus, that income which a household has earned and is equal to the minimum expenditure figure. Households having income less than the break-even income are said to be poor and the break-even income may be considered as poverty line income or threshold income.

(d) Engel Coefficient Approach:

(i) Orshansky Method:

In this approach, we first estimate the minimum cost of a food bundle which provides the predetermined calorie intake (say, 2122 Kcal per person per day), and then divide it by the Engel Coefficient – which is defined as the proportion of income spent on food in the society (i.e. overall proportion). Orshansky (1965) adopted this method for an absolute poverty line while he was constructing Social Security

Assistance (SSA) index for the United States. This is sometimes called the Orshansky method and the poverty line (z_1) is calculated by using the following formula:

$$z_1 = C_m / E_s \quad \dots \dots \dots \dots (7.6)$$

where, C_m , refers to the actual expenditure on the minimum food bundle and E_s is the Engel Coefficient of the society as a whole. In other words, the actual expenditure on minimum food bundle is multiplied by the inverse of the Engel Coefficient of the society. For instance, if the minimum expense on food amounts to Tk.400, while the Engel Coefficient is 0.55, the poverty line income would be equal to Tk.727. It is to be mentioned that as average income of the society rises, E_s decreases, which implies that z_1 would increase with income¹. Consequently, z_1 cannot be designated as the absolute poverty line in a true sense. Moreover, specification of minimum food bundle and estimation of its cost suffers from some conceptual difficulties. However, by using actual consumption pattern, it is hoped that we can at least overcome the problem of arbitrariness in determining the needs of non-food items.

(ii) Friedman's Approach:

Friedman's approach is similar to that of Orshansky approach, but with a slight modification. In this approach, E_s is replaced by E_p , where E_p is the Engel Coefficient—proportion of income spent on food items by the poor households. The main departure of this approach from the previous one is that a share of food expenditure of the poor (income below Tk.300 per person per month, say) is used instead of considering society as a whole. The poverty line (z_2) is then calculated by using the following formula :

$$z_2 = C_m / E_p \quad \dots \dots \dots \dots (7.7)$$

where, C_m is the actual expenditure on minimum food bundle and E_p is the Engel coefficient of the poor households. Like Orshansky's approach, it is not free from problem of specification of minimum food bundle and determination of its cost. Another dimension of the problem is that if one wishes to use the Engel Coefficient of the poor, he or she must identify the poor first and thus this method may be termed as circular. This fact limits its use in actual practice [Hagenaars (1986)].

¹ Engel's law states that as income rises, the relative importance of food expenditure tends to fall. The underlying assumption is that as household income increase, proportionately higher amounts are spent on other goods and services.

(iii) Watts Method:

Watts (1967) proposed a method for drawing the poverty line based on the Engel Coefficient of actual consumption. This method does not require specifying the minimum food bundle. The proportion of income spent on basic needs, particularly food, is an indicator of the economic well being of a household or society. A lower proportion of income spent on food is associated with higher incomes, while a higher proportion spent on food is associated with lower incomes. Under this analytic framework, households having higher Engel Coefficient are considered extreme poor. To determine the poverty line, households may be arranged in ascending order of their incomes into 10 equal decile groups. For each decile, the Engel Coefficient is then estimated and we select that decile group from which the Engel Coefficient begins to decline. Households with income falling in this decile group have met most of their urgently needed food items, so that a larger portion of their remaining income can be spent on nonfood items. Therefore, the average per capita expenditure corresponding to this decile group may be considered as the poverty line. From Table 7.2, it is seen that the Engel Coefficient begins to fall after the second decile. We can, therefore, conservatively consider the per capita expenditure of the third decile as the poverty line [Shari, I. (1979)].

Table 7.2: Engel Coefficients, Average Household Size and per Capita Expenditure According to Deciles.

Decile	Engel Coefficient	Average Household Size	Per Capita Expenditure
1	4379	59	29.54
2	47.76	5.9	30.59
3	43.51	5.8	38.33
4	42.51	6.1	46.03
5	41.13	5.8	54.54
6	38.88	5.7	68.39
7	36.18	5.6	81.49
8	32.37	5.2	103.96
9	25.67	4.1	166.79
10	17.28	3.7	338.62
Overall Average	36.91	5.41	95.83

Source: Shari, I. (1979). *Estimation of poverty Lines and the Incidence of Poverty in Peninsular, Malaysia, 1973, The Philippine Economic Journal, Vol. XVIII, No. 4, 1979.*

7.6 Measures of Poverty:

Apart from the selection of a poverty line, the choice of an appropriate measure of poverty is necessary to assess the prevalence, depth and

severity of poverty. It is also necessary to formulate policies for poverty alleviation. There is now a voluminous literature on poverty measures and a number of measures along with a framework of poverty indices, both theoretical and empirical, have been developed by many authors and experts in the related field, among them Townsend (1962), Atkinson (1987), Foster, Greer and Thorebecke (1984) may be mentioned. Rather than discussing all measures, I shall focus on the following important measures of poverty.

7.6.1 Head Count Index (HCI)

Among the poverty measures, the proportion of population with income below the poverty line appears to be pioneering and has proved to be a popular measure of poverty. This measure, known as the head count index (H), may be expressed as

$$H = m/n \quad \dots \dots \dots \dots \dots \dots \dots \dots \dots (7.8)$$

where H is the proportion of total population deemed to be poor, m is the number of poor and n the total population size. The important feature of the head count index (H) is that it is simple to calculate and easy to understand. Although H is widely used to measure incidence of poverty overtime, or across region, countries and social groups, it has serious shortcomings. In particular, it ignores income short-fall of the poor people from the poverty line. This means that H is insensitive to how far below the poverty line the income of the poor falls. Thus this index does not take the intensity of poverty into account. This feature can be illustrated with the following examples.

Examples 1 Calculation of Head Count Index

Head Count Index Based on 5 individuals in Village A and B, assuming Poverty Line Income of Tk. 625.00							
Income/Person/months for each individual						Head count index (H)	
Village A	:	450	500	400	650	700	60%
Village B	:	575	600	620	650	700	60%

It is observed that the head count index in both the villages is same but the greater intensity of poverty is observed in village A, which is not indicated by head count index (H). Thus as a welfare function, the head count index is unsatisfactory, in that it violates the principle of transfer (Dalton, 1920). Another shortcoming is that this index does not change even if people below the poverty line become poorer.

7.6.2 Poverty Gap Index (PGI)

To overcome the shortcoming faced by head count index (H), the United States Social Security Administration introduced the notion of

Poverty gap. This gives the aggregate value of the difference between the incomes of the poor and the poverty line [Clark et. al. (1981)]. This measure when expressed as a proportion of poverty line is known as the poverty gap index (PGI). The gap is defined as the difference between poverty line (Z) and the income (y_i) of the poor individuals and the gap is considered to be Zero for non-poor, and the poverty gap index (PGI) (calculated over poor individuals only) may be written as

$$PGI = \frac{1}{m} \sum_{i=1}^m (z - y_i) / Z, \text{ for } y_i < Z \quad \dots \dots \dots \dots \dots \dots \dots \dots (7.8)$$

$$= \frac{1}{m} \sum_{i=1}^m G_i / Z$$

where G_i = (Z - y_i) ≥ 0, y_i is the income of the ith poor individual, Z denotes the poverty line.

The poverty gap index (PGI) also has one shortcoming; it ignores the number of people living below the poverty line. This feature is shown in the following example.

Example 2 shows the calculation of poverty gap index for five individuals from village A, assuming poverty line income Z=Taka 625.

Income/Person/months for each individual in Village A	Poverty Gap index (PGI)
Income/Person/Month in : 450 500 400 650 700 Village A	$\frac{1}{3} \sum G_i / Z = 0.28$
Poverty gap (Z - y _i) : 175 125 225 0 0	
G _i /Z : 0.280 0.200 0.360 0 0	

Poverty gap index measures the depth of poverty, as it depends on the short-fall of the poor’s income from the poverty line. In the above example the PGI = 0.28 which means that if 28.0 percent of the income of the poor could be raised by implementing ‘pro-poor’ programs or project such as microcredit, safety-net, food for education, food for work, etc. then the poverty could be removed. In 2010, the national headcount rate was 31.5 and depth of poverty was 6.5. The ratio of the depth of poverty to headcount rate (6.5/31.5) indicates that, on average the poor fell about 21 percent short of the poverty line (i.e. the poor could fulfill only 79 percent of the total cost of basic needs) [WB, 2010].

7.6.3 Squared Poverty Gap Index (SPGI)

The squared poverty gap index (SPGI) is the average of the squares of the poverty gaps relative to the poverty line. This index measures the

severity of poverty and is calculated by taking into account inequality among the poor. This index can also be defined as the weighted sum of poverty gaps (as a proportion of the poverty line) the weights being the proportionate poverty gaps themselves [Haughton and Khandakar, 2009]. However, the squared poverty gap index (calculated over poor individuals only) may be written as:

$$SPGI = \frac{1}{m} \sum_{i=1}^m \left(\frac{G_i}{Z} \right)^2 \quad \dots \dots \dots \dots \dots \dots \dots \dots (7.9)$$

It is to be noted that this measure implicitly gives more weight on the observations that are far below the poverty line. Illustration is shown in example 3.

Example 3 shows the calculation of squared poverty gap for a society of 5 individuals with the following income.

Income for each individual of a society, assuming poverty line income Tk. 625						Squared Poverty Gap index (SPGI)	
Income/Person/Month	:	450	500	400	650	700	$\frac{1}{3} \sum (G_i/Z)^2$ = 0.083
Poverty gap (G _i)	:	175	125	225	0	0	
G _i /Z	:	0.280	0.200	0.360	0	0	
(G _i /Z) ²	:	0.078	0.040	0.130	0	0	

Among the three measures of poverty, first two measures (H and PGI) are easy to interpret but the third measure (SPGI) is not easy to interpret and understand. However, the latter two measures (PGI and SPGI) have significant use in policy formulation for poverty alleviation. For instance, PGI may be used as an indicator for eliminating poverty by targeting income transfer to the poor through Food for Works (FFW), Test Relief (TR), Vulnerable Group Development (VGD), Micro Credit Programs etc. The SPGI has one important feature that it is decomposable and can be written by the sum of two components as

$$SPGI = \frac{(PGI)^2}{H} + \frac{(H - PGI)^2}{H} + CV_p^2 \quad \dots \dots \dots \dots \dots \dots \dots \dots (7.10)$$

where CV_p² denotes the squared coefficient of variation of income among the poor. The first term of the right hand side of (7.10) indicates the contributions of poverty gap to SPGI, while the second term of equation (7.10) indicates the contribution of inequality amongst the poor to SPGI (Ravillion, 1992).

7.6.4 General Class of Poverty Measure

Foster, Greer and Thorbecke (FGT) propounded in 1984 a general class of poverty measure which satisfies the following aspects:

- (a) the incidence of poverty as measured by the percentage of the population with per capita income below the poverty line
- (b) depth of poverty as measured by the aggregate income deficit of the poor relative to the poverty line, and
- (c) degree of inequality among the poor

The FGT class of poverty index may be written as

$$P_{\alpha} = N^{-1} \sum_{i=1}^N [(z - y_i)/z]^{\alpha}, (\alpha \geq 0) \quad \dots \dots \dots \quad (7.11)$$

where P_{α} is the mean over the whole population which takes the value $(z - y_i/z)^{\alpha}$ for the poor and zero for the non-poor [Ravillion (1992)], Z denotes the poverty line, N is the population size, and α is the parameter which is a measure of sensitivity of the poverty index. When the parameter $\alpha = 0$, P_0 becomes the measure of poverty head count index (HCI), when $\alpha = 1$, P_1 is the measure of poverty gap index (PGI) and when $\alpha = 2$, P_2 becomes the measure of severity of poverty. In other words, P_{α} reduces to P_0 corresponding to $\alpha = 0$ and gives a measure of incidence of poverty or head count index, P_0 is then given

$$P_0 = N_p/N \quad \dots \dots \dots \quad (7.12)$$

where N_p is the number of poor and N is the population size. Calculation is shown in example 4.

Example 4 shows the calculation of poverty gap index based on whole population of size 5 individuals with the following income

Income/Person/months for each individual in village A	Poverty Gap index (PGI)
Income/Person/Month in : 450 500 400 650 700 Village A	0.168
Poverty gap (Z - y _i) : 175 125 225 0 0	
G _i /Z : 0.280 0.200 0.360 0 0	

when $\alpha = 1$, P_{α} reduces to P_1 which is a measure of the poverty gap based on the aggregate poverty deficit of the poor relative to poverty line, P_1 is a indicator for measuring the depth of poverty, as it depends on the distance of the poor below the poverty line. Thus, P_1 is given by

$$P_1 = N^{-1} \sum_{i=1}^N (z - y_i) / z \quad \dots \dots \dots \dots \dots \dots \dots \dots (7.13)$$

Example 5.

When $\alpha=2$, P_α reduces to P_2 which gives the Foster – Greer – Thorbecke measure and indicates the severity of poverty for the whole population. It is also known as squared poverty gap and defined by

$$P_2 = N^{-1} \sum_{i=1}^N \left\{ (z - y_i) / z \right\}^2 \quad \dots \dots \dots \dots \dots \dots \dots \dots (7.14)$$

Example 5 shows the calculation of squared poverty gap index based on population of size 5 individuals with the following income.

Income for each individual of a society, assuming poverty line income Tk. 625						Squared Poverty Gap index (SPGI)	
Income/Person/Month	:	450	500	400	650	700	0.0496
Poverty gap (G_i)	:	175	125	225	0	0	
G_i/Z	:	0.280	0.200	0.360	0	0	
$(G_i/Z)^2$:	0.078	0.040	0.130	0	0	

The FGT class of poverty measures has another important feature regarding decomposition of poverty. They can be disaggregated for population subgroups and the contribution of each subgroup to national poverty can be calculated. This has been illustrated below.

According to HIES 2010 conducted by the BBS, the head count index based on upper poverty line is 21.3 for urban area where 26 percent of the population lives, while the head count index is 35.2 for rural area where 74 percent of the population lives. Then the national poverty index may be obtained as the weighted average of these sub-national poverty indexes as

$$\begin{aligned} P_0 &= P_0, \text{ urban (Urban Population/N)} + P_0, \text{ rural (Rural Population/N)} \\ &= (0.213)(0.26) + (0.352)(0.74) \\ &= 0.055 + 0.260 \\ &= 0.3154 \text{ or } 31.54 \text{ percent.} \end{aligned}$$

where N is the total population of Bangladesh

7.6.5 Sen's Composite Index of Poverty Measure

Sen (1976) pointed out that income inequality among the poor is also an important dimension of poverty measurement and both the measures

(H and PGI) have failed to capture this dimension. Sen (1976) further pointed out that H violates two important axioms, namely those of monotonicity² and transfer³. The PGI violates the transfer axioms among the poor (Clark et.al., 1981). Keeping these shortcomings in view, Sen suggested a composite index of poverty measurement which is based on ordinal welfare concept and uses an axiomatic approach (Chen, C., 1979). This index may be written as

$$S = H \left[1 - (1 - I) \left(1 - G_p \frac{m}{1 + m} \right) \right] \quad \dots \dots \dots (7.15)$$

For very large number of poor m, then $\frac{m}{1 + m} \approx 1$ and 7.15 reduces to

$$S = H \{ 1 + (1 - I) G_p \} \quad \dots \dots \dots (7.16)$$

where G_p is the Gini coefficient of income distribution among the poor and I is the income gap ratio. The G_p may be defined as

$$G_p = 1 + \frac{1}{m} - \frac{2}{m^2 \bar{y}_p} (y_1 + 2y_2 + \dots + my_m)$$

and incomes are assumed to be in decreasing order such that

$$y_1 \geq y_2 \geq y_3 \geq \dots \geq y_m$$

The Sen Composite index S does not suffer from the short comings as is outlined for H and I. It lies between 0 and 1 and satisfies both the axioms. S is 0 means there is no poor in the society, while S is 1 indicates that all incomes are in one hand and all other individuals have zero income. Sen Index also satisfies weak transfer axiom (WT)⁴. Although Sen Composite index is a pioneer work, it is not totally free from weaknesses. Many authors have made criticisms on different aspects of Sen Index among them the name of Kakwani, Tokayama and Clark may be mentioned

7.6.6 Other Measures of Poverty

Kakwani (1980) pointed out one shortcoming of S and suggested rank order weighting to poverty gap (I) in order to make S more sensitive to

² Other things remaining equal, a reduction in income below the poverty line must increase the poverty measure.
³ Under the transfer axiom, inequality-reducing transfer among the poor should reduce poverty.
⁴ Other things remaining same, a transfer of income from a richer person to poorer 'person below the poverty line-which does not make either of them cross the poverty line-must strictly reduce the poverty measure.

transfer of income among the poor. He suggested a modified approach and proposed the following alternative index of poverty measurement

$$\kappa = \frac{H}{\mu} [Z - \mu_2(1 - G_p)] \dots\dots\dots (7.17)$$

where μ denotes the mean income of the society, μ_2 denotes the mean of income of the poor people, Z is the poverty line and G_p is the Gini coefficient of the income distribution among the poor and H is the head count index.

Takayama (1979) identified another shortcoming of Sen Index. He argued that the composition of poverty of the poor among themselves does not give an adequate representation of the relative deprivation unless it is compared with rest of the society (Clark et. al. 1981). Takayama, therefore, suggested an alternative poverty index which is written as

$$T = H[(1 - \theta)I + \theta G_p] \dots\dots\dots (7.18)$$

where $\theta = 1 - (1 - H) Z/\mu_2$ and other symbol I , Z and μ_2 have their usual significance. The index T lies in the close interval (0,1) and the upper limit is attained when one individual possesses all incomes. This index, however, does not satisfy the monotonicity axiom in general and is not sensitive to the changes in inequality in income distribution among the poor (Kakwani, 1981). It also does not satisfy the normalization axiom⁵.

In view of the above weaknesses, Clark et. al. (1981) suggested and calculated two modified poverty indices by using the following formulae.

$$P = HI \left(\frac{g^*}{g} \right) \dots\dots\dots (7.19)$$

$$\text{and } P_1 = 1 - \left(\frac{y^*}{z} \right) \dots\dots\dots (7.20)$$

$$\text{or } = 1 - \left\{ H [(1 - A)(1 - I)]^\beta + (1 - H) \right\}^{1/\beta}$$

$$\text{where, } g^* = \left\{ m^{-1} \sum_{i=1}^m g_i^\alpha \right\}^{1/\alpha}, \quad i = 1, 2, \dots, m$$

⁵ If all the poor persons have the same income say \bar{y}_p , then $S=HI$

g^* = mean of g vector of non-negative poverty gap.

$$y^* = \left\{ H \left[(\mathbf{1} - \mathbf{A}) \bar{y}_p \right]^\beta + z^\beta (\mathbf{1} - H) \right\}^{1/\beta}$$

the equally distributed equivalent income for the whole population.

$$\mathbf{A} = \mathbf{1} - \left(y_p^* / \bar{y}_p \right)$$

is the Atkinson inequality index of income distribution among the poor.

$$\bar{y}_p = \left[m^{-1} \sum_{i=1}^m y_i^\beta \right]^{1/\beta}$$

the equally distributed equivalent income of the poor and β = inequality aversion parameter.

These indices are analogous to S and satisfy nearly all the properties and axioms of S . Moreover, in certain situations, \mathbf{P} and \mathbf{P}_1 claim better interpretation than the other indices in respect of explicit social-welfare.

Nonetheless, the indices are not completely free from weaknesses, an important one being that these indices are more subjective, because arbitrary values for inequality aversion parameter β are taken to estimate equally distributed equivalent income [for details see Clark et. al (1981)].

Huda and Rahman (1992) suggested another modified index by introducing welfare based inequality in the composite index S , instead of using Gini index of income distribution among the poor. The modified index may be defined by

$$\mathbf{M} = \mathbf{H} [\mathbf{I} + (\mathbf{1} - \mathbf{I}) \mathbf{R}] \quad \dots \dots \dots (7.21)$$

where $\mathbf{R} = \mathbf{E}_T / (1 + \mathbf{E}_T)$,

$$\mathbf{E}_T = \ln \bar{y} - n^{-1} \sum \ln y_i,$$

$$\bar{y} = n^{-1} \sum_{i=1}^n y_i, \text{ and}$$

H and I are as defined earlier.

It may be noted that E_T being log of ratio of arithmetic mean to the geometric mean can be viewed as welfare based measure of income inequality. E_T lies between 0 and ∞ . The lowest value is attained when all incomes are equal, i.e. society is totally egalitarian. On the other hand, it attains the highest value when there is an extreme disparity in the distribution of income. Thus, in the utilitarian framework, E_T indicates the difference between the maximum possible welfare and actual welfare. The higher the value of the difference, the lower is the social welfare [Bourguignon (1979)]. The composite index M satisfies most of the desirable properties as outlined by Sen for his composite index S. The index M lies between 0 and 1. $M = 0$ when everyone is rich, and the upper limit is attained when everyone is poor and there is extreme inequality among the poor [Rahman and Huda (1992)].

Chapter 8

Population and Vital Statistics

8.1 Introduction

Population size and different vital events describe social conditions of a nation. Thus statistics on different aspects of population are important and required to help develop short-term and long-term economic planning and to frame policy on health, education, social service, social welfare, administration etc. Bangladesh is a over populated country with respect to its area and economy. The country's resources will not be sufficient to provide adequate food and generate gainful employment to all. As a result of over-population the average productivity will decrease and consequently per capita income will diminish. A over-populated state continues with a state of unemployment, under employment, ill-health, illiteracy, food insecurity and poverty. Our growing populations are over-straining the country's slender resources which lead to lower the level of living.

Although the population growth rate has slowed down considerably over the last thirty years from 2.7 percent per year in 1980s to 1.4 percent in 2000s, yet Bangladesh added 19 million people to its total population indicating about 15 percent increase between 2000 and 2010. The working age population increased more rapidly than the total population and it increased at an average rate of 2.3 percent between 2000 and 2010 (WB, 2010). Apart from demographic impact, the increased population has negative impacts on several aspects of the society. Large population size leads to poor diet, bad sanitary conditions, absence of preventive and curative medical services etc. Changes in fertility and mortality have important consequences for the age structure of the population. Reduction in fertility and mortality leads to a lower proportion of children and an increase in the number of working age adults and elderly people. Thus statistics on population size and its different demographic aspects are very important for economic policy and different social planning in the country.

8.2 Sources of Population Statistics

Population statistics are gathered mainly from the (a) periodic censuses, (b) sample surveys and (c) vital registration system. The decennial censuses of population constitute the most comprehensive population statistics of the country. Total population size distribution

and other characteristics of population are gathered by population census. The first census in Bangladesh was conducted in 1974 by the Bangladesh Bureau of Statistics (BBS). Since then, there has been a series of decennial censuses in 1981, 1991, 2001 and latest one in 2011 and is the fifth in the series.

A large volume of aggregated and disaggregated population statistics such as total population, population by age, sex and their urban-rural distribution, migration, occupation, economically active population are obtained from decennial censuses. Despite having vast uses of population census, it has some limitations. Among the limitations, the following are important:

- (i) As population census is a large-scale statistical investigation, a limited number of questions can be asked during census.
- (ii) A census can only be carried out at intervals of ten years and the interval is too long to satisfy the data requirements for the development plans.
- (iii) With each subsequent census the subjects to be covered become more and more complicated, and
- (iv) The time required for processing an entire data collected in census is too long because of technical, financial and administrative constraints.

And when population statistics are finally published after two or three years of conducting census, they may no longer be useful in assessing current population changes. In that situation the changes in population characteristics need to be adjusted for making national development plans on health, education, employment generation, social welfare, social protection etc.

8.3 Sample Surveys

A sample survey is the second most important source of population statistics. In order to supplement up-to-date data on population characteristics, sample survey with a long questionnaire can be conducted. In Bangladesh Demographic and Health Survey (BDHS) is the second most important source of demographic statistics. This survey is conducted to see the changes of population characteristics and to arrive at estimates of demographic events, population size and its distribution, mortality, fertility, health related statistics, migration etc. The sample survey generally gives data of a better quality than a complete enumeration. This is because in a sample survey it is possible to employ highly trained personnel, conduct better supervision or use

better equipment if necessary. Thus, there is generally greater scope and coverage in respect of information than in a census.

8.4 Vital Registration

Vital registration is another but weak source of population statistics. It consists of continuous registration of births, deaths and marriages by local designated personnel. In Bangladesh, vital registration system of this type does not work efficiently and the data are inadequate, under reported and defective. The statistics collected by administrative channel is not published in report form. These data can hardly be used to measure the level and trends of fertility, mortality and other vital statistics to see the changes over time. However, the Bangladesh Bureau of Statistics (BBS) has been conducting a Sample Vital Registration System (SVRS) since 1980 to capture annual population change in Bangladesh. The coverage of vital registration has been increased from 103 primary sampling units in 1980 to 1000 in 2009. Each PSU is comprised of 250 continuous households. This is done to provide estimate of vital statistics at the division and district levels. The main objectives of the SVRS are to meet the demand of demographic data in between two population census periods and the data included the following vital events:

(i) Birth, (ii) Death, (iii) Marriage, (iv) Divorced/Separated, (v) Out-migration, (vi) In-migration, (vii) Contraceptive use and (viii) Disability.

8.5 Time – Lag in Publication

There is considerable time-lag between data collection and final presentation of data for use. The time-lag in publication of population census, surveys and sometimes sample vital registration is 3 – 4 years.

8.6 Reliability of Data

The reliability of the population data is questionable. For example, the reported age data are not based on birth certificate, which is not the case in India at present. In most of the censuses and surveys, non-sampling error and sampling error are not estimated to measure reliability of data.

8.7 Certain Important Population Statistics

Population growth, total population, population composition and vital events such as infant mortality, maternal mortality, birth rate, death rate and life expectancy indicate social conditions of the country. Higher value of these indicators except life expectancy will spell

misery of the country. Due to rapid growth of population the average productivity and per capita income will diminish and consequently standard of living will fall and it acts as a drag on economic progress and slows down the pace of economic development. Intercensal population size and its growth is shown in Table 8.1 which indicates a rapid decrease in growth rate between 1961 and 2011 census periods. Table 8.2 sets out information on population projection up to 2025 by sex and region. Data on life expectancy from 2000 to 2011 by sex and region are shown in Table 8.3. Table 8.4 shows crude death rate while Table 8.5 gives crude birth rate from 2000 to 2011 by region. Information on infant mortality rate per 1000 live birth by sex and region from 2002 to 2011 is shown in Table 8.6. It is a good social indicator of a country for population projection and proper planning on health sector. Table 8.7 sets out the natural growth rate which means CDR minus CBR from 2002 to 2011 by region. Maternal mortality rate from 2000 to 2011 by region is shown in Table 8.8. Trend in total fertility rate and age specific fertility rate by region is shown in Table 8.9. The total fertility rate reveals wide variation between urban and rural areas. The higher of total fertility over the national average rates are observed in rural area. Trend in gross reproduction rate (GRR) and net reproduction rate (NRR) are given in Table 8.10 by region. Bangladesh is now experiencing a significant increase of elderly populations over time. Nearly 7 percent of the total population are aged 60 years and over. As the share and size of the elderly population is increasing over time which is challenging to the government and creating a serious problem on the economy. The rapid increase of elderly population has great impact on their health status and quality of life. To address this challenge effectively policies should be taken to provide adequate social security and health facilities for them. Table 8.11 shows the increase in elderly population between 2001 and 2011.

Table 8.1 Inter Censal Population and Growth Rates

Census Year	Adjusted Population in million	Growth Rate (exponential)
1961	65.22	--
1974	76.40	2.48
1981	89.91	2.35
1991	111.46	2.17
2001	130.52	1.59
2011	149.77	1.37

Source: Statistical Year Book, 2013, BBS.

Table 8.2 Projected Population by Sex, and by Urban and Rural Residence based on the Assumption that TFR 2.1 by 2011

(Fig. in million)

Year	Bangladesh			Urban			Rural		
	Male	Female	Total	Male	Female	Total	Male	Female	Total
2001	67.08	62.94	130.02	16.44	14.02	30.47	50.63	48.92	99.55
2002	68.39	64.21	132.60	16.86	14.39	31.25	51.53	49.82	101.35
2003	68.67	65.45	135.12	17.37	14.83	32.20	52.30	50.62	102.92
2004	70.89	66.65	137.54	17.96	15.36	33.33	52.93	51.28	104.21
2005	72.01	67.75	139.76	18.65	15.97	34.62	53.36	81.78	105.14
2006	73.03	68.77	141.80	19.43	16.67	36.11	53.60	52.10	105.69
2007	74.09	69.81	143.91	20.25	17.40	37.65	53.84	42.41	106.26
2008	75.11	70.82	145.93	21.08	18.14	39.22	54.03	52.68	106.71
2009	76.08	71.78	147.86	21.92	18.89	40.82	54.15	52.89	107.04
2010	76.99	72.69	149.69	22.77	19.66	42.43	54.22	53.04	107.04
2011	77.85	73.56	151.40	23.63	20.43	44.06	54.22	53.13	107.35
2012	78.75	74.46	153.20	24.52	21.23	45.75	54.23	53.22	107.45
2013	79.68	75.38	155.06	25.44	22.07	47.51	54.23	53.32	107.55
2014	80.64	76.34	156.98	26.40	22.93	49.33	54.24	53.41	107.65
2015	81.63	77.33	158.96	27.39	23.83	51.22	54.24	53.50	107.74
2016	82.65	79.34	160.99	28.42	24.76	53.18	54.24	53.58	107.81
2017	83.70	79.38	163.08	29.48	25.73	55.21	54.22	63.65	107.87
2018	84.77	80.43	165.21	30.57	26.72	57.30	54.20	53.71	107.91
2019	85.86	81.51	167.37	31.70	27.75	59.40	54.16	53.76	107.92
2020	86.96	82.58	169.54	32.86	28.80	61.92	54.10	53.78	107.88
2021	88.05	83.66	171.71	34.04	29.88	63.92	54.01	53.78	107.79
2022	89.13	84.73	173.86	35.24	30.99	66.23	63.89	53.74	107.63
2023	90.21	85.79	176.00	36.47	32.11	68.58	53.75	53.68	107.43
2024	91.28	86.84	178.12	37.71	33.26	70.97	53.56	53.58	107.15
2025	92.33	87.88	180.21	38.98	34.43	73.41	53.35	53.45	106.80

*Source: Statistical; Pocket Book 2013, BBS.***Table 8.3** Life Expectancy at Birth by Sex, 2000–2011

Year	Sex	Bangladesh	Urban	Rural
2000	Both Sex	63.6	65.3	62.1
	Male	63.7	65.2	61.7
	Female	63.5	65.4	62.7
2001	Both Sex	64.2	66.4	63.2
	Male	64.0	66.2	62.5
	Female	64.5	66.7	64.1
2002	Both Sex	64.9	67.2	64.4
	Male	64.5	67.0	63.9
	Female	65.4	67.0	65.0

Contd.

Year	Sex	Bangladesh	Urban	Rural
2003	Both Sex	64.9	67.6	64.3
	Male	64.3	67.3	63.4
	Female	65.4	67.8	65.5
2004	Both Sex	65.1	67.8	64.3
	Male	64.4	67.5	63.4
	Female	65.7	68.1	65.5
2005	Both Sex	65.2	67.9	64.5
	Male	64.4	67.6	63.5
	Female	65.8	68.1	65.6
2006	Both Sex	65.4	68.0	64.6
	Male	64.5	67.8	63.6
	Female	66.6	68.3	65.7
2007	Both Sex	66.6	68.1	66.0
	Male	65.5	67.7	64.7
	Female	67.9	68.7	67.6
2008	Both Sex	66.8	68.3	66.2
	Male	65.6	67.9	64.8
	Female	68.0	68.8	67.7
2009	Both Sex	67.2	68.7	68.9
	Male	66.1	68.2	65.6
	Female	68.7	69.2	68.3
2010	Both Sex	67.7	68.9	67.4
	Male	66.6	68.3	66.4
	Female	68.8	69.5	68.6
2011	Both Sex	69.0	69.9	68.6
	Male	67.9	68.9	67.4
	Female	70.3	71.1	69.8

Source: Statistical; Pocket Book 2013, BBS.

Table 8.4 Crude Death Rates (CDR) by Residence, 2000–2011

(Per 1000)

Year	National	Urban	Rural
2000	4.9	3.5	5.3
2001	4.8	4.3	5.2
2002	5.1	3.8	5.4
2003	5.9	4.7	6.2
2004	5.8	4.4	6.1
2005	5.8	4.9	6.1
2006	5.6	4.4	6.0
2007	6.2	5.1	6.6
2008	6.1	4.9	6.5
2009	5.8	4.7	6.1
2010	5.6	4.9	5.9
2011	5.5	4.8	5.8

Source: Statistical; Pocket Book 2013, BBS.

Table 8.5 Crude Birth Rate (CBR) by Residence, 2000–2011

(Per 1000)

Year	National	Urban	Rural
2000	19.0	13.7	20.8
2001	18.9	13.6	20.7
2002	20.1	16.6	21.0
2003	20.9	17.9	26.7
2004	20.8	17.8	21.6
2005	20.7	17.8	21.7
2006	20.6	17.5	22.7
2007	20.9	17.4	22.1
2008	20.1	17.1	21.6
2009	19.4	16.8	20.4
2010	19.2	17.1	20.1
2011	19.2	20.2	17.4

*Source: Statistical; Pocket Book 2013, BBS.***Table 8.6** Infant Mortality Rate (IMR) Per 1000 Live Birth, 2002–2011

Sex & Residence	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
A. Sex										
Both Sex	53	53	52	50	45	43	41	39	36	35
Male	54	55	57	52	47	45	43	42	38	36
Female	52	51	47	47	43	41	39	37	35	33
B. Residence										
National	53	53	52	50	45	43	41	39	36	35
Urban	37	40	41	44	38	42	40	37	35	32
Rural	57	57	55	51	47	43	41	40	37	36

*Source: Statistical; Pocket Book 2013, BBS.***Table 8.7** Natural Growth Rate (CBR – CDR) by Residence, 2002–2011

Residence	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
National	1.50	1.50	1.50	4.49	1.49	1.40	1.40	1.36	1.36	1.37
Urban	1.29	1.32	1.34	1.29	1.31	1.23	1.22	1.21	1.22	1.26
Rural	1.59	1.56	1.55	1.58	1.57	1.55	1.51	1.43	1.42	1.44

*Source: Statistical; Pocket Book 2011, BBS.***Table 8.8** Maternal Mortality Ratio (MMR), 2000–2011

(Per 1000 live births)

Year	National	Rural	Urban
2000	3.18	3.29	2.61
2001	3.15	3.26	2.58
2002	3.91	4.17	2.73
2003	3.76	4.02	2.70
2004	3.65	3.87	2.53

Contd.

Year	National	Rural	Urban
2005	3.48	3.58	2.75
2006	3.37	3.75	1.96
2007	3.51	3.86	2.19
2008	3.35	3.74	2.07
2009	2.59	2.85	1.79
2010	2.16	2.30	1.78
2011	2.09	2.15	1.96

Source: Statistical; Pocket Book 2013, BBS.

Table 8.9 Trend in Age-Specific Fertility Rates per 1000 Women by Residence

Year	Total Fertility rate per women	Age groups						
		15-19	20-24	25-29	30-34	35-39	40-44	45-49
National								
2000	2.59	39	159	162	91	49	15	5
2001	2.56	44	152	159	89	49	15	5
2002	2.55	57	153	134	88	47	21	13
2003	2.57	64	163	136	82	42	19	9
2004	2.51	59	165	130	71	50	21	8
2005	2.46	57	160	131	71	48	18	8
2006	2.41	54	159	121	72	47	22	7
2007	2.39	59	148	123	79	44	16	8
2008	2.30	66	142	116	73	38	15	9
2009	2.15	62	137	113	68	33	12	4
2010	2.12	59	136	113	66	36	11	5
2011	2.11	66	142	110	62	30	9	4
Rural								
2000	2.89	43	178	181	102	54	17	4
2001	2.84	49	171	179	96	51	17	4
2002	2.69	62	160	138	90	51	23	14
2003	2.70	70	170	138	86	46	20	10
2004	2.67	63	176	136	75	54	24	9
2005	2.65	61	173	141	76	51	21	8
2006	2.63	58	173	131	78	53	25	8
2007	2.61	67	164	133	95	49	17	8
2008	2.60	75	159	131	82	44	19	11
2009	2.28	68	147	113	71	34	13	5
2010	2.26	61	145	120	72	39	12	5
2011	2.25	66	142	110	62	30	9	4
Urban								
2000	1.68	26	101	102	57	36	9	4
2001	1.73	24	102	97	68	41	10	4
2002	1.94	40	130	120	79	32	13	6
2003	1.91	41	124	107	65	27	13	5
2004	1.91	42	129	106	54	37	11	3
2005	1.87	38	127	106	60	31	9	4

Contd.

Year	Total Fertility rate per women	Age groups						
		15-19	20-24	25-29	30-34	35-39	40-44	45-49
2006	1.81	41	123	95	56	30	14	4
2007	1.79	39	107	99	63	31	14	5
2008	1.79	51	113	93	57	28	10	7
2009	1.65	50	116	89	53	26	5	4
2010	1.72	52	112	92	46	30	8	3
2011	1.71	52	196	192	125	100	29	5

Source: Statistical Year Book 2012, BBS

Table 8.10 Trend in Gross Reproduction Rate (GRR) and Net Reproduction Rate (NRR) by Residence

Year	G R R			N R R		
	National	Urban	Rural	National	Urban	Rural
2000	1.27	0.82	1.41	1.24	0.79	1.37
2001	1.26	0.80	1.40	1.23	0.79	1.36
2002	1.26	1.03	1.32	1.22	0.94	1.29
2003	1.24	0.95	1.32	1.20	0.92	1.29
2004	1.21	0.92	1.28	1.18	0.91	1.25
2005	1.19	0.91	1.28	1.17	0.90	1.24
2006	1.17	0.90	1.27	1.15	0.88	1.24
2007	1.17	0.87	1.28	1.14	0.85	1.24
2008	1.11	0.87	1.25	1.09	0.86	1.23
2009	1.07	0.81	1.15	1.06	0.80	1.14
2010	1.05	0.84	1.12	1.04	0.82	1.11
2011	1.04	0.85	1.11	1.03	0.83	1.10

Source: Statistical Year Book 2012, BBS

Table 8.11 Populations 60 Years and over by Region and Sex, 2001 and 2011

Region and Sex	Age					
	60-64		65-69		70+	
	2001	2011	2001	2011	2001	2011
Total :						
Both Sex	2849107	3934013	1461406	2113488	3418701	4721993
Male	1546041	2081306	817904	1149569	1903923	2494097
Female	1303066	1852707	643502	963919	1514778	2227896
Urban :						
Both Sex	543767	759025	272516	386330	610007	780308
Male	310178	425996	156491	217634	337001	409905
Female	233589	333029	116025	168696	273006	370403
Rural :						
Both Sex	2305340	3174988	1188890	1727155	2808694	3941685
Male	1235863	1655310	661413	9319355	1566922	2084192
Female	1069477	1519678	527477	795223	1241772	1857493

Source: Statistical Yearbook of Bangladesh 2012 and Statistical Pocketbook Bangladesh 2013, BBS.

The demographic profile discussed above highlights the importance of sound demographic projections by district-wise breakdown for planning and programming for the needs of the different age groups. This becomes indispensable for the formulation of sound integrated plans for the fast growing segments of the population, the children and adolescents. The current national and sectoral plans such as education, health etc. takes into account of aggregate population and the demands that are generated for the total population. But the systematic analysis of demands and the needs related to the age structure of the population has received little attention. The disaggregation of age structures at district level has been almost entirely neglected, and has not been attempted in the formulation of sector plans such as health and family planning, education, employment generation etc. The age structures in the different districts will indicate the pressures that will be developed on the various services for the different age groups in different districts of the country.

Chapter 9

Labour Force Statistics

9.1 Introduction

Labour force of a country plays an important role in economic development by producing goods and services. But the labour force statistics are important particularly for economic and manpower development planning. Labour force statistics are generally referred to economically active population. They are the sum total of the employed (including underemployed) and unemployed. Under this criterion, labour force comprises all persons of age 15 years and above who are either gainfully employed or is looking for gainful employment during the reference period of the survey (say, preceding week of the day of enumeration). More specifically, a person is in the labour force if he/she is engaged in gainful activity even for a small part of the reference period but not in the labour force for the rest of the period is also classified as labour force. It excludes disabled, retired persons, rent receivers, full time housewives, students, beggars and other who did not work for pay at least one hour during the reference week (BBS, 1999-2000). It is thus a measure of economically active population. The term 'active' is used in a sense of engagement in the productive work or services. Persons having only income but not engaged in productive work or services are not included in the economically active population. For instance, rent receivers, pension holders and beggars earn income only but not doing work in economic sense. The employed consists of all persons who are engaged in gainful activity and those who are temporarily absent from work for reasons of illness, injury and other reasons. This implies that underemployed persons are basically classified as employed, while those who do not return as employed but are looking for work are classified as unemployed.

Apart from employment and unemployment there are other aspects of labour force such as distribution of labour force by urban and rural areas, by education levels, age, sex compositions, industrial and occupation classification etc. Besides information on the classification and the characteristics of labour force in respect of employed, unemployed and outside the labour force, data on the number of hours worked during the week preceding of the enquiry are also collected to measure visible underemployment. Although there are variations in

working hours among different occupations, generally a norm of 8 hours per day or 56 hours per week is considered as the level of full-time work or fully employed. A person working for less than 4 hours (half of the norm) may be treated 'underemployed' and a person working less than half of the 4 hours may be considered as 'severely underemployed'. The labour force data are extremely useful and important barometers to assess the changes in employment situation over a period of time in the country.

Two definitions of economically active population were followed in Labour Force Surveys (LFS) conducted by the Bangladesh Bureau of Statistics (BBS). One definition is called usual definition and the other is called extended definition. Under usual definition, any person aged 15 years and over, who was either employed (worked at least one hour in a week) for pay or profit or without pay or profit or unemployed but seeking or available for job during the reference period is considered as an economically active. Under this definition a person who is engaged in own household activities is not considered as economically active. But in extended definition, a person who is engaged in own household economic activities (such as, poultry and livestock care, threshing, boiling, drying, processing, preservation of food etc.) is considered as economically active remaining other things same. The number of economically active persons for extended definition is generally higher than those for usual definition of labour force.

The following discussions are, however, confined to the major sources of data, deficiencies in data, time-lag in publication of data and some important indicators of labour force.

9.2 Sources of Labour Force and Employment Statistics

The National Labour Force Survey (LFS) is the main source of labour statistics in Bangladesh. The labour force, employment, unemployment and under employment characteristics of active population are collected in different labour force surveys which are conducted by the Bangladesh Bureau of Statistics (BBS). The first LFS in Bangladesh was undertaken in 1980. Since then there has been a series of LFS's in 1982–83, 1984–85, 1985–86, 1988–89, 1991–92, 1995–96, 1999–2000, 2002–2003, 2005–2006 and the latest LFS conducted in 2009–2010 is the eleventh in series. It is, thus, observed that some of the surveys could not be held at uniform time intervals due to resource constraints and other reasons. A large volume of socio-economic data on labour force such as age, sex composition, their urban–rural distribution, and industrial and occupational classification are found in the reports of the labour force surveys. The decennial censuses of population also constitute the most comprehensive source of information on the economically active population of the country.

Population census is the source of comprehensive data relating to the employment in unorganized sectors. However, the population census, by its nature is not the best way in getting all aspects of labour statistics. Consolidated data on employment of Bangladeshis abroad are released by the Bureau of Manpower, Employment and Training (BMET). Information on the number of workers employed in major industries is published by Bangladesh Garment Manufacturer and Exporters Association (BGMEA). However, the Labour Force Survey (LFS) is perhaps the only official source through which the desired type of information can be obtained for a meaningful analysis of various problems of unemployment in its various facets.

9.3 Deficiencies in Labour Force and Employment Statistics

The labour force surveys are intended to furnish information on labour force statistics but not on regular intervals. The coverage of items, the concepts and definitions adopted in terms of economic activities, the reference period, etc. have, however, varied from Round to Round. For instance extended definition of labour force was followed, in 1991-92, 1995-96 and 1999-2000 LFS, while in other LFSs, usual definition of labour force was followed. The comparability of data over time is thus rendered difficult, thereby limiting the validity of long-term trends. Moreover, the changes in concepts and definitions of various economic terms used in different rounds have also been a subject of comment. These changes, however, are generally brought about in the light of experience gained in different rounds of LFS.

Another important limitation of Labour Force Survey (LFS) data is the non availability of much of the information about the labour force characteristics by region such as district, upazila, urban and rural. Information on employment, unemployment and underemployment by socio-economic and demographic characteristics and by region is very weak. Information on employment, unemployment and underemployment in the unorganized sectors are not easily available. Coverage of employment situation in relation to suitable disaggregated segments of population is also limited. The data collected in LFS cannot be cross-checked with information available from any other sources due to conceptual and definitional differences. As a result there are some inconsistencies in figures between two rounds of surveys. For instance, youth labour force (age 15-29 years) reduced from 19.0 million in 2002-2003 to 17.8 million in 2005-2006 and this figure again increased to 20.9 million in 2009-10. The dependable estimate of visible and invisible underemployment is almost absent in LFS. The coverage of items in LFS is limited and the main purpose of labour force enquiries

was to provide broad estimates of economically active population, employment and unemployment.

9.4 Time – Lag in Publication

The data collected in various LFS's are available in consolidated form with considerable time-lag, which is the most serious deficiency in LFS's. The data are collected with considerable cost, labour and time but published after 2–3 years when the data become out dated for purposes of manpower planning and policy formulation.

9.5 Some Indicators of Labour Force

Table 9.1 shows the trend in key indicators in respect of labour force, characteristics, economically active population, employed, under employed, unemployed, participation rate, youth labour force etc. Trend indicates a slight improvement in all characteristics of labour force.

Table 9.2 illustrates the trend in female labour force by region based on different labour force survey reports. In 1981, percentage of female labour force was about 6 percent in urban and 5.7 percent in rural area. The participation rate was 5 percent, 7 and 5 percent respectively. The percentage of female labour force in 2010 raised to about 30 percent at national level, 29 percent in urban and 30 percent in rural areas, while the participation rate increased to 37 percent, 34 percent and 37 percent respectively.

Table 9.3 indicates the employment status by broad economic sectors. It appears that employment in agriculture sector is gradually decreasing and it decreased from 51 percent in 1999-2000 to about 48 percent in 2009 to 2009-10. On the contrary, employment in non-agriculture sector increased from 49 percent to 52 over the same period.

Major occupation of youth in urban area is in production and transport sector while agriculture, forestry and fisheries are the main occupation of youth in rural area (Table 9.4).

Table 9.5 shows the distribution of employed youth aged 15-29 years by status of employment. About 36 percent male and 30 percent female in urban area worked as regular paid employee, while this figure for rural area is 16 percent for male and 6 percent for female. Second majority of youths worked as self-employed worker.

Majority of the female youths particularly in rural area worked as unpaid family worker. Unemployment rate of youth by age group is shown in Table 9.6. Youth of age 15-19 years are more unemployed than those of 20 to 29 age groups. Annual average growth rate of

labour force between 2005-2006 and 2010 was found to be 3 percent for both sexes, while it was 1.4 percent for male and 9 percent for female (Table 9.7).

Table 9.1 Key Indicators of Labour Force Surveys and Their Trend, 1999–00 – 2009–10

Labour Force Characteristics		Labour Force Survey (15+population)			
		1999– 2000	2002– 2003	2005– 2006	2009– 2010
1	Economically Active Population/Labour Force (million)				
	Bangladesh:				
	Total	40.7	46.3	49.5	56.7
	Male	32.2	36.0	37.4	39.5
	Female	8.5	10.3	12.1	17.2
	Urban:				
	Total	9.2	11.3	11.7	13.3
	Male	7.1	8.6	8.9	9.3
	Female	2.1	2.7	2.8	4.0
	Rural:				
	Total	31.5	35.0	37.8	43.3
	Male	25.1	27.4	28.5	9.3
	Female	6.4	7.8	9.3	4.0
2	Employed Population (million)				
	Bangladesh:				
	Total	39.0	44.3	47.4	54.1
	Male	31.1	34.5	36.1	37.9
	Female	7.8	9.8	11.3	16.2
	Urban:				
	Total	7.8	10.7	11.3	12.4
	Male	6.7	8.2	8.6	8.8
	Female	2.0	2.5	2.7	3.6
	Rural:				
	Total	30.3	33.6	36.1	41.7
	Male	24.4	26.3	27.5	29.1
	Female	5.9	7.3	8.6	12.6
3	Unemployed Population (million)				
	Bangladesh:				
	Total	1.8	2.0	2.1	2.6
	Male	1.1	1.5	1.2	1.6
	Female	0.7	0.5	0.9	1.0
	Urban:				
	Total	0.6	0.6	0.5	0.9
	Male	0.4	0.4	0.3	0.5
	Female	0.2	0.2	0.2	0.4
	Rural:				
	Total	1.2	1.4	1.6	1.7
	Male	0.7	1.1	0.9	1.1
	Female	0.5	0.3	0.7	0.6

Contd.

Labour Force Characteristics		Labour Force Survey (15+population)			
		1999– 2000	2002– 2003	2005– 2006	2009– 2010
4	Not in Labour Force (million)				
	Bangladesh:				
	Total	33.5	34.5	35.1	38.9
	Male	6.2	5.2	5.7	8.4
	Female	27.3	29.3	29.4	30.5
	Urban:				
	Total	7.3	8.6	9.3	9.9
	Male	1.4	1.5	1.8	2.3
	Female	5.9	7.1	7.5	7.6
	Rural:				
	Total	26.2	25.9	25.8	29.0
	Male	4.8	3.7	3.9	6.1
	Female	21.4	22.2	21.9	22.9
5	Unemployment Rate (%)				
	Total	4.3	4.3	4.3	5.4
	Male	3.4	4.2	3.4	4.1
	Female	7.8	4.9	7.0	5.8
6	Under Employment Rate (%)				
	Bangladesh:				
	Total	16.6	37.6	24.5	n.a.
	Male	7.4	n.a.	10.9	n.a.
	Female	52.8	n.a.	68.3	n.a.
	Urban:				
	Total	12.2	31.2	n.a.	n.a.
	Male	4.7	n.a.	n.a.	n.a.
	Female	38.2	n.a.	n.a.	n.a.
	Rural:				
	Total	17.8	39.6	n.a.	n.a.
	Male	57.7	n.a.	n.a.	n.a.
	Female	38.2	n.a.	n.a.	n.a.
7	Labour Force Participation Rate (%) (refined activity rate)				
	Bangladesh:				
	Total	54.9	57.3	58.5	59.3
	Male	84.0	87.4	88.8	82.5
	Female	23.9	26.1	29.2	36.0
	Urban:				
	Total	55.8	56.8	55.7	57.3
	Male	84.0	85.1	83.2	80.2
	Female	23.9	27.4	27.4	34.5
	Rural:				
	Total	54.6	57.5	59.4	60.0
	Male	84.0	88.1	88.0	83.3
	Female	23.1	25.6	29.8	36.4

Contd.

Labour Force Characteristics		Labour Force Survey (15+population)			
		1999– 2000	2002– 2003	2005– 2006	2009– 2010
8	Crude Activity Rate (%)				
	Bangladesh:				
	Total	35.3	34.7	36.0	38.1
	Male	52.6	52.7	53.3	52.5
	Female	16.5	15.9	18.0	23.3
	Urban				
	Total	n.a.	36.3	36.3	39.0
	Male	n.a.	54.2	54.2	54.2
	Female	n.a.	17.9	17.9	23.6
	Rural				
	Total	n.a.	34.3	35.9	37.8
	Male	n.a.	52.3	53.0	52.0
	Female	n.a.	15.4	18.1	23.3
9	Dependency Ratio				
	Bangladesh:				
	Demographic (DDR)	45.5	77.7	73.5	72.5
	Economic (EDR)	183.1	74.5	71.0	68.7
	Urban:				
	Demographic (DDR)	n.a.	67.0	60.6	59.4
	Economic (EDR)	n.a.	76.1	79.7	74.5
	Rural:				
	Demographic (DDR)	n.a.	81.3	77.9	78.0
	Economic (EDR)	n.a.	74.0	68.3	67.0
10	Unpaid Family Worker (million)				
	Bangladesh:				
	Total	6.0	8.1	10.3	11.8
	Male	2.9	3.4	3.5	2.7
	Female	3.1	4.7	6.8	9.1
	Urban:				
	Total	n.a.	1.6	1.1	2.1
	Male	n.a.	0.6	0.5	0.3
	Female	n.a.	1.0	0.6	1.8
	Rural:				
	Total	n.a.	6.5	9.2	9.7
	Male	n.a.	2.8	3.0	2.3
	Female	n.a.	3.7	6.2	7.4
11	Youth Labour Force (15-29) (million)				
	Bangladesh:				
	Total	18.8	19.0	17.8	20.9
	Male	13.2	13.5	13.2	13.1
	Female	5.6	5.5	4.6	7.8

Contd.

Labour Force Characteristics		Labour Force Survey (15+population)			
		1999– 2000	2002– 2003	2005– 2006	2009– 2010
	Urban:				
	Total	n.a.	4.4	4.2	5.1
	Male	n.a.	3.1	3.0	3.1
	Female	n.a.	1.3	1.2	2.0
	Rural:				
	Total	n.a.	14.6	13.6	15.8
	Male	n.a.	10.4	10.2	10.0
	Female	n.a.	4.2	3.4	5.8
12	Employment by Major Occupation (million)				
	Total	42.8	44.3	47.4	54.1
	Professional Technical	1.6	1.7	2.2	2.4
	Administrative Managerial	0.2	0.1	0.2	0.7
	Clerical Workers	1.2	1.5	1.0	1.0
	Sales Workers	6.3	6.5	6.7	8.2
	Service Workers	2.8	2.0	2.8	3.0
	Agriculture, forestry & fisheries	21.7	22.8	23.0	25.7
	Production & Transport Labours & others	9.0	9.7	11.5	13.5
13	Employment by Major Industry (million)				
	Total	42.8	44.3	47.4	54.1
	Agriculture, forestry and fisheries	21.5	22.9	22.8	25.7
	Mining and Queering	0.2	0.1	0.1	0.1
	Manufacturing	4.2	4.3	5.2	6.7
	Electricity, Gas and Water	0.1	0.1	0.1	0.1
	Construction	1.1	1.5	1.5	2.6
	Trade, Hotel and Restaurant	6.8	6.7	7.8	8.4
	Transport, Storage & Communication	2.6	3.0	4.0	4.0
	Finance and Business, Services	0.4	0.3	0.8	1.0
	Public Administrative & Defense	--	2.5	2.6	2.3
	Community and Personal Services	5.4	2.7	2.6	3.4
14	Status in Employment				
	Total	42.8	44.3	47.4	54.1
	Self-employed/accountant workers	18.8	19.8	19.9	22.0
	Employer	0.1	0.2	0.1	0.1
	Employee	7.7	6.1	6.6	9.4
	Unpaid family helper	6.0	8.1	10.3	11.8
	Day Labourers	10.2	8.9	8.6	10.6
	Others	--	1.2	1.9	1.4

Note: 'n.a.' denotes not available – denotes nil.

Source: Reports of the Labour Force Surveys, Bangladesh, 1999-2000 and 2010, Bangladesh Bureau of Statistics (BBS)

Table 9.2 Female Labour Force Composition by Residence 1981 to 2010

Year and Characteristics	National	Urban	Rural
1981 Census			
Labour Force (million)	1.5	0.2	1.3
Percent of Total Labour Force for Area	5.7	6.0	5.7
Participation Rate	5.1	6.8	5.0
Unemployment Rate	--	--	--
1983–84 LFS			
Labour Force (million)	2.5	0.4	2.1
Percent of Total Labour Force for Area	8.9	10.5	8.6
Participation Rate	8.0	12.3	7.4
Unemployment Rate	4.2	3.9	4.3
1984–85 LFS			
Labour Force (million)	2.7	0.5	2.2
Percent of Total Labour Force for Area	9.0	10.5	8.6
Participation Rate	8.2	12.1	7.7
Unemployment Rate	5.6	4.0	6.0
1985–86 LFS			
Labour Force (million)	3.2	0.6	2.6
Percent of Total Labour Force for Area	10.4	13.4	9.9
Participation Rate	9.9	14.9	8.6
Unemployment Rate	3.3	2.6	3.4
1989 LFS			
Labour Force (million)	21.0	1.5	19.5
Percent of Total Labour Force for Area	41.4	26.3	43.2
Participation Rate	61.5	28.9	67.3
Unemployment Rate	1.0	3.2	0.9
1990–91 LFS			
Labour Force (million)	20.1	2.1	18.0
Percent of Total Labour Force for Area	39.3	24.1	42.4
Participation Rate	58.0	30.0	65.0
Unemployment Rate	1.9	4.7	1.6
1995–96 LFS			
Labour Force (million)	21.3	2.8	18.5
Percent of Total Labour Force for Area	38.0	5.0	33.0
Participation Rate	50.6	28.6	57.3
Unemployment Rate	2.3	4.6	1.9
1999–2000 LFS			
Labour Force (million)	8.6	2.2	6.4
Percent of Total Labour Force for Area	21.1	5.4	15.7
Participation Rate	23.9	26.5	23.1
Unemployment Rate	7.8	8.2	7.6
2002–2003 LFS			
Labour Force (million)	10.3	2.7	7.6
Percent of Total Labour Force for Area	22.2	5.8	16.4
Participation Rate	26.1	27.4	25.6
Unemployment Rate	4.9	6.2	4.4

Contd.

Year and Characteristics	National	Urban	Rural
2005–2006 LFS			
Labour Force (million)	12.1	2.8	9.3
Percent of Total Labour Force for Area	24.4	23.9	24.6
Participation Rate	29.2	27.4	29.8
Unemployment Rate	7.04	6.69	7.15
2009–2010 LFS			
Labour Force (million)	18.9	3.9	13.0
Percent of Total Labour Force for Area	29.6	29.3	29.7
Participation Rate	36.9	34.2	36.5
Unemployment Rate	5.9	7.6	5.4

Source: Statistical Yearbook of Bangladesh-2010, Bangladesh Bureau of Statistics, Statistics Division, Ministry of Planning.

Table 9.3 Trend in Employment by Broad Economic Sectors 1999–2000 to 2009–2010

Year	Sex	Total	Agriculture	Non-Agriculture*
Number in million				
1999–00	Both Sex	38.97	19.99	18.98
	Male	31.08	16.23	14.85
	Female	7.89	3.76	4.12
2002–03	Both Sex	44.32	22.93	21.39
	Male	34.47	17.15	17.31
	Female	9.84	5.77	4.07
2005–06	Both Sex	47.4	22.8	24.6
	Male	36.1	15.1	21.0
	Female	11.3	7.7	3.6
2009–10	Both Sex	54.1	25.7	28.4
	Male	37.9	15.2	22.7
	Female	16.2	10.5	5.7
Percent				
1999–00	Both Sex	100.0	51.3	48.7
	Male	100.0	52.2	47.8
	Female	100.0	47.7	52.3
2002–03	Both Sex	100.0	51.7	48.3
	Male	100.0	49.8	47.8
	Female	100.0	38.6	41.1
2005–06	Both Sex	100.0	48.1	51.9
	Male	100.0	41.8	58.2
	Female	100.0	68.1	31.9
2009–10	Both Sex	100.0	47.6	52.4
	Male	100.0	40.2	59.8
	Female	100.0	64.8	35.2

According to usual definition and persons aged 15 years and over.

Source: Statistical Pocket Book of Bangladesh 2009, Table 4.01 and Report on Labour Force 2010, BBS

* Non-agriculture sector includes manufacturing, other industries and services.

Table 9.4 Employed youths aged 15-29 years by major occupation

Major Occupation	Bangladesh			Urban			Rural		
	Total	Male	Female	Total	Male	Female	Total	Male	Female
Number (000)									
Total	1934	12210	7133	4556	2806	1750	14786	9403	5383
Professional, technical	3								
Administrative, managerial	539	376	164	214	137	77	325	239	86
Clerical worker	213	201	12	62	58	4	151	143	8
Services worker	224	198	26	88	73	15	136	125	11
Sales workers	669	396	273	225	119	106	444	277	167
Agri. forestry. fisheries	1872	1740	132	623	586	36	1249	1154	96
Production, transport labourer	9984	494	5070	1201	368	833	878	4546	4237
Others	5601	4180	1422	2026	1372	654	357	2808	768
	289	255	--	126	102	24	163	153	10
Percent									
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Professional, technical	2.8	3.1	2.3	4.7	4.9	4.4	2.2	2.5	1.6
Administrative, managerial	1.1	1.6	0.2	1.3	2.0	0.2	1.1	1.5	0.1
Clerical worker	1.2	1.6	0.4	1.9	2.6	0.9	0.9	1.3	0.2
Services worker	3.5	3.2	3.8	4.9	4.2	6.0	3.0	2.9	3.1
Sales workers	9.7	14.1	1.8	13.6	20.8	2.1	8.4	12.2	1.8
Agri. forestry. fisheries	51.5	40.1	71.1	24.3	13.1	46.7	59.2	48.1	78.7
Production, transport labourer	289	34.1	19.9	44.4	48.1	37.4	24.1	29.7	14.3
Others	1.5	2.1	0.5	2.8	3.6	1.4	1.1	1.6	0.2

Source: Statistical Pocket Book of Bangladesh 2009, Table 4.01 and Report on Labour Force 2010, BBS

Table 9.5 Employed youths aged 15-29 years by status in employment

Major employment	Bangladesh			Urban			Rural		
	Total	Male	Female	Total	Male	Female	Total	Male	Female
Number (000)									
Total	9343	12210	7133	4556	2806	1750	14786	9403	5383
Regular paid employee	3287	2472	815	1522	1001	520	1766	1471	295
Employer	19	16	3	4	3	1	16	13	3
Self employed (agri.)	978	899	79	73	64	9	905	835	70
Self employed (non-agri.)	2601	2328	272	645	525	120	1956	1803	153
Unpaid family worker	7684	2246	5438	1169	274	894	6515	1972	4543
Irregular paid worker	664	503	161	305	208	97	359	295	64
Day labourer (agri.)	2473	2327	146	181	170	11	2292	2157	135
Day labourer (non-agri.)	1600	1442	158	626	560	66	974	882	92
Servent	87	27	60	41	9	32	46	18	28
Percent									
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Regular paid employee	17.0	20.2	11.4	33.3	35.6	29.7	11.9	15.6	5.5

Contd.

Major employment	Bangladesh			Urban			Rural		
	Total	Male	Female	Total	Male	Female	Total	Male	Female
Employer	0.1	0.1	0.0	0.1	0.1	0.0	0.1	0.1	0.1
Self employed (agri.)	5.0	7.3	1.1	1.6	2.3	0.5	6.1	8.8	1.3
Self employed (non-agri.)	13.4	19.0	3.8	14.1	18.7	6.8	13.2	19.1	2.8
Unpaid family worker	39.6	18.3	76.2	25.6	9.7	51.1	43.9	20.9	84.4
Irregular paid worker	3.4	4.1	2.3	6.7	7.4	5.5	2.4	3.1	1.2
Day labourer (agri.)	12.6	19.0	2.1	4.0	6.0	0.6	15.5	22.8	2.5
Day labourer (non-agri.)	8.2	11.8	2.2	13.7	19.9	3.8	6.6	9.3	1.7

Source: Statistical Pocket Book of Bangladesh 2009, Table 4.01 and Report on Labour Force 2010, BBS

Table 9.6 Unemployed youths aged 15-29 years by age group, sex and residence

Age Group	Bangladesh			Urban			Rural		
	Total	Male	Female	Total	Male	Female	Total	Male	Female
Number (000)									
Total	1558	895	663	499	264	235	1059	631	428
15-19	606	375	231	174	94	80	432	281	152
20-24	534	306	228	182	96	86	352	210	142
25-29	418	214	204	143	74	69	274	140	134
Percent									
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
15-19	38.90	41.90	34.84	34.87	35.11	34.04	40.79	44.53	35.51
20-24	34.27	34.19	34.39	36.17	36.36	36.60	33.23	33.28	33.18
25-29	26.83	23.91	33.77	28.66	28.03	29.36	25.87	22.10	31.31

Source: Report on Labour Force Survey, 2010, Bangladesh Bureau of Statistics (BBS), Statistics Division, Ministry of Planning, Govt. of People's Republic of Bangladesh

Table 9.7 Annual Average Labour Force Growth Rate

Period	Bangladesh			Urban			Rural		
	Total	Male	Female	Total	Male	Female	Total	Male	Female
LFS 2005–2006	49461	37330	12131	11730	8884	2846	37731	27447	9285
LFS 2010	56651	39477	17174	13278	9276	4002	43373	30201	13172
Annual compound growth rate (percent)									
LFS 2005–2006 to 2010	3.39	1.40	8.69	3.10	1.08	8.52	3.48	1.50	8.74

Source: Report on Labour Force Survey, 2010, Bangladesh Bureau of Statistics (BBS), Statistics Division, Ministry of Planning, Govt. of People's Republic of Bangladesh

Chapter 10

Health statistics

10.1 Introduction

Health has been described as the main social concern of a nation and health is a state of complete physical, mental and social well being. Thus health statistics are important aspects of social statistics, because health is not only absence of disease or infirmity but also has positive effects on other social outcomes such as healthier workforce, higher lifetime earnings, lower infant and child mortality, maternal mortality etc. It is needless to emphasize that physical well-being depends on health and nutrition of people. The system of preventive care and curative services improves the health status of the entire nation. The development of health status has been one of major objectives of health care services in Bangladesh. The steady expansion of the health services, establishment of a wide network of medical institutions and provision of low cost medical care services through out the country have resulted in increasing the average life span (life expectancy) and decreasing infant mortality and morbidity rates, maternal mortality rate etc. Thus, health statistics are important in health planning, administration, and evaluation of comprehensive health care services and other aspects of social development such as sound and healthy workforce, reducing child mortality and under weight children etc. Health statistics are of varied nature. But health statistics should also pertain to the following aspects:

- (i) population to be served
- (ii) resources in terms of manpower, infrastructure, building, equipment
- (iii) finance on account of health services
- (iv) resources on account of health services and medicine
- (v) statistics pertaining to resource utilization, effectiveness, efficiency and performances
- (vi) statistics on nutrition (height/weight), disease-specific infant, child and maternal mortality, morbidity, disability, social and mental quality of life etc.

The above mentioned statistics are required to:

- (i) assist in the administration and co-ordination of health services
- (ii) help develop short-term and long-term policy
- (iii) assess the effectiveness and efficiency of health services
- (iv) study of epidemiology of health services and disease problems
- (v) study on nutritional status of child and mother

But in Bangladesh, traditional health statistics are gathered on number of health providers (doctors, nurses, other supporting staffs), hospital beds, noticeable diseases cost of these services and son on.

The major deficiency remains to be the delay in the publication of health statistics which has mostly been due to inadequacy of trained statistical staff, especially at the district level.

10.2 Sources of Statistics on Health and Nutrition

The Health Information Unit, Ministry of Health and Family Welfare is the main source of data on available health services. Bangladesh Demographic and Health Survey conducted at a periodical interval under the authority of the National Institute of Population Research and Training (NIPORT), Ministry of Health and Family Welfare, also provides health and demographic statistics for policy makers and researchers. This periodic survey provides up-to-date data on fertility and childhood mortality, maternal and child health, family planning, awareness of HIV/AIDS, sexually transmitted disease etc. International Centre for Diarrheal Disease Research, Bangladesh (ICDDR,B) is another important source of health statistics. Bangladesh Bureau of Statistics (BBS) also collect and compile health statistics through Sample Vital Registration Survey (SVRS). However, despite the great detail and the quality of supervision, these are subject to a high sampling error and cannot produce adequate data for smaller region or unit such as district or upazila level.

10.3 Data Requirement for Policy Formulation and Planning

The health information units are expected to provide the information that will be used by planners and policy makers in establishing national health policies and in the allocation of resources for health sector. But at present, the national information systems are not operated in such a way as to be responsive to these needs. Even there is no adequate information flow into the decision processes.

In planning for health sector, the major statistics required are the status of health and morbidity of people. Information on extent of

immunization and vitamin programs, maternity and child health services are important. Statistics on height and weight of children and youth by age and sex are also very useful as long-term indicators of the health status. The planning could have been better served if the health statistics were available for smaller regions and units.

The objective of the health services is to extend health facilities to all people. Thus the health information particularly on mortality by disease, morbidity, disability, existing manpower by type, material resources, equipment, health expenditure and financial resources has to be collected on a regular basis for evaluating progress and making further plan. In all sectors of social, economic and agriculture we conduct survey and census to provide valuable baseline data. Unfortunately, in the health sector, such surveys or censuses are not carried out to provide statistics on existing health facilities, morbidity, cause-specific mortality and factors affecting the health status of the people.

The objective of the Family Planning Program is to reduce fertility rate through bringing down the birth rate. In order to achieve such a demographic target, it is essential to have the basic data on the current level of fertility and its trend, practice and knowledge of family planning methods, size of population to be covered, its structure, marital status, composition in respect of age and sex, urban–rural composition, religious composition etc. The more important requirement is to identify the couples who are eligible for and are in need of family planning services. The Bangladesh Demographic and Health Surveys at least at periodic intervals, appear to be the only source for filling up the gaps in demographic statistics. The demographic surveys are devoted mainly to a study of population characteristics and are designed to study fertility, mortality, morbidity, practice of family planning, rate of contraceptive used etc.

10.4 Time – Lag in Publication

In addition to the gaps mentioned above, there are some other serious problems in respect of availability of data to the users. One of such problems is the time–lag that exists in collection of data and their publication. To be more specific, one major source of health statistics is a publication made by the Director General of Health Services, Government of Bangladesh. This publication gives data on facilities available in terms of government hospitals, upazila health complex, dispensaries and primary health care centres, expenditure, cases treated different national health programs, quantum of services rendered in

different health service centres, manpower of different types etc. Unfortunately there is time-lag of about 2–3 years in its publication. By the time the health statistics are published, the users find that they have become outdated and irrelevant.

10.5 Reliability of Health Statistics

Lack of accuracy and reliability and also incomplete coverage are the serious limitations of the published health statistics. There are some discrepancies in reported data between two time periods in respect of number of available beds, number of dispensaries etc. Some institutions and areas are not covered and the data received at the national level are very often incomplete in respect of geographical coverage (by district), institutional coverage etc. The published statistics on health facilities and resources are mainly with respect to public institutions, whereas there are a large number of private and voluntary health institutions in the country. Data of these private institutions are hardly available. Thus, the health statistics suffer from many deficiencies from the user's point of view. There is no proper administrative arrangement for carrying out surveys or collection of health statistics. The data on health produced by different agencies are generally by-products of their efforts and not specifically completed for health related service needs. However, the inventory of resources in the area is apparently good and adequate.

10.6 Some Selected Health Statistics/Indicators

This section attempts to present information from available data and indicators of health sector. Table 10.1 shows the existing number of dispensary, bed, registered doctor, nurse, birth attendant, and Tuberculosis hospital and upazila health complex. Except dispensary and TB hospital, all other facilities have been expanding steadily. But this expansion is not at par with population growth. The population changes give rise to emerging health challenges. More youth, more ageing population and more females require creating more health services. Table 10.2 illustrates the availability of facilities for the population. It is observed that more than one lac people are served by one dispensary. There are on average about 3500 people/available bed in hospitals, 3000 people/registered doctor, 7000 people/nurse and more than 3 lack people/upazila health complex. Large number of population to be serviced with limited facilities, and as a result of high population pressure these services resulted in adverse impact on health and human welfare. Information on private health expenditure is very

weak in Bangladesh. Emphasis should be given for data collection on private health services and expenditure therein.

Although the development of countrywide network of healthcare infrastructure in health sector is remarkable, the difference in health outcomes between urban and rural is significant. There is no significant change in crude birth rate and crude death rate between 2000 and 2009. Infant and child mortality rates have markedly declined. Average life expectancy has been increasing steadily. Maternal mortality and total fertility rate have been declining slowly. The rate of contraceptives use is also registering increase but slowly (Table 10.3). Table 10.4 sets out the morbidity rate by sex. Incidence of gastric ulcer is the highest both for male and female followed by rheumatic fever. Incidence of respiratory problem is also high in Bangladesh. Health Indicators at the aggregate level are less effective for policy making and planning. For proper planning and policy making, regional information is essential and at least district level information on the above health indicators is to be furnished. This is because the aggregate data do not point to the widespread prevalence of poor conditions of health situation in the majority of the districts, among social classes and among age groups and sex.

Table 10.1 Number of Government Hospital, Dispensaries, Doctor and Nurse & Number of Beds, 2000/01–2009/10.

Year	Population	No. of Dispensaries	No. of Bed in Hospital and Dispensaries	No. of Registered Doctor	No. of Registered Nurse	No. of Registered Birth Attendants	No. of TB Hospital	No. of Upzila Health Complex
2000-2001	130.02	1362	31972	31952	17922	15652	44	402
2001-2002	132.60	1362	32022	32498	18135	15794	44	402
2002-2003	135.12	1362	32459	34502	19066	16553	44	402
2003-2004	137.54	1362	34693	36576	19500	17622	44	403
2004-2005	139.76	1362	35579	40210	20009	18037	44	406
2005-2006	141.80	1362	37661	42010	20100	18958	44	413
2006-2007	143.91	1362	38211	44632	20129	19911	44	419
2007-2008	145.93	1362	41107	49608	23266	21936	44	421
2008-2009	147.81	1362	41107	51993	24151	22653	44	422
2009-2010	149.69	1362	43996	52884	25604	24034	44	424

Source: Bangladesh Economic Review, MoF, 2011

Table 10.2 Populations per Dispensary, Bed, Doctor and Nurse and Per Upazila Health Complex, 2001 – 2010

Year	Population/ Dispensary	Population/ Bed	Population/ Doctor	Population/ Nurse	Population/ Upazila Health Complex
2001	95,463	4,066	4,069	7,255	3,23,432
2002	97,356	4,141	4,080	7,312	3,29,850
2003	99,207	4,163	3,916	7,087	3,36,119
2004	100,983	3,964	3,760	7,053	3,41,290
2005	102,614	3,928	3,476	6,987	3,44,236
2006	104,112	3,765	3,375	7,054	3,43,341
2007	105,661	3,766	3,224	7,149	3,43,460
2008	107,144	3,550	2,942	6,272	3,46,627
2009	108,561	3,596	2,844	6,355	3,50,379
2010	109,905	3,402	2,830	5,846	3,53,042

Source: Bangladesh Economic Review, MoF, 2011

Table 10.3 Trends in Health Indicators, 2000 - 2009

Indices	Levels	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Crude Birth Rate (Per '000)	National	19.0	18.9	20.1	20.9	20.8	20.7	20.6	20.9	20.5	19.4
	Urban	13.7	13.6	16.6	17.9	17.8	17.8	17.5	17.4	17.2	16.8
	Rural	20.8	20.7	21.0	21.7	21.6	21.7	20.7	22.1	22.4	20.2
Crude Death Rate (Per '000)	National	4.9	4.8	5.1	5.9	5.8	5.8	5.6	6.2	6.0	5.8
	Urban	3.5	3.4	3.8	4.7	4.4	4.9	6.0	6.6	6.5	4.7
	Rural	5.3	5.2	5.4	6.2	6.1	6.1	6.0	6.6	6.5	6.1
Average age (Yr) at marriage	Male	27.7	25.8	25.6	25.2	25.3	23.3	23.4	23.6	23.8	23.8
	Female	20.4	20.4	20.6	20.4	19.0	17.9	18.1	18.4	19.1	18.5
Population per doctor		4218	4043	4043	3532	3137	3261	3110	N/A	2860	2832
Average Life Expectancy (year)	National	63.6	64.2	64.9	64.9	65.1	65.2	66.2	66.6	66.8	67.2
	Urban	65.3	66.4	67.2	67.6	67.8	67.9	68.0	68.1	68.3	--
	Rural	62.1	63.2	64.4	64.3	64.3	64.5	64.6	66.5	66.2	--
Infant (<1yr) Mortality Rate (Per '000)	National	58.0	56.0	53.0	53.0	52.0	50.0	44.0	43.0	41.0	39.0
	Urban	44.0	43.0	37.0	40.0	41.0	38.0	35.0	42.0	40.0	37.0
	Rural	62.0	60.0	57.0	57.0	55.0	52.0	46.0	43.0	42.0	40.0
Child Mortality Rate (1-4 yr) (Per '000)	National	4.2	4.1	4.6	4.6	4.5	4.4	3.7	3.6	3.1	3.0
Maternal Mortality Rate (Per '000)	National	3.2	3.2	3.9	3.8	3.7	3.48	3.37	3.51	3.5	2.59
	Urban	2.6	2.6	2.7	2.7	2.5	2.75	1.96	2.19	2.4	1.37
	Rural	3.3	3.3	4.2	4.0	3.9	3.58	3.75	3.86	3.9	3.01
Rate of use of contraceptives (%)		53.6	53.9	53.4	55.1	56.0	57.0	58.3	59.0	52.6	56.4
Total Fertility rate per woman (15-49 yrs)		2.6	2.6	2.6	2.6	2.5	2.46	2.41	2.39	2.30	2.15

Source: Bangladesh Economic Review, MoF, 2011

Table 10.4: Distribution of Population Suffered from Chronic Diseases in Bangladesh during Last 12 Months, 2010

Type of Illness	Proportion			Percentage		
	Both Sex	Male	Female	Both Sex	Male	Female
	1	2	3	4	5	6
Total	1.00	1.00	1.00	100.00	100.00	100.00
Chronic Fever	0.0285	0.0318	0.0256	2.85	3.18	2.56
Injury/Disability	0.0391	0.0500	0.0298	3.91	5.00	2.98
Chronic Heart Disease	0.0734	0.0746	0.0723	7.34	7.46	7.23
Asthma/Respiratory	0.0887	0.1020	0.0770	8.87	10.20	7.70
Chronic Dysentery	0.0148	0.0188	0.0113	1.48	1.88	1.13
Gastric Ulcer	0.2402	0.2377	0.2423	24.02	23.77	24.23
High/Low Pressure	0.1053	0.0776	0.1291	10.53	7.76	12.91
Rheumatic Fever	0.1401	0.1142	0.1622	14.01	11.42	16.22
Eczema	0.0159	0.0158	0.0160	1.59	1.58	1.60
Diabetic	0.0540	0.0670	0.0429	5.40	6.70	4.29
Cancer	0.0042	0.0029	0.0053	0.42	0.29	0.53
Leprosy	0.0036	0.0050	0.0025	0.36	0.50	0.25
Paralysis	0.0222	0.0256	0.0193	2.22	2.56	1.93
Epilepsy	0.0043	0.0053	0.0034	0.43	0.53	0.34
Other	0.1659	0.1716	0.1611	16.59	17.16	16.11

Source: Report of the Household Income & Expenditure Survey, 2010, BBS

Chapter 11

Nutrition Statistics

11.1 Introduction

Nutrition is important to improve health status of children as well as adults and it profoundly influences the health status and capacity to perform work. Malnutrition, on the other hand, leads to deterioration of physical fitness and mental efficiency. For the malnourished child, mortality and morbidity are very high and he/she suffers from different health problems.

To sustain healthy and active life, a balance diet that includes all necessary nutrients such as energy, protein, vitamins and minerals should be ensured. Inadequate consumption of these nutrients forms the nutritional deficiency. Calorie and protein deficiency cause of iron, foliate and calcium deficiencies and consequently nutritional anemia occurs. Thus, under-nutrition is the outcomes of deficiency of the energy (calorie) component in food over a long time period. There are also non-calorie components in the food such as vitamins, fats, protein, minerals and these components are crucial for the sustainment and reproduction of human life. These components also play an important role later in providing energy. When these components are inadequate we can say the state of health with various nutritional deficiencies. But many nutritionists refer the terms under-nutrition and undernourishment when there is energy insufficiency only, while the terms malnutrition is used when there is deficiency of mineral and vitamins. However, there is no universally accepted terminology to distinguish between various nutritional deficiency such as under and malnutrition (Svedberg, p. 2000). However, for balanced food the universally accepted energy ratio as suggested by Garrow and James, 1993 is as follows:

- (i) 60% energy from carbohydrate
- (ii) 25% from fat and oil, and
- (iii) 15% from protein (pulse, fish, beans etc.)

Universally accepted daily requirement of nutrients for an average Bangladeshi person is not yet reached since it depends upon many factors such as age, sex, occupation, place of residence etc. However, various organisations and individuals came up with different figures.

For instance, World Bank recommended an intake of 2112 kcal/day/person, FAO/WHO (1973) recommended an intake of 2122 kcal/day/person which is followed by the Bangladesh Bureau of Statistics (BBS) and National Nutrition Council recommended 2310 kcal/day/person. Average calorie–protein requirements and food bundle prescribed by different organisations and individual researchers are given below:

Table 11.1 Average National Requirement of Foods for Balanced Nutrition

Food Item	Bundle suggested by Kabir ¹	Bundle suggested by NNC ²	Bundle suggested by Yusuf ³	HIES 2000 ⁵ BBS ⁴	Bundle suggested by RH ⁵	Bundle suggested by WB ⁶
Cereals	428	490	372	437	430	474
Pulses	22	30	66	40	37	17
Animal Food	50	109	126	118	142	88
Fruits	89	50	57	20	23	30
Vegetables and potato	148	165	262	177	83	206
Added Oil	21	20	38	20	11	14
Sweeteners	31	10	28	20	10	7
Spices	--	10	10	--	22	54
Total Intake (g)	819	944	949	820	830	892
Total Intake (calorie)	2159	2310	2310	2122	2122	2112
Share of carbohydrate rich food in total energy	80	78	65	76	76	77
Total Protein (g)	53	67	69	56	51	59

¹Kabir 2001, ²NNC 1999, ³Yusuf 1996, 1997, ⁵Rahaman and Hossain 2000, ⁴BBS 2001, ⁶WB

Source: RED, BRAC and Aga Khan foundation, Canada (2006). Towards a Profile of the Ultra Poor in Bangladesh: Findings from CFPR/TUP Baseline Survey, Dhaka

11.2 Methods of Obtaining Nutrition Statistics

There are several methods for obtaining nutrition statistics among which the following are important:

- (i) Statistics available through clinical survey
- (ii) Statistics available through anthropometric survey
- (iii) Statistics available through dietary survey or food consumption survey
- (iv) Statistics available through food balance sheets, and
- (v) Statistics on ameliorative measures in progress (nutrition education, publicity etc.)

11.3 Sources of Nutrition Statistics

In Bangladesh, nutrition statistics are gathered basically from two sources. The first source is the dietary or food survey and the second source is the anthropometric survey. The dietary or food consumption data are collected by the Bangladesh Bureau of Statistics (BBS) through Household Income and Expenditure Survey (HIES). Besides HIES, the BBS conduct child and mother nutrition survey at a periodical intervals in which anthropometric approach is followed. Helen Keller International, Dhaka is another important source of nutrition statistics. National Nutrition Council (NNC) established by the government collects data on nutrition. International Centre for Diarrheal Disease, Bangladesh (ICDDR) conducts surveys to assess the prevalence of nutrition deficiencies signs in some specific areas. The Institute of Nutrition and Food Science, University of Dhaka also conducts survey and census on nutrition time to time.

11.4 Some Indicators of Nutrition

1. Specific mortality rates from malnutrition
2. Infant and child Mortality rate
3. Prevalence of calorie–protein malnutrition
 - (a) Proportion of households/individuals consumed less calorie and protein than the recommended levels
 - (b) Clinical signs
 - (c) Weight–for–age (under weight)
 - (d) Height–for–age (stunted)
 - (e) Weight–for–height (wasted)
 - (f) $(\text{Weight})/(\text{height})^2$ ratio (BMI)
 - (g) $(\text{Weight})/(\text{height})^3$ index (Ponderal index)
 - (h) (Head)/(chest) ratio
 - (i) Skinfold etc.

11.5 Energy and Nutrient Intake

Deficiencies in energy and protein consumption lead to childhood stunting and wasting. Inadequate calorie and protein has also negative impact on linear growth, Ponderal growth and attainment of height and weight of children (WHO, 1995). The classification of population by adequacy of calories and proteins in comparison with the pre recommended requirement levels (say 2122 kcal and 59 proteins) may be made for indicating the percentage of population with both calorie and protein deficiencies or adequacy of both of them in the dietaries.

11.6 Anthropometric Measures of Child Nutrition

11.6.1 Anthropometric Indices

Anthropometric failure is one of the important causes of child malnutrition which leads to retarded growth and finally child mortality. Malnutrition is related to inadequate food consumption. Children aged 6–59 months are generally the subject of anthropometric study. In order to examine nutritional status of children, the following parameters are taken into consideration.

- (a) age in months;
- (b) weight in kilograms; and
- (c) height in centimeters

But to assess the extent of malnutrition of children, the following three widely used anthropometric indices are used:

- (a) weight–for–age (underweight)
- (b) height–for–age (stunted), and
- (c) weight–for–height (wasted)

The first index (weight–for–age) measures the child’s weight in relation to his/her age which is influenced by the combined effects of height–for–age, and weight–for–height. The second index (height–for–age) is a measure of linear growth of child and tells about how tall or short is in relation to his/her age. Inadequate height–for–age is an indicator of long–term effects of malnutrition. Third index body mass in relation to length implies how thin or fat a child is in comparison with his height. Weight–for–height is affected by an acute shortage of food intake.

The anthropometric indices mentioned above can be expressed in terms of Z–scores, percentiles, or percent of medians. The Z–score (or standard deviation score) is defined as the deviation of the value for an individual from the median value of the reference population, divided by the standard deviation for the reference population. Symbolically it may be written as:

$$\text{Z–Score or SD–Score} = \frac{(\text{observed value}) - (\text{median value of reference population})}{\text{SD of reference population}}$$

In order to assess the nutritional status of children, the Z–Score (or standard deviation score) is to be calculated for each individual from the median value of the reference population and Z–score $< -2\text{SD}$ of the National Centre of Health Statistics (NCHS), USA reference is

used as a cut off point to describe the moderate and severe conditions of nutritional status (Table 11.2).

Table 11.2 Cut-off-Points of Z-Scores Index

Anthropometric Index	Cut-off-level	
	<--2 SD	<--3 SD
Weight-for-age Z-score (WAZ)	Moderately underweight	Severely underweight
Weight-for-height Z-score (WHZ)	Moderately wasted	Severely wasted
Height-for-age Z-score (HAZ)	Moderately stunted	Severely stunted

In all nutrition surveys and censuses information on dietary intake, prevalence of nutrition deficiency signs, and growth status are measured through anthropometric measurement such as height, weight, arm circumference etc. The basic anthropometric measurements in nutritional survey are weight and height in relation to age and these measurements can be used in other measurements. Thus, anthropometric indices are combinations of parameters. For instance, measurement of body weight only has no meaning unless it is related with age or height. As an example, measurements of weight and height may be combined to calculate the body mass index (BMI) by $[(\text{weight})/(\text{height})^2]$ or a Ponderal index (PI) by $[(\text{weight})/(\text{height})^3]$.

11.6.2 Other Anthropometric Indices

Apart from height, weight and age based measurement there are some other anthropometric indices among which Mid-upper arm circumference (MUAC), Body mass index (BMI), Ponderal index (PI) and Skinfold are important to measure nutritional status. Description of each index is given below:

(i) Mid-Upper Arm Circumference (MUAC) Index

The MUAC can be used as an alternative anthropometric measure where the collection of height and weight measurement is difficult due to several reasons such as famine, emergency situation etc. If the estimated MUAC value is less than the cut-of-point 12.5 cm, then the situation is termed as low weight-for-height or wasting.

(ii) Body Mass Index (BMI)

The Body Mass Index (BMI) is a number calculated from an individual's weight and height. Although it is used as a reliable indicator of body fatness for most of the people, it is considered as an alternative measure of body fat. But research has shown that BMI number and body fatness is highly correlated. However, the correlation varies by sex, age and race. For instance, women tend to have more

body fat than men with the same BMI. The BMI may have different significance in elderly individuals and young adults because of the age-related changes in both height and weight and morphological changes in the vertical column that result from osteopenia and increased curvature (WHO, 1995).

The BMI is computed by dividing weight in kilograms by height in meters squared and it is calculated in the same way for both adults and children with the following formula.

$$\text{BMI} = \frac{[\text{weight (kg)}]}{[\text{height (m)}]^2}.$$

This index is also used to examine the nature of overweight or thinness of the adults as well as old children. The cut-off-points for adults and interpretation in respect of BMI ranges are shown in the following table:

Table 11.3 Recommended Cut-off-Points of BMI and Interpretation for Adult

Recommended BMI cut-off range	Interpretation/indication	Weight Status
BMI < 16.0	Grade 3 thinness	Underweight
BMI 16.0 – 16.99	Grade 2 thinness	
BMI 17.0 – 18.49	Grade 1 thinness	
BMI 18.5 – 24.99	Normal range	Normal
BMI 25.0 – 29.99	Grade 1 over weight	Overweight
BMI 30.0 – 39.99	Grade 2 over weight	Obese
BMI ≥ 40.0	Grade 3 over weight	

Source: WHO (1995). *Physical Status: The use and Interpretation of Anthropometry*. WHO Technical Report Series, 854. World Health Organisation, Geneva

(iii) Ponderal Index

Ponderal Index (PI) is used to identify infants whose soft tissue mass is below normal at the skeletal development stage. PI is not a superior predictor than either birth weight or body mass index of new born. But it may be used as a reliable predictor of long term complications such as micro albuminuria, insulin resistance etc. A low neonatal PI is defined as less than 1SD below a mean 2.0. Foetal Ponderal index can also be calculated by ultrasound examination and compared with the neonatal PI. However, the PI is calculated by the following formula:

$$\text{PI} = \frac{[\text{birthweight(g)}]}{[\text{birthlength(cm)}]^3} \times 100$$

(iv) Skinfolts

Measurement of skinfold is widely used to assess obesity among adults. But this measure is not good in assessing the degree of wasting because it fails to take into account changes in muscle mass. Skinfold thickness measurement is also used to assess body fatness.

(v) Head Circumference

This type of measurement is used for health screening and to assess potential development or neurological disabilities in children. Both small and large head circumference (occipital–frontal circumference) indicates the risk of health or development. This measure is, however, less indicative to nutritional status.

11.7 Deficiencies of Nutrition Statistics

The main difficulty in nutrition statistics for planning purposes is that there is enough gaps between the planners and those responsible for data collection. Nutrition surveys are generally confined with anthropometric measures for child and these data are not regularly collected. The data that are needed for nutritional assessment are mostly related to the agricultural production, intake of food staffs and their nutritive (calorie, fuel, protein) values should be provided. There are different social groups, regions, age, growth etc. and some of them have very low nutritional status, and the planners may require information on them. For instance, nutritional status of newborn, poor children and pregnant mother are lacking. The classification of population by inadequacy of calories and proteins in comparison with the suggested requirements should be available for those classifications. Due to lack of reliable information in respect of nature and extent of nutritional problem, a comprehensive plan for prevention of malnutrition could not be taken and included in the over all health planning.

11.8 Time–lag in Publication

Apart from the deficiencies of data, time–lag between collection of data and publication of consolidated statistics at the national level is the major handicap in utilization of statistics for planning, administration and research purposes. The time–lag in publication of nutrition statistics is 2–3 years.

11.9 Some Selected Nutrition Statistics

As revealed by Table 11.4 there has been a gradual decline in average calorie intake from 1991-92 to 2005 and then it increased in 2010. The average calorie intake at the national level was estimated at 2266.6 kcal

per person per day in 1991-92, 2254.0 kcal in 1995-96, 2240.3 kcal in 2000, 2238.5 kcal in 2005 and 2318.2 kcal in 2010. Similar pattern is observed in urban and rural areas. Although the average calorie intake is found to be higher than the recommended calorie intake of 2122 kcal per person per day, about 40 percent households failed to consume the recommended calorie intake. There is no significant variation in average calorie intake between urban and rural areas. A significant finding which emerges from Table 11.5 is that the average per capita per day protein intake in urban is higher than that in rural areas. The level of protein intake slightly varies and there is no big jump over the period.

Table 11.6 reveals the trend in prevalence of malnutrition of children aged 6 to 59 months through several indicators such as underweight, stunting, wasting and MUAC by region. Percentage of underweight, stunted and wasted children showed a marked decline between 1985 and 2012. Mean age, weight, height, MUAC and BMI of non-pregnant mother by region is shown in Table 11.7. There is a slight improvement in mean age, weight, height, MUAC and BMI of non-pregnant mothers between 2005 and 2012. The prevalence of underweight children by economic class is shown in Table 11.8. It is observed that chronically poor children have the highest prevalence of underweight (31% in 2004 and 29% in 2009). The prevalence of wasted which measures the body mass in relation to body length of children aged 6 to 59 months is presented in Table 11.9 for 2004 and 2009. Table 11.10 shows the prevalence of stunted children (height-for-age) for 2004 and 2009. There is significant difference in the prevalence of underweight, wasted and stunted children across the economic classes. An inverse relationship is noticed between economic class and level of malnutrition.

Table 11.4 Trend in Average per Capita/Day Calorie (Kcal) Intake by Residence, 1991–92 – 2010

Survey Year	Residence		
	National	Urban	Rural
2010	2318.3	2244.5	2344.6
2005	2238.5	2193.8	2253.2
2000	2240.3	2150.0	2263.2
1995-96	2254.0	2208.1	2263.1
1991-92	2266.6	2258.1	2266.8

Source: Household Income and Expenditure Survey–2010, Bangladesh Bureau of Statistics (BBS).

Table 11.5 Trend in Average per Capita/Day Protein (Grams) Intake by Residence, 1991–92 – 2010

Survey Year	Residence		
	National	Urban	Rural
2010	66.26	69.11	65.24
2005	62.52	64.88	61.74
2000	62.50	64.96	61.88
1995-96	64.96	67.50	64.45
1991-92	62.72	65.49	62.29

Source: Household Income and Expenditure Survey–2010, Bangladesh Bureau of Statistics (BBS).

Table 11.6 Trend in Prevalence of Malnutrition of Children aged 6–59 Months, 1985 to 2012 (NCHS 1977 GRS)

Indicator		Year of the CNS/CMNS						
		1985	1989–1990	1992	1995	2000	2005	2012
Underweight (WAZNCHS <-2SD)	Rural	72.0	66.7	69.8	59.3	50.1	50.1	35.5
	Urban	62.3	62.7	57.2	46.3	38.5	38.5	30.9
	National	70.9	65.8	68.3	57.4	47.8	47.8	34.4
Stunting (HAZNCHS <-2SD)	Rural	68.9	66.7	65.8	52.8	44.9	44.9	45.0
	Urban	57.1	58.3	52.8	42.9	32.5	32.5	38.1
	National	67.5	64.6	64.2	51.4	42.4	42.4	43.4
Wasting (WHZNCHS <-2SD)	Rural	15.4	14.7	16.9	17.2	13.1	13.1	13.2
	Urban	14.0	14.0	15.1	13.3	10.8	10.8	12.8
	National	15.3	14.4	16.7	16.6	12.7	12.7	13.1
MUAC<125mm	Rural	14.9	11.0	13.2	11.0	4.9	4.9	3.3
	Urban	9.9	8.5	8.4	6.6	2.6	2.6	2.2
	National	14.4	10.7	12.6	10.4	4.1	4.1	3.0

Source: Report of the Child and Mother Nutrition Survey of Bangladesh, 2005 and 2012, BBS, Table 27

Table 11.7 Mean Age, Weight, Height MUAC and BMI of Non-Pregnant Mothers by Area of Residence, 2005 and 2012.

Indicators	Rural				Urban				Total			
	Mean		SD		Mean		SD		Mean		SD	
	2005	2012	2005	2012	2005	2012	2005	2012	2005	2012	2005	2012
Age (years)	28.2	28.1	6.2	6.3	27.8	42.0	6.0	6.0	28.1	285.0	6.2	6.2
Weight (kg)	44.5	47.8	7.0	8.0	48.8	52.8	9.5	10.3	45.4	49.0	7.8	8.5
Height (cm)	149.5	150.9	6.4	5.3	149.9	15.1	7.8	5.3	149.6	150.9	6.7	5.3
MUAC (cm)	23.8	25.4	2.5	2.8	25.3	27.1	3.3	3.3	24.1	25.8	2.8	3.0
BMI (kg/m ²)	19.9	21.0	2.8	3.2	21.7	23.1	3.7	4.2	20.2	21.5	3.1	3.6

Source: Report of the Child and Mother Nutrition Survey of Bangladesh, 2005, BBS, Table 28

Table 11.8 Prevalence of Underweight Children (weight-for-age) by economic class

Economic class	% of Underweight Children aged 6-59 months			
	Moderates Underweight (<-2SD)		Severely Underweight (<-3SD)	
	2004	2009	2004	2009
Non-Poor	21.4	21.4	4.2	2.4
Ascending Poor	30.9	25.8	9.3	7.8
Descending Poor	21.3	19.6	10.1	8.9
Chronically Poor	30.6	29.0	11.2	12.2
Overall	36.9	24.7	9.0	7.7

Source: Rahman, Pk. M.M., et.al. (2013).

Table 11.9 Prevalence of Wasted (weight-for-height) Children by economic class

Economic class	% of Wasted Children of age 6-59 months			
	Moderates Wasted (<-2SD)		Severely Wasted (<-3SD)	
	2004	2009	2004	2009
Non-Poor	3.4	2.4	0.0	2.4
Ascending Poor	5.2	8.8	1.0	1.8
Descending Poor	1.1	7.1	1.1	1.8
Chronically Poor	6.4	9.2	1.0	0.8
Overall	4.6	6.8	0.8	1.6

Source: Rahman, Pk. M.M., et.al. (2013).

Table 11.10 Prevalence of Stunted Children (weight-for-age) by economic class

Economic class	% of Stunted Children of age 6-59 months			
	Moderates Stunted (<-2SD)		Severely Stunted (<-3SD)	
	2004	2009	2004	2009
Non-Poor	23.1	21.0	17.1	21.0
Ascending Poor	41.8	34.3	19.4	11.2
Descending Poor	39.5	33.3	29.4	13.0
Chronically Poor	33.8	28.9	29.4	23.4
Overall	33.5	28.8	22.9	14.2

Source: Rahman, Pk. M.M., et.al. (2013).

Chapter 12

Educational Statistics

12.1 Introduction

Bangladesh with its birth is committed to provide basic education for all the children as a matter of their rights. It is also stated in the constitution of Bangladesh. Recognizing the primary education as a national responsibility of the state, Bangladesh has undertaken many programs and projects to improve the education system in line with its national development objectives. Some progress has also been made in respect of access to education and gender equity. But in respect of efficiency and quality of education, we could not make much progress. However, the requirement of education statistics for planning and policy formulation of education sector should be linked with the objective of the compulsory primary education to all children and more access to secondary and tertiary education. Educational statistics, in a broad sense, cover data pertaining to literacy, stock of institution, enrolment, teacher-student ratio, dropout rate, completion rate and other aspects of social development such as employment and unemployment by education level and skilled manpower. Thus they, cover a broad sphere of human resource development in the country.

Like health, education can be described as an important social concern of a nation. Education is the basis for human development leading to cultural and social evolution over the period. The educational statistics as a part of statistics have drawn the interests of national and international bodies as well as social scientists, planners and policy makers. Educational statistics play an important role on social development planning and form an important part of social statistics. Educational statistics are also important to guide the planners and policy-makers to determine the availability of and accessibility to those facilities to the target-age group children. Broadly speaking, they are important to meet the needs of the following four important areas:

- (i) for educational planning
- (ii) for management of the educational system
- (iii) for educational research, and
- (iv) for dissemination of information to other departments of the government and international organisations.

12.2 Main Sources of Educational Statistics

Some items of educational statistics are collected on a decennial basis through the decennial population census. The census data provide a broad idea about educational statistics of the entire population. These include literacy rate of males and females by age group and by urban–rural residence. The Directorate of Primary Education, Ministry of Primary and Mass Education, collects data through Primary school survey and census and publishes reports on Pre-primary and Primary education. These reports are the main source of information for assessing the progress of Primary education of the country. The Bangladesh Bureau of Educational Information and Statistics (BANBEIS), Ministry of Education, is the main source of data of Post-Primary education services. The BANBEIS publishes annual reports on the educational statistics of Bangladesh based on, surveys, the returns coming from secondary, higher secondary, schools, college and universities. Annual reports published by the BANBEIS are the source of information for assessing the progress of secondary and tertiary education of the country. The planning cell of the Ministry of Education also brings out a mimeographed publication on educational statistics time-to-time.

The annual reports of other organisations, such as University Grants Commission (UGC) and the individual universities are important for tertiary level educational information. The educational statistics mainly cover the following aspects:

- (i) Educational institutions of different categories and facilities therein,
- (ii) Enrolment, entrants, dropout, repeater and leavers by age and sex,
- (iii) Educational manpower by sex,
- (iv) Educational attainment by sex, and
- (v) Educational expenditure.

Information on the above aspects particularly for secondary and tertiary education is collected together in Bangladesh under the integrated system of educational statistics. A major responsibility of the BANBEIS is to collect, consolidate and provide information to meet the needs for educational planning, policy making and evaluation. As mentioned earlier that the educational status of the entire population of Bangladesh can be obtained from the decennial population census. But the census cannot provide information on educational institution, entrants, leavers, attainment and educational expenditure. However,

census of population is the main source of information for deriving the progress of literacy and manpower of the country. Apart from the census, educational statistics are also collected in other socio-economic surveys such as Household Income and Expenditure Survey (HIES), Bangladesh Demographic and Health Survey (BDHS), labour force survey etc. In these surveys educational information is collected to relate with other socio-economic and demographic variables.

12.3 Limitations of Educational Statistics

Let us now consider the limitations of data collection system on education. Educational statistics published by the BANBEIS, Ministry of Education is based on the returns coming from educational institutions and the figures given therein describe the situation as on February 28 of the year concerned. In this system there may be some non-response error in reporting information by the unrecognised private institutions. Moreover, certain types of institutions such as English medium school, pre-primary schools, schools for the physically handicapped, elementary school, unrecognised institution etc. are left out. Furthermore, a large number of institutions fail to supply the data in time or send incomplete returns. Non-response and delays in return of necessary forms from the institutions, inadequate trained staff are the main problems in publication of educational statistics in time.

Moreover, data on classroom accommodation and classroom space per student are not available in any report. Aggregated data are available but disaggregated data are necessary for proper planning. The annual report published by the UGC may also suffer from similar bias because the information come from the registrar of the universities and if the current year data are not available the last year's data used for the purposes of aggregation. The session time also differs between public and private universities which creates problem in estimating session-wise enrolment of students, expenditure, results, number of teachers etc. Data on private expenditure on education which are incurred by parents hardly exist in any report. The scope and coverage may vary from one survey to another according to the objectives of study and interests of the researchers. But these surveys do not collect information regularly about school facilities, size of school, enrolment, teachers, expenditure, and examination results by type of school. The limitations which have been pointed out are the major problems in the utilization of educational statistics for development planning, administrative and research purposes.

12.4 Reliability of Educational Statistics

One of the reasons for unreliability of educational statistics is the absence of arrangement for checking of primary data which are sent from schools to upazila, district, division and then head quarter levels. If the arrangement for checking could be done, many inconsistencies and deficiencies in the data could be removed at the first stage of data collection.

The reliability of data particularly on dropout rate, enrolment rate by age, repeaters, flow of students in the school system, daily attendance etc. is questionable. In the absence of birth certificate, it is difficult to get reliable data of enrolment by age group and the reported enrolment figures in primary schools in rural areas are often inflated. There is no adequate arrangement for checking reliability and comparing of data obtained from different sources. For instance, the literacy rate estimated in census and surveys is not found to be similar. In most of the sample surveys on education, the standard error (SE) is not estimated to measure the reliability of the estimate.

12.5 Major Deficiencies in Educational Statistics

Although many data are being collected and published annually, many information which are important for planning purposes are not covered. Data on non-formal education, flow of student, dropout and repeaters by social class, efficiency, average daily attendance by social class, private expenditure on education, utilization of existing facilities etc. by district, urban and rural residence and social class should be collected and made available regularly. The major deficiency remains to be the delay in the publication of educational statistics.

12.6 Time-lag in Publication

Educational statistics obtained from educational institutions are assembled and scrutinized at the BANBEIS for post-primary education and for Primary education, the data are assembled at the Directorate of Primary education. This process takes a long time before the information see the light of the day and is available for using in planning and research purposes. Thus there is considerable time-lag between collection of data and final publication in consolidated form at the national level. The time-lag in publication of educational statistics by the BANBEIS, and by the Directorate of Primary education is usually 2–3 years.

12.7 Some Selected Available Indicators on Education

The data relating to the availability of educational services for primary education are analysed and presented in Tables 12.1–12.2. They

include the stock of school and teacher-student ratio. Table 12.1 shows the stock of primary school by type. The number of school within a radius of 2 miles is a reasonable distance from a child's home which means that there should be a school or schools for every 12.57 sq. miles of land area. This indicator indicates the adequacy of educational facilities. There are on average 8 public Primary schools and 12 schools (public and private) for every 12.57 sq. miles of land area. These figures indicate that sufficient facilities are available in respect of educational services for primary school aged children (6–10 years).

Table 12.2 shows the trends in enrolment by sex, number of teacher, share of female student and teacher and gender parity index of enrolment in primary school. It is observed that after 2003 the gender parity index is greater than one indicating that number of girl student is higher than their boy counterpart. However, the number of students in primary level has been increasing gradually and it increased from 15570360 in 2002 to 16957895 in 2010 showing about 9 percent increase over the period. The number of teacher has increased tremendously indicating about 151.39 percent increase over the same period. The share of female teacher increased from 37.6 percent in 2003 to 58.4 percent in 2010, while the share of girl student increased from 49.9 percent in 2003 to 50.5 percent in 2010.

Table 12.3 shows the teacher–student ratio in Primary school. It is another indicator to measure the adequacy of human resource input in relation to number of student. The teacher – student ratio is found to be very high and it reflects an inadequate level of services. The aggregate teacher student ratio is, however, not a good indicator of the quality of teaching services. The quality would be reflected in the availability of trained and qualified teachers and trained teacher–student ratio would help us to ascertain the efficiency and quality of the teaching services. The teacher–student ratio should be broken down by district and by training and qualification of teachers. The disaggregated (by district or upazila) information becomes indispensable for the formulation of sound planning for the primary education.

Dropout from school without completion of educational cycle as well as repetition in the same grade badly affects the efficiency of the educational systems. These indicators also reflect the wastage of resources and measure the effectiveness of instruction and performance in education system. If there would be regular progress from grade to grade, the return on the education investment would be at the maximum possible level. The average dropout rate in primary cycle (from 1 – 5 grade) is almost 50 percent (Table 12.4), while it was on

average about 8.5 percent in grade 1, 3.0 percent in grade 2, 7.7 percent in grade 3, 12.2 percent in grade 4 and 9.4 percent in grade 5. But about 40 percent of the primary level completed students dropped out and did not enroll their name in grade 6 (Table 12.5).

The rates of repetition, survival rate to grade 5 and coefficient of efficiency are indicators of the effectiveness of instruction and the levels of performance in the education system. Table 12.6 sets out the rate of repetition in the primary level and it is almost 11 percent for both sex between 2005 and 2008. Survival rate measures the retention capacity of primary education level. It appears from Table 12.6 that about 50 percent of a cohort of students who enrolled in the first grade survived up to grade 5 indicating an inefficient scenario of primary education system. The coefficient of efficiency summarises the consequences of repetition and dropout on the efficiency in producing graduates. The coefficient of efficiency is found to be higher for girl students than their boy counterpart (Table 12.6). However, proportion of students graduating from Primary school system is around 58 percent for boys and more than 60 percent for girls.

The gross and net participation rate in primary school in 2010 is shown in Table 12.7. The gross participation rate for both sexes was found to be 107.65 percent and for girls it was 112.37 percent, while net participation rate was 94.83 percent and 97.63 percent respectively. It is interesting to note that the participation rate for girls in primary school was higher in 2010 than their boy counterpart.

12.8 Some Selected Indicators of Secondary Level Education

The data relating to the availability of secondary education institution within 2 miles of radius are analysed and presented in Table 12.8. It is observed that on average there are 4 secondary schools within 2 mile radius. Number of secondary schools within 2 miles radius by district is more important for planning on secondary education and for allocation of school in each district. It would be better if we could provide information on number of schools per thousand of school-going age population.

Table 12.9 shows the data relating to secondary school aged population (11–15 years) enrolment and gross enrolment rate. The number of school aged children between 2001 and 2010 showed a decreasing trend. The number of school aged children per school decreased from 1133 children in 2001 to 885 children in 2010. The number of school-going age children per school is, however, a crude indicator of the availability of services. In 2010, about 40 percent boys

and 49 percent girls of the school going population between the ages 11-15 years were in attendance at the secondary schools. Although there is a rapid expansion of education facilities and public expenditure, almost half of the total secondary school age population (11-15 years) do not get enrolled in the secondary school (Table 12.10).

In Table 12.10, it is also observed that the gross enrolment rate in grade 6–10 showed a decreasing trend but the number of teacher showed an increasing trend. The teacher-student ratio in secondary school was 1:34 in 2010; that is there were 218011 teachers for 7465774 students. The proportion of female teachers has increased from 16.48 percent in 2001 to 23.09 percent in 2010. The gender parity index in enrolment is more than one indicating that the number of girls enrolled in the secondary schools is higher than the enrolment of boys. The same table shows that the teacher–student ratio varies year to year. It is obvious that over crowded classes negatively influence the efficiency of the teaching and learning process. In overcrowded classes there is little chance to give attention equally to all students and to follow up student’s educational achievements as well as weaknesses.

Table 12.11 reveals that 39 percent boys and 46 percent girls who got enrolled in grade 6 completed secondary cycles (grade 6 to 10). This means majority of the cohort of students who were enrolled in grade 6 could not complete the cycle of secondary education. On average about 61 percent of the boys and 54 percent of the girls from a cohort enrolled in grade 6 could not complete the secondary cycle. More than 60 percent boys and 53 percent girls dropped out from secondary cycle (from grade 6 to 10). This figure for both sexes is about 57 percent. Survival rate measures the percentage of a cohort of students enrolled in first grade of secondary education who are expected to reach the successive grades. The survival rates for secondary schools are estimated to be 58 percent for boys and 68 percent for girls. The coefficient of internal efficiency measures internal efficiency of secondary education and it is a percentage of ideal student years required to complete secondary cycle by the graduates to the total years actually spent to produce those graduates (BANBEIS). The coefficient of internal efficiency is found to be 49 percent for boys and 51 percent for girls. Dropout and repetition both affect the internal efficiency of educational system.

The lower the dropout and repetition rates, the higher would be the return from the educational investment and the social cost would be reduced. Table 12.12 sets out the prevailing literacy rates of persons of age 7 years and above in each of the 64 districts and the table shows how the literacy rates are distributed among different districts. When

the districts are ranked on this criterion it would be observed that Jhalokathi comes first (65.36% in 2001 and 66.68% in 2011) while the district Bandarban comes last (31.67% in 2001 and 35.86 in 2011). Trend in literacy of persons of age 7 years and above by sex and region is shown in table 12.13. The literacy rate is indicating an increasing trend between 1999 and 2011. It is a notable feature that there are wide variations in literacy rates between urban and rural and between male and female. In 2011, the literacy rate for both sexes in rural area was 47.16 percent while it was 66.40 percent in urban area. Similarly, at national level the literacy rate was 54.11 percent for male while it was 49.44 percent for female.

The data of the trend in adult literacy rate of persons of age 15 years and above by region and sex are presented in table 12.14. Very few improvements in adult literacy are observed between 1998 and 2011. Similar improvement is noticed in urban and rural areas. However, the gender disparity in adult literacy is observed over the period. In 2011, the adult literacy was 58.8 percent for male and 49.2 percent for female indicating wide difference in adult literacy between sexes. Table 12.15 shows the adult literacy rate for all ages by district and by sex for 2011. Wide variation in adult literacy rate is observed between district and between sex.

Table 12.1 Number of Primary School by Type in 2 Miles Radius, 2001–2010)

Year	Type of School		Total	No. of Schools per 12.57 sq. miles (i.e. 2 miles radius)	
	Public Primary	Private Primary		All Types	Public Schools
2003	37671	24358	62029	13.68	8.31
2004	37671	24706	62377	13.76	8.31
2005	37671	44348*	80397	17.74	8.31
2006	37671	44348	82020	18.09	8.31
2007	37671	43762	81434	17.97	8.31
2008	37671	44546	82218	18.14	8.31
2009	37671	43836	81508	17.98	8.31
2010	37672	41013	78685	17.36	8.31
2011	37672	41013	78685	17.36	8.31

Source: Bangladesh Economic Review, MoF, 2000–2009.

* From 2005, Ebtadae madrasah, Kindergarten, NGOs school, Madrasa, Primary Section of High Schools are included.

Table 12.2 Number of Students Enrolled by Sex and Total Number of Teacher in all Types of Primary Schools.

Year	No. of Student		Total	No. of Teacher of Both Sex	Share of female student as % of total student	Share of female teacher as % of total teacher	Gender parity index (G/B) of enrollment
	Boys	Girls					
2002	7795346	7775014	15570360	157236	49.9	37.6	- 0.99
2003	7779183	7670830	15450013	162114	42.6	38.2	- 0.98
2004	7587964	7657150	15245114	162220	50.0	41.1	- 1.00
2005	8091221	8134437	16225658	162084	50.1	44.3	- 1.01
2006	8129314	8256533	16385847	162227	50.4	46.5	1.02
2007	8035353	8277554	16312907	182374	50.7	50.2	1.03
2008	7919837	8081768	16001605	182899	50.5	52.7	1.02
2009	8241026	8298337	16539363	361450	50.2	43.5	1.01
2010	8394761	8563133	16957895	395281	50.5	58.4	1.02
2011	8394761	8563133	16957894	395281	50.5	58.4	1.02

Source: Bangladesh Economic Review, MoF, 2000–2009.

Table 12.3 Teacher–Student Ratio in Public Primary School, 2005–2010

Year	Teacher–Student Ratio
2005	1 : 58
2006	1 : 58
2007	1 : 52
2008	1 : 52
2009	1 : 53
2010	1 : 46

Source: Bangladesh Education Statistics, Bangladesh Bureau of Educational Information and Statistics (BANBEIS), Ministry of Education, August, 2011

Table 12.4 Cycle Dropout Rates in GPS, RNGPS and Experimental School, 2005–2008

Year	Cycle Dropout Rate (%)
2005	47.2
2006	50.5
2007	50.5
2008	49.3
2009	--
2010	--

Table 12.5 Dropout Rate by Grade (%), 2010

Sex	Grade 1	Grade 2	Grade 3	Grade 4	Grade 5	Grade 6
Boys	9.7	3.7	8.5	11.1	8.5	40.3
Girls	7.3	2.3	7.0	13.2	10.4	39.3
Average	8.5	3.0	7.7	12.2	9.4	39.8

Source: Bangladesh Education Statistics, Bangladesh Bureau of Educational Information and Statistics (BANBEIS), Ministry of Education, August, 2011

Table 12.6 Trend in Repetition Survival and Coefficient of Efficiency Rates in GPS, RNGPS and Experimental School, 2005–2008

Year	Repetition in all grades		Survival Rate to Grade 5		Coefficient of Efficiency	
	Boys	Girls	Boys	Girls	Boys	Girls
2005	10.7	9.6	51.7	56.1	58.0	63.2
2006	11.4	10.9	47.1	53.3	56.6	61.3
2007	11.8	11.3	48.9	54.9	56.5	61.1
2008	11.7	11.4	52.9	57.0	57.5	59.1
2009	--	--	--	--	--	--
2010	--	--	--	--	--	--

Table 12.7 Gross and Net Enrolment Rate in Primary Education, 2010

Sex	Population (6–10 years)	Enrolment all ages	Enrolment of Primary School Age (6–10 years)	Enrolment Rate	
				Gross	Net
Both Sex	15751788	16957894	14937517	107.65	94.83
Female	7620131	8563133	7439283	112.37	97.63

Source: Bangladesh Education Statistics, Bangladesh Bureau of Educational Information and Statistics (BANBEIS), Ministry of Education, August, 2011

Table 12.8 Number of Secondary School in 2 Miles Radius and Teacher-Student Ratio, 2001–2010.

Year	No. of Secondary School	Number of secondary school per 12.57 sq. mile radius
2001	16166	3.57
2002	16562	3.65
2003	17386	3.83
2004	18267	4.03
2005	18500	4.08
2006	18700	4.13
2007	18723	4.13
2008	18756	4.14
2009	19083	4.21
2010	19040	4.20
2011	19070	4.21

Source: Own Calculation from Table 2.1.0, Bangladesh Education Statistics, 2011, BANBEIS.

Table 12.9 Shows the Secondary School Children, Enrolment and Gross Enrolment Rate

Year	Secondary School Age Population (11-15 years)			Enrolment (VI-X)			Gross Enrolment Rate (%)		
	Total	Boy	Girl	Total	Boy	Girl	Total	Boy	Girl
2001	18317747	9241792	9075955	7887010	3690913	4196097	43.06	39.94	46.23
2002	18263183	9208646	9054537	8162134	3801356	4360778	44.69	41.28	48.16
2003	17980817	9064785	8916032	8126362	3803794	4322568	45.19	41.96	48.48
2004	17148640	9040058	8108582	7503247	3578137	3925110	43.75	39.58	48.41
2005	17341882	9141926	8199956	7398552	3530538	3868014	42.66	38.62	47.17
2006	n.a.	n.a.	n.a.	n.a.2	n.a.	n.a.	n.a.	n.a.	n.a.
2007	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
2008	17190672	9019584	8171088	6819748	3158291	3661457	39.67	35.02	44.81
2009	17018112	8907496	8110616	7356793	3560255	3796538	43.23	39.97	46.81
2010	16845552	8795408	8050144	7465774	3486098	3979676	47.34	39.64	49.44

Source: Bangladesh Education Statistics, Bangladesh Bureau of Educational Information and Statistics (BANBEIS), Ministry of Education, August, 2011

n.a. Not available.

Table 12.10 Secondary Student and Teacher in Secondary School, 2001–2010

Year	Number of Teacher			Enrolment		Gender parity index (G/B)	Teacher-student ratio
	Total	Female	% of Female	Total	Girl		
2001	183277	30196	16.48	7887010	4196097	1.14	43
2002	186949	31311	16.75	8162134	4360778	1.15	44
2003	206557	39580	19.16	8126362	4322568	1.14	39
2004	214673	47255	22.01	7503247	3925110	1.10	35
2005	238158	48290	20.28	7398552	3868014	1.10	31
2006	239431	48615	20.30	7419179	3876914	1.10	31
2007	208183	46464	22.32	n.a	n.a.	n.a.	n.a.
2008	209496	46788	22.33	6819748	3661457	1.11	33
2009	213482	53363	25.00	7356793	3796538	1.08	34
2010	218011	50334	23.09	7465774	3979676	1.14	34

Source: Bangladesh Education Statistics, Bangladesh Bureau of Educational Information and Statistics (BANBEIS), Ministry of Education, August, 2011

n.a. Not available.

Table 12.11 Secondary Cycle Completion Rate, Dropout Rate and Coefficient of Efficiency by Sex in Secondary Schools, 2010

(Fig. in %)

No.	Indicators	Both	Boy	Girl
1.	Completion Rate	42.85%	39.47%	46.17%
2.	Dropout Rate	57.15%	60.53%	53.83%
3.	Survival Rate	63.02%	58.26%	67.64%
4.	Coefficient of Internal Efficiency	50.10%	48.80%	51.30%

Source: Bangladesh Education Statistics, Bangladesh Bureau of Educational Information and Statistics (BANBEIS), Ministry of Education, August, 2011

Table 12.12 Literacy Rate for Persons Aged 7 Years and Above by Sex and Zila 2001 & 2011

(Percent)

Sl. No.	Name of Zila	2001			2011		
		Both Sex	Male	Female	Both Sex	Male	Female
	BANGLADESH	46.15	50.27	41.80	51.77	54.11	49.44
1.	Barguna	55.59	57.70	52.83	57.64	59.23	56.12
2.	Barisal	56.99	59.01	54.92	61.24	61.88	60.63
3.	Bhola	36.89	39.50	34.09	43.24	43.59	42.91
4.	Jhalakathi	65.36	67.38	63.35	66.68	67.59	65.84
5.	Patuakhali	51.65	55.54	47.73	54.07	56.24	52.01
6.	Pirojpur	54.31	66.58	63.02	64.85	66.04	64.68
7.	Bandarban	31.67	38.24	23.67	35.86	40.29	30.93
8.	Brahmanbaria	39.46	42.26	36.69	45.29	45.74	44.88
9.	Chandpur	50.29	51.91	48.74	56.78	56.14	57.34
10.	Chittagong	55.55	59.79	50.83	58.91	61.13	56.66
11.	Comilla	45.99	49.37	42.64	53.32	54.08	52.65
12.	Cox's Bazar	30.18	34.01	26.00	39.29	40.32	38.22
13.	Feni	54.27	57.47	51.19	59.63	61.10	58.28
14.	Habiganj	37.72	41.76	33.62	40.53	42.22	38.94
15.	Khagrachhari	41.81	49.94	32.66	46.11	51.88	40.07
16.	Lakshmipur	42.94	44.25	41.45	49.40	48.94	49.81
17.	Mauvibazar	42.06	45.59	38.45	51.10	52.74	49.53
18.	Noakhali	51.67	53.51	49.90	51.29	51.44	51.16
19.	Rangamati	43.60	51.47	34.21	49.73	56.42	42.26
20.	Sunamganj	34.37	38.07	30.47	34.98	36.86	33.12
21.	Sylhet	45.59	49.43	51.56	51.18	53.48	48.87
22.	Dhaka	64.79	69.58	58.74	70.54	73.56	66.86
23.	Faridpur	40.85	44.64	36.96	49.96	50.29	47.69
24.	Gazipur	56.40	60.47	51.90	62.60	65.96	58.92
25.	Gopalganj	51.37	55.23	47.44	58.09	60.30	55.98

Contd.

Sl. No.	Name of Zila	2001			2011		
		Both Sex	Male	Female	Both Sex	Male	Female
26.	Jamalpur	31.80	35.44	28.02	38.44	41.14	36.86
27.	Kishoreganj	38.27	41.35	35.11	40.87	41.51	40.25
28.	Madaripur	42.14	46.87	37.29	47.97	50.11	45.93
29.	Manikganj	41.02	46.03	35.98	49.20	52.59	46.05
30.	Munshiganj	51.62	45.13	49.07	56.09	56.44	55.74
31.	Mymensingh	39.11	41.86	36.26	43.49	44.86	42.16
32.	Narayanganj	51.75	55.93	46.90	57.10	59.48	54.56
33.	Narsingdi	42.91	46.14	39.50	49.60	50.56	48.66
34.	Netrokona	34.94	37.88	31.88	39.44	40.88	38.03
35.	Rajbari	39.81	43.66	35.75	52.28	53.98	50.63
36.	Shariatpur	38.95	42.17	35.77	47.26	47.96	46.62
37.	Sherpur	31.89	35.04	28.55	37.91	40.17	35.70
38.	Tangail	40.46	44.94	35.88	46.79	50.01	43.77
39.	Bagerhat	58.73	60.82	56.49	58.98	59.97	57.99
40.	Chuadanga	40.88	43.52	38.08	45.91	46.88	44.93
41.	Jessore	51.29	56.15	46.09	56.52	59.38	53.65
42.	Jhenaidah	44.66	48.78	40.26	45.91	46.88	44.93
43.	Khulna	57.81	63.26	51.83	60.14	64.32	55.85
44.	Kushtia	40.37	43.40	37.19	46.33	47.88	44.79
45.	Magura	44.71	49.16	40.10	50.64	52.87	48.48
46.	Meherpur	37.80	39.89	35.60	46.27	46.67	45.69
47.	Narail	48.56	52.38	44.69	61.27	63.34	59.31
48.	Satkhira	45.52	51.84	38.91	52.07	56.11	48.15
49.	Bogra	42.89	47.99	37.53	49.38	52.86	45.89
50.	Dinajpur	45.67	51.52	39.99	52.42	55.68	49.12
51.	Gaibandha	36.73	40.87	30.51	42.81	46.29	39.50
52.	Joypurhat	49.62	56.01	43.95	57.48	61.39	53.55
53.	Kurigram	33.45	39.42	27.55	42.52	46.49	38.80
54.	Lalmonirhat	42.33	48.19	36.25	46.09	49.30	42.89
55.	Naogaon	44.39	49.42	39.12	48.22	51.29	45.17
56.	Natore	41.55	45.45	37.41	49.59	51.90	47.29
57.	Nawabganj	35.92	37.37	34.44	42.94	41.55	44.27
58.	Nilphamari	38.84	44.73	32.58	44.37	47.59	41.13
59.	Pabna	42.44	45.18	39.50	46.72	47.83	45.61
60.	Panchagarh	43.89	50.12	37.33	51.77	55.21	48.32
61.	Rajshahi	47.54	52.27	42.48	52.98	55.84	50.09
62.	Rangpur	41.91	46.50	37.06	48.55	51.25	45.86
63.	Sirajganj	40.59	45.56	35.36	52.98	56.84	50.09
64.	Thakurgaon	41.82	48.44	34.77	48.71	52.97	44.40

Source: Population & Housing Census – 2011, BBS.

Table 12.13 Trend in Literacy Rate of Population 7 Years and Over

Percent

Year	Both Sex	National	Rural	Urban
1999	Both Sex	48.20	42.30	66.20
	Male	53.70	46.20	70.30
	Female	39.00	36.10	62.40
2000	Both Sex	48.40	43.50	66.90
	Male	53.90	48.00	71.30
	Female	40.70	37.90	62.50
2001	Both Sex	48.20	42.30	66.20
	Male	53.70	46.20	70.30
	Female	39.00	36.10	62.40
2002	Both Sex	48.80	45.30	63.10
	Male	52.80	49.30	67.30
	Female	44.50	41.00	58.80
2003	Both Sex	49.10	45.70	63.20
	Male	53.10	49.70	67.40
	Female	50.00	41.40	58.90
2004	Both Sex	49.90	46.60	64.20
	Male	53.70	50.20	68.10
	Female	46.20	42.90	60.20
2005	Both Sex	52.10	48.30	63.50
	Male	55.40	51.80	67.00
	Female	48.80	45.00	60.00
2006	Both Sex	52.50	48.70	64.00
	Male	55.80	51.90	67.50
	Female	49.10	45.30	60.50
2007	Both Sex	58.06	52.19	67.78
	Male	59.41	55.53	71.06
	Female	52.69	48.67	64.52
2008	Both Sex	57.68	51.49	58.63
	Male	60.76	54.54	71.80
	Female	54.56	48.41	65.44
2009	Both Sex	56.70	52.70	68.80
	Male	59.60	55.70	71.90
	Female	53.80	49.70	65.40
2010	Both Sex	56.80	52.80	69.00
	Male	59.80	55.80	72.10
	Female	53.90	49.90	66.00
2011	Both Sex	51.77	47.16	66.40
	Male	54.11	49.01	69.30
	Female	49.44	45.38	63.22

Source: Population & Housing Census – 2011, BBS, SVRS, BBS.

Table 12.14 Trend in Adult Literacy Rate of Population 15 Years and Over by Region and Sex

Year	Both Sex	Percent		
		National	Rural	Urban
1998	Both Sex	52.60	48.20	68.30
	Male	59.40	56.80	75.90
	Female	42.50	38.20	60.40
1999	Both Sex	52.70	48.40	68.90
	Male	60.70	56.90	76.00
	Female	42.80	38.30	61.90
2000	Both Sex	52.80	48.70	69.30
	Male	61.00	57.10	76.10
	Female	43.20	38.60	62.30
2001	Both Sex	47.80	42.20	64.30
	Male	54.00	48.00	70.00
	Female	41.40	36.50	57.40
2002	Both Sex	49.60	45.30	66.50
	Male	55.50	51.40	72.20
	Female	43.40	39.10	60.70
2003	Both Sex	50.30	46.10	67.10
	Male	56.30	52.20	72.70
	Female	44.20	39.90	61.20
2004	Both Sex	51.60	47.40	68.30
	Male	57.20	53.00	73.80
	Female	45.80	41.60	62.70
2005	Both Sex	53.50	48.80	67.10
	Male	58.30	53.60	72.00
	Female	48.60	43.80	62.30
2006	Both Sex	53.70	43.80	67.40
	Male	58.50	44.00	72.30
	Female	48.80	53.71	62.50
2007	Both Sex	58.30	53.71	71.50
	Male	63.10	58.64	75.98
	Female	53.53	48.64	67.09
2008	Both Sex	59.07	52.18	70.86
	Male	63.40	56.56	75.19
	Female	54.74	47.86	66.56
2009	Both Sex	58.40	53.80	71.50
	Male	62.60	58.20	75.40
	Female	54.30	49.60	67.60
2010	Both Sex	58.60	54.10	71.60
	Male	62.90	58.40	75.60
	Female	56.40	49.80	67.80
2011	Both Sex	53.00	47.50	69.50
	Male	58.80	50.80	73.40
	Female	49.20	44.40	65.10

Source: Population & Housing Census – 2011, BBS, SVRS, BBS.

Table 12.15 Adult literacy Rate of Population for All Ages by District and by Sex, 2011

Name of Zila	Both Sex	Male	Female
BANGLADESH	92.96	56.77	50.39
Barguna	58.96	61.72	61.64
Barisal	63.48	65.40	67.32
Bhola	44.01	45.65	44.67
Jhalakathi	68.76	70.95	75.91
Patuakhali	55.01	58.66	56.47
Pirojpur	67.05	68.24	70.47
Bandarban	36.15	42.31	26.26
Brahmanbaria	48.69	48.92	52.32
Chandpur	59.21	59.89	69.87
Chittagong	63.04	66.77	59.48
Comilla	55.95	58.51	63.31
Cox's Bazar	41.23	44.07	36.78
Feni	63.64	66.85	69.55
Habiganj	41.36	44.77	41.78
Khagrachhari	47.06	55.15	37.08
Lakshmipur	52.53	53.36	51.37
Mauvibazar	52.18	55.38	52.75
Noakhali	55.77	57.57	64.76
Rangamati	50.32	59.05	36.16
Sunamganj	35.79	39.30	33.30
Sylhet	53.74	57.72	50.17
Dhaka	73.66	77.20	55.28
Faridpur	49.75	52.64	50.32
Gazipur	65.15	69.55	54.65
Gopalganj	59.46	63.24	60.39
Jamalpur	35.91	39.57	35.51
Kishoreganj	41.18	43.36	42.78
Madaripur	48.12	51.93	47.82
Manikganj	48.31	53.08	48.86
Munshiganj	57.14	58.52	57.64
Mymensingh	43.37	46.15	42.93
Narayanganj	80.08	63.70	52.24
Narsingdi	51.14	53.76	51.67
Netrokona	38.20	41.07	37.25
Rajbari	49.23	52.04	49.06
Shariatpur	47.65	49.94	51.21
Sherpur	35.81	39.23	34.38
Tangail	45.74	50.24	46.26
Bagerhat	60.70	62.82	59.46
Chuadanga	46.22	48.17	45.34
Jessore	57.08	61.32	53.66

Contd.

Name of Zila	Both Sex	Male	Female
Jhenaidah	48.18	51.37	45.80
Khulna	61.80	67.57	55.19
Kushtia	45.80	48.42	44.23
Magura	50.33	53.90	50.05
Meherpur	44.91	46.43	45.67
Narail	59.36	62.58	61.87
Satkhira	52.55	58.23	49.66
Bogra	49.07	53.94	45.36
Dinajpur	52.26	57.03	47.62
Gaibandha	40.89	45.73	40.02
Joypurhat	55.91	61.09	51.36
Kurigram	40.75	46.31	39.82
Lalmonirhat	45.26	50.21	41.76
Naogaon	48.05	52.42	45.01
Natore	48.60	52.02	46.37
Nawabganj	43.55	43.18	47.08
Nilphamari	42.82	47.83	38.53
Pabna	45.99	48.06	45.13
Panchagarh	50.53	55.68	45.78
Rajshahi	53.23	57.44	49.03
Rangpur	47.36	51.42	44.44
Sirajganj	41.62	46.14	38.35
Thakurgaon	47.09	53.95	42.05

Source: Population & Housing Census, 2011, BBS

Chapter 13

Statistics of Level of Living

13.1 Introduction

One of the major objectives of economic planning in Bangladesh is to improve the level of living of population, especially of the poorer sections of the society. The term “level of living” is very difficult to define and quantify by a single statistical measure. It is also not possible to construct an overall index which could measure changes in the level of living. This is because; the level of living depends on several elements relevant to social and economic attainments of the society. Some of the important elements of the ‘level of living’ are

- (i) Distribution of Income
- (ii) Per capita income
- (iii) Housing condition
- (iv) Assets
- (v) Savings
- (vi) Indebtedness
- (vii) Working environment
- (viii) Health conditions
- (ix) Education
- (x) Safe drinking water
- (xi) Toilet facilities
- (xii) Security, etc.

A study of changes in the level of living, therefore, calls for a study of changes of a set of socio-economic indicators. Over time there may be improvements in some of the components, while the condition of some other indicators may remain unchanged or may have even deteriorated. These phenomena create complexity in measuring changes of level of living. Due to this complexity, measurement of changes is the important element of level of livings like expenditure on various consumer goods and services may be considered to indicate changes in level of living over time.

The estimated private consumptions and their trends may then be associated with the change in per capita availability of various consumer goods and services and income. They are estimated mainly

from Household Income and Expenditure Survey (HIES) conducted by the Bangladesh Bureau of Statistics (BBS). Changes in, availability of facilities for water, sanitation, education, health care services etc. may all be studied for assessing changes in level of living. An increase in the average per capita consumption may bring about improvements in the level of living. The increase in national income or per capita income at constant prices together with its components is also a good indicator of progress in the level of living. This is mainly because a part of the increase in income goes to increase the level of private consumption. Government expenditure particularly on education, health, and other social sectors contributes directly or indirectly towards the improvement of level of living or welfare of the population.

Housing Structure is another important indicator of level of living. It is one of the elements of basic needs and it indicates the living conditions of people. Its structure is also a good indicator of social status, well-being and social prestige of people. Good quality physical structure of houses may give a better picture of long-term living standards than the income snap short. This is because the good quality houses have been accumulated overtime and last longer. The good quality houses are centered round the items of (i) dispersal from other houses, (ii) ventilation, (iii) construction material, (iv) electricity connection and (v) sanitation. In Bangladesh housing condition is assessed only by structure of household and available data contain information on construction materials but other items are not considered for minimum needs. For living purpose, people need some other facilities such as drinking water, lighting facilities, kitchen, toilet, furniture fixture etc. The housing structures along with related facilities reflect the level of living or welfare of the household. Level of income and expenditure is correlated with housing conditions. For instance, households with higher consumption expenditure are likely to have better house with electricity connection, hygienic sanitation facilities, safe drinking water etc. Moreover, the quality of physical structure and environment of the house not only reflects the social status of its owner in the community but is also associated with household members' exposure to disease and sufferings.

A household may possess one or more structures for living purpose and other uses. The structure of the house may be of various types such as (i) Pucca (Brick built), (ii) Semi-pucca (Brick in the wall but CI sheet in the roof), (iii) Kutcha (CI sheet or wood/bamboo/mud in the

wall and CI sheet in the roof), and (iv) Jhupri/ thatched/others (House built of straw/hay etc.).

For the needs of planning on housing, the statistical requirements are the availability of water facilities, the nature of sanitary facilities, lighting facilities, and the extent of overcrowding. Likewise, households may be classified according to the type of construction, type of water supply, type of toilet facilities, type of lighting facilities and the number of rooms in the dwelling unit. Number of rooms in the dwelling unit and household members may give a broad idea of the extent of overcrowding. Therefore, housing statistics are necessary for proper planning and policy making on housing and level of living.

13.2 Sources of Level of Living Statistics

Bureau of Statistics (BBS), the central statistical organization of Bangladesh is the main source of statistics of level of living. Data on household income, expenditure, private consumption of different goods and services, education, health care, housing, savings, indebtedness, disability etc. are collected in Household Income and Expenditure Survey (HIES). This survey is conducted from time-to-time with the main objective of measuring level of living as well as measuring incidence of poverty. Another objective of the HIES is to construct consumer price index (CPI) for specified sections of population and areas. A wealth of information on various aspects of the level of living of household, including income, are collected continuously through HIES but they are not collected every year. Since 1973-74, the HIES has been repeated with a given periodicity. The BBS in its annual publication publishes regularly estimates of net national product and per capita net national product at current and constant prices. However, all these data could serve as important to furnish overall picture at the national level only.

The main sources of housing statistics are the population census, and household surveys. But there is no National Sample Survey (NSS) specifically on housing. Household Income and Expenditure Survey (HIES), Welfare Monitoring Survey etc. conducted by the Bangladesh Bureau of Statistics are also sources of housing statistics in Bangladesh. Very few detailed information on housing is available in Bangladesh. Population Census also collects information on housing condition by type of material used for wall and roof. Apart from the census and HIES data, there are several ad hoc socio-economic survey carried out by different organizations in which information on housing structure is collected.

13.3 Deficiencies in Statistics of Level of Living

No regular annual system of collection of data on personal and household incomes, private consumption of different goods and services has so far been comprehensively developed in Bangladesh. In the decennial population census, income, consumption and related data are not collected because of difficulty in administering a broad questionnaire containing these issues. Income data available from income-tax returns of assesses do not serve the purpose much due to its small coverage of population, substantial concealment of income and manipulation of accounts and of conceptual problems in defining income.

Although, information on earnings, wages, and salaries are collected and published by different agencies, the scope of the data leaves much more to be desired from the point of income distribution. For instance, salary statistics of government employees do not include various allowances accruing to them such as bonus, overtime, dearness allowance etc. Further, there are several occupational and functional groups about whom no regular income data are available. These include self-employed or own account workers who constitute a sizeable proportion both in rural and urban areas. Moreover, data relating to level of living are not available for small unit of area and the derived estimates of different aspects of level of living published by BBS are not suitable for studies of level of living for different categories of people in the society. The tabulations are made separately only for few broad occupational groups.

Systematic work on estimation of asset, savings, indebtedness etc. at the household level is very weak. In view of the large gaps in the availability of statistical data, especially for the household sector, it is necessary to conduct comprehensive surveys on these aspects for the measurement of the levels of living of households. And it is not possible to cover all the aspects within a single survey like HIES. It would, therefore, be desirable to organize independent large-scale surveys on these aspects to be carried out at regular intervals. The BBS being the largest national data collecting and processing organization with the longest experience of conducting household surveys in the country, should obviously take the responsibility of providing reliable estimate of the needed series of data for measuring level of living for urban and rural areas and other social groups separately.

Available information on housing is deficient in scope coverage and quality. The housing statistics are obtained as a by-product of various

socio-economic studies/surveys. These studies report only about type of construction of main dwelling unit. There is no information about total floor space, per capita floor space, number of rooms, type of bath room, type of latrine, source of drinking water, source of lighting, type of kitchen etc. Sometimes all these information is found separately. Thus, the available information on housing is deficient in scope, coverage and quality and utility. There is an urgent need for improving the housing statistics by conducting specific housing survey with wider coverage and by streamlining the procedures for collection and compilation of the housing statistics and then it may be possible to obtain all necessary information required for proper planning and evaluation of housing programs. Another serious limitation of the published data is lack of accuracy and reliability. It has been noticed that the data for the same period of time vary from publication to publication.

13.4 Reliability of Data

The reliability of the data on some items is very much questionable. For example, the reported income is often deflated, while the reported expenditure is inflated. Thus, income and expenditure data at the household and individual level collected through household surveys contain errors of different types and estimate of these errors is of great importance. There are many other items such as assets, savings, wealth etc. on which correct information are not supplied either due to non-availability of accurate information, carelessness or deliberate attempt to distort the figure. Adequate arrangements for checking of data are not available. Sampling errors are not estimated by standard errors (SE) for all indicators which can be considered as the basis of reliability or precision of the survey estimates. These problems happen to be the major handicap in the utilization of statistics for assessing the levels of living.

13.5 Time-lag in Publication

Several researchers have pointed out about time-lag of socio-economic data time and again. There are considerable time-lags between collection of data and final presentation of consolidated statistics at the national, sub-national and district levels. The current available housing statistics collected by the various socio-economic surveys and census suffer from time-lag in collection, compilation and publication of data. The time-lag in publication of housing statistics by the censuses is 10 years, while by various studies/surveys it is 2–3 years at present.

13.6 Some Selected Statistics on Level of Living

Table 13.1 shows the percentage of household expenditure for food and non-food items by decile group and regions. It indicates that poorest 5 percent households spent about 73 percent of the total expenditure on food items, while about 27 percent spent on non-food items in 2010. This scenario is quite opposite for households in top 5 percent in respect of consumption expenditure. These households spent 38 percent on food items and 62 percent on non-food items. The percentage of expenditure on food items decreases with the increase of decile group. On the other hand, percentage of expenditure on non-food items increases with the increase of decile group. Thus, as income level (decile group) rises, so does expenditure on non-food items. Table 13.1 illustrates that expenditure on non-food items is an increasing function of total income/expenditure. Similar trend is observed for 2005 and 2002. These results conform to the Engel's law of expenditure¹ (Prais and Houthakker, 1955).

13.7 Engel Ratio

The proportion of income spent on food items is called the Engel ratio. It is widely used as an indicator of level of living. The Engel's law describes as income rises, the proportion of expenditure spent on food declines. This law is holding universally both in developed and least developed countries (Bhattacharya and Coondoo, 1992). On the other hand, the Engel ratio for food items consumed by the household/individual also indicates the relative importance of an item in the consumer's budget. It is a proportion of the total expenditure on an item or group of items. The Engel ratio (ER) for a commodity is defined as $ER_i = \frac{E_i}{Y}$, where E_i is the expenditure on i-th item and Y is the total income or expenditure. The Engel ratio is a variable and its value changes systematically as the level of living (standard or living) of household rises. The estimated value of the ER is shown in Table 13.2 for food items for 2000, 2005 and 2010 by decile group. The Engel ratio for food is the highest for households in bottom 5 percent, while it is the lowest for households in top 5 percent. It decreases with the increase of income level or decile groups. Table 13.3 shows that highest importance is given in rice consumption in all years and in all areas. It also indicates that the importance of rice consumption is much higher in rural areas. The second highest importance is given for fish

¹ Proportion of expenditure devoted to food decreases as the standard of living of the household increases is termed as Engel's law of expenditure

which is followed by meat and eggs, condiment/spices and vegetables. The lowest importance is given for beverage and sugar/gur.

Quality of dwelling units, access to toilet facilities and access to electricity, telephone, mobiles and e-mail are important indicators of level of living. Tables 13.4 and 13.5 shows the quality of dwelling units by structure. Between 2001 and 2011, improvement in structure is observed both in urban and rural areas (Table 13.5). Table 13.6 provides the distribution of households having different types of toilet facilities by residence. It is observed that about 78.3 percent of households in urban area used sanitary latrine in 2011 while this figure for 2001 was 67.3 percent. In rural area this figure was 55 percent in 2011 and 28 percent in 2001 indicating a great improvement in level of living over the period. In urban area about 38.3 percent households used supply water as a source of drinking water in 2011. This figure was about 25.54 percent in 2001. In rural areas only about 0.34 percent households had supply water and it raised to 2.3 percent in 2011 (Table 13.7). In 2001 about 79.92 percent households in urban area and 23.25 percent households in rural areas had electricity connection, while these figures raised to 87.0 percent and 43.20 percent in 2010 respectively (Table 13.8). At the national level, the use of cell phone and fixed phone has increased to a great extent (Table 13.9). Thus, we saw a large improvement in the structure of households. That means improved quality of materials used in the construction of houses between 2001 and 2011. More households were in house with walls and roofs made of corrugated iron sheets, steel and cement. More households were found to have access to sanitary latrine, electricity and safe drinking water and amenities such as cellular phones etc. between 2001 and 2014. Even the rural households continued to improve their house in terms of those facilities which implies that level of living are improving gradually both in urban and rural areas.

Table 13.1 Percentage Distribution of Consumption Expenditure for Food and Non-Food Items by Decile Group of Households

Decile of household	National		Rural		Urban	
	Food	Non-Food	Food	Non-Food	Food	Non-Food
01	02	03	04	05	06	07
Year 2010						
Total	54.8	45.2	58.7	41.3	48.2	51.8
Bottom 5%	72.3	27.7	71.4	28.6	81.8	18.2
Decile 1	71.2	28.8	70.8	29.2	75.4	24.6
Decile 2	69.0	31.0	68.3	31.7	73.4	26.6
Decile 3	67.1	32.9	66.5	33.5	70.8	29.2
Decile 4	65.0	35.0	64.9	35.1	66.0	34.0

Contd.

Decile of household	National		Rural		Urban	
	Food	Non-Food	Food	Non-Food	Food	Non-Food
01	02	03	04	05	06	07
Decile 5	63.3	36.7	62.6	37.4	66.1	33.9
Decile 6	61.6	38.4	61.7	38.3	61.2	38.8
Decile 7	59.4	40.7	58.4	41.6	61.3	38.7
Decile 8	56.4	43.6	57.2	42.8	54.9	45.1
Decile 9	52.1	47.9	53.6	46.4	50.2	49.8
Decile 10	41.0	59.0	46.8	53.3	37.4	62.6
Top 5%	37.8	62.2	44.8	55.2	17.5	82.5
Year 2005						
Total	53.8	46.2	58.6	41.5	45.2	54.8
Bottom 5%	67.9	32.1	68.3	31.8	66.7	33.3
Decile 1	67.8	32.2	68.0	32.1	66.1	33.9
Decile 2	67.7	32.3	67.9	32.1	63.2	36.9
Decile 3	66.6	33.5	67.5	32.5	62.5	37.5
Decile 4	66.0	34.0	67.2	32.8	60.7	39.3
Decile 5	64.4	35.6	65.8	34.3	58.0	42.0
Decile 6	63.5	36.5	64.8	35.2	56.4	43.6
Decile 7	61.3	38.7	63.7	36.3	51.0	49.0
Decile 8	57.7	42.3	61.7	38.3	47.1	52.9
Decile 9	52.9	47.1	57.6	42.5	40.7	59.3
Decile 10	37.9	62.1	45.7	54.3	30.7	69.3
Top 5%	33.2	66.8	41.6	58.4	27.8	72.2
Year 2000						
Total	54.6	45.4	59.3	40.7	44.6	55.4
Bottom 5%	69.2	30.8	69.7	30.3	65.3	34.7
Decile 1	69.1	30.9	69.5	30.4	65.5	34.5
Decile 2	68.6	31.3	69.1	30.9	63.0	37.0
Decile 3	67.8	32.1	68.9	31.2	61.1	38.9
Decile 4	65.6	34.4	66.5	33.5	58.6	41.4
Decile 5	64.3	35.7	65.3	34.5	57.7	42.3
Decile 6	62.9	37.7	64.4	35.6	53.3	46.7
Decile 7	61.0	38.9	62.41	37.6	51.2	48.7
Decile 8	57.8	42.2	60.1	39.9	47.1	52.9
Decile 9	53.0	47.1	57.3	42.6	41.1	58.9
Decile 10	37.4	62.5	45.9	54.1	27.4	55.4
Top 5%	32.7	67.3	41.8	58.1	23.9	76.1

Source: Report of the Household Income & Expenditure Survey 2010, BBS

Table 13.2 Engel Ratio for Food Consumption Expenditure by Decile Group of Households

Expenditure decile group	Engel Ratios								
	National			Rural			Urban		
	2000	2005	2010	2000	2005	2010	2000	2005	2010
Bottom 5%	0.692	0.679	0.723	0.697	0.683	0.714	0.653	0.667	0.818
Decile 1	0.691	0.678	0.712	0.695	0.680	0.708	0.655	0.661	0.754
Decile 2	0.686	0.677	0.690	0.691	0.679	0.683	0.630	0.632	0.734
Decile 3	0.678	0.666	0.671	0.689	0.675	0.665	0.611	0.625	0.78
Decile 4	0.656	0.660	0.650	0.665	0.672	0.649	0.586	0.607	0.660
Decile 5	0.643	0.644	0.633	0.653	0.658	0.626	0.577	0.580	0.661
Decile 6	0.629	0.635	0.616	0.644	0.648	0.617	0.533	0.564	0.612
Decile 7	0.610	0.613	0.593	0.624	0.637	0.584	0.512	0.510	0.613
Decile 8	0.578	0.577	0.564	0.601	0.617	0.572	0.471	0.471	0.549
Decile 9	0.530	0.529	0.521	0.573	0.576	0.536	0.411	0.407	0.502
Decile 10	0.374	0.379	0.410	0.459	0.457	0.468	0.274	0.307	0.374
Top 5%	0.327	0.332	0.378	0.418	0.416	0.448	0.239	0.278	0.175
Total	0.547	0.538	0.548	0.593	0.586	0.587	0.446	0.452	0.482

Source: Report of the Household Income & Expenditure Survey, 2005 and 2010, BBS

Table 13.3: Percentage Share of Food Expenditure by Residence & Major Food Items

Food Item	National			Rural			Urban		
	2010	2005	2000	2010	2005	2000	2010	2005	2000
01	02	03	04	05	06	07	08	09	10
Total food expen.	6031	3209	2477	5543	3023	2300	7362	3756	3175
% of Total	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Cereal	35.95	39.50	38.02	39.62	42.25	41.23	28.411	31.30	28.87
Pulses	2.35	2.65	2.92	2.32	2.39	2.79	3.00	3.28	3.29
Fish	13.71	12.24	12.48	12.74	11.66	12.06	15.71	14.11	13.66
Meat & eggs	10.31	8.51	8.02	8.61	7.64	6.97	13.80	10.56	11.01
Vegetables	7.79	8.38	9.21	7.98	8.34	9.44	7.40	8.48	8.57
Milk/Milk Products	3.02	3.74	3.95	2.74	3.46	3.62	3.58	4.41	4.89
Edible Oil	4.35	4.25	3.71	4.26	41.07	3.62	4.53	4.67	3.97
Condim/	9.99	7.52	7.13	10.54	7.18	7.22	8.85	8.31	6.87
Spices									
Fruits	4.08	3.23	2.97	3.49	2.97	2.57	5.29	3.83	4.10
Sugar/Gur	1.06	1.56	1.34	1.04	1.54	1.29	1.12	1.62	1.49
Beverage	0.73	0.68	1.97	0.51	0.45	1.57	1.18	1.21	3.10
Miscellanies	5.67	8.25	8.29	6.15	8.25	7.62	6.38	8.23	10.18

Source: Report of the Household Income & Expenditure Survey 2010, BBS

Table 13.4 Dwelling Units of Head of Household by Types of Roof and Wall Material, 2010

Wall Material	Roof Material					
	Total	CIS/ wood	Mud/tile/w ood	Straw/ Bamboo	Other	Concrete
1	2	3	4	5	6	7
National						
Total	100.00	81.52	2.35	5.24	0.52	10.37
Brick/Cement	25.12	15.21	0.37	0.06	0.02	9.46
CIS/Wood	38.46	37.17	0.21	0.50	0.04	0.54
Mud/Brick	16.72	13.34	1.50	1.52	0.18	0.18
Fench/Straw/Bamboo	19.29	15.56	0.25	3.00	0.21	0.18
Others	0.41	0.24	0.03	0.06	0.07	0.02
Rural						
Total	100.00	86.38	2.79	6.63	0.55	3.65
Brick/Cement	13.59	10.30	0.41	0.07	0.02	2.78
CIS/Wood	43.24	41.89	0.27	0.64	0.05	0.39
Mud/Brick	20.57	16.27	1.79	2.05	0.23	0.23
Fench/Straw/Bamboo	22.12	17.63	10.28	3.79	0.18	0.23
Others	0.48	0.28	0.04	0.07	0.07	0.02
Urban						
Total	100.00	68.28	1.16	1.44	0.41	28.71
Brick/Cement	56.59	28.59	0.26	0.04	0.01	27.67
CIS/Wood	25.40	24.30	0.02	0.11	0.03	0.94
Mud/Brick	6.22	5.36	0.740	0.08	0.03	0.06
Fench/Straw/Bamboo	11.57	9.91	0.16	1.18	0.29	0.04
Others	0.21	0.11	0.01	0.04	0.05	0.00

Source: Report of the Household Income & Expenditure Survey 2010, BBS

Table 13.5 Percentage Distribution of Households by Type of Structure

Structure	Total		Urban		Rural	
	2001	2011	2001	2011	2001	2011
Jhupri	8.80	2.90	7.58	2.60	9.15	3.00
Kutchra	74.38	65.70	47.15	32.80	82.19	75.50
Semi-Pucca	10.10	19.70	23.26	32.10	6.33	16.00
Pucca	6.72	11.70	22.01	32.50	2.33	5.30
Total	100.00	100.00	100.00	100.00	100.00	100.00

Source: Population and Housing Census, 2001 and 2011, BBS.

Table 13.6 Percentage Distribution of Households by type of Toilet Facilities.

Type of Toilet Facilities	Urban		Rural	
	2001	2011	2001	2011
Sanitary	67.30	78.30	28.16	55.00
Other	25.34	20.80	46.18	41.20
None	7.36	0.90	25.66	3.80
Total	100.00	100.00	100.00	100.00

Source: Population and Housing Census, 2001 and 2011, BBS.

Table 13.7 Percentage Distribution of Households by Source of Drinking Water

Source	Urban		Rural	
	2001	2011	2001	2011
Supply Water (Tap)	25.54	38.30	0.34	2.30
Tube-well	65.15	58.60	83.96	91.10
Pond	1.20	--	4.09	--
Others	8.11	3.10	11.61	6.60
Total	100.00	100.00	100.00	100.00

Source: Population and Housing Census, 2001 and 2011, BBS.

Table 13.8 Percentage Distribution of Households by Electricity Connection

Locality	% of Households			
	With Electricity Connection		Without Electricity Connection	
	2001	2011	2001	2011
Urban	79.92	87.00	20.08	13.00
Rural	23.25	43.20	76.75	56.80

Source: Population and Housing Census, 2001 and 2011, BBS.

Table 13.9 Number of Mobile Phone and Fixed Phone Users in Bangladesh, 2007-2014

(Figure in million)

Year	No. of Mobile Phone User	No. of Fixed Phone User
2007	34.4	1.2
2008	44.6	1.3
2009	52.4	1.7
2010	68.7	1.7
2011	73.0	1.7
2012	86.6	1.0
2013	97.4	1.0
2014*	114.8	1.1

*Upto January, 2014

Notes : One person may use more than one set of mobile phone

Source : Bangladesh Economic Review, 2014, MoF

Chapter 14

Social Welfare Statistics

14.1 Introduction

Before going to discuss about social welfare, let us discuss about the term welfare. What does welfare mean? Welfare means the well-being of the entire society. The welfare of all people is fundamental to assure provisions for meeting social needs and functioning of the social order. It also refers to a broad discourse which may have certain implications regarding the provision of a minimal level of well-being and social support for all members of the society. Social welfare on the other hand, refers to the upliftment of the backward or vulnerable sections of people such as handicapped, destitute women, destitute children, backward tribes, lower castes, backward classes, poorest of the poor and so on. Social welfare activities have dominating roles in the society to combat social problems of the people especially the disadvantaged section of the population. The basic difference between social services and social welfare services is that social services are provided for the entire population to meet basic needs like health care services, education, housing etc., while social welfare services refer to a variety of fields such as family and child welfare, women's welfare, special nutrition of children, rehabilitation of the physically and mentally handicapped etc. The aims of the social services are to develop the human resources of the country as a whole, while the aims of the social welfare are to improve the socio-economic conditions of the targeted or vulnerable sections of the society. Encyclopedia Britanica defines social welfare as “a system of laws and institutions through which a government attempts to protect and promote the economic and social welfare of its citizens usually based on various forms of social insurance against unemployment, accident, illness and, old age”.

In Bangladesh, there are many development programs and social welfare activities for the socio-economic development of the poor and disadvantaged people. Among the development programs, the following are important and these programs are run by the Department of Social services, under the Ministry of Social Welfare and other Ministries and Departments of the government.

- (i) Urban Community Development (UCD) Program
- (ii) Rural Social Services (RSS) Program
- (iii) Implementation of National Population Program through Rural Mother's Centre (RMC)
- (iv) Rehabilitation Program for the Acid Burnt and Handicapped People
- (v) Abasan/Asrayan Project of the Prime Minister's Office
- (vi) Old Age Allowance Program
- (vii) Allowance for the Insolvent Persons with Disabilities
- (viii) Social Integration Programs (Poverty Alleviation through Human Resource Development)
- (ix) Baby Homes
- (x) Day Care Centre
- (xi) Training and Rehabilitation Centres for the Destitute Children
- (xii) Socio-economic Training Centres for the Women
- (xiii) Vocational Training and Production Centre for the Destitute Women
- (xiv) Protection of Children at Risk (PCAR) Project: A Program for the Street Children and Children without parental care
- (xv) Prevention of Social Disintegration Programs (Poverty Alleviation Programs)
- (xvi) Juvenile Development Centres
- (xvii) Probation and After Care Services
- (xviii) Training and Rehabilitation Centres for the Vagrants (Sharkari Ashroy Kendro)
- (xix) Safe Custody Home for the Women and Adolescent Girls (Safe Home)
- (xx) Program for Socially Disadvantaged Girls (Sex Workers)
- (xxi) Disability Related Programs
- (xxii) Integrated Education Program for the Visually Impaired (Blind Children)
- (xxiii) Schools for the Visually Impaired
- (xxiv) School for the Hearing Impaired
- (xxv) Plastic Goods Production Centre

- (xxvi) Mineral Water Plant Run by the Persons with Disabilities
- (xxvii) Artificial Limb Production Centre
- (xxviii) National Training and Rehabilitation Centre for the Visually Impaired
- (xxix) Training Centre for Physically Handicapped
- (xxx) Job Placement Services
- (xxxi) Nine Point Short and Long Term Program
- (xxxii) Welfare and Service Delivery Program
- (xxxiii) Hospital/Medical social Services Programs
- (xxxiv) Financial Assistance for Treatment and Rehabilitation of the Burn-Victims
- (xxxv) Human Resource Development and Capacity Building through Training
- (xxxvi) National Academy of Social Services (NASS)
- (xxxvii) Regional Training Centres
- (xxxviii) Community Empowerment Programs through Voluntary Works
- (xxxix) Registration, Control and Empowerment of the Voluntary Organisations

Apart from the government organisations, many social welfare activities are run by the local NGOs and international NGOs.

14.2 What Matters with Social Welfare Statistics?

In order to develop social welfare services in a much more organized way, it would be necessary to have statistics relating to this aspect. Social welfare statistics are essential for the purpose of planning and implementing the programs under taken by the welfare agencies such as Department of Social Welfare, NGOs, UNICEF and other organizations. These statistics are needed not only for planning purposes but also for assessment and evaluation of implemented programs.

The evaluation is primarily in terms of the number of persons whose needs are met, number of beneficiaries and their socio-economic characteristics. For instance, social welfare services are generally provided by the Department of Social Services (DSS) to vulnerable sections of the population such as old, divorced, separated, physically disabled children and youth etc. to satisfy their certain basic needs.

If we have to bring about a change in social welfare, we shall have to proceed on the basis of some selected indicators of social welfare. And if really useful social welfare statistics are to be compiled, the very first would be to understand well-developed problems concerning social welfare. What emerges from the foregoing discussions is that, in order to determine the content of social welfare statistics, it is essential to spell out the objectives and the purposes of welfare programs. Then those statistics can be used for both planning as well as evaluating the services.

14.3 Some Selected Indicators on Social Welfare

Without going into the conceptual details and without explaining the rationale on which the selection is based, the following indicators of social welfare appear to be important for planning and social services. These indicators are related to the social welfare needs of the individuals for their better functioning in the society. However, the following indicators are of particular importance from the point of view of social welfare statistics.

- (i) Percentage of persons aged 60 years and over
- (ii) Percentage of persons aged 60 years and over whose health needs are not met
- (iii) Number of high-risk poor pregnant women who need special care
- (iv) Incidence of physical handicaps
- (v) Incidence of mental handicaps
- (vi) Incidence of mental illness
- (vii) Incidence of divorce
- (viii) Incidence of separation
- (ix) Incidence of widowhood
- (x) Number of scheduled castes, scheduled tribes and other backward classes
- (xi) Displaced persons
- (xii) Poor and the destitute
- (xiii) Industrial labour and mines labour
- (xiv) Incidence of drug abuse
- (xv) Emotionally disturbed persons
- (xvi) Chronically ill persons
- (xvii) Requirement of hostel accommodation for working women etc.

14.4 Sources of Social Welfare Statistics

In Bangladesh there is a great dearth of social welfare statistics. There is no proper administrative arrangement for collection of statistics on

social welfare, nor even any attempt is made to anticipate in advance the statistical needs for formulation and implementation of plans. The official statistics published annually by the Bangladesh Bureau of Statistics (BBS), do not have even a separate section on social welfare statistics. The weakest link in our national statistical system is the social welfare statistics. There are very few primary as well as secondary sources of social welfare statistics. Among the primary sources, mention may be made of statistical data compiled in the surveys conducted or sponsored by the Department of Social Welfare. Bangladesh Bureau of Statistics also collects data in specific areas of social welfare through sample surveys generally as by-products of their efforts and not especially for social welfare needs. The main source of social welfare until recently is the Decennial Population Census of Bangladesh. The population census provides demographic and vital statistics such as: the aged persons, number of women by age-groups, number of women workers, number of child workers, distribution of women by marital status etc.

14.5 Deficiencies in Social Welfare Statistics

There has been no proper administrative arrangement for taking a unified effort to view the aspects of social welfare and for carrying out the collection of basic statistics relating to social welfare. That means statistics regarding the incidence of blindness, leprosy, insanity, lepers, mute, deaf, orthopedically handicapped, street beggar, street boys, dustbin hunters, destitute women, old poor people etc. Statistical information relating to backward classes such as scheduled castes, schedule tribes and other weaker sections of people is almost non-existence in the country. The collection of statistics on various aspects relating to these groups has so far been strictly limited to serve the essential requirements for welfare developments of backward classes. The statistics produced by the other organisations or agencies of relevance to social welfare were generally the by-products of their efforts and not specifically compiled for social welfare needs. As a result, there are a number of gaps in the basic statistics required for formulation of the social welfare program as well as in the data which help in the assessment of the ongoing program. Thus, proper planning for future development is difficult. Moreover, there has been no proper system for scrutiny or verification of available data in respect of their validity and reliability. A major gap in the available statistical data is the dearth of statistics relating to voluntary organizations, NGOs and international NGOs which have a major contribution towards the social welfare activities. In all economic, industry and agricultural sectors of

this country, we have well-established national surveys which are carried out periodically so as to provide baseline data on those aspects. Unfortunately, in social welfare sectors such systemic and regular surveys have not been carried out – on a large scale. As a result, the available data on social welfare suffer from many deficiencies from the user's point of view and the more important deficiencies are:

- (i) lack of reliability and incompleteness of coverage in the available data
- (ii) lack of primary data based on surveys or enquiries
- (iii) non-availability of certain data on social welfare etc.
- (iv) data of private and voluntary agencies who are engaged in social welfare activities are hardly available.

So far, the data collected have been mostly on the number of beneficiaries and the expenditure incurred. These data are useful but they do not indicate the progress in actual terms to provide information about the effectiveness and sustainability of a program. In other words, it is not sufficient not only to assess the efforts put on but also the efficacy of these efforts in terms of achievement of the objectives of the program.

14.6 Some Social Welfare Related Statistics

There is a great dearth of statistics in Bangladesh for the development of social welfare of the people. For the improvement of welfare situation, Ministry of Social Welfare alone is not sufficient. Different Ministries, particularly Education and Health could be used along with the Ministry of social welfare to have a wider impact on the society. For instance, statistics on disability and autism are important element for planning and policy formation on these aspects. Table 14.1 provides brief information on disability for 2011. Table 14.2 sets out information on widowhood, divorce and separated which is necessary to make effective program for them. To make a plan for the old people such as old age pension scheme information on old age population is essential. Table 14.3 gives information on population of age 60 years and above by region. Table 14.4 sets out information regarding trend in number of children remanded in and discharged from correctional services. All these information are important for the improvement of social welfare of the people. Street children are gradually increasing and are deprived of welfare. Proper policy is needed to bring them from the street to school. Table 14.5 shows the current situation and projected figure of number of street children for 2024. Table 14.6 gives

information about Sarkari Ashroy Kendra for the rehabilitation of vagrant and neglected people of the society, while Table 14.7 provides information on capacity of safe custody home for women and adolescent girls by division. Table 14.8 gives information on capacity of schools for visually impaired children by division. Number of school for hearing impaired with their capacity in shown in Table 14.9. This information is important to judge the gap between demand and present capacity. If the gap is large then proper planning is necessary to address this problem and to improve the social welfare.

14.7 Time – Lag in Publication

Apart from the deficiencies mentioned above in social welfare statistics, there is time–lag in publication. There is a considerable time–lag in the publication of the social welfare statistics, which is largely due to delay in receipt of primary information and its processing. There is considerable time – lag between collection of data and presentation of consolidated statistics for users. Time–lag in publication of social welfare statistics by the Ministry of Social Welfare is 3–4 years at present.

Table 14.1 Percentage Distribution of Disabled Persons by Type of Disability, Broad Age Group and Sex, 2011

Age group and sex	Disable Person (%) by Type of Disability						
	Total	Speech	Vision	Hearing	Physical	Mental	Autism
Both sex							
Total	100	13.6	19.4	9.0	39.3	12.6	6.1
0-4	100	20.7	10.4	4.6	46.4	6.2	11.6
5-14	100	23.3	11.1	6.7	35.98	13.4	9.6
15-29	100	19.8	11.6	6.4	34.9	19.2	8.1
30-49	100	12.6	18.3	8.8	39.0	16.2	5.0
50-64	100	7.0	26.4	11	42.9	9.2	3.4
65+	100	4.3	31.7	13.2	42.6	4.9	3.2
Male							
Total	100	14.1	17.1	8.1	41.9	12.7	6.1
0-4	100	20.3	9.8	4.6	47.7	6.3	11.3
5-14	100	22.9	11.0	6.3	36.8	13.4	9.5
15-29	100	19.4	10.9	5.8	36.0	19.8	8.1
30-49	100	13.6	15.3	7.5	42.2	16.3	5.1
50-64	100	7.7	22.7	9.4	48.0	8.7	3.5
65+	100	4.8	28.8	12.5	46.1	4.7	3.0
Female							
Total	100	13.0	22.1	10.2	36.3	12.4	8.0
0-4	100	21.2	11.3	4.6	44.7	6.0	12.1
5-14	100	23.7	1.3	7.2	34.7	13.3	9.8

Contd.

Age group and sex	Disable Person (%) by Type of Disability						
	Total	Speech	Vision	Hearing	Physical	Mental	Autism
15-29	100	20.1	12.4	7.1	33.6	18.6	8.2
30-49	100	11.5	21.8	10.3	35.4	16.1	4.8
50-64	100	6.3	30.7	12.8	37.0	9.8	3.3
65+	100	3.8	34.8	14.0	38.9	5.2	3.4

Source: Statistical Pocket Book, Bangladesh 2013.

Table 14.2 Percentage Distribution of Population by Marital Status, Age and Sex, 2001 and 2011

Age	Male						Female					
	Never Married		Currently Married		Widowed/ Divorce/ Separated		Never Married		Currently Married		Widowed/ Divorce/ Separated	
	2001	2011	2001	2011	2001	2011	2001	2011	2001	2011	2001	2011
Total	43.1	41.3	55.7	57.3	0.6	1.1	29.0	27.5	63.0	62.0	8.0	1.3
10-14	98.7	99.1	1.3	0.5	0.0	0.4	96.1	98.5	3.4	1.0	0.5	0.1
15-19	95.7	96.5	4.2	3.2	0.1	0.4	62.6	76.3	36.2	22.6	1.1	0.5
20-24	69.1	73.0	30.7	26.3	0.2	0.5	17.6	24.9	80.5	73.3	1.9	1.2
25-29	32.2	36.4	67.6	62.8	0.2	0.41	6.6	7.7	91.0	89.4	2.4	1.4
30-34	12.0	12.3	87.7	86.6	0.3	0.4	3.9	2.7	92.0	94.1	4.1	1.4
35-39	4.7	4.8	95.0	95.2	0.3	0.4	2.5	1.3	91.4	94.0	6.1	1.5
40-44	3.3	2.2	96.3	96.9	0.41	0.6	2.6	1.0	87.2	90.4	10.2	1.8
45-49	2.4	1.4	96.7	97.6	0.6	0.7	2.1	0.85	84.3	84.3	13.6	2.2
50-54	2.9	1.5	96.1	97.0	1.0	1.2	3.0	0.9	75.2	78.0	21.8	1.8
55-59	2.9	1.1	95.8	97.1	1.3	1.8	3.2	0.8	71.8	67.2	25.0	1.8
60+	5.0	2.9	91.2	95.2	3.8	11.9	63	3.3	48.0	51.6	45.7	3.6

Source: Population and Housing Census, 2001 and 2011, BBS.

Table 14.3 Populations of 60 Years and Over by Region and Sex, 2001 and 2011

Sex	Age Group					
	60-64		65-69		70 and over	
	2001	2011	2001	2011	2001	2011
Total						
Both Sex	2849107	3934013	1461406	2113488	3418701	47421993
Male	1546041	2081306	817904	1149569	1903923	2494097
Female	1303066	1852707	643502	963919	1514778	2227896
Urban						
Both Sex	543767	759025	272516	386330	610007	780308
Male	310178	425996	156493	217634	337001	409905
Female	233589	333029	116025	168696	273006	370403
Rural						
Both Sex	2305340	3174988	1188890	1727158	2808694	3941685
Male	1235863	1655310	661413	931935	1566922	2084192
Female	1069477	1519678	527477	795223	1241772	1857493

Source: Population and Housing Census, 2001 and 2011, BBS.

Table 14.4 Statistical data of the inmates remanded and committed to the National Institute of Correctional Services, Tongi and Correctional Institute, Jessore

Year	No. of Children		No. of Children Committed to Training Institute/Placed		Total
	Remanded	Discharged	Remanded	Discharged	
1	2	3	4	5	6
1978	54	03	49	02	51
1979	52	08	39	05	44
1980	148	67	76	05	81
1981	223	76	142	05	147
1982	324	106	203	15	218
1983	409	112	289	08	297
1984	464	154	299	11	310
1985	573	212	356	05	361
1986	379	861	284	09	293
1987	417	115	297	05	302
1988	342	143	184	15	199
1989	317	85	232	00	232
1990	266	54	204	08	212
1991	307	73	221	13	234
1992	304	103	189	12	201
1993	385	161	212	12	224
1994	352	74	264	14	278
1995	355	70	277	08	285
1996	370	86	263	21	284
1997	301	122	159	20	179
1998	305	235	247	23	270
1999	392	191	182	19	201
2000	540	287	240	13	253
2001	566	292	266	08	274
June 2002	303	201	98	04	102
Total	8648	3116	5272	260	5532

Source: Juvenile Justice Administration and Correctional Services in Bangladesh, Department of Social Services, Ministry of Social Welfare, Government of the People's Republic of Bangladesh.

Table 14.5 Numbers of Street Children in Bangladesh in 2004 and Projected Figure for 2014 and 2024.

Number of Street Children in Bangladesh in 2004	6,79,728
Street Children in Six Division	3,89,892
Street Children in Dhaka	2,49,200
Street Children in Chittagong	55,856
Street Children in Rajshahi	20,426
Street Children in Khulna	41,474
Street Children in Barisal	9,771
Street Children in Sylhet	13,165
Projection of Street Children in 2004	1,144,754
Projection of Street Children in 2024	1,615,330

Source : Poverty Alleviation, Human Resource Development, Ministry of Social Welfare, Government of the People's Republic of Bangladesh

Table 14.6 Rehabilitation Centres for the Vagrants (Sarkari Ashroy Kendra) and their Capacity

No.	Name of the Centres	Capacity
1.	Sarkari Ashroy Kendra, Mirpur, Dhaka (Reception Centre)	200
2.	Sarkari Ashroy Kendra, Dhala, Mymensingh	300
3.	Sarkari Ashroy Kendra, Pubail, Gazipur	500
4.	Sarkari Ashroy Kendra, Kashimpur, Gazipur	300
5.	Sarkari Ashroy Kendra, Betila, Maniganj	200
6.	Sarkari Ashroy Kendra, Godnail, Narayanganj	400
	Total Capacity	1900

Table 14.7 Safe Custody Home for the Women and Adolescent Girls (Safe Home) and Their Capacity by Division

No.	Division	Location	Capacity
1.	Dhaka	Tepakhola, Faridpur	50
2.	Chittagong	Farhadabad, Chittagong	50
3.	Rajshahi	Baya, Rajshahi	50
4.	Khulna	Pachadighirpar, Bagerhat	50
5.	Barisal	Sagardi, Barisal	50
6.	Sylhet	Bagbari, Sylhet	50

Table 14.8 Number of Schools for the Visually Impaired and Their Capacity

No.	Name and Location	Capacity
01.	Government School for the Blind, Section-14, Mirpur, Dhaka	30
02.	Government School for the Blind, Goakhali, Khulna	50
03.	Government School for the Blind, Muradpur, Chittagong	50
04.	Government School for the Blind, Sagardi, Barisal	60
05.	Government School for the Blind, Shastitola, Rajshahi	50

Table 14.9 Number of Schools for the Hearing Impaired and Their Capacity

Sl. No.	Name and Location	Capacity
01.	Government School for the Deaf and Dump, Section-14, Mirpur, Dhaka	30
02.	Government School for the Deaf and Dump, Goakhali, Khulna	30
03.	Government School for the Deaf and Dump, Muradpur, Chittagong	30
04.	Government School for the Deaf and Dump, Faridpur	30
05.	Government School for the Deaf and Dump, Shastitola, Rajshahi	50
06.	Government School for the Deaf and Dump, Baburhat, Chandpur	50
07.	Government School for the Deaf and Dump, Sheikhghat, Sylhet	50

Chapter 15

Cultural Statistics

15.1 Introduction

Culture is an essential and integral part of the identity of a nation and its people. It is at the root of country's existence. Culture plays an important role in the social lives of different sections of people in the society. For instance, culture provides entertainment and rhythm to farmers, fishermen, boatmen, potters, peasants at their work. It relieves them from the mundane drudgery and uplifts their mental strength in times of hardship. Apart from entertainment the term 'culture' refers to the ways of life of the members of a society. People adapt to a particular environment utilizing culture. Thus culture plays a central role to their personal, professional and social lives. Culture is very much linked with both modern and indigenous religions, and many cultural elements are derived from the religious text such as the Holy Koran, the Ramayan, the Mahabharat, the Bible etc. Cultural elements such as prayer, fasting, marriage in Muslim community are guided by the Koran.

The term 'culture' has been explained and defined by different authors, researchers, sociologists, anthropologists differently. In the 1950s, two anthropologists, Alfred Kroeber and Clyde Kluckhohn (1952) gathered 164 definitions of culture that has appeared in the literature of anthropology. Since 1700s, there has been a series of definitions of culture. However, the first definition of culture was explained by British anthropologist Edward Tylor in 1871. His definition is quoted as "culture... is that complex whole which includes knowledge, belief, art, law, morals, custom, and any other capabilities and habits acquired by man as a member of society". Like Tylor's definition, Harris's definition pays attention to both behavior and ideas. Thus cultures are learned and shared behavior and ideas among human beings (Miller, D.B., 1999). Some researchers say that culture is a learning which depends on the curiosity and attention of each individual. It also refers to customary behavior and beliefs that are passed on through enculturation (Grasec and Hastings, 2007). There are cultural differences within the nations due to differences in ethnicity, region and social class. But they have unity within the nation with diversity of culture. For instance, although Muslim, Hindu,

Christian, Buddhist etc. live in Bangladesh with different cultures but they are united to protect national interests at the time of national crisis, Andre Matraux explained “culture as the sum of all forms of art of love and of thought, which in the course of centuries have enabled a man less enslaved”. Anthropologist Clifford Geertz defines culture as ideas based on cultural learning and symbols (Kottak, C.P., 1972). Cultural activity is a significant driver of economic growth and employment generation and it is a source of creativity and innovation. For instance, cultural institutions such as cinema halls, drama and other art institutes generate employment and contribute to GDP of the country. Cultural practices contribute to social cohesion and well-being of people and its activities are important sources of cultural jobs which positively contribute to the society through criticism, creativity and innovative approaches. More recently, Anthony Giddens (2001) defined culture as the “ways of life of members of a society, or of groups within the society”. It includes how the family members dress, their marriage customs, their eating habits, their patterns of life and work, their religious ceremonies and leisure pursuits. For instance, people of Bangladesh are comprised of Muslim, Hindu, Buddhist, Christian and other ethnic groups and live in the same land but their marriage customs, religious ceremonies, family dress, eating habits, language etc. are different. But the religious tolerance in our mixed communities is very good and the people live in Bangladesh harmoniously and celebrate one another’s religious festivals. Although culture can conceptually be distinguished from society, but there are close connections between them. No culture can exist without society and equally no society can exist without culture. And members of a society are united in structured social relationships according to a unique culture (Giddens, A., 2001). For example, there are many ethnic groups (minority in terms of population) in Chittagong Hill Tracts such as Bum, Chak, Chakma, Garo, Khyang, Khumi, Lushai, Marma, Murang, Mroo, Pungdhu, Rakhain and others but they are individually united in structured social relationships¹.

15.2 Classification of Culture

William F. Ogburn (1922), a Sociologist, classified culture into two distinct forms. One is material culture and another one is nonmaterial culture. Material culture refers to the physical or technological aspects

¹ That means each group has different ways of duties and respects towards elderly people and their Kith and Kins. Their customs, belief, ideas, values etc. are also different. But still they are united based on a common culture and national identity that results in structured relationship.

of our daily lives, such as food items, housing materials, factories, raw materials etc., while nonmaterial culture refers to customs, beliefs, philosophies, nature of communications of ideas, value etc. which form the content of culture. In other words, we can say that culture comprises of both tangible and non-tangible aspects of life.

15.3 Basic Elements of Culture

Each culture has several elements and these elements distinctively vary from one culture to another. Elements of culture in a society shape the way of life of its members. For instance, system of education, system of marriage, matrimonial ceremonies and religious doctrines are learned and transmitted through interactions of people within specific society. However, the following are the important elements of culture:

- (i) Language
- (ii) Norms
- (iii) Sanctions, and
- (iv) Values

A brief explanation of each element of culture is given below:

(a) Language

Language is the basic element of every culture. It refers to an abstract system of word meanings and symbols for all aspects of culture including speech, written characteristics, expression etc. It also includes gestures and other nonverbal communication, numerals, symbols etc. But the meaning of language and symbols (say nonverbal gestures) vary from one culture to another. For instance, Saontal community has its own language, numerals and symbols which is different from Bengali and English language.

(b) Norms

Norms are established standard behavior and they are set and maintained by the society. All societies have their own established norms. Thus norms vary from one society to another. For instance, the way of respecting elders vary from one society to another but younger respect elder in all societies. Washing your hands before taking meals is a norm in some of the societies. Norms are of two types – formal and informal. Formal norms are recorded and backed by the rules of law, while informal norms are not recorded or backed by the law. Anthony Giddens (2001) mentioned that norms are the rules of behavior which reflects cultural values. For instance, Bangladeshi cultural norm is to encourage arranged marriage of adult children by the parents, while in

western culture this norm is not strictly followed and adult boys and girls arranged marriage by themselves.

(c) Sanctions

Sanctions are generally referred to penalties and rewards for bad or good conduct concerning a social norm. Free mixing between male and female before marriage is strictly prohibited in middle-east countries particularly in Saudi Arab and if “illicit” connection is detected between male and female then sentence to death punishment is given to them. But this is not the case in other society rather living together without getting married is allowed in some societies of Scandinavian countries and USA (Finer, LB, 2007).

(d) Values

Cultural values are collective conceptions of what is good or bad, desirable or undesirable and what is proper or improper. Values indicate what people in a given culture prefer and what they find important, what is their attitude and what they serve as criteria for judging the actions of other. Sociologist Robin Williams (1970) prepared a list of values and his list includes certain important values such as achievement, efficiency, material comfort, nationalism, equality, supremacy of science and reasons over faith (Schaefer, R.T. 2003). These are abstract ideas or values of a particular culture. More specifically, monogamy is an example of a value that is prominent in Muslim and other most societies. Premarital sexual relations and unmarried couples living together are strictly prohibited in Muslim society, while these practices are not restricted in USA, Britain, Germany, France, Spain and many other societies (Bernharat, 2002). Thus cultural values vary from one culture to another and one society to another society.

15.4 Culture of Bangladesh: A brief review

Although Bangladeshi culture is influenced by diversified forms of Dravidian, Indo-Aryan, Mongolian, Mughal, Persian, Arab and West European cultures and sub-cultures², it has a rich cultural heritage and a long history. Bangladeshi people have their own language, literature, philosophy, religion, festivals and celebrations. In line with our cultural heritage we have many songs, music, dances, dramas, arts and crafts. As an integral part of our culture, people of Bangladesh observe

² In comparison to a dominant culture and larger society a subculture can be defined as a dominated culture. The cultures of gypsies or snake charmers may be called subculture,

Bengali New Year Day, Mother Language Day, Eid-ul-Fitre, Eid-ul-Azha, Muharram, pujas of Hindu community and festivals of Christian and Buddhist community. But no well-defined policy has so far been laid down for the cultural development of the country. There are some programs on cultural activities under general education and treated them as miscellaneous programs. As such there is no well coordinated effort for promotion of cultural activities. In the five year plans, culture as a national development was given inadequate importance.

15.5 Sources of Cultural Statistics

The main aim of collection of cultural statistics is to assess the level of cultural participation and cultural development of different regions and populations so that ways and means may be devised for larger participation and higher development. At present in Bangladesh, there is no separate organization which can provide statistics on cultural activities, cultural facilities, public financing and private expenditure on cultural activities on a regular, systematic and continuing basis. There is a great dearth of reliable and comparable cultural statistics. Very few cultural statistics can fully provide evidence of their actual contribution to economic and social development.

However, information on education, music, dancing, other arts, crafts and physical education should be available in the publication of Ministry of Education and culture and Ministry of Social Welfare. But their publications do not cover these information in a systematic way. The Ministry of Information and Broadcasting is the source of statistics on radio, television, cinema halls, licensed films etc. Statistics on book publication, number of public library, are compiled by National Public Library. It is mentioned that culture is learning and to measure the degree of culture of a society we can use indicators like the number of newspapers and periodicals which are available in the country. Likewise, the number of borrowings made in a Library is a way to see if a population cultivates its cultural interest. Furthermore, we cannot speak about culture without mentioning internet facilities, mobile phone, and Skype since they have become important media sources and also become essential part of modern life. Besides, there are other Ministries/Departments which are concerned with the administration of cultural activities such as Information and Broadcasting, Tourism, Community development, Housing, Museum etc. But there is no coordinated effort for collection of data on cultural activities from the administrative records maintained by the individual agencies.

15.6 Deficiencies of Cultural Statistics

There are no cultural statistics from primary sources based on surveys or enquiries. The main source of data in the cultural sector has until recently been the secondary sources. Moreover, lack of separate organization for proper coordination of development activities under culture has been responsible for the absence of collection of cultural statistics. Statistics on book publication and book trade are compiled by national library but these data are not complete and up-to-date. Some sketchy statistics on radio, television sets, cinema halls, licensed films etc. are available with the Ministry of Information and Broadcasting but there is no up-to-date and regular statistics on these aspects. At this moment there is no data on a regular basis regarding number of dancer, singer, drama and cinema artists, creative writers, readers, copies of books published and users of various libraries all over the country. Little attention has been paid on compilation and publication of library related statistics. Similar is the case of statistics on museums. There is no regular information on the number of museums, number of visitors, number of staff and recurring expenditure for the maintenance of the museums. At present in Bangladesh there is no regular, up-to-date and systematic collection of statistics on physical cultural activities and sports. We do not know the number of educational institutions that provide facilities for physical culture and sports, number of institutions that have playgrounds, swimming pools, gymnasium and number of students who take part in these activities. These activities are important for development of physical fitness and sportsmanship of the student. To sum up, whatever cultural statistics are available, they are quantitatively inadequate and qualitatively poor. And there is no way to measure reliability and comparability of the available statistics in the absence of alternative data from other sources. Very little systematic and up-to-date cultural statistics are known at present. But there is a need for bringing out up-to-date data for proper planning on cultural development of the country. Another related problem is that of incomplete coverage of items of cultural statistics.

15.7 Time – Lag in Publication

In addition to the deficiencies pointed out above, in statistical system of culture in our country, there are some other serious points which deserve immediate attention. One of such deficiencies is the time-lag that exists in collection of data, their publication and availability to the users. The time-lag in publication of cultural statistics is 4–5 years at present. If we could improve our cultural statistics, the economic and

social benefits, in GDP terms, would be much larger than the present situation.

15.8 Some Selected Statistics on Culture

Cultural activities are expressed through literature, publication of books, newspapers etc. Table 15.1 shows the trend in publication of newspaper of different types such as daily, bi-weekly, weekly, fortnightly, monthly and others. As revealed by Table 15.1 there has been a regular expansion of daily newspaper and in recent years' publication of daily newspapers have registered a clear increase. There were 172 newspapers in 1992 and 580 in 2012. On the other hand, number of bi-weekly, weekly, fortnightly, monthly and other type newspapers after showing upward spurt in the nineties and mid-twenties has registered a sharp decline in the last decades.

The number of books published in Bengali, English and other languages is shown in Table 15.2 which indicated a marked year to year variation in number of book publication. In fact, the number of books published was substantial between 1992 and 2001, except in 1999; since then it shows a marked decline in publication of books. The number of books published in Bengali language in 2011 was only 318 and in 2012 it decreased to 251, while in 1994 this number was 983. Similar trend is observed for publication of English and other language books.

As revealed by Table 15.3 there are a few number of cinema halls and significant number of halls are going to be closed. This is because, cinema halls failed to attract people due to bad quality of film but cinema is a good media to expose and express our cultural art, thought and ways of life.

Table 15.4 shows the number of analogue telephone (land phone) from 2003–2004 to 2009—2010 by division. After coming of mobile phone in the market, the demand of land phone has not been increased over the period. A significant finding which emerges from Table 15.5 is that the number of licenses for coloured and black and white television has registered a decline in the recent years.

Table 15.6 shows the number of tourist visited Bangladesh from 1999 to 2007 by nationality. The highest number of tourist came from India followed by U.K., U.S.A., Japan, Singapore, Thailand, while the lowest number of tourist came from Yugoslavia. As revealed from the same table there has been a substantial increase of foreign currency earning from the tourists and it increased from Tk.24519 lac in 1999 to Tk.52652 in 2007 indicating a two fold increase. Table 15.7 shows the

number of institution engaged in different cultural and recreational activities for 2009—2010. There are 542 institutions for music, 188 for dance, 429 for drama, 40 for opera (Jatra) and 140 for cinema. There are a total of 3327 institutions for different cultural activities. The number of artists by sex and nature of engagement is shows in Table 15.8. There are large number of male artists than the female in all types of cultural activities in 2009—2010.

Table 15.1 Number of Newspapers Published (General)

Year	Number of Newspaper and Periodicals				
	Daily	Bi-weekly, weekly & fortnightly	Monthly	Others	Total
1992	172	685	249	75	1181
1993	204	755	289	78	1326
1994	251	851	316	81	1499
1995	255	450	171	20	896
1996	296	903	338	83	1619
1997	297	913	343	83	1636
1998	281	891	292	97	1561
1999	217	349	127	87	780
2000	337	556	247	106	1246
2001	338	579	251	107	1305
2002	407	603	258	108	1376
2003	436	615	260	108	1419
2004	376	239	67	6	688
2005	407	286	64	7	764
2006	410	267	57	6	740
2008	424	214	69	6	712
2009	405	129	57	2	593
2010	294	126	30	20	470
2011	518	322	97	8	495
2012	580	376	376	11	1081

Source: Statistical Yearbook of Bangladesh-2012, Bangladesh Bureau of Statistics, Statistics Division, Ministry of Planning

Table 15.2 Number of Books Published (General)

Year	Number of Books Published			
	Bengali	English	Others	Total
1992	698	40	99	837
1993	896	92	54	1041
1994	983	122	153	1258
1995	649	34	56	738
1996	554	52	4	610
1997	459	29	5	484
1998	447	31	5	483
1999	88	23	--	111

Contd.

Year	Number of Books Published			
	Bengali	English	Others	Total
2000	530	87	29	646
2001	780	75	4	859
2002	439	27	--	466
2003	340	34	--	374
2004	339	38	1	368
2005	302	22	1	325
2006	269	30	--	299
2008	267	50	2	319
2009	301	31	--	332
2010	700	100	100	900
2011	318	100	90	508
2012	251	21	2	274

Source: Statistical Yearbook of Bangladesh-2012, Bangladesh Bureau of Statistics, Statistics Division, Ministry of Planning

Table 15.3 Number of Cinema Houses and Their Seating Capacity by Former Districts, 2010

Sl.No.	Former Districts	Total Cinema Houses	Running	Closed	Total Seat
01	Dhaka	56	36	20	32234
02	Narayanganj	274	18	09	13502
03	Nawabganj	17	09	08	5417
04	Pabna	30	10	20	4737
05	Khagrachhari	13	01	12	450
06	Rajshahi	21	08	13	9283
07	Noakhali	06	05	01	1200
08	Moulvibazar	07	06	02	1060
09	Khulna	15	12	03	7229
10	Sunamganj	06	03	02	1200
11	Bandarban	11	11	--	3100
12	Satkhira	13	7	6	6000
13	Panchagarh	11	10	01	3400
14	Tangail	37	33	04	15920
15	Naogaon	22	18	04	10970
16	Chandpur	06	06	--	2322
17	Magura	04	04	--	--
18	Sherpur	15	11	04	4775
19	Chittagong	08	07	01	--
20	Chuadanga	08	05	03	2790

Source: Department of Films and Publications.

Table 15.4 Region-Wise Number of Telephones

Regions	2003-04	2004-05	2005-06	2006-07	2007-08	2008-09	2009-10
Dhaka	491941	522420	542266	547999	528682	530832	544027
Chittagong	19140	133186	138145	139820	135080	143057	166299
Khulna	90522	91122	90266	801736	70886	78840	115065
Rajshahi	34582	35881	40849	32430	29788	33259	43521
Rangpur	39048	39325	38082	35551	33023	39598	55805
Sylhet	34965	36424	39567	39986	39816	41198	46929
Total	810198	857358	889174	877522	837275	866784	971746

Note: T & T board distributed Bangladesh into four former districts:

Chittagong former district contains Chittagong, Chittagong Hill Tract, Noakhali, Comilla and Sylhet

Dhaka former district contains Dhaka, Mymensingh, Jamalpur and Tangail

Khulna former district contains Khulna, Barisal, Patuakhali, Jessore, Faridpur and Kushtia

Rajshahi former district contains Rajshahi, Pabna, Bogra, Rangpur and Dinajpur

Source: *Statistical Year Book of Bangladesh-2010*. Bangladesh Bureau of Statistics, Statistics Division, Ministry of Planning

Table 15.5 Number of Television Licenses Issued in Bangladesh, 2005-06–2009-10

SL. No.	Name of Divisions	2005-06		2006-07		2007-08		2008-09		2009-10	
		Black & White	Coloured	Black & White	Coloured	Black & White	Coloured	Black & White	Coloured	Black & White	Coloured
1.	Chittagong Division	1054	6897	442	8639	398	11845	21	2793	-	3
2.	Sylhet Division	217	1689	153	2502	47	2060	14	210	-	42
3.	Dhaka Division	1130	17112	1153	40436	438	19920	16	3860	34	1418
4.	Barisal Division	158	625	144	2796	218	2743	14	922	1	18
5.	Khulna Division	345	2842	200	3724	105	1852	6	647	3	24
6.	Rajshahi Division	360	2402	763	12428	233	5244	15	1398	-	239
7.	Total Bangladesh	3264	31567	2855	70524	1436	43664	86	9830	-	432524

Note: (-) indicated data not available

Source: *Statistical Yearbook of Bangladesh-2010*, Bangladesh Bureau of Statistics, Statistics Division, Ministry of Planning.

Table 15.6 Arrival of Tourists in Bangladesh by Nationality

Item	1999	2000	2001	2002	2003	2004	2005	2006	2007
Australia	2091	2377	2722	3409	3787	6815	3686	4878	7902
Canada	2461	2723	5484	3603	5847	8964	4519	5086	10573
France	2457	2336	2289	2599	2924	3157	2736	2674	3102
Germany	2947	3080	2633	3297	4184	4812	3128	3190	4890
Greece	141	16	99	81	147	211	164	180	110
Italy	1789	2118	1780	2112	2420	2629	1800	1667	2218
Japan	7055	8006	7090	7325	6523	7857	6269	4370	5851
Netherlands	2767	2951	2508	2524	2735	2939	2431	1416	2287
New Zealand	664	666	440	773	1094	1606	1480	1384	1418
Norway	766	714	650	821	1002	1282	1025	725	956
Sweden	1075	1456	1350	1536	2062	2360	2364	1869	3363
Switzerland	694	573	685	664	873	957	1264	978	950
Singapore	2762	2271	2623	2920	2786	3073	1562	2321	3766
Thailand	2159	2492	2881	3997	4188	3376	2956	3469	3484
U.K.	22510	29106	34087	28905	42138	52410	24955	37136	51314
U.S.A.	9557	11924	13394	13622	24458	27896	13422	19604	34638
U.S.S.R.	574	24	26	64	59	118	263	1122	1216
Yugoslavia	38	14	--	5	1	12	4	3	15
India	62935	74268	78090	80415	84704	80469	86232	60516	7856
Others	47343	52007	48368	48584	52577	60328	47403	48024	152291
Total:	172781	199211	207199	207246	244509	271270	207662	200311	289110
Foreign exchange earned (Tk. in lakh)	24519	26270	26538	33126	33100	39676	44939	55307	52652

Note: 2008, 2009, 2010 Data not available

Source: *Statistical Yearbook of Bangladesh-2010, Bangladesh Bureau of Statistics, Statistics Division, Ministry of Planning*

Table 15.7 Number of Institution by Cultural Activities, 2009-2010

Institutions	Main Activity	
	No. of Institution	%
Music	542	16.3
Dance	188	5.7
Drama	429	12.9
Opera (Jatra)	40	1.2
Cinema	198	6.0
Band	116	3.5
Painting	185	5.6
Musician	33	1.0
Writer	27	0.8
Stage show	5	0.2
Photography	20	0.6

Contd.

Institutions	Main Activity	
	No. of Institution	%
Library	231	6.9
Sports	955	28.7
Garden/Park	39	1.2
Historical Places	54	1.6
Gymnasium	94	2.8
Others	171	5.1
Total	3327	100.0

Source: Report on Pilot Study on Cultural & Recreational Activities-2010, Bangladesh Bureau of Statistics.

Table 15.8 Numbers of Artists by Institution and Sex, 2009-2010

Type of Institutions	Number of Artists										Number of Artists		
	Full Time		Part Time		Irregular		Daily Basis		Unpaid		M	F	Both Sex
	M	F	M	F	M	F	M	F	M	F			
Music	1460	861	1165	673	223	114	--	--	422	297	3269	1945	5215
Dance	297	693	336	594	25	25	--	--	30	25	688	1336	2023
Drama	2317	758	2271	709	452	272	--	19	552	153	5592	1911	7504
Opera (Jatra)	273	207	36	22	--	--	--	--	29	36	338	265	604
Cinema	--	--	43	--	--	--	--	--	--	--	43	--	43
Band	251	9	195	19	148	23	--	--	79	--	673	51	724
Painting	351	70	102	26	45	6	--	--	6	--	504	102	606
Musician	--	--	41	--	231	25	--	--	--	--	272	25	297
Writer	92	16	5	--	--	--	--	--	5	11	103	27	130
Stage show	3	--	2	--	--	--	--	--	70	28	75	28	103
Library	35	6	133	35	--	--	--	--	--	--	167	40	208
Sports	3205	127	5008	539	187	4	--	--	1736	51	10136	722	10857
Historical Places	73	12	--	--	--	--	--	--	31	--	104	12	116
Gymnasium	403	74	20	--	--	--	--	--	37	17	460	91	551
Others	379	128	3858	160	48	21	--	--	43	16	855	326	1181
Total	9138	2962	9744	2776	1359	490	--	19	3039	634	23279	6881	30160
%	30.3	9.8	32.3	9.2	4.5	1.6	0.0	0.1	10.1	2.1	77.2	22.8	100.0

Source: Report on Pilot Study on Cultural & Recreational Activities-2010, Bangladesh Bureau of Statistics.

Chapter 16

Crime Statistics

16.1 Introduction

Crime is defined as any anti-social act done by an individual or a group of individuals that causes violation of social order or social norms. The act has harmful effect on the society and on individuals. The specified act that causes violation of social order or law of the country is also considered as crime (Giddens, 2006). There are several definitions of crime in the literature among which two broad definitions – Social definition and Legal definitions are important. The Panel codes defined thousands of crimes. All these crimes are human acts and they are acted against the state or person with a criminal intention to cause specific harms. For instance, mugging and murder, cheating with any person, illicit trading on drugs, offences against property, gang robbery, burglary, theft, smuggling of food, illicit traffic etc. are the most common major crimes. Apart from these, there are some other crimes which are termed as ‘white-collar crimes’, ‘corporate crime’, ‘organised crime’ and ‘cyber-crime’. The white-collar crimes are generally carried out by rich and affluent people of the society. This type of crime includes tax frauds, illegal sales practices, land frauds, sale of dangerous products, embezzlement, taking bribe for office and other works etc. Health risk in the work place, risks from health care products, production of low quality medicine, sale of out of date medicine and food etc. fall under corporate crime category. The organized crimes include smuggling, illegal gambling, illegal drug trading, prostitution, narcotics trade etc. Electronic money laundering internet-based fraud, telemarketing frauds, electric funds transfer crimes etc. are the main and important cyber crimes. The white-collar, corporate, organised and cyber crimes are less violent and less visible in nature but their consequences are more serious than those of robbery, prostitution, homicide and assault crimes (Giddens, A. 2002).

Crime is not an independent event. It is the result of interplay of a number of factors such as demographic, economic, cultural, social, political, geographic and religious. Among the demographic factors, age and gender are important for committing crimes. Young people are more involved in criminal activities than children and old people. Criminal statistics also show higher prevalence rate of crimes among

men than women (Faruk, O. and Khatun, N, 2008). Similar explanations can be made for other factors. There is no uniformity in crime in respect of its nature, seriousness, cause and impact. Thus, there are various kinds of crime and each of these crimes is dealt by different codes and acts. For instance, incidence of crimes is dealt by the Bangladesh Penal Code (BPC), the Criminal Procedure Code (CPC) and the local acts. Moreover, crimes are observed by different departments such as police, Prosecutors Criminal Court, Social Welfare Department and Education Departments etc. But each of the departments sees the crimes from their own angle and perspective. Sociologists have specific outlook about crimes and criminals, while psychologists see crime from different perspectives. Police department views the crime from its administrative and law point of view (Rao, S.V., 1978).

Crimes are carried out more by the young people and male persons. There are contrasts between the types of crimes committed by the young and children. There are also enormous contrasts in crime commitment by men and women. Petty thefts, shoplifting, pick pocketing; public order offences are typical crimes of children and women. Prostitution offences are, however, mainly committed by the young women (Flowers, 1987). Crimes committed by the children and women are less violent, while the crimes committed by young men are more violent and destructive. There are certain categories of offences where men become the main actors and women become the victims. For instance sexual harassment, rape, sexual assault, physical assault, domestic violence are crimes on which males use their physical power against females. Socio-economic and political power, dominance and superiority also provoke males to carry out crimes against females (Giddens, A. 2002). Crime situations particularly in Bangladesh have been growing out of the inter-mixture of political party politics and socio-economic issues such as labour agitation, industrial strike and other illicit traffic.

16.2 Sources of Crime Statistics

In order to measure the extent of crime and the common nature of criminal offence, we need the crime statistics. Crime statistics are compiled by different departments such as Police, Criminal Courts, Prisons, Probation Department and Social Welfare Department. Police being the biggest establishment dealing with crime, it is entrusted with responsibility for compilation of statistics on crime and criminals by government order. Crime statistics are mainly available in the Police Administration Reports, Ministry of Home Affairs. The initial

information is obtained from the record made in each police station for which suitable forms and registers are maintained. Thereafter, the reported information are consolidated for all the police stations directly at the district level or at the national level. These reports provide information relating to the incidence of crime under Penal Code, Criminal Procedure Code and the Local Acts. Court of Criminal Justice is another source of judicial statistics relating to the number of criminal cases received, number of persons tried, classification by nature of offence, length of sentence awarded etc. Judicial statistics are presented in the annual reports of administration of criminal justice of respective district. Statistics relating to the rehabilitation of criminals and relevant correctional aspects are collected and compiled by the jail authority of different districts. Office of the IG (Prisons) compiles statistics obtainable from concerned district authority relating to the prisoners of various categories, viz. convicts, un-trials, detention, civil prisoners, admissions and discharges of prisoners etc. to reach at national figure. In short, the Criminal Statistics may be gathered mainly from three sources such as police headquarters, administration of Criminal justice and Jail which is compiled by the IG prisons. But very difficult to get up-to-date reliable statistics in publication or bulletin form.

16.3 Deficiencies in Crime Statistics

The deficiencies in crime statistics and shortcomings in the system of collecting statistics are briefly discussed below. Statistics about crime are probably least reliable of all officially published data. The most basic weakness of the official crime statistics is that they only include crimes actually reported and recorded at the police stations. The main limitation of the official crime statistics is that the majority of crimes, especially petty thefts, delinquencies, sexual harassment, domestic violence, pick-pocketing, shop lifting, crimes committed by children are not actually reported to the police at all. Even in developed countries more than one third victims choose not to inform police for fear of harassment and they claim that it is a private affair and so no need to report to the police (HMSO, 1999). The main limitations of the available data are that they suffer from large scale under coverage and many of the crimes are not reported to the police. Very little information is available on white-collar crimes, corporate crimes, and organized crime and cyber-crimes. It is, therefore, very difficult to measure the incidence in the absence of compiled and published information. The available statistics on these crimes have, therefore, limited scope and restricted coverage. There are many other items on

which information are not supplied either due to non-availability of information or deliberate attempt is not taken to collect information. For instance, number of persons involved in crime by age, sex, residence and education is almost absent. The reliability of the data on crimes is very questionable. For instance, the reported crimes are often deflated. There are many unreported crimes which are not included in the published crime statistics. In the absence of alternative source or results based on sample surveys, it is difficult to compare data and measure reliability of data. Adequate arrangements for checking of data may improve the reliability considerably. The deficiencies which have been pointed out above happen to be the major handicap in the utilization of available crime statistics for planning administration and research purposes

Another important administrative feature is that statistical compilation at the police station, district and at even national levels are carried out by the police personnel as a part-time task without any support of statisticians or researchers in criminology. No attempt is made so far to mechanize or computerize the processing or to make network for compilation of crime statistics. Rather the process of compilation is made through the entire police hierarchical system and is dependent on the manual methods of data collection and compilation. The most remarkable feature is that very few crimes committed by political personnel in power, elite, police personnel, big government officials are recorded in the process of compilation of crime statistics.

16.4 Time-lag in Publication

There is considerable time-lag between collection of crime statistics and final publication or presentation in consolidated form. The time-lag in publication of crime statistics is about 2–3 years at present and it is mainly due to delays in receipt of primary information and its processing. The value of any statistics is lost if there are inordinate delays in availability or publication. The most gaps in crime statistics is the absence of statistics on offences by category; motives for murder, recidivism, age-groups of victims of rape, premises and localities in which rape is committed etc.

16.5 Some Selected Statistics on Crimes

The following tables provide available information on incidence of crime by type. As measured by statistics of crimes reported and recorded to the police stations, rates of different crimes in Bangladesh have been increasing more or less continuously for well over 2 to 3

decades. Table 16.1 sets out the trend in Social crimes of different types from 2001 to 2012. As revealed by Table 16.1 there has been a substantial increase in occurrence of total crimes between 2001 and 2012. During this period the total crimes increased by more than 1.61 times. In recent years sharp increase in use of narcotic medicine is observed and about 32000 persons in 2011 and 37000 persons in 2012 suffered from narcosis. The significant finding which emerges from Table 16.1 is that all types of crimes have registered clear increases over the period. Among the crimes, cruelty to women has the second highest incidence amounting to 19683 women in 2011 and 19298 women in 2012, followed by theft, robbery and burglary. Trend in occurrence of crime may be seen in Figure 16.1. Tables 16.2 sets out the number of crimes by type as registered with police for the year 2012. A significant finding which emerges from this table is that the all types of crimes such as dacoity, murder, rape, snatches etc. occurred most frequently in Dhaka range area and Dhaka Metropolitan area. Major dacoity occurred at home, while robbery occurred on the street and road. The non-political murder is prominent in all the areas. Higher number of rape cases is also reported in Dhaka and Chittagong range areas. Table 16.3 shows the incidence of accident, number of persons killed and injured in Dhaka, Chittagong, Khulna and Rajshahi Metropolitan areas. An important finding which emerges from table 16.3 is that the highest occurrence of accidents occurred in Dhaka metropolitan area followed by Chittagong, Rajshahi and Khulna metropolitan areas.

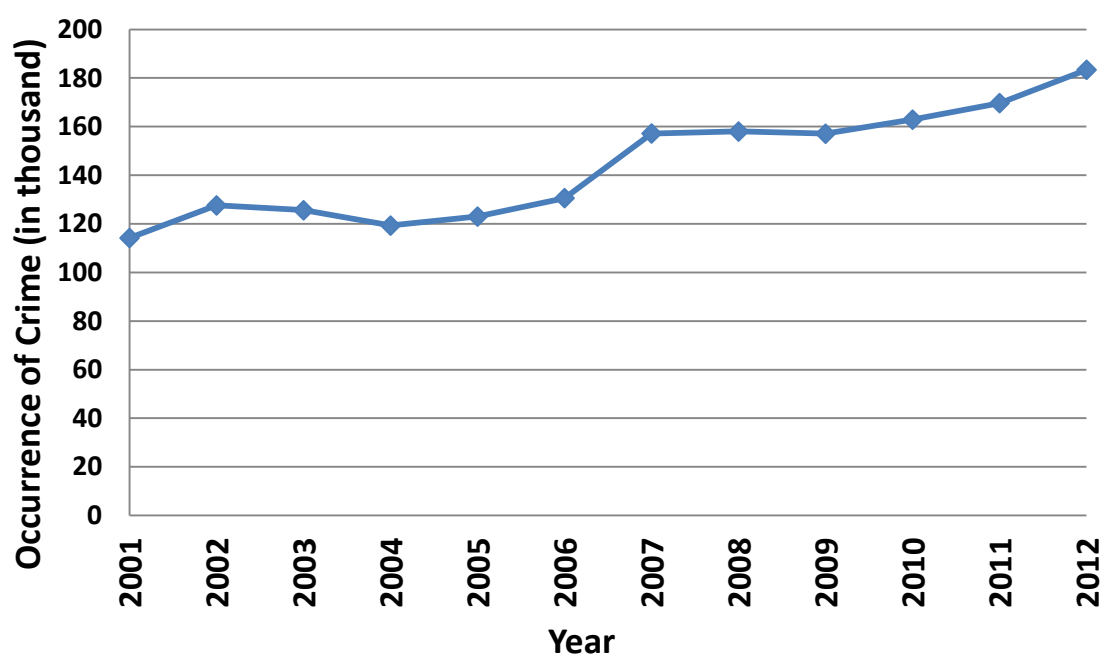


Figure 16.1 Trend in Occurrence of Crime

Table 16.1 Trend in Crime Statistics in Bangladesh, 2001—2012.

No.	Name of Offence	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
1.	Dacoit	758	963	949	885	796	795	10417	885	784	656	650	593
2.	Robbery	1265	1397	1170	1207	898	843	1298	1583	1298	1059	1069	964
3.	Murder	3678	3503	3471	3902	3592	4166	3863	4099	4219	3988	3966	4114
4.	Speedy Trial Act	2396	1693	2179	2053	1814	1638	1980	1700	1817	1666	1863	1907
5.	Rioting	2161	1278	890	754	570	570	263	203	112	130	108	--
6.	Cruelty to Women	12958	18455	20242	12815	11426	11068	14250	14284	12904	16210	19683	19298
7.	Child Abuse	3850	512	475	503	555	662	967	962	1093	1542	1706	1549
8.	Kidnapping	834	1040	896	898	765	722	774	817	858	870	792	850
9.	Police Assault	344	281	271	280	240	337	278	296	357	473	581	659
10.	Burglary	3854	3959	3883	3356	3270	2991	4439	4552	3456	3101	3139	2927
11.	Theft	7432	8245	8234	8605	8101	8332	12015	12188	9171	8529	8873	8598
12.	Ars Act	3151	30850	2293	2370	1836	1552	1748	1529	1721	1575	1269	1511
13.	Explosive Act	746	570	499	477	595	308	232	239	227	253	207	289
14.	Narcotics	5936	9018	9494	9505	14195	15479	15622	19263	24272	29344	31696	37254
15.	Smuggling	3076	4746	4499	4182	4334	4734	5202	7962	7817	6363	5714	6678
16.	Others	65422	68898	66194	67531	70046	76381	93224	87417	87022	87139	88355	96112
Total		114191	127616	125639	119323	123033	130578	157200	157979	157108	162898	169667	183407

Source: www.police.gov.bd

Table 16.2 Number of Crimes by Type as Registered with the police by nature and place, 2012

Name of Unit	dacoit								Robbery			Total No. of Murder
	Home	Bus & Trucks	Bank	Piracy	Mills & Industry	Dacoits with Murder	Other	Total dacoits	Home	At the Street & Road	Total No. of robbery	
1	2	3	4	5	6	7	8	9	10	11	12	13
DMP	39	13	0	0	0	2	12	66	40	182	222	264
CMP	10	0	0	0	0	0	0	10	4	62	66	88
KMP	0	1	0	0	0	0	0	1	5	13	18	23
BMP	1	0	0	0	0	0	1	2	2	22	24	37
RMP	8	0	0	0	0	0	0	8	2	7	9	20
SMP	7	0	0	0	0	1	0	8	3	12	15	37
Dhaka Range	108	11	0	3	8	5	19	154	41	109	150	1244
Chittagong Range	82	12	0	2	0	10	23	129	19	84	103	664
Sylhet Range	48	1	0	1	1	0	5	56	12	14	26	236
Khulna Range	49	5	0	1	0	3	6	64	32	119	151	482
Barisal Range	28	0	0	4	0	0	2	34	26	35	61	170
Rajshahi Range	19	8	0	1	0	3	7	38	7	48	56	464
Rangpur Range	4	1	2	1	1	1	10	20	10	43	53	354
Railway Range	0	2	0	0	0	0	1	3	1	10	11	31
Total	403	24	20	13	10	25	86	593	204	760	964	4114

contd.

Law & Order Breaking Crime (Rapid Action Trial Law-2002)									Registered cases to Law & Other
Extort-ionist	Make Hindrance to vehicle or to divert the route of the vehicle	Damages Caused to the Vehicle	Property Destroy	Snatching	Creation of Constellation	Obstruction to Submit Tender	Obstruction to Carryout Duty	Total	
14	15	16	17	18	19	20	21	22	23
54	10	25	10	258	27	0	4	388	951
7	9	5	4	46	3	0	0	74	256
6	0	0	0	8	0	0	0	14	56
1	0	0	0	5	3	0	0	9	78
0	1	0	2	1	3	0	0	7	44
1	0	4	0	38	7	1	1	52	115
49	17	25	32	203	99	0	1	426	1981
14	19	12	8	158	53	0	3	267	1180
2	6	0	10	24	24	0	0	66	401
16	2	7	17	67	43	0	1	153	862
108	3	5	3	10	102	0	1	232	498
20	7	15	4	47	34	0	5	132	689
0	3	7	7	43	21	0	8	85	514
0	0	0	0	2	0	0	0	2	47
278	77	105	97	910	1	20	1907	94	7672

Contd.

Name of Unit	Women Molestation					Child Persecution	Abduction				Police Assault	Burglary
	Rap	Throw Acid	Seriously Unit	Other ways	Total		Hostage	For rafficking	Other	Total		
1	2	3	4	5	6	7	8	9	10	11	12	13
DMP	273	5	34	1197	1491	146	30	2	117	149	136	592
CMP	61	1	0	171	233	48	4	0	23	27	26	112
KMP	16	0	2	178	196	3	0	0	16	16	9	44
BMP	13	1	8	53	75	47	3	0	8	11	15	52
RMP	33	0	0	100	133	2	0	0	5	5	11	40
SMP	18	0	0	82	100	40	0	0	6	6	28	42
Dhaka Range	1064	27	114	3674	4869	246	17	8	131	156	136	634
Chittagong Range	467	12	54	3478	4011	210	11	2	107	120	122	430
Sylhet Range	197	6	0	508	711	137	16	1	24	26	29	152
Khulna Range	344	17	6	2127	2494	70	6	36	125	167	46	359
Barisal Range	256	6	7	628	897	271	0	1	54	56	13	186
Rajshahi Range	373	4	134	1522	2033	248	4	0	50	54	47	156
Rangpur Range	515	6	126	1407	2054	181	3	4	46	53	41	129
Railway Range	0	0	0	1	1	0	0	2	3	5	1	0
Total	3520	85	15108	15108	19298	1649	79	56	715	850	659	2927

Contd.

Theft					Other Cases	Rapid Action Trial					Total Number of Cases (Registered)
Cattle Theft	Car Theft	Copper wire Theft	Other Theft	Total Theft		Arms Law	Explosive	Drugs	Smuggling	Total	
14	15	16	17	18	19	20	21	22	23	24	25
8	960	15	1267	2240	8296	284	94	8345	99	8822	22823
6	107	4	166	283	1492	121	5	1976	41	2143	4620
1	28	6	41	76	493	17	7	437	19	480	1373
1	60	6	69	136	723	5	3	229	130	367	1509
3	19	3	50	75	600	16	0	459	49	524	1434
11	34	3	68	116	784	11	1	186	4	202	1433
140	452	23	1127	1782	21957	315	28	10918	1039	12300	44020
83	309	35	627	1134	15873	232	13	814613	531	5389	28469
134	121	9	216	480	6018	38	3	1751	186	1978	9932
50	162	12	537	761	11275	260	110	3372	1207	4949	20983
38	30	3	206	277	6879	44	11	444	56	555	9631
37	160	16	311	554	11932	131	12	3120	2124	5387	21099
112	146	14	336	607	9586	32	2	1083	959	2076	15241
0	2	0	115	117	199	5	0	331	134	470	840
654	2660	149	5135	8598	96112	1511	299	37264	6578	45642	183407

Source : Statistical Yearbook of Bangladesh 2010, BBS, Statistics Division, Ministry of Planning.

Table 16.3 Number of Road Accident in Bangladesh by Zila

Zila	2006			2007			2008			2009			2010		
	Acci- dent	Persons		Acci- dent	Persons		Acci- dent	Persons		Acci- dent	Persons		Acci- dent	Persons	
		Killed	Injured		Killed	Injured		Killed	Injured		Killed	Injured		Killed	Injured
Bandarban	9	7	9	13	8	11	23	12	59	18	9	44	13	18	4
Chittagong	159	94	49	307	130	116	21	81	64	111	109	141	92	99	100
Cox's Bazar	28	21	16	41	37	9	31	50	16	38	27	81	33	38	3
Khagrachhari	30	19	38	21	10	56	37	35	77	31	20	27	16	6	23
Rangamati	13	12	1	15	6	8	23	17	113	12	6	33	14	16	48
Comilla	109	93	45	119	149	67	117	157	127	115	114	72	99	116	110
Chandpur	31	27	10	53	38	16	27	23	4	24	174	9	15	12	4
Brahmanbaria	29	36	5	106	101	33	107	102	67	86	80	44	62	59	53
Feni	76	56	29	58	42	16	46	46	4	33	36	63	32	28	13
Lakshmipur	38	31	19	39	34	2	27	18	40	24	19	11	19	22	16
Noakhali	30	29	8	78	54	36	41	40	7	27	31	14	24	22	9
Habiganj	62	62	16	78	70	11	87	75	38	39	39	27	45	38	37
Maulvibazar	46	39	8	56	41	20	59	45	17	54	54	12	28	30	7
Sunamganj	31	22	9	56	42	60	54	47	17	30	26	8	36	36	3
Sylhet	112	103	7	128	101	58	111	114	27	97	88	33	57	63	41
Dhaka	218	164	116	241	148	125	132	121	90	131	89	82	151	145	61
Gazipur	134	138	21	181	159	33	121	113	26	78	66	15	63	64	17
Manikganj	88	62	103	79	58	45	86	52	77	82	69	147	57	56	120
Munshiganj	87	69	23	77	49	56	86	107	91	54	63	14	21	26	5
Narayanganj	148	129	103	167	136	120	110	73	81	55	58	43	61	59	40
Narshingdi	130	63	24	79	62	53	98	81	21	91	93	32	39	66	28
Faridpur	70	61	11	107	83	37	95	81	21	85	87	36	46	30	22

Contd.

Zila	2006			2007			2008			2009			2010		
	Acci- dent	Persons		Acci- dent	Persons		Acci- dent	Persons		Acci- dent	Persons		Acci- dent	Persons	
		Killed	Injured		Killed	Injured		Killed	Injured		Killed	Injured		Killed	Injured
Rajbari	51	42	32	58	44	67	30	68	70	35	27	59	31	33	25
Gopalganj	17	18	8	36	31	7	31	33	9	17	18	4	18	19	3
Madaripur	36	36	27	48	40	10	31	41	13	27	25	2	13	19	2
Shariatpur	25	18	33	7	6	6	12	10	12	19	15	20	11	8	6
Jalalpur	14	11	3	43	32	11	36	26	19	12	11	6	21	18	3
Sherpur	30	18	36	29	23	8	24	23	15	25	24	7	274	25	19
Kishoreganj	64	50	86	77	61	43	75	56	29	40	40	38	32	27	23
Mymensingh	71	80	181	192	164	381	137	127	300	77	111	75	37	42	28
Netrokona	34	23	20	43	31	53	34	31	10	9	7	3	21	18	4
Tangail	93	133	326	182	188	366	153	204	345	100	95	281	10	75	155
Barisal	34	16	10	36	18	11	31	35	20	31	23	28	15	22	20
Bhola	19	16	2	17	14	1	20	17	3	21	18	3	10	8	2
Jhalokati	13	11	2	5	1	1	12	9	1	7	4	1	18	18	3
Pirojpur	3.	1	0	8	1	3	17	10	6	9	7	2	16	12	4
Jessore	36	31	20	46	32	6	11	31	0	18	8	9	34	26	12
Jhenaidah	574	57	7	58	52	6	29	21	8	12	16	6	18	14	4
Magura	19	12	7	23	20	2	20	15	9	12	11	14	16	17	3
Narail	13	21	1	8	6	0	19	13	9	12	10	2	5	4	0
Bagerhat	31	26	22	53	48	58	66	58	110	45	45	98	33	46	130
Khulna	24	28	16	30	26	12	46	32	26	31	23	45	33	29	46
Satkhira	9	10	0	26	23	12	24	17	15	34	27	25	57	55	15
Chuadanga	18	17	4	20	13	6	30	23	5	9	8	1	11	9	2
Kushtia	13	44	2	38	36	16	32	78	8	69	69	0	42	40	2

Contd.

Zila	2006			2007			2008			2009			2010		
	Acci- dent	Persons		Acci- dent	Persons		Acci- dent	Persons		Acci- dent	Persons		Acci- dent	Persons	
		Killed	Injured		Killed	Injured		Killed	Injured		Killed	Injured		Killed	Injured
Meherpur	38	10	3	7	74	0	7	5	2	4	5	1	6	5	1
Barguna	13	13	4	23	24	8	36	25	20	11	8	3	29	24	24
Patuakhali	17	21	12	21	16	2	19	11	0	14	9	3	0	2	0
Bogra	26	72	75	106	125	269	85	113	29	102	132	21	102	120	26
Joypurhat	48	16	3	23	17	12	23	18	68	10	12	1	429	8	6
Dinajpur	16	37	29	32	24	8	20	27	0	34	38	8	142	45	8
Panchagarh	54	20	20	20	16	14	12	14	9	12	8	5	211	1	0
Takurgaon	24	22	1	28	25	3	25	23	7	12	12	0	21	22	18
Pabna	30	27	18	41	41	23	45	52	18	49	48	42	23	46	31
Sirajganj	87	112	100	143	125	269	91	93	174	43	84	202	47	40	29
Naogaon	50	41	30	53	42	26	59	--	--	48	42	65	45	42	44
Natore	70	59	26	61	51	63	66	61	25	24	21	9	21	27	6
Nawabganj	20	28	2	24	21	19	45	52	67	31	33	11	33	33	21
Rajshahi	35	28	26	63	57	36	54	44	40	42	49	43	29	30	11
Gaibandha	36	40	25	51	41	73	57	49	40	38	35	106	14	26	1
Kurigram	28	18	27	19	11	9	14	9	5	8	9	0	12	12	1
Lalmonirhat	14	10	8	32	25	32	29	25	23	37	19	11	34	27	9
Nilphamari	19	15	5	27	24	5	16	11	12	7	7	1	15	14	33
Rngpur	110	99	171	67	54	98	62	56	71	69	64	33	28	25	7
Bangladesh	3099	2743	2139	4021	4014	3042	3349	3146	2736	2611	2498	2325	2827	2646	1803

Source: Statistical Yearbook of Bangladesh 2010, BBS, Statistics Division, Ministry of Planning.

Chapter 17

Plan Objectives for Poverty Alleviation

17.1 Introduction

Bangladesh has had a vast and long experience of planning at the national level since its inception in 1971. It experienced steady and strong economic development. Bangladesh has already implemented six Five Year Plans and a Two Year Plan with a plan holiday during fiscal year 1995-96 and 1996-97. Sixth Five-Year Plan is running at present. The period of First Five Year Plan was 1973 to 78, the period of Two Year Plan was 1978 to 80 and it was 1980 to 85 for second Five Year Plan, 1985 to 90 for third Five Year Plan and 1990 to 95 for fourth Five Year Plan and 1997-2002 for fifth Five Year Plan. It may be mentioned that there was no development plan during 1995-97 and it was called the plan holiday. Strategies for poverty alleviation were set in each Five Year Plan and the Central Strategy of almost all the plans was to raise the standard of living of the common people. As poverty is the most key problem, all the plan documents set “poverty alleviation measures” as one of the major development strategies. These measures have played a critical role in reduction of country’s poverty. Over the course of the four decades, since independence in 1971 significant changes had occurred for poverty reduction and level of living. Although poverty rates demonstrated an impressive and steady improvement in the last two decades, about 31.5 percent people were living in poverty at the national level in 2010. This figure was 35.2 percent for rural area and 21.3 for urban area. The extreme poverty continued to be significant and about 21 percent of the rural population was extremely poor in 2010. The development strategies of different Five Year Plans for poverty alleviation have been illustrated in the following sections:

17.2 Development Strategies of Different Five Year Plan

17.2.1 First Five Year Plan

Bangladesh started its journey as an independent nation in 1971 with destruction and displacement occurred due to the war of liberation. As a result, during the first two years since independence the growth rate of GDP was negative, --6.83 percent in 1971 and –14.74 percent in

1972 (World Bank 2013). Under the negative GDP growth rates and war-ravaged situation, the First Five Year Plan (1973—78) was prepared to give a new sense of direction in promoting economic growth, reducing poverty and inequality and ensuring social justice. However, the following more specific development strategies were set in the First Five Year Plan (FFYP) for poverty alleviation:

- (i) to increase output of major sectors like agriculture, industry etc. and complete reconstruction work;
- (ii) to raise per capita income at a modest rate of 2.5 percent per annum and adopt policies to ensure equitable distribution of income;
- (iii) to increase output of essential commodities to meet the basic needs of the masses and to make them available to common people at reasonable prices;
- (iv) to alleviate poverty through expansion of employment opportunities, increase in the rate of growth of GDP to the extent of 5.5 percent and equitable distribution of income;
- (v) to mobilize labour in the informal and non-monetised sectors in order to increase output, income and employment opportunities;
- (vi) to accelerate development expenditure, particularly in social sector such as education, health, housing, sanitation and safe drinking water;
- (vii) to transform institutional and technological base of agriculture in order to attain self-sufficiency in food grains;
- (viii) to reduce dependency on food aid and;
- (ix) to reconstruct the shattered infrastructure.

It appears that the FFYP was more concerned with the increase in GDP growth through increase in output of the most labour-intensive sectors of the economy particularly agriculture and industry than with poverty reduction. Moreover, the plan's targets for GDP growth, output, employment, income etc. remained largely unrealized as the necessary action programs could not be undertaken due to shortage of adequate domestic and external resources. Besides a dearth of resources, there was lack of adequate institutional support, skilled manpower, favorable weather condition etc. As a result, a great majority of the development objectives could not be fulfilled.

17.2.2 Two Year Plan

The Two Year Plan was initiated and formulated in 1978 after the FFYP to complete as many on-going projects as possible with the available resources before embarking upon a new Five Year Plan. The main objectives of the TYP were to attain an annual GDP growth rate of 5.6 percent and per capita income of 2.8 percent. However, the other central development objectives of the TYP were

- (i) to increase rate of growth of GDP;
- (ii) to accelerate employment opportunities and increase rural productivity;
- (iii) to reduce poverty by expanding employment generation for the poor, improving income distribution and promoting social justice;
- (iv) to achieve self-sufficiency in food grains;
- (v) to reduce population growth rate;
- (vi) to improve provision for basic needs, and;
- (vii) to reduce dependency on foreign assistance for development.

If we compare the plan objective of FFYP with those of TYP, it will be observed that none of the objectives was new except that in the name of poverty alleviation, expansion of employment and improvement of distribution had been substituted by the idea of social welfare. Moreover, none of the poverty-focused objectives such as equitable distribution of income, employment generation etc. were achieved during the FFYP and TYP periods. The annual growth rate of GDP during the TYP was estimated to be 5.0 percent as against 5.6 percent envisaged.

17.2.3 Second Five Year Plan

The Second Five Year Plan (SFYP) continued more or less in the same pattern and the objectives of the plan were formulated in the context of acute problems of poverty, unemployment, illiteracy and malnutrition of the rural people. The main poverty-focused development objectives of this plan included large expansion of employment opportunities, reduction of inequalities, adequate supply of basic needs, reduction of illiteracy etc. However, the listed objectives of the SFYP were

- (i) to bring about equitable growth for ensuring improvement in the standard of living through adequate supply of basic needs such as foods, safe drinking water, clothes, primary healthcare, education, housing etc.;

- (ii) to achieve self-sufficiency in food grains;
- (iii) to expand gainful employment opportunities in order to increase income, to fulfill basic needs at an affordable price and to share the benefits of economic growth;
- (iv) to reduce poverty by a significant level through growth of income, employment and efficient utilization of land, water and human resource;
- (v) to reduce population growth rate;
- (vi) to achieve self-reliance through mobilization of domestic resources;
- (vii) to eliminate illiteracy and achieve universal primary education;
- (viii) to promote participation of people in the development processes, and;
- (ix) to accelerate the pace of economic development.

The objectives of expansion of employment opportunities, economic growth, reduction of population growth, utilization of resources, such as, land, water, and human resources and achievement of self-reliance continued to have important positions in SFYP. Elimination of illiteracy and participation of people in the development processes were recognized for the first time in the SFYP.

17.2.4 Third Five Year Plan

Like the earlier development plans, the Third Five Year Plan (TFYP) too visualized the need for reducing poverty by ensuring better access of the rural poor to the means of production through provision of facilities in such areas as development of agriculture, basic physical infrastructure and social services. Poverty alleviation and improvement of income and employment opportunities in rural areas were the major thrust of the TFYP. Decentralization of the public administration to Upazila and strengthening of local administration structure by a larger allocation of funds were also given greater emphasis in this plan. The plan target of growth of GDP was 5.4 percent per annum. However, the important objectives of the TFYP were defined as follows:

- (i) to reduce population growth;
- (ii) to expand productive and gainful employment;
- (iii) to improve technological base for structural change in production of rural industries and especially of small and cottage industries;
- (iv) to raise economic growth;

- (v) to ensure provisions of basic needs and services;
- (vi) to promote self-reliance through mobilization of domestic resources;
- (vii) to achieve self-sufficiency in food grain, and;
- (viii) to increase the human resource development and universal primary education.

It is interesting to note that the objectives stated in the TFYP do not differ much from the earlier plans; but rather there were many common objectives, such as poverty alleviation, reduction of population growth, increase in economic growth, achievement of self-sufficiency in food, employment generation, promotion of self-reliance etc. which were also stated in the earlier plans. But the Third Five Year Plan put particular emphasis on the development of rural industries and specially small and cottage industry. The purpose was to create rural employment, generate higher labour incomes and poverty alleviation.

17.2.5 Fourth Five Year Plan

Considering poverty alleviation in rural areas as the key problem, the Fourth Five Year Plan laid greater emphasis on three broad objectives, namely, acceleration of economic growth, rural development and promotion of self-reliance. In order to achieve these broad objectives, the plan enunciated other specific development objectives. These were

- (i) to promote human resource, remove illiteracy, provide basic health care facilities and to take population control measures;
- (ii) to promote and expand employment opportunity for the poor through appropriate rural institutional development;
- (iii) to strengthen rural economy through development of agriculture sector;
- (iv) to improve employment opportunities in agriculture and rural industry by adopting appropriate technology in these sectors;
- (v) to generate interactive dynamic of growth through inter-sectorial linkage;
- (vi) to decentralize macro-level planning and to ensure their integration with built-in accountability;
- (vii) to strengthen national conservation policy and programs, and;
- (viii) to promote private sectors for making them efficient in an open competitive environment and to create export initiative.

It can be seen from the stated objectives that social sectors' development which are essential for poverty alleviation received

greater emphasis in the fourth FYP compared to the earlier plans. Like other plans, the objectives of higher economic growth, employment generation and human resource development including universal primary education were also given importance in this plan.

17.2.6 Fifth Five Year Plan

After completion of fourth FYP, there was no development plan during 1995-97. But the development activities were continued on the basis of the annual Development programs during those periods after which the Fifth Five Year Plan (1997-2002) was formulated and started since 1 July 1997. Poverty alleviation and promotion of employment opportunities in rural areas was given greater importance in the list of the stated objectives of the Fifth Five Year Plan accompanied by larger allocation of funds for poverty alleviation. However, the operational terms of objectives for poverty alleviation along with others were

- (i) to reduce poverty through accelerated economic growth of 7 percent per annum during the plan period and through ensuring the increased access of the poor to resources;
- (ii) to generate substantial employment opportunities and to increase productivity through labour intensive technologies.
- (iii) to attain food production beyond the self-sufficiency level in the shortest possible time;
- (iv) to develop human resources with emphasis on compulsory primary education, vocational training etc.;
- (v) to promote diversified high valued export goods;
- (vi) to develop infrastructure and other services needed to promote growth particularly in private sector;
- (vii) to reduce population growth rate to the tune of 1.32 percent by the terminal year of the plan;
- (viii) to develop of hitherto neglected and poverty stricken areas such as the north-west region, Chittagong Hill Tracts and coastal areas;
- (ix) to reduce the gender gap through different women's development program, particularly on education, training, income generating employment etc., and;
- (x) to establish better social justice through an even distribution of income, resources and opportunities and creation of effective safety nets for the poor.

17.2.7 Sixth Five Year Plan

After completion of Fifth Five Plan, there was no development plans during 2002-2011. However, the development activities were continued through annual development plans and the Sixth Five Year Plan (2011-2015) was formulated and started from 1 July 2011. It continued up to 30 June 2015. Like other Five Year Plans, Sixth Five Year Plan also emphasised on high economic growth, employment generation and thereby poverty alleviation. The more specific objectives formulated for the Sixth Five Year Plan (BES, 2014) are given below:

- (i) to generate employment opportunity in the poverty stricken area for the earning of capable people,
- (ii) to increase agricultural production and increase employment in non-agricultural fields,
- (iii) to give more importance on the matter of regional disparity in allocation in the field of education, health, family planning, water supply and nutrition,
- (iv) to give priority for the poor on the matter of the distribution of Khas land (Government Land), fertilizer, seed, irrigation, electricity and rural roads,
- (v) to arrange institutional finance for the poor, and
- (vi) to provide urbanised benefit for the urban poor

It is thus observed that the inter-related objectives of employment opportunities, equitable distribution of income and alleviation of poverty have always been included in all the plans along with other objectives. However, rehabilitation of war ravaged infrastructure was the major concern of the First Five Year Plan and the Two Year Plan. As a result, alleviation of poverty could not be taken as a primary objective of the First Five Year and Two Year Plan since the implementation of these plans was seriously hampered by the scarcity of domestic resources and unfavorable conditions of developments at home and abroad. The second and third plan also could not attach high priority to poverty alleviation because of a dilemma that arose out of the conflict between growth and distribution. Moreover, the shortfall in the performance in the SFYP and TFYP periods may be attributed to a number of economic and non-economic factors such as resource shortfall, natural calamities, weak institutional framework, lack of skilled manpower and management problems. But the fourth and fifth plans asserted ideas of poverty alleviation in different sections of plan

documents, but in the absence of priority rating of objectives, it is very difficult to judge intense priority of those objectives related to poverty alleviation. The list of stated objectives in all plans referred to poverty alleviation within the framework of a trickle down theory which means that economic growth alone in the long run may benefit the relatively less privileged classes of the society and also improves the lot of the poorer group. But it is important to recognize that growth alone may not be sufficient to ensure reduction of poverty, provision of basic needs and overall socio-economic development. To sum up, the focus of the First Five Year Plan for poverty alleviation was on economic growth and distribution through public sector interventions. The second Five Year Plan was concerned for poverty alleviation through participation of the rural poor within an expanded program with adequate supply of basic needs, and sharing benefits of development. Poverty alleviation through employment and income generations were the major theme of the Third Five Year Plan. The Fourth Five Year Plan stressed on poverty alleviation through linking of growth with employment and income generations, human resources development and greater participation of women in the development processes [GOB, 1995]¹. A significant change in framing objectives was made with the advent of the Fifth Five Year Plan. The emphasis on poverty alleviation is continued even in the present plan. The fifth Five Year Plan was concerned more with poverty alleviation through accelerated economic growth, importance were given to employment opportunities, increased production, equitable distribution of income and ensuring access of the poor to resources. A significant priority was given in the Sixth Five Year Plan on employment generation for the poor, increase of agricultural production, provision of institutional financial help for the poor, reduction of regional disparities etc.

17.2.8 The Plan Outlay for Poverty Alleviation

The planning and budgetary system in Bangladesh are highly centralised and their processes are very complex and difficult to understand by the common people. The financial allocation for different sectors and sub-sectors of the economy are made on the basis of proposals from the Planning Commission both in plans and in the Annual Development Programs (ADP). The ADP is the key to the implementations of plans, as it contains the budgetary allocation for projects and other development activities. The total cost of a particular

¹ GOB (1995). Country Paper Bangladesh. World Summit for Development, Copenhagen, Denmark.

project includes cost for different components such as physical infrastructure etc. As a result, it is difficult to find out the share of actually allocated or spent money for the main component for the project, such as employment generation, poverty alleviation, skill formation etc.

As most of the policies for poverty alleviation are parts of several macro-economic policies, the budgetary allocation made exclusively for poverty alleviation is, therefore, hard to differentiate, and remains obscure. However, the plan outlay is largely dependent upon the objectives, strategies and availability of resources. The national desire to achieve sustainable growth is dependent upon the total outlay of the plan. But the plan outlay is crucially dependent on both domestic and external resources and ability of management. The plan outlay, by its size by public and private sectors, GDP growth rate (targeted and actual) are shown in Table 17.1.

Table 17.1 Size of Different Five Year Plans by Sectors and GDP Growth Rate

Plans	At respective base year price			Economic Growth	
	Plan size	Public sector	Private sector	Targeted	Actual
First Five Year Plan (1973-78)	44,550 (100.00)	39,320 (88.71)	6,030 (31.29)	5.50	4.00
Two Year Plan (1978-80)	38,610 (100.00)	32,610 (84.46)	6,000 (15.54)	5.50	3.50
Second Five Year Plan (1980-85)	172,000 (100.00)	111,000 (64.53)	61,000 (35.47)	5.40	3.80
Third Five Year Plan (1985-90)	386,000 (100.00)	250,000 (64.77)	136,000 (35.23)	5.40	3.80
Fourth Five Year Plan (1990-95)	620,000 (100.00)	347,000 (55.97)	273,000 (44.03)	5.00	4.15
Two Year Plan Holiday (1995-97)	508,760 (100.00)	217,160 (42.68)	291,600 (57.32)	7.00	5.21
Fifth Five Year Plan (1997-2002) Proposed	508,760 (100.00)	858,939 (43.88)	100,582 (58.17)	7.00	5.21
Sixth Five Year Plan (2011-2015)	(100.00)	(22.29)	(77.71)	8.00	6.25

It is observed from plan size by sector that since independence, the public sector had dominating role in the economy of Bangladesh, while the private sector had smaller role and in the First Five Year Plan, only 11 percent of the total financial allocation came from the private sector. But there has been substantial change in the policy and the private sector has come forward with investment in the development processes. The share of private sector in different Five Year Plans increased from 11 percent in first Five Year Plan to 56 percent in fifth Five Year Plan and in the proposed Sixth Five Year Plan it raised to about 78 percent. It is also observed from the same table that there was a wide gap between targeted economic growth and achieved growth in each five years plan. For instance, in fifth Five Year Plan the targeted growth was 7.0 percent, while the achieved growth was only 5.21 percent. The slow economic growth hampers pace of poverty reduction. If economy of Bangladesh could achieve the targeted growth then the pace of poverty reduction would have been much higher than the present rate (an average poverty decline rate of 1.74 percent points per year between 2000 and 2005 and 1.78 percent points per year between 2005 and 2010 (WB, June 2013).

It is clear from the discussions of plan objectives that planners had always been concerned with the trade-off between economic growth and poverty alleviation. Between these two, greater emphasis had been given on economic growth in almost all the plans. Furthermore, the inter-related objectives of employment generation, even distribution of income, reduction of gender disparities in primary and secondary education, reduction of infant, child and maternal mortality rates, increase in literacy rate, poverty alleviation etc. had always been talked for some limited success in economic growth, redistribution of assets, employment generation and poverty alleviation; the poor, by and large remained untouched by many development processes. As a result, nearly one-third of the total population are still living in poverty.

17.2.9 Pace of Poverty Reduction

Government planning for poverty alleviation through different activities such as employment generations, infrastructure development, economic growth, equitable distribution of income and wealth was prescribed in all Five Year Plans. The poverty alleviation programs have been gradually receiving greater importance in budgetary allocations. Table 17.2 sets out the trend in proportion of population below 'absolute' and 'hardcore' Poverty lines between 1973-74 and 1988-89 by urban and rural residence.

Table 17.2 Incidence of Poverty (Head count rates), 1973-74 to 1988-89.

Year	Absolute Poverty line (2122 kcal/day/person) (% of population)		Hardcore Poverty line (18058 kcal/day/person) (% of population)	
	Rural	Urban	Rural	Urban
1973---74	82.9	41.4	48.3	28.6
1981---82	73.8	66.0	52.2	30.7
1983---84	57.0	66.0	38.0	35.30
1985---86	51.0	56.0	22.0	19.0
1988---89	48.0	44.0	29.5	20.5

Note : The estimates are based on fitting a calorie-expenditure.

Source : HES 1988—89, Bangladesh Bureau of Statistics.

The Cost of Basic Need (CBN) method¹ was started since 1991-92 to estimate incidence of poverty. In CBN method, the poor is counted on the basis of consumption expenditure threshold and which is expressed in percentage term. Table 17.3 shows the trend in incidence of Poverty from 1991—92 to 2010 estimated by using CBN method and based on upper and lower poverty lines.

Table 17.3 Incidence of Poverty (Head count rates) by Urban and Rural residence.

Year of HIES	% of Population					
	Upper Poverty line			Lower Poverty line		
	National	Rural	Urban	National	Rural	Urban
1991-92	56.7	58.8	42.8	41.1	43.8	24.0
1995--96	50.1	54.5	27.8	35.2	39.5	13.7
2000	48.9	52.3	35.2	34.3	37.9	20.0
2005	40.0	43.8	28.4	25.1	28.6	14.6
2010	31.5	35.2	21.3	17.6	21.1	7.7

Source : HIES 2010, Bangladesh Bureau of Statistics (BBS).

Whatever method is used to estimate the head count rate (HCR), the HCR recorded a reduction of poverty. In about twenty years (1991—92 to 2010), it is recorded about 25 percent point reduction (HIES 2010). This indicates that the development plans taken during different plan periods have had the positive impact on poverty reduction.

¹ See Appendix-C of HIES 2010 for further explanation

Chapter 18

Social Development Plans for Poverty Alleviation

18.1 Introduction

The Government of Bangladesh is committed to reducing poverty, improving standard of living through social development and social protection. The Government seeks in different Five Year Plans to reduce poverty by addressing the main causes of poverty as well as lowering the impact of risks and shocks faced by the poor and vulnerable people. Although there has been a substantial progress in living conditions of the poor, between 2000 and 2010, more than 31 percent of the total population are still living in poverty. There is also a substantial number of people that are just-above the poverty line and are termed as non-poor, but they can easily fall below the poverty line due to various vulnerabilities resulting from exogenous shock (natural disasters). So, various development policies have been taken in Bangladesh to help the poor, near-poor and vulnerable households. A general agreement among the policy makers that (i) a market oriented and growth-inducing development, (ii) social sector development, (iii) targeted financial services and (iv) social safety nets are the main policies for poverty alleviation particularly in rural Bangladesh. The development of agriculture, industry and service sectors are also important for higher economic growth and expansion of employment opportunities among the poor labourers.

The social sector development policies which include policies for improvement of education, health, family planning, women development, youth development etc. affect the human resources development and socio-economic conditions of the poor and have positive bearing on poverty alleviation. Policies for easy access to financial services in the form of microcredit particularly in rural areas are also important for access to resources, self-employment opportunities and for increasing employment of the poor and their level of living [WB (1990)]. The policies for safety net reflect the Government's concern to support the poor and vulnerable people. They include food stamp, subsidised food distribution, nutrition programs etc. Currently there are 95 Safety net programs in Bangladesh among which the following are the most important programs:

Sl. No.	Programs
1.	Vulnerable Group Feeding
2.	Open Market Sale
3.	100 Days Employment Guarantee for the Poor
4.	Food for Work
5.	Test Relief
6.	Old Age Allowance
7.	Stipend for Primary Students
8.	Stipend for Secondary Students
9.	Vulnerable Group Development
10.	Honorarium for Freedom Fighters

Alleviation of Poverty and Vulnerability is the main objectives of each program. However, policies for poverty alleviation can broadly be classified into two main categories, viz. (i) Indirect policies and (ii) Direct policies. The macroeconomic policies are indirect policies which are designed for achieving objectives for general economic growth, employment generations etc. rather than exclusively for poverty alleviation; nevertheless they may come to the benefits of the poor indirectly. These policies include long-term as well as short-term development policies. The long-term policies include agriculture, industry, service sector, infrastructure, education, health etc. The short-term policies include fiscal, monetary, price, wage, exchange rate etc. The long-term macroeconomic policies provide benefits to all groups of population including poorer groups through trickle-down process. For instance, high economic growth derived from agricultural, industrial and infrastructural development benefit the poor through increasing employment opportunities. Increased demand for labour, the only income earning source of the poor, will enhance the wage rates and thereby increase the standard of living. Microeconomic policies such as credit to crop, fishery and livestock sub-sectors have indirect impacts on macroeconomic issues such as food security, employment generation, sustainability Development in education sector increases human capital, awareness, social mobility, income and employment opportunities for educated people. Health and nutrition are important basic elements for good health and increasing life expectancy, working capabilities and income of the poor. Good health helps in reducing income erosion, wastage of human resources, productivity losses and improving the quality of life of the poor. The development policies both for general and targeted streams are schematically shown in Figure 18.1.

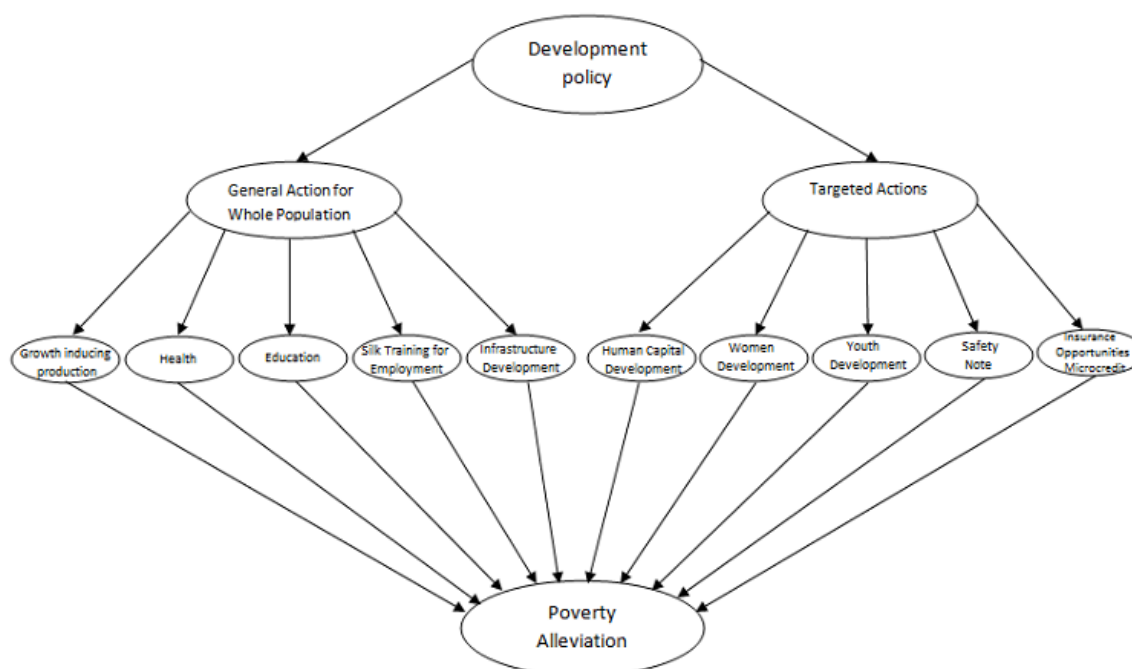


Figure 18.1: Development Policy Stream for Poverty Alleviation

In the absence of policies for social justices, high economic growth alone may not benefit the poor to alleviate poverty completely. This is because the growth process without social justice sometimes bypasses some groups of population. It is, therefore, important to frame policies for equitable distribution of income and to make provision for social services to poorer groups along with high economic growth.

The direct microeconomic policies are specifically designed for the poor as well as vulnerable people for alleviating their poverty. Some of these policies are not targeted while some others are target group oriented. The target-group oriented policies are designed to benefit the poor and vulnerable people directly. Policies for social services, women's development and youth development fall under the preview of target-group oriented policies and there are several programs and projects for their development. Apart from the target-group oriented policies, there are several direct interventions under social safety-net programs in Bangladesh. The aim of these programs is to direct income transfer to the poor and vulnerable people. Apart from the targeted programs mentioned above there are many other safety-net programs in Bangladesh.

18.2 Public Expenditure for Poverty Alleviation

Policies for poverty alleviation are parts of several macro-economic policies. Therefore, budget allocations exclusively for poverty alleviation are not well documented and transparent. The complicated budgetary system makes it difficult to calculate the volume of public resources allocated for poverty alleviation through different ministries

and departments. Another important thing to be noted is that there are components in development expenditure which are essentially revenue expenditures and are not related with poverty alleviation. Thus, segregation of public expenditure into revenue and development is difficult. As a result, it is also difficult to find out the actual budget allocation for poverty alleviation. However, ADP allocation (revised) for sectors which are directly and indirectly related to poverty alleviation is presented in Table 18.1.

It reveals from Table 18.1 that ADP allocation for poverty alleviation related sectors showed an increase in nominal terms between 2004-05 and 2013-14. The allocation as percentage of total ADP also increased from 43.09 percent in 2004-05 to 61.32 percent in 2008-09 and then registered a decline between 2009-10 and 2013-14. It decreased from 59 percent in 2009-10 to 50 percent in 2012-2013. This figure as percentage of GDP is very small and it is around 2 percent over the period.

Table 18.1 Revised ADP Allocation to Poverty Related Sectors^a

Year	Taka in million	% of ADP	% of GDP ^b
2004-2005	88337.4	43.09	2.38
2005-2006	115164.5	53.56	2.38
2006-2007	119459.2	55.31	2.17
2007-2008	120423.7	53.52	1.92
2008-2009	141040.9	61.32	2.00
2009-2010	167427.5	58.75	2.10
2010-2011	189990.9	52.95	2.10
2011-2012	206302.3	50.22	2.00
2012-2013	262101.5	50.05	2.18
2013-2014	291584.2	48.60	2.16

Notes: (a) Agriculture, Rural development institutions, Education and religion, Health, Nutrition, Population and Family Planning, Social Welfare, Women Affair and Youth Development, Infrastructures, Water Supply and Housing and Labour and Employment.

(b) GDP at current price.

Source: Estimated from *Bangladesh Economic Review, 2014, MoF*.

It is worth mentioning that some portion of the allocated budget is spent on wages and salaries and other components of revenue expenditure. The position in respect of resource allocation is unsatisfactory and the allocated resources are meager by any standard to make a significant dent in the great problem of poverty.

18.3 Targeted Public Policies for Poverty Alleviation

Apart from the general approaches to poverty alleviation, the government of Bangladesh has sought to alleviate poverty through

target-group oriented programs such as social welfare services, women development, youth development, rural development etc. These programs are undertaken by the Ministry of Women and Children Affairs, Ministry of Youth and Sports, Ministry of Labour and Manpower, Bangladesh Rural Development Board, Local government Engineering Department (LGED). The main objective of these programs is to reduce poverty through increased income opportunities of the poor by:

- (i) Skill development through training;
- (ii) Socio-economic development of the rural poor
- (iii) Providing resources and services
- (iv) Infrastructure development

Among the Cash Transfer programs, Old-age Allowance, Fund for Rehabilitation of the Acid-Burnt Women and the Physically Handicapped, Allowance for Physically Challenged Insolvent Citizens, Allowance Program for Widowed, Deserted and Destitute Women, Allowance for Poor Women, Honorarium for Insolvent Freedom Fighters etc. are important.

The budget allocation for targeted programs shown in Table 18.2

Tale 18.2 Revised ADP Allocation Target-Group Oriented Sectors^a for Poverty Alleviation

Year	Revised ADP Allocation (in million Taka)	% of Total ADP	% of GDP ^b
2004-2005	40951.7	20.0	1.1
2005-2006	52409.8	24.4	1.1
2006-2007	52172.0	23.2	0.9
2007-2008	50422.6	21.9	0.8
2008-2009	64078.0	22.5	1.0
2009-2010	73005.8	20.3	1.0
2010-2011	82156.0	22.9	0.8
2011-2012	94450.9	23.7	0.9
2012-2013	125521.8	24.0	1.0
2013-2014	131662.1	21.9	1.0

Notes: (a) Rural Development and Institution, Social Welfare, Women Affair and Youth Development, Infrastructure, Water Supply and Housing and Labour and Employment.

(b) GDP at Current Price

Source: Estimated from Bangladesh Economic Review, 2011, 2013 and 2014, MoF.

As revealed in Table 18.2, there has been a substantial increase in absolute term in the allocation exclusively for poverty alleviation and it increased from Tk.40951.7 million in 2004-2005 and Tk.131662.1 million in 2013-2014 indicating about 3 fold increase. But the percentage share of ADP allocation for target-group oriented sectors to total ADP and GDP is very small and about 20 percent of the total ADP and one percent of GDP is spent for these sectors. Although the Government has laid greater emphasis on poverty alleviation, it failed to provide a substantially higher share in ADP allocation in these sectors.

18.4 Certain Programs Specifically for Poverty Alleviation

Besides the general and targeted programs, the Government has undertaken different immediate actions to strengthen the efforts to poverty alleviation and to boost up the economy of the country. The immediate actions are taken under the umbrella of safety-net programs and implemented under an incentive package. The safety-net programs produce main gains to the poor within the society and work as a social protection activity. The government of Bangladesh implemented several safety-net programs and has been spending for these programs over the past few decades. The list of safety-net programs is shown in Appendix 18.1. The coverage of these programs in terms of beneficiaries and budget has significant impacts on socio-economic development and poverty reduction. Some of the programs have been implemented by the government and non-government organisations and some are run by a joint initiative between the Government and U.N. organisations. Although a complete list of social safety-net programs is provided in Appendix 18.1, the following cash transfer and food assistance programs under social safety-net are important and sufficient allocation have been made. Under cash transfer program, Old-Age Allowance, Rehabilitation of the Acid-Burnt Women, Physically Handicapped and Insolvent Citizens, Programs for Widowed, Deserted and Destitute Women, program of Poor Working Lactating Mothers, Allowance for Children living in Government Shishu Paribar and residence for poor Children, Maternity Allowance for poor women, and Honorarium for Insolvent Freedom Fighters and cash payments are made as allowance to the beneficiaries of these programs. Besides cash transfer programs, there are some Food Assistance Programs among which Food for Works (FFW), Vulnerable Group Feeding (VGF), Vulnerable Group Development (VGD), Employment Generation for the Ultra poor, Ashrayan, Ekti Bari Ekti Khamar, Gharey Fera Programs are important. The budget allocation

for different safety-net programs from 2009-10 to 2013-14 is set out in Table 18.3. Budget allocation on account of cash transfer for various allowances is the highest and it is almost Tk.91,000.0 million in 2013-14 which is followed by food security for social protection and microcredit for social empowerment. The revised budget for social protection was Tk.70,000.0 million and for social empowerment it was about Tk.35,000.0 million in 2013-14. In the absence of any idea about the rate of return of these programs, it is difficult to examine the effectiveness of these programs for poverty alleviation.

Table 18.3 Budget Allocation for Different Safety-Net Programs

Programs	Budget (in million taka)				
	2009-10 (revised)	2010-11 (revised)	2011-12 (revised)	2012-13 (revised)	2013-14 (revised)
Cash transfer (various allowances)	55392.8	63593	71485.4	77051.4	90806.8
Cash transfer (special)	1610.0	555.2	581.7	591.2	761.5
Food Security:Social Protection	49324.8	72321.2	64570.9	70725.5	69980.8
Micro-Credit: (Social Empowerment)	3950.0	3400.2	34357	3427.0	34965.0
Miscellaneous fund	29841.5	33003.8	31845.8	31929.6	43263.5

Source: Bangladesh Economic Review, 2011, 2012 and 2014, MoF.

18.5 Micro-Credit Program for Poverty Alleviation

In a bid to poverty alleviation micro-credit program has been undertaken by the Palli Daridra Bimochan Foundation (PDBF), Palli Karma Shahayok (PKSH), Social Development Foundation (SDF), Bangladesh Academy for Rural Development (BARD), Comilla, Bangladesh Rural Development Board (BRDB), Rural Development Academy (RDA), Bogra, Karmasangsthan Bank, Grameen Bank (GB) and other government and Semi-government organisations. In order to uplift socio-economic condition of the poor the role of micro-credit along with Comprehensive Village Development, training, Self-employment generation is important. The main objective of PDBF is to organise the distressed rural poor, disburse loan among the poor and to provide training for skill development, leadership and social development with a view to improving socio-economic condition of the poor. The BARD, Comilla provides micro-credit and training on different aspects and women's vocational training to uplift their socio-economic condition and to eradicate their poverty. Poverty alleviation through rural development is one of the prime objectives of the BARD.

The PKSF has been set up by the Government as a non-profit organisation. It works as an apex financial organisation. The main objective of this organisation is to undertake nationwide programmes for providing microcredit to the potential institutions to undertake poverty alleviation programmes for the poor, vulnerable, landless and asset less people. The PKSF channels its fund for the poverty alleviation programs through Non-Government Organisations (NGOs) which are termed as Partner Organisations (POs).

The BRDB is a statutory body under the Ministry of Local Government and Rural Development (LGRD) and Co-operatives. This organisation is directly involved in rural development activities and Poverty alleviation by organising the poor into cooperative institution. The BRDB aims at organising small farmers, asset less men and women into an institution for increased production as well as income and thereby alleviating poverty. The BRDB is also concerned with women's socio-economic development for their poverty alleviation. The main strategy adopted through woman's development program is to organise women into a cooperative and to provide training for their skill development, family welfare services such as health, education, family planning, sanitation etc. and thereby increasing their income generation opportunities.

The Grameen Bank (GB), a target group oriented program has initiated intervention programs in various areas having certain interface with poverty alleviation. The clients of the GB are generally poor women who are unable to provide any collateral and this is the significant feature that distinguishes GB from traditional banking practice. The GB works on the principle that of some capital money is made available to the poor without collateral, they can create self-employment opportunities for themselves, earn income and thereby alleviate poverty. Apart from the credit operation for income generating activities, the GB has also gradually introduced social development activities which include improvement of personal health care, literacy and children's education, skill development etc. The GB has made great achievement in poverty alleviation through creating income-generating opportunities for the rural poor with special focus on women. Amount of microcredit disbursed, number of beneficiaries and number of villages covered is shown in Table 18.4.

Table 18.4 Microcredit Disbursed on Different Programs of Grameen Bank

Year	Disbursement in million Tk.	No. of Beneficiaries		No. of village covered
		Male	Female	
Cumulative upto 2005	243176.7	682351	14003513	47570
2006-2007	50194.4	236104	6972351	9519
2007-2008	55618.5	237096	7290604	3653
2008-2009	71845.9	245058	7659739	2175
2009-2010	85544.1	295913	7980581	29
2010-2011	102959.8	317871	8057039	17
2011-2012	115771.6	325203	8054249	3
2012-2013	120816.3	321194	8103952	5
2013-2014	73257.7	327716	8246564	3
Cumulative upto January	958963.0	327716	8246564	81387

Source: Bangladesh Economic Review, 2014, MoF

Besides those organisations the state-owned commercial banks, public specialised banks and private commercial and specialised banks are also implementing micro-credit program for poverty alleviation and to create self-employment opportunities for the poor.

18.6 Microcredit Disbursement by the Administrative Division of the Government

Besides the GB, PKSF and other organisations like public and private scheduled Banks, different Ministries and Administrative Divisions of the government have also been providing microcredit to the poor. Table 18.5 sets out the amount of microcredit disbursed by them up to June 2013.

As revealed in Table 18.5, the Rural Development and Cooperative Division had the highest amount in respect of volume of microcredit disbursed followed by Ministry of Youth and Sports and Ministry of Women and Children Affairs. As of June 2005-06, the cumulative amount of microcredit disbursed was Tk.10,33,410.2 million, while this figure rose to Tk.9,80,914.0 million in December 2013 indicating about 9 times increase over the period. This increased trend in amount of microcredit provided by the government is accompanied by favourable shifts of public spending towards poverty alleviation. As we have no idea about the rate of return of microcredit, it is difficult for us to assess how much effective role the microcredit plays for poverty alleviation. Moreover, the poverty particularly in rural area has persisted despite much poverty alleviation programs undertaken by the government of Bangladesh.

18.7 Social Development Programs Under Ministry of Social Welfare for Poverty Alleviation

Rehabilitations of the disadvantaged people of the society such as orphan, destitute, poor and helpless are the main activities of the Ministry of Social Welfare. Poverty alleviation through social development is one of the most important among the social integration programs undertaken by the Ministry. Four main programs undertaken by the Social Welfare Department are considered as poverty reduction interventions. These programs are (i) Rural Social Service (RSS), (ii) Urban Community Development (UCD), (iii) Poverty Alleviation through Rural Maternal Centre (RMC), and (iv) Rehabilitation Programs for Acid-burnt, Disabled, Beggar, Hijra, Charmer, Dolit, Horizon etc. Apart from these programs, there are other programs for the poor and destitute which include: 'Programs on Welfare and Service Delivery', 'Programs on Addressing Social Disintegration', 'Community Empowerment (CE)', and 'Environment and Afforestation Programs'. Loan revolving funds (LRF) are invested as micro-credit among the target groups to create opportunities for them to improve their socio-economic conditions and consequently reduce their poverty (BER, 2014).

Appendix 18.1 List of Social Safety Net Program

Sl. No.	Programs	Budget (Taka in crore)		
		Budget (2013-14)	Revised (2013-14)	Budget (2014-15)
(A.1.1) Social Protection				
1.	Old Age Allowances	980.10	980.10	1306.80
2.	Allowances for the Women, Deserted and Destitute Women	364.32	364.32	485.76
3.	Allowances for the Financially Insolvent Disabled	132.13	132.13	240.00
4.	Maternity Allowance Programme for the Poor Lactating Mothers	48.88	48.88	132.00
5.	Allowances for Urban Low-income Lactating Mothers	41.19	41.19	60.00
6.	Honorarium for Freedom Fighters	360.00	720.00	1200.00
7.	Honorarium & Medical Allowances for Injured Freedom Fighters	75.64	121.40	144.97
8.	Assistance for Cancer, Kidney and Liver Cirrhosis Patients	--	2.00	10.00
9.	Grants for Residents in Government Orphanages and Other Institutions	30.88	30.88	46.50

Contd.

Sl. No.	Programs	Budget (Taka in crore)		
		Budget (2013-14)	Revised (2013-14)	Budget (2014-15)
10.	Capitation Grants for Orphan Students in Non-Government Orphanages	71.40	71.40	74.40
11.	General Relief Activities	89.36	89.36	100.41
12.	Block Allocation for Disaster Management	100.00	100.00	100.00
13.	Non-Bengali Rehabilitation	19.80	19.80	20.00
14.	Allowances for Distressed Cultural Personalities/Activists	2.50	2.50	3.10
15.	Pension for Retired Government Employees and their Families	6691.51	68.16.05	8482.03
16.	Ration for Shaheed Family and Injured Freedom Fighters	22.50	26.00	26.90
17.	Program for Livelihood Improvement of Tea-Garden labourers	--	1.00	5.00
(A.1.2) Social Employment				
18.	Stipend for Disabled Students	9.70	9.70	25.56
19.	Grants for the Schools for the Disabled	5.81	8.50	9.00
(A.2.1) Social Employment				
20.	Housing Support	14.00	14.00	16.00
21.	National Legal Aid	--	4.89	6.00
22.	Agriculture Rehabilitation	62.15	62.15	67.15
(B) Food Security Programs: Social Protection				
23.	Open Market Development (OMS)	1565.00	1565.00	1687.50
		(7.50)	(7.50)	(7.50)
24.	Vulnerable Group Development (VGD)	851.06	836.77	886.92
		(2.75)	(2.75)	(2.75)
25.	Vulnerable Group Feeding (VGF)	1326.91	1362.77	1419.22
		(4.00)	(4.00)	(4.00)
26.	Test Relief (TR) Food	1291.94	1282.35	1292.37
		(4.00)	(4.00)	(4.00)
27.	Gratuitous Relief (GR) Food	265.38	272.55	283.84
		(0.80)	(0.80)	(0.850)
28.	Food Assistance in CTG-Hill Tracts Area	240.81	266.70	250.88
		(0.75)	(0.75)	(0.75)
29.	Food For Works (FFW)	1456.98	615.19	1317.74
		(4.00)	(2.15)	(4.00)
30.	Work For Money (WFM)	--	428.63	--
			(1.85)	

Contd.

Sl. No.	Programs	Budget (Taka in crore)		
		Budget (2013-14)	Revised (2013-14)	Budget (2014-15)
31.	Employment Generation Program for the Poor	1400.00	1400.00	1500.00
		(0.00)	(0.00)	(0.00)
(C.1) Micro-Credit Programs: Social Empowerment				
32.	Micro-credit for Women Self-employment	1.00	1.00	2.00
33.	Fund for Micro-Credit through PKSF	50.00	45.00	80.00
34.	Social Development Foundation	298.50	300.00	160.00
(C.2) Miscellaneous Funds: Social Empowerment				
35.	Fund for the Welfare of Acid Burnt Women and Disabled	1.00	1.00	1.00
36.	Trust for the protection of the persons with neuodevelop-mental disabilities	--	--	20.00
37.	Welfare Trust for Physical disabilities	--	--	5.00
38.	Oppressed destitute women and children welfare und	--	--	5.00
39.	Fund for Assistance to the Small Farmer and Poultry Farms	100.0	100.0	100.0
40.	Swanirvar Training Program	1.50	1.50	1.70
41.	Joyeeta Foundation	--	--	10.00
42.	Shamaj Kallyan Parishad	23.99	23.99	28.40
(C.3) Miscellaneous Funds: Social Protection				
43.	Women's Skill Based Training For Livelihood	--	--	2.50
44.	Child Development Center	3.20	3.20	4.00
45.	Service and Assistance Center for Disabled	12.50	13.50	13.00
46.	Rehabilitation and Creation of Alternative Employment for Beggars Profession	1.00	1.00	1.00
47.	Program for Improving the Livelihood of Harijan Dalit , Bade common unity	8.00	8.00	9.23
48.	Program for Improving the Livelihood of Trans Gender (Hijra)	4.26	4.26	4.59
(D) Development Sector Programs: Social Empowerment				
49.	Promotion of Services & Opportunity to the Disabled Person in Bangladesh	--	16.40	27.20
50.	Child Sensitive Social Protection in Bangladesh	25.98	16.08	23.97

Contd.

Sl. No.	Programs	Budget (Taka in crore)		
		Budget (2013-14)	Revised (2013-14)	Budget (2014-15)
51.	Establishment of Multipurpose Rehabilitation Centre for Destitute Aged Pupil and Socially Disabled Adolescent Girls	--	4.24	0.86
52.	Services for Children at Risk	--	10.70	29.01
53.	Establishment of Hostel for the Visually Impaired Children (37 Unit)	--	15.00	18.54
54.	Basic Education for Urban Working Children	33.00	--	--
55.	Enabling Environment for Child Rights	--	60.55	68.49
56.	Early Learning for Child Development (2 nd phase)	28.98	25.72	--
57.	Urban Based Marginal Women Development	--	4.13	4.66
58.	Food and Livelihood Security	81.44	76.00	3.76
59.	Eradication of Hazardous Child Labour in Bangladesh (3 rd Phase)	--	42.00	--
60.	Northern Areas Reduction of Poverty Initiatives	--	89.45	32.00
61.	Pro Poor Slum Integration	--	6.73	4.19
62.	Employment Opportunities for Unemployed Youth in 7 Northern District	5.44	5.44	49.20
63.	Establishment Vocational Training and Health Care Center for the Vulnerable Youth	--	4.67	4.24
64.	Establishment of Training and Employment generation Center for the Vulnerable Youth and Adolescents	--	6.68	5.95
65.	Rehabilitation of Aila Affected Rural Infrastructure	35.00	35.00	55.00
66.	Haor Infrastructure and Livelihood Improvement	--	90.00	161.28
67.	Rural Employment and Road maintenance Programme-2	--	94.21	235.00
68.	Poverty Reduction through Urban Partnership	--	134.40	104.58
69.	Poverty Eradication through Social A forestation	33.40	6.12	--

Contd.

Sl. No.	Programs	Budget (Taka in crore)		
		Budget (2013-14)	Revised (2013-14)	Budget (2014-15)
70.	Employment Creation through Sugarcane Cultivation in Char Areas of Greater Rangpur	1.66	1.64	2.78
71.	Participatory Small Scale Water Resources Development	--	75.00	150.00
72.	Emergency 2007 Cyclone Recovery and Restoration	--	300.00	123.98
73.	Expansion of Polli Daridro Bimochon Foundation for Poverty Alleviation and self Employment	30.00	--	--
74.	Char Livelihood Program – 2 nd phase	--	164.91	130.37
75.	One House One Farm	260.00	562.19	585.00
76.	Economic Empowerment of Poorest in Bangladesh	131.23	131.23	151.94
77.	Integrated Rural Employment Support Project for the Poor Women	24.00	20.00	32.00
78.	Comprehensive Village Development Program	18.54	21.54	24.87
79.	Rural Livelihood (2 nd phase)	--	27.36	32.00
80.	Participatory Rural Development	19.73	13.00	6.73
81.	Pulse and Oil Seed Project	29.74	29.74	--
82.	Initiative for Development, Empowerment, Awareness & Livelihood, Kurigram	--	3.43	4.80
83.	Integrated Support to Poverty and Inequality Reduction through Enterprise Development	150.00	150.00	--
84.	Rural Development of Greater Comilla	45.00	55.00	70.00
85.	Emergency 2007 Cyclone Recovery and Restoration	--	89.19	125.83
86.	Poverty Reduction & Livelihood Security for the People of Economically Backward Area	10.00	10.00	30.00
87.	Small Scale Dairy & Poultry Farmers' Support Project in 22 Selected Districts	-	2.08	3.65
88.	Char Development and Settlement	191.97	86.34	124.40
89.	“Gucchagram” (Climate Victims Rehabilitation)	59.63	35.86	9.80

Contd.

Sl. No.	Programs	Budget (Taka in crore)		
		Budget (2013-14)	Revised (2013-14)	Budget (2014-15)
90.	Operations Support to the Employment Generation Program for the Poorest	--	19.59	--
91.	Second Chittagong Hill Tracts Rural Development Project (LGED part)	--	5.10	25.00
92.	Construction of Residence for Landless & Poor Freedom Fighters	227.97	33.75	75.00
N.2 New Development Projects				
93.	Establishment of Autistic Academy in Bangladesh	--	--	10.00
94.	Reconstruction on Rehabilitation Centre for the Destitute Children, Konabari	--	--	0.50
95.	Establishment of Sheikh Rasel Training and Rehabilitation Centre for the Destitute Children	--	--	1.00
96.	Construction of Probin Nibas in Five Divisional Head Quarter & One Zila	--	--	0.25
97.	Empowerment of communities, group and individuals	--	--	0.50

Table 18.5 Trend in Micro-Credit Disbursement by Different Ministries/Divisions/Departments

(Figure in million Tk)

Ministry/Division/ Department	Department/ Division	Disbursement									Cumula- tive Upto June 2013
		2004-05	2005-06	2006—07	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13	
Ministry of Finance	Banking Division (RAKUB)	307.3	292.3	149.9	177.1	180.3	186.1	276.8	292.2	390.4	4118.6
RDA Rural Deve- lopment & Co- operative Division	BRDB	6548.6	6837.7	8627.3	7960.6	6911.9	6744.4	7377.7	8719.1	8150.3	106183.8
	BARD	31.1	14.5	1.5	2.3	6.6	66.5	99.5	67.7	148.6	1893.0
	RDA	--	19.9	22.6	35.7	61.9	56.0	67.2	61.9	95.4	616.8
Ministry of Women and Children Affairs	Department of Women Affairs	239.9	276.5	173.8	468.1	469.2	576.6	627.6	--	--	3430.7
	Jatiyo Mohila Sangsrha	52.6	35.8	29.5	19.9	--	--	0.3	25.6	20.0	400.2
Ministry of Social Welfare	Dept. of Social Welfare	445.9	618.6	410.2	675.4	731.5	690.9	418.6	238.6	548.7	7842.5
Ministry of Fisheries and Livestock	Department of Fisheries	25.0	20.0	--	46.4	46.5	46.0	48.3	300.9	312.3	312.3
	Department of Livestock	188.1	54.9	--	--	666.8	--	--	--	--	666.8
Ministry of Industries	BSCIC	259.4	220.7	137.7	43.2	43.2	57.8	49.9	58.4	63.1	2842.0
	SERWTCI	97.5	94.1	92.6	81.2	73.3	78.5	104.6	110.7	119.4	1029.9
Ministry of Agriculture	Agricultural Credit	49567.8	54942.0	52925.0	85807.0	92845.0	11117.0	12184.0	13132.0	146674.9	939201.6
	Cotton Develop-ment Board	2.6	2.1	2.9	3.3	3.4	4.3	6.4	7.7	11.7	92.6
	Dept. of Agr.Ex (Upto Sept.08)	697.7	278.2	353.8	311.5	184.3	11.3	--	--	--	4902.1

Contd.

Ministry/Division/ Department	Department/ Division	Disbursement									Cumulative Upto June 2013
		2004-05	2005-06	2006—07	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13	
Ministry of Land	Local Govt.	72.2	63.7	55.0	87.6	43.3	47.2	52.5	73.2	8.3	1256.0
Ministry of Land Local Govt. Divn.	Local Government	87.0	60.0	163.2	319.5	931.3	570.4	586.1	459.8	728.6	4414.4
Ministry of Youth and Sports	Department of Youth	628.7	777.7	600.2	617.5	515.2	610.7	700.3	842.6	899.8	11221.7
Ministry of Textile and Jute	BHB	91.6	46.8	33.1	6.0	6.9	15.9	--	--	18.4	563.4
Ministry of libera- tion War Affairs		101.6	328.6	86.0	20.8	15.8	73.0	39.4	102.3	34.0	5088
Total		59425.5	64751.9	638763.8	96682.8	103736.0	121004.4	132312.1	142693.6	158223.9	1091497.2

Source: Bangladesh Economic Review, 2011 and 201

Chapter 19

Role of Non-Government Organisations (Ngos) in Poverty Alleviation

19.1 Introduction

Despite having budgetary provision for poverty alleviation programs in successive Five Year Plans, the poor, vulnerable, disintegrated and disadvantaged people do not have easy access to public finance and services. The positive impacts of public services sometimes bypass those disadvantaged groups. This deprivation mainly arises due to complexities of the government budgetary systems as well as complicated bureaucratic systems. These situations are found to be insensitive to the demands of the poor. Inefficient management, weak program design, inappropriate strategy and weak institutional framework are also identified as other reasons for deprivation of the poor. Keeping view of this problem many non-government organisations (NGOs) are working side by side with the government to help mitigate the sufferings of the poor and poverty alleviation. Many NGOs in the world are engaged and working for poverty alleviation. In Bangladesh also a large number NGOs are engaged in poverty alleviation activities. There are more than 1000 NGOs in Bangladesh and they are receiving foreign aid from international and bilateral agencies for poverty alleviation programs. The NGOs put particular emphasis on social mobilisation of the target group (poor) in small informal groups.

Under the target group approach, these small informal groups are supposed to have the ability to organise themselves, identify their own problems and make their own decisions specially in areas relating to their income generating activities. This approach is claimed to be successful under the NGOs' pro-poor program for poverty alleviation. These programs may be classified into two broad categories, namely (i) direct poverty alleviation programs, and (ii) indirect poverty alleviation programs. Among the direct poverty alleviation programs, micro-credit for self-employment, income generating activities like handicrafts, poultry, cow and goat rearing, fish culture etc. are important. On the other hand, the indirect poverty alleviation programs include, among others, skill development, health and family planning, education, nutrition, sanitation, plantation, infrastructure development, awareness development, women employment creation, rising of consciousness etc. But the main problem of NGOs activities is that the revolving loan

fund (RLF) mainly depends upon the government, schedule banks, foreign aid and donor's commitment. Although, there are more than 1000 NGOs, among which BRAC, ASA, PROSHIKA, SWANIRVAR BANGLADESH, TMSS, SHAKTI FOUNDATION, SOCIETY FOR SOCIAL SERVICES, BURO Bangladesh are the major NGOs in terms of amount of micro-credit disbursement.

Micro-Finance Institute (MFIs) and NGOs are extending hand to implement different development programs undertaken by the Government. NGOs provide not only micro-credit but also they work hand in hand with the Government in implementing different programs during flood, draught, environmental and natural calamities. In order to operate micro-credit activities, Micro-Credit Regulatory Authority (MRFA) has given certificate to 719 NGOs. Bangladesh NGO Foundation and its associate NGOs are also working in remote areas of the country for women empowerment, education, health care services, water and sanitation, disabled development and rehabilitation, agricultural development etc. The cumulative disbursement of micro-credit up to April 2014 was Tk. 769.7 million and total beneficiaries were 72.73 lack people. The main aim of providing micro-credit by the NGOs to the poor is to improve their economic standing within the household and social position in the society. They are also contributing to the process of sustainable social development through poverty alleviation, awareness building of the poor and empowerment of women.

19.2 Activities of Major NGOs

19.2.1 BRAC

Bangladesh Rural Advancement Committee (BRAC) is the largest multifunctional national NGO in the country. It undertakes different development policies at micro level with primary objective of improving socio-economic conditions of the poor and consequently poverty alleviation. It has undertaken several nation-wide development programs such as (i) Rural Development Program (RDP), (ii) BRAC Education Program, (iii) Health, Nutrition and Population Program etc. The major components of RDA are Agricultural, Poultry, Fisheries, Small Business, Cottage Industry, Food Processing, Transportation etc. Other than rural development programs, BRAC is one of the largest micro-credit providers.

19.2.2 ASA

The Association for Social Advancement (ASA) as a NGO first emphasized on conscientious for social actions, legal aid, awareness building, human development training communication support etc. At the second phase, ASA focused on various integrated approaches such as education for empowerment, credit for income generation,

institution building etc. In 1993, it shifted its activities to micro-credit services and ASA becomes a large micro-credit provider. At present ASA has established itself as a self-dependent and fast growing micro-credit providers in the world.

19.2.3 PROSHIKA

Proshika was established in 1976 and it is now one of the largest national NGOs in Bangladesh. Its main objectives are to promote sustainable rural development, improve socio-economic conditions of the poor men and women to reduce poverty. Development Strategies of Proshika are generally directed forwards the target groups which include (i) landless labourers, (ii) small farmers (iii) working people such as fishermen, weavers, artisans, slum dwellers, rickshaw-pullers (iv) illiterate poor (v) disadvantaged women etc. Proshika works through informal group formation and provides training to these groups. These training help improve various income generation activities such as skill development, trade, self-employment creation etc. Currently, Proshika activities are going on in 22700 villages. Proshika has also initiated a system of “Revolving Loan Fund” to provide micro-credit to those groups who are capable to undertake the development projects. Microcredit is provided to different income and employment-oriented projects like agriculture, fisheries, livestock, cottage industries, small business, transportation etc.

19.2.4 SWANIRVAR BANGLADESH

Swanirvar Bangladesh is a non-political, non-profit and non-government voluntary organisation. It was established in 1970 with the goal to promote self-reliance in economic and social life of the poor through mobilisation of the political leaders, bureaucrats, local leaders and target groups. At the beginning, voluntary mass participation schemes such as health and family planning, literacy, women development etc. were undertaken. Over the time, Swanirvar Bangladesh has extended its credit facilities to the poor to undertake income generating activities. Since 1985, it has been working for the socio-economic development at the grass root level through implementation of several integrated programs. Then Swanirvar Bangladesh started promoting self-reliance by providing micro-credit facilities for the poor. It provides credit to the organised group of members who own less than 0.40 acre of land or whose yearly income is not above 6000.0 [Rahman, Pk. M. (2005)].

19.2.5 CARITAS

This NGO has been playing important role in socio-economic development for the poor in rural areas. It has also intended to reduce poverty by extending micro-credit program for the poor and disadvantaged section of the community. Up to December 2013, the

total disbursement of micro-credit and beneficiaries stood at Tk. 20570.0 million and 316906 individuals.

19.2.6 TMSS

Thangamara Mohila Sobuj Sangha (TMSS) works mainly for poverty alleviation, improvement of socio-economic condition of the poor women and for empowerment of rural women. It started its microcredit services since 1985. Besides, PKSF, TMSS is functioning micro-credit programs with the financial assistance from Asian Development Bank (ADB), World Bank (WB), DFID, EU and Bangladesh Bank. Its main aim is to promote socio-economic condition of the deprived women.

19.2.7 Shakti foundation

Shakti foundation is engaged in providing micro-credit facilities to the disadvantaged women living in Slum areas in Dhaka, Chittagong, Khulna, Comilla, Bogra, Rajshahi and other major cities. It also provides help for health care, business entrepreneurship and social development of the poor women.

19.2.8 Society for social services

This organisation has been functioning since 1986. The main aim of this organisation is to contribute to awareness building, sustainable social development and thereby to alleviate poverty. Special emphasis is also given on health of the poor and the disadvantaged section of the community. Besides these activities SSS implemented macro-credit program for the poor to create self-employment and hence improve their socio-economic conditions.

19.2.9 BURO, Bangladesh

The BURO, Bangladesh was established in 1990 and started its activities in Tangail district. It has intended to reduce poverty through implementing micro-credit program. The BURO has many schemes of loan, savings, insurance and also remittance services. Besides these services, this organisation actively participated in healthcare, pre-primary education, women development and empowerment, water and sewerage management, family planning, plantation and social forestry, disaster management etc.

The main problem is that the success of these NGOs is evaluated mainly on the basis of their recovery rates. But how many poor families could have crossed the line of poverty through micro-credit program is not mentioned anywhere in their respective reports. However, up to December 2013, 9 major NGOs have disbursed Tk. 82,685,620.0 million and the number of beneficiaries stood at 27080556. The status of micro-credit program of 9 NGOs is presented in Table 19.1.

Table 19.1 Status of Micro-Credit Programs of Major NGOs

(in crore taka)

Name of NGO	Year									Total 2013 (December)
	Cum 2005	2006	2007	2008	2009	2010	2011	2012	2013	
BRAC:										
Disbursement	16575	4262	6233	8429	7568	7376	6627	10422	12115	8161049
Beneficiaries	24505176	5310317	7370847	8090369	8351993	8054515	6770338	5835862	56640684	5640684
ASA:										
Disbursement	12923	4132	4836	6111	6191	6870	8847	9381	9996	71088
Beneficiaries	16247288	6455979	6674058	7276677	5498293	5656257	4935685	4735545	4859588	4903328
PROSHIKA:										
Disbursement	3188	317	312	267	222	195	207	143	313	5071
Beneficiaries	6457363	15030	8209	6723	847	193	137929	100245	148424	3423895
SWANIRVAR BANGLADESH:										
Disbursement	471	91	96	97	132	158	198	220	197	2660
Beneficiaries	325180	129894	101565	104702	123803	127176	124260	121251	103181	1954863
CARITAS:										
Disbursement	554	118	148	140	150	154	237	266	286	20574
Beneficiaries	400137	4227	4362	100	11932	41855	12513	19251	10928	316206
TMSS:										
Disbursement	1133	410	515	5742	656	769	991	1209	1470.71	8408.62
Beneficiaries	444788	68587	99826	89544	22462	6027	50134	368579	449158	3740748
SHAKTI:										
Disbursement	555	180	176	203	305	514	455	532	5074	3427
Beneficiaries	567809	167113	156108	181990	299158	4759746	9317	12147	15373	153730
BURO BANGLADESH:										
Disbursement	774	318	375	591	814	2091	2191	2581	2211	9720
Beneficiaries	1112345	331329	376710	602273	746938	985182	2043541	1301375	2052006	6499693
MSS:										
Disbursement	507	261	354	430	524	614	827	2099	1249	6081
Beneficiaries	598376	260110	320110	362636	356483	362883	412819	474000	4148658	446744

Source: Bangladesh Economic Review 2014, MoF

Chapter 20

An Introduction to Anthropology¹

20.1 Defining Anthropology:

Over several decades ‘Anthropology’ has been defined as the study of ‘primitive’, ‘exotic’ or ‘tribal’ people. Anthropology studies human being through holistic approach or sometimes illustrated as the intensive study of human society and culture. In fact, different textbooks of anthropology generally identify this discipline as the study of human being, human society and culture throughout their places and time. The aforesaid notions can also be found in the following definitions:

Hunter and Whitten (eds, 1976) says, “this discipline may be defined as the systematic study of the nature of human beings.”

According to Serena Nanda (1994), the writer of an anthropological text titled ‘Cultural Anthropology’, “anthropology is the comparative study of human societies and cultures. The aim of anthropology is to describe, analyze, and explain the different ways of life, or cultures, through which human groups, or societies, have adapted to their environments.”

William A. Haviland (1999) defines anthropology as “the study of humankind everywhere, throughout time, seeks to produce reliable knowledge about people and their behavior, both about what makes them different and what they all share in common.”

Conrad P. Kottak (2010) redefines this discipline as “anthropology studies the whole of the human condition: past, present, and future; biology, society, language, and culture. Of particular interest is the diversity that comes through human adaptability.”

In fact, while we define anthropology mentioning that this discipline attempts to understand human diversity, norms and values of society, it means that the learning of anthropology is useful for living and working in today’s world. Anthropologists develop holistic outlook and keen insights that may have immense value in rectifying ethnocentric (biased) development models. For example, the four field

¹ This chapter has been written by Nayeem Sultana, Professor, Department of Development Studies, University of Dhaka, Dhaka-1000. Email: sultana_nayeem@yahoo.ca.

approaches in anthropology, such as, physical anthropology, cultural anthropology, anthropological linguistics and archaeology enable us to learn different culture and society. To have a deeper insight of this holistic outlook, let us explain its basic characteristics, debates in terms of the difference between cultural and social anthropology, four field approaches and the methods of anthropological research below.

20.2 Basic Characteristics of Anthropology:

It is known to us that not only anthropology, but also there are other disciplines, which can be defined as the “study of human beings”. Consequently, the question arises, what is so special or whether or not there is any unique characteristic of anthropology that separates it from other disciplines. In this context we may refer to the basic characteristics of the discipline. These are, firstly, anthropology is holistic; it pursues a multi-dimensional approach in studying human behavior. While studying human behavior, it attempts to understand all of the aspects. In order to study human society and its culture, it seeks to display how different parts of culture are interlinked and influence each other.

Secondly, instead of researcher or outsider’s point of views, anthropology pursues ‘emic’ or insider’s point of view in studying a specific culture. In doing this, it underscores for the necessity of persuasion of ‘cultural relativist’ approach and avoidance of ‘ethnocentrism’ (or biased attitude towards one’s own culture). As a matter of fact, the concept of ‘cultural relativism’ was introduced by Franz Boas and his associates. According to this concept, each culture needs to be viewed and evaluated in line with its own context and logic. For this, anthropologists need to conduct intensive field research and collect data pursuing the approaches of the insiders or the inhabitants of a particular area. Telling it differently, instead of collecting data and viewing one culture from the researcher’s or outsider’s point of view, each culture needs to be understood from the perspectives of its participants.

Thirdly, anthropology is trans-cultural. It looks all human groups irrespective of their number (large and small) and distance (distant and near). Fourthly, in order to understand current societies, anthropology spans all of human history, the ancient and the modern. Anthropology, moreover, seeks to find the generalities about human life, while also explaining the differences.

In this context, we may refer to the following definition of ‘family’ to indicate how this discipline is unique from other disciplines. For an

example, Alan Barnard and Jonathan Spencer (1998) defines family in the following way,

“...the family is identified as those kin and affines who live together in the same dwelling, share a common hearth, and jointly participate in production and consumption.”

Likewise, Friedrich Engels in his book ‘The Origin of the Family, Private Property and the State’ (1902) provided with an evolutionary scheme of the family and described that from the very beginning a gendered division of labor was persisted. Mentioning this kind of division of labor as ‘natural’ and ‘egalitarian’, he said that initially both the domestic and external domain was given higher value. In other words, no sector was more prestigious than the other. In those days’ women used to look after the domestic sphere and children and taking care of the outside domain was the responsibility of men, said he. This type of egalitarian relationship was demolished through the development of the patriarchal family and ownership of private property. Women’s labor in the domestic sector was thus undervalued and her sexuality was also started to be controlled by men from then, described by Engels. This definition is unique on the ground that it is holistic, trans-cultural and pursues cultural relativist approach that may not be found in other definitions of family, provided by other disciplines.

20.3 Social and Cultural Anthropology:

There is no rigid dissimilarity between ‘social’ and ‘cultural anthropology’, rather, to a certain level, they share some common characteristics. However, it is to be mentioned here that they differ from each other in line with their areas of emphasis. For an example, in cultural anthropology, which is particularly well-known in the USA and very much influenced by the works of pioneer anthropologists Franz Boas and Ruth Benedict, importance is given to the consistency of cultures. It is argued that rules of behavior, language, material creations, world views etc and many other parts of a particular culture deserve equal importance and need to be explained according to its own terms. The four field approaches, like physical or biological anthropology, cultural anthropology, anthropological linguistics and archaeology are emphasized upon in the American anthropology. In fact, no human society can be studied holistically if these approaches are not followed properly, is a wide-known believe and practice in American anthropology (Barnard, 1998).

The British trend, (which is) developed since the early years of the 20th century, is different from the American one, where anthropology is defined as 'social anthropology'. Even some of the British anthropologists like to consider anthropology as a branch of social science or sociology (Mair, 1972). Social anthropologists focus on social institutions and their interrelationships. The 'deep structure' of social relations and the organizing principles of social life by which individual behavior is governed in a particular society have been underscored in social anthropology. On what ground and circumstances the organizing principles of social life are challenged and ruined, also receive attention in social anthropology.²

20.4 The Four Field Approaches in Anthropology:

It is mentioned in the erstwhile paragraph that in American anthropology four field approaches are recognized as the four major branches. The following sections illustrate the major ideas about these four major branches.

20.4.1 Physical Anthropology:

The branch of anthropology which deals with humankind pursuing a biological perspective is called physical or biological anthropology. It explores human adaptation and evolution. Depending on the fossil record, paleontologists trace human evolution. Biological anthropologists are also interested in the cultural evolution of human-being. They believe and argue that both of these evolutions are interlinked. For example, human beings get their biological structure that enables their cultural adaptation with the environment. Cultural adaptation expedites the process of biological adaptation on the ground that it "frees humans from the relatively slow process of biological adaptation. Populations can invent, or adopt from other societies, new ways of dealing with problems on an almost immediate basis (Nanda, 1994)."

Along with the living human groups, physical anthropologists also conduct their study on the living nonhuman primates, like monkeys, apes etc. Being primates, humans have their own evolutionary history and share a more common trait with the nonhuman primates than with other living groups. Thus, the studies of nonhuman primates enable biological anthropologists understand human biological foundations. Researchers, moreover, can identify the causes of recent outbreak of different life-threatening diseases like 'aids', cancer, diabetics, high

² This part has been reproduced from the mentioned website, <https://www.discoveranthropology.org.uk/about-anthropology/what-is-anthropology/social-and-cultural-anthropology.html> (access 27th July, 2016).

blood pressure etc applying the approaches of physical anthropology. Physical anthropologists, thereafter, can argue why people of the contemporary world are facing different kinds of health hazards that were totally absent in the so-called primitive or hunter-gather societies. In this case, anthropologists may compare the life-style and livelihood patterns of different communities and societies throughout all the time and places and also come out with the probable suggestions for the contemporary world.

20.4.2 Cultural Anthropology:

Cultural anthropology deals with the human behavior of a particular group or society. This field shows how human culture and their norms are learned and shared by the members of a particular group and the way it is transmitted from one generation to next. It also explores how culture has changed over time and spaces. This branch also guides us to predict or even control the speed and flow of cultural change. Different types of questions like, “is religion universal?” or “what kinds of marriage and family system prevail in different societies?” are asked by the cultural anthropologists to discover both the specific and universal cultural pattern.

It argues that a particular form of culture is developed by the human beings to adapt to a particular environment. Cultural anthropologists study the origin, development and the diversity of different culture irrespective of time and places. In this context, a cultural relativist approach has been proposed by the cultural anthropologist that explores both the ways and causes of differences and diversities within different cultures at the synchronic and diachronic levels. These differences, in fact, broaden our world views and nurture multidimensional hubs of knowledge. All these things are worthwhile for achieving a sustainable development at the local, national and global levels. By learning cultural anthropology, people can become familiar with a wide range of behaviors, beliefs, customs, institutions and values that assist them identify themselves as “thrice-born” (Nanda, 1994).

The term “thrice-born” was mentioned actually by a renowned anthropologist M.N. Srinivas. A person’s birth into his original, particular culture is defined by him as “first-born”. While a researcher visits other cultures for fieldwork and is able to perceive the rules, regulations and meanings of other cultures, it can be defined as “second-born”. A person becomes worthy of third birth only after his return from field work. In this context, his world view has been

changed and upgraded to that parameter so that he is able to see his native land and culture from a different viewpoint.

20.4.3 Anthropological Linguistics:

This field of anthropology deals with the study of community language and its variation irrespective of time and spaces, following the cultural relativist approach. In which way human languages have been developed, how it is learned and transferred from one generation to another and in what way different kinds of changes have been incurred in different languages, all these chronological issues are investigated and studied by the linguistic anthropologists. Along with the analysis of the development of human mind and thought expressed through language, it also delves into the relationship between language and other parts of a particular culture.

20.4.4 Archaeology:

Anthropological archaeology is sometimes cited as the ‘past tense of cultural anthropology’ (Renfrew and Bahn, 1991). In fact, archaeology explores material remains to study past societies and culture. Artifacts, faunal remains, and human altered landscapes are facts of the cultural and material existence of past societies. For this, archaeologists collect material remains like pottery, tools, garbage and many other things of the past societies and explore human behavior and culture of that particular time and place by analyzing these. Archaeology thus combines a major time dimension to our understanding of culture. Describing the artifacts of prehistoric societies, they also interpret and explain these data to know about a particular culture, its ritual, belief system and human behavior.

In summary, while we say that anthropologists study human society and culture from a holistic perspective, it intends to mean the integration and application of four-field approaches in understanding of a particular society and culture. In other words, the four field approaches are being pursued by the researchers while they conduct field research within a particular community.

20.5 Anthropological Field Research:

If you want to understand what a science is, you should look in the first instance not at its theories or its findings, and certainly not at what its apologists say about it; you should look at what the practitioners of it do³.

³ CLIFFORD GEERTZ, *The Interpretation of Cultures*

Field research, in fact, is an important part of this discipline. All anthropologists, thereby, learn different research skills and approaches that enable them conduct intensive **ethnographic field research**. Anthropologists, for an example, try to do field research by equipping themselves with ‘rapport building’, ‘emic’(‘native’s point of view’) and ‘etic’(outsider/researcher’s point of view) approaches, ‘cultural relativism’, ‘micro level study’, ‘participant’s observation’ method, ‘key-informant technique’ and many others. Pursuing these techniques and approaches, anthropologists attempt to collect intensive data, analyze that to identify important details, and relate those particulars to a larger issue. And this is how anthropologists provides us with a “thick description”⁴ (Geertz, 1973) of a particular culture.

In point of fact, while we mention about classical anthropological field researches, exploration of the ‘**participant observation method**’,

⁴ “One of the key terms in Clifford Geertz's anthropological theory is that of "Thick Description". Following Ryle, Geertz holds that anthropology's task is that of explaining cultures through thick description which specifies many details, conceptual structures and meanings, and which is opposed to "thin description" which is a factual account without any interpretation. Thin description for Geertz is not only an insufficient account of an aspect of a culture; it is also a misleading one. According to Geertz an ethnographer must present a thick description which is composed not only of facts but also of commentary, interpretation and interpretations of those comments and interpretations. His task is to extract meaning structures that make up a culture, and for this Geertz believes that a factual account will not suffice for these meaning structures are complexly layered one on top and into each other so that each fact might be subjected to intercrossing interpretations which ethnography should study.

In "Thick Description: Toward an Interpretive Theory of Culture" Geertz outlines four parameters for an adequate "thick description" and a study of culture:

1. Interpretative study: since anthropology is a semiotic endeavor, cultural analysis should be an interpretative practice which traces the manner in which meaning is ascribed. The raw observational material collected by an ethnographer is not sufficient if we are to achieve a thick description of a culture.
2. The subject of interpretation is the flow of social discourse. Interpretative ethnography according to Geertz should produce the codes required for decoding social events.
3. Interpretation deals with extrovert expressions. Data collection and interpretation are limited to what local informants can tell us. Therefore the thickest of descriptions can only be based on extrovert expressions of culture.
4. Ethnographic description is microscopic. According to Geertz ethnographic findings describe local behaviors and truths as serve as an ethnographical miniature. We always view specific and contextualized happenings, and these make up the thick description,” in

<http://culturalstudiesnow.blogspot.com/2012/05/clifford-geertzs-thick-description.html>.

demands a particular attention. Since this method is identified as one of the hallmark or pillars of anthropological research, it needs to be defined properly. Likewise, we need to define ‘**ethnography**’ that is closely related to participant observation method. So, during field research, when a researcher studies and observes the lives of the community under study by participating in their daily life and livelihood, it can be called participant observation method. Bronislaw Malinowski, who developed ‘functionalist’ theory (1944) in anthropology by conducting field research among the Trobriand Islanders of New Guinea, suggested for the participant observation method (Nanda, p-37, 1994). He advised us for an intensive fieldwork. To develop a sound ethnographic report, a researcher needs to have a long-term participatory fieldwork experience and to view things from native’s/other’s point of view, "exactly as they are," said he. He also highlighted to stay with the people being studied for at least a year or two. After that an intensive period is again needed to develop a written account of the lives of the community under study. This written report is called ethnography (Nanda, 1994).

20.6 Applied Anthropology:

As an academic discipline, generally anthropology deals with academic or ‘basic research’ (Nanda, 1994). It tries to find out answers of different questions, such as, the development of human culture and civilization, the origin of our species, the role and functions of different social institutions like, family, religion etc. Apart from these academic roles, anthropologists also play applied roles by putting their knowledge in solving human problems. Both academic and applied anthropologists attempt to involve themselves in many development interventions at the global, national, and community levels. By providing empirical data about the contemporary social, political and economic issues, they strengthen their roles in development related policy-making and also to conduct social advocacy for the individuals and groups.

In fact, there exists a critical relationship between anthropology and development that takes a dynamic outlook when the question of international development comes in front. As a matter of fact, a new era started after the Second World War and the end of colonialism. This new era focuses on economic growth, poverty, and inequality and a special spotlight was given towards the ex-colonies. Targeting the Third World, many national and international agencies were developed.

These national and international aid agencies' special focus was on "exotic" and traditional people (of the ex-colonies), since then anthropologists received special attention because of her/his disciplinary background. As a consequence, the role of anthropologists, particularly for the development of the underdeveloped, were highly emphasized on the ground that utilizing anthropologists' critical insights on the local people, the donor agencies may receive deeper insights of their targeted population. Later on, these will be implemented in development policy, planning and action.

In spite of these types of applied/engaged roles, anthropologists also face criticism as reluctant anthropologists (Edelman, 2005). These reluctant anthropologists criticize that claims to development is nothing but an attempt to disguise "neo-colonial" (ethnocentric, Western neo-imperialism) exploitation of the previous colonies. And the donor agencies actually enhance global capitalism in the name of development. They also criticize those anthropologists who continue their consultancy with the international aid agencies and governments as well for not becoming critical towards the ongoing political economy that actually takes global capitalism a step ahead.

Basically, the role of anthropologists as unconscious consultants and/or reluctant anthropologists deserves criticism on the ground that both of their roles undermine the very basic premise of the discipline. The approach of 'holism', 'emic', 'etic' as well as the anthropological research methods, for an example, participant observation method may guide us towards an intensive research on development. In this context, the role of anthropology and anthropologist can be revived by constructing and analyzing problems and reflecting on the wider social, cultural and political context of development. This will thereby enable us to remain objective by critically engaging with the dilemmas of power and knowledge that shape the aid system (Eyben, 2007). By exploring the intended and unintended consequences of development initiatives and introducing a better understanding about the development agencies, anthropology can open up a spontaneous capability. Subsequently, anthropologists will concentrate not only on producing and disseminating knowledge on development problems, but also they will try for new policy recommendations, planning and action.

Bibliography

- Amado, J. (1971): *Tent of Miracles*, New York: Knopf
- Atkinson, A.B. (1970): On the Measurement of Inequality, *Journal of Economic Theory*, Vol.2, Pp. 244-63.
- Atkinson, A.B. (1978): *The Economics of Inequality*, Clarendon Press, Oxford, U.K.
- Atkinson, A.B. (1987): On the Measurements of Poverty, *Econometrica*, Vol. 55, No. 4.
- Bangladesh Bureau of Statistics (BBS). *Population Census Reports* (1974, 1981, 1991, 2001 and 2011). Ministry of Planning, Dhaka
- Bangladesh Bureau of Statistics (1997): *National Accounts Statistics of Bangladesh*, BBS, Ministry of Planning, Dhaka
- Bangladesh Bureau of Statistics (1999-2000): *Report of the Labour Force Survey, 1999-2000*, BBS, Ministry of Planning, Dhaka
- Bangladesh Bureau of Statistics (2009): *Sample Vital Registration System*, BBS, Ministry of Planning, Dhaka
- Bangladesh Bureau of Statistics (2010): *Report of the Household Income and Expenditure Survey (HIES) 2010*, BBS, Ministry of Planning, Dhaka
- Bangladesh Bureau of Statistics (2010): *Statistical Year Book of Bangladesh, 2010*, BBS, Ministry of Planning, Dhaka
- Bangladesh Bureau of Educational Information and Statistics (2011), *Bangladesh Education Statistics*, BANBEIS, Ministry of Education.
- Bangladesh Bureau of Statistics (2012): *Statistical Yearbook of Bangladesh, 2012*, BBS, Ministry of Planning, Dhaka
- Barnard, A. and Jonathan Spencer (eds.) (1998): *Encyclopedia of Social and Cultural Anthropology*. Routledge. London & New York.
- Bernhardt, E. (2002): Cohabitation and marriage among young adult in Sweden: Attitudes, expectations, and Plans. In *Nordic Demography: Trends and Differentials*, Scandinavians Population Studies, pp.157-70. Oslo: Unipub.
- Bhattacharya, N. and Coondoo, D. (1992): *Collection and Analysis of Survey Data on Income and Expenditure: Training Handbook*, Statistical Institute for Asia and the Pacific, Tokyo, Japan.
- Bourguignon, F. (1979): Decomposable Income Inequality Measures; *Econometrica*, Vol. 47, No. 901-19.
- Bronfenbrenner, M. (1971): *Income Distribution Theory*, Macmillan, London.
- Chisholm, R and McCarty, M (1978): *Principles of Macroeconomics*, Scott, Foresman and company, Glenview, Illinois, USA
- Chen, C. (1979):
- Clark, S., Hemming, R. and Ulph, D. (1981): On Indices for the Measurement of Poverty, *Economic Journal*, Vol. 91, pp.515-526.
- Douglas A. Lind, Robert D. Mason and William G. Marchal (2000): *Basic Statistics for Business and Economics*, Mc Graw Hill.

Clifford Geertz's "Thick Description" explained (summary).

<http://culturalstudiesnow.blogspot.com/2012/05/clifford-greertzs-thick-description.html>, access 31st August, 2015.

Dewett, K.K. and Chand, A. (1992): Modern Economic Theory, Rajendra Ravindra Printers (Pvt.) Ltd., New Delhi.

Dalton, H. (1920): The Measurement of the Inequality of Incomes, Economic Journal, Vol. 30, pp.348-61.

Edelman, M. and Angelique Haugerud (2005): 'Introduction: The Anthropology of Development and Globalization' in Marc Edelman and Angelique Haugerud (eds.), The Anthropology of Development and Globalization. From Classical Political Economy to Contemporary Neoliberalism. Blackwell Publishing.

Elteto, O. and F. Frigyes (1968): New Inequality Measures as Efficient Tools for Casual Analysis and Planning, Econometrica, Vol. 36, pp. 386-96.

Engles, F. (1984): The Origin of the Family, Private Property, and the State. Translated by Ernest Unterman. Chicago, C.H. Kerr & Company, 1902.

Eyben, R. (2007): 'Labelling People for Aid' in J. Moncrieffe and R. Eyben (eds.), The Power of Labelling. How People are Categorised and Why it Matters. London: Earthscan.

ESCAP (1993): Report of the Committee on Poverty Alleviation Through Economic Growth and Social Development, Bangkok, E/ESCAP/CPA/2, 5,6.

FAO/WHO (1973): Energy and Protein Requirements, Technical Report Series, 522, Geneva, WHO.

FAO (2006): Describing Income Inequality (Theil Index and Entropy Class Indices) by Bellu G.L. and Liberti, P., Esypol Model 051.

FAO (2006): Policy Impacts on Inequality Welfare Based Measures of Inequality. The Atkinson Index by Bellu, L.G. and Liberty, P., Esypol Model 050.

Ferguson, J. (2005): Anthropology and Its Evil Twin: "Development" in the Constitution of a Discipline' in Marc Edelman and Angelique Haugerud (eds.), The Anthropology of Development and Globalization. From Classical Political Economy to Contemporary Neoliberalism. Blackwell Publishing.

Faruk, O. and Khatun, N, (2008): Crime Index Bangladesh 2007, Academic Press and Publishers Library, Dhaka.

Finer, L.B. (2007): Trends in Premarital Sex in the United States, Public Health Report of USA, 122(1); 73-78.

<http://Paa.2011.Princeton.edu/Papers/110852>

Foster, James, J. Greer and Eric Thorebecke (1987). A class of Decomposable Poverty Measures, Econometrica, Vol. 52(3), pp. 761-766.

Friedman, R.D. (1965): Poverty Definition and Perspective. Empirical Enterprise Institute for Public Policy Research.

Gardner, K. and David Lewis, (2005): 'Beyond Development?' in Marc Edelman and Angelique Haugerud (eds.), The Anthropology of Development and

- Globalization. From Classical Political Economy to Contemporary Neoliberalism. Blackwell Publishing.
- Garrow, J.S. and James, W.P.T. (1993): *Human Nutrition and Dietetics*, Churchill Livingstone, 1993.
- Gastwirth, J.L. (1971): A General Definition of the Lorenz Curve, *Econometrica*, 39, p. 1037-1038.
- Geertz, C. (1995): *After the facts: two countries, four decades, one anthropologist*, Cambridge, MA: Harvard University Press.
- Geertz, Clifford (1973): *The Interpretations of Cultures*. New York. Basic Books.
- Giddens, A. (2001): *An Introduction to Sociology*. W.W. Norton, Incorporated, 2001.
- Giddens, A. (2002): *Runaway World: How Globalisation is Reshaping our lives*, Profile Books, 2002.
- Giddens, A. (2006): *Sociology*, Cambridge, Polity Press.
- Gini, C. (1912): *Variabilita e mutabilita*. Bologna.
- Glick S.N. and Georges Eugene Fouran (2001): *Long-Distance Nationalism and the Search for Home* Georges Woke up Laughing. Durham, London: Duke University Press.
- Gonzalez, R.C., and Woods, R.F. (2002): *Digital Image Processing*, Prentice Hall, NJ.
- Grusec, Joan E.; Hastings, Paul D (2007): *Handbook of Socialization: Theory and Research*. Guilford Press.
- Hannerz, Ulf. (2000): "Flows, Boundaries, Hybrids, Keywords" in *Transnational Anthropology*, Oxford Working Paper, WPTC2k-02, www.transcomm.ox.ac.uk/working_papers.htm.
- Haviland, W. A. (1999): *Cultural Anthropology*. Fort Worth. Harcourt Brace College Publishers.
- Hossain, S. (2007): *Income Inequality in Bangladesh*, Osder Publications, Dhaka.
- Hunter, David E.K. and Phillip Whitten (eds.) (1976): *Encyclopedia of Anthropology*. Joanna Cotler Books Publisher.
- Kakwani, N.C. (1980): *Inequality and Poverty: Methods of Estimation and Policy Applications*. Oxford University Press, New York.
- Kakwani, N.C. (1980a): *Income Inequality and Poverty (Methods of Estimation and Policy Application)*. Published for the World Bank, Oxford University Press.
- Kakwani, N. (1980b): On a Class of Poverty Measures, *Econometrica*, 48.
- Klein, L. R. (1967): *Introduction to Econometrics*. Englewood Cliffs, Prentice Hall.
- Kottak, C.P. (1972): Ecological Variables in the Origin and Evaluation of African States. *Comparative Studies in Society and History* 14: 351-80.
- Kroober, A.L., and Kluckhohn, C. (1952), *Culture: A critical review of concepts and definitions*. Harvard University Peabody Museum of American Archaeology and Ethnology Papers 47.

- Lange, Oskar (1978): Introduction to Econometrics, 4th Edition, Revised and Enlarged, Pergamon, London.
- Lewellen, Ted C. (2002): The Anthropology of Globalization. Cultural Anthropology Enters the 21st Century, Bergin & Garvey, Westport, Connecticut. London.
- Lorenz, M.O. (1905): Methods of Measuring the Concentration of Wealth. Journal of the American Statistical Association, Vol. 9, pp.209-19.
- Mair, L. (1972): An Introduction to Social Anthropology. Oxford. Clarendon Press.
- Marcus, G. E. (1986): "Contemporary Problems of Ethnography in the Modern World System" in James Clifford and George E. Marcus (eds.), Writing Culture. The Poetics and Politics of Ethnography.
- Meillassoux, C. (1981): Maidens, Meal and Money: Capitalism and the Domestic Community, New York, Cambridge University Press.
- Miller, D.B. (1999): Racial Socialization and Racial Identity: Can they promote resiliency for African American adolescents? Adolescence, Volume 34, p.493.
- Nanda, S. (1994): Cultural Anthropology. Wadsworth Publishing Company. Belmont, California.
- Newbery, D. (1970): A Theorem on the Measurement of Inequality. Journal of Economic Theory, Vol. 2, pp. 264-66
- Orshansky, M. (1965): Counting the Poor: Another Look at the Poverty Profile. Social Security Bulletin, Vol. 28.
- Pareto, V. (1897): Coura d'Economie Politique, Rouge and Cie, Lausanne and Paris
- Prais, S.S. and H.S. Houthakker (1955): The Analysis of Family Budgets. Cambridge University Press, Cambridge.
- Prieto, N.I. (1997): Beautiful Flowers of the Maquiladora: Life Histories of Women Workers in Tijuana, University of Texas Press
- Rahman, M.M. Pk., and S. Huda (1992). Decomposition of Income Inequality in Rural Bangladesh. Modern Asian Studies, Vol.26, Part I, Cambridge University Press.
- Rahman, Pk. M.M., N. Matsui and Y. Ikemoto (2013): Dynamics of Poverty in Rural Bangladesh, Springer.
- Rao, S.V. (19678): White Collar Crime – An Adjunct of our Political and Economic System. Indian Journal of Social Work, Vol. 38, p.399-409.
- Ravallion, M. (1992): Poverty Comparisons: A Guide to Concepts and Methods. Washington DC: World Bank.
- Rein, M. (1970): "Problems in the Definition and Measurement of Poverty", in Peter Townsend (ed). The concept of poverty, London, Heinemann, pp. 46-63.
- Renfrew, C and P. Bahn. (1991): Archaeology: Theories, Methods and Practice. London. Thames and Hudson.

- Rey, P.P. (1975): The Libeage Mode of Production. *Critique of Anthropology* 3:27-79.
- Rey, P.P. (1979): Class Contradiction in Lineage Societies. *Critique of Anthropology* 4:41-60.
- Round, J. (1993): *System of National Accounts*, United Nations.
- Rowntree, S. (1901): *Poverty: A Study of Town life*. London, Macmillan.
- Roy, M.K. (1996): *Fundamentals of Probability and Probability Distributions*, ROMAX Publications, Chittagong.
- Ricci, U. (1916): Lindice di variabilita e la curra dei redditi. *Giornale degli Economisti e Rirista di Statistika, Serie Terza* 53:177:228
- Schiller, B.R. (2008): *The Economics of Poverty and Discrimination* (tenth edition). Pearson Education, Inc., Upper Saddle River, New Jersey, USA
- Shari, I. (1979): Estimation of Poverty Lines and the Incidence of Poverty in Peninsular, Malaysia. *The Philippines Economic Journal*, Vol. XVIII, No. 4.
- Stevens (1946): On the Theory of Scales of Measurement, *American Association for the Advancement of Science*, Vol. 103, pp.677-680.
- Schaeter, R.T. (2003): *Sociology: A Brief Introduction*, McGraw-Hill Humanities/Social Sciences/Languages, 2003.
- Schultze, C.L. (1967): *National Income Analysis* (Scond Edition), Prentice-Hall-Inc, New Jersey, USA
- Svedberg, P. (2000): *Poverty and Undernutrition: Theory, Measurement and Policy*, Oxford University Press, New Delhi, India
- Sheshinski, E. (1972): Relation Between a Social Welfare Function and the Gini Index of Inequality. *Journal of Economic Theory*, Vol. 4, pp.98-100.
- Sen, A.K. (1972): Utililitarian and Inequality. *Economic and Political Weekly*, Vol. 7, pp. 54-57.
- Sen, A.K. (1973): *On Economic Inequality*. Clarendon Press, Oxford.
- Sen, A.K. (1976): Poverty: An Ordinal Approach to Measurement, *Econometrica*, 44.
- Smith, Adam (1976): *An Inequality into the nature and causes of the wealth of Natins*.
- Theil, H. (1967): *Economics and Information Theory*. Amsterdam: North Holland.
- Takayama, N. (1979): Poverty, Income Inequality and Their Measures: Professor Sen's Approach Reconsidered; *Econometrica*, 47.
- Townsend, Peter (1979): *Poverty in the United Kingdom – A Survey of Household Resources and Standard of living*. Harmondsworth, England, Penguin Books.
- Towmsend, Peter (ed)(1970): *The Concept of Poverty: Working Papers and Methods of Investigation and Life Styles of the Poor in Different Countries*, London, Heinemman Education Books Ltd.
- Townsend, Peter (1993): *The International Analysis of poverty*, BPCC

- Townsend, Peter (1962): The meaning of Poverty, *British Journal of Sociology*, Vol. 13, reprinted in Townsend (1973).
- Tylor, E. (1871): *Primitive Culture: Researches into the development of Mythology, Philosophy Religion, Art and Custom*. Volume 1 and 2. London: John Murray. 1871.
- Wikipedia (1993) : *System of National Accounts*, United Nations, Chapter 4.
- Waltz, M.W. (1967): *An Economic Definition of Poverty* (Wisconsin University, Institute for Research on Poverty, Discussion Papers 5-57), USA
- Williams, R. (1980): *Problems in Materialism and Culture: Selected Essays*, London: Verso. p.243.
- William, F. Ogburn (1922): *Social Change with respect to culture and original Nature* (1922), Literary Licensing LLC, 2014.
- World Bank (2010): *Bangladesh Development Series (Bangladesh Poverty Assessment: Assessing a Decade of Progress in Reducing Poverty 2000-2010)*.
- WHO (1995), *Physical Status: The Use an Interrelation of Anthropometry*, World Health Organisation, Technical Report Series, 854, Geneva.
- Yntema, D.B. (1933): *Measures of the Inequality in the Personal Distribution of Wealth and Income*. *Journal of the American Statistical Association*, Vol. 28, pp. 423-33.
- Zarina, R. K. and H.K. Arefeen (1989): *POTITA NARI (A Study of Prostitution in Bangladesh)*. Centre for Social Studies, Dhaka University, Dhaka.