2014

Demand for Universal Primary Education in Bangladesh: A case study of Jhenaidah District

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University of Rajshahi

PhD Thesis

DEMAND FOR UNIVERSAL PRIMARY EDUCATION IN BANGLADESH: A CASE STUDY OF JHENAIDAH DISTRICT

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A Dissertation Submitted to the University of Rajshahi in fulfillment of the requirements for the degree of Doctor of Philosophy in Statistics

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DECLARATION

This dissertation entitled "**Demand for Universal Primary Education in Bangladesh: A case study of Jhenaidah District."** Submitted by me in the Department of Statistics, University of Rajshahi for the award of the degree of Doctor of Philosophy is based on my research work carried out under the supervision of Professor **Dr. M. A. Basher Mian,** Department of Statistics, University of Rajshahi.

To the best of my knowledge, this work neither in part nor in full has been submitted to any other University or Institution for the award of any degree.

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ACKNOWLEDGEMENT

All praise goes to Almighty **Allah** who has given me the strength and opportunity to do this research work. It gives me much pleasure to express my sincere appreciation to the Department of Statistics, Rajshahi University, Rajshahi for giving me the opportunity to work on this thesis.

This dissertation would not have been possible without the advice and enthusiastic assistance of my reverend supervisor **Dr. M. Abul Basher Mian,** Professor, Department of Statistics, University of Rajshahi. I would like to express my sincere thanks to him for his encouragement, detailed guidance and critical comments throughout the course of this dissertation. I owe to him as an important stimulus in the formulation of my thinking throughout this research and my graduate career.

I am indebted and grateful to Professor Dr. Md. Ripter Hossain, Chairman, Department of Statistics, University of Rajshahi who always encouraged me to complete the thesis.

I am indebted and grateful to Professor M. A. Razzaque, Professor Dr. Md. Nurul Islam, Professor Dr. Mohammad Nasser, Professor Dr. Md. Ayub Ali, Professor Dr. Md. Golam Hossain, Department of Statistics, University of Rajshahi for their helpful advice, cooperation and good suggestion for the improvement of my research work at different times while I needed.

I am highly grateful to my respected honorable Mrs. Dr. M. Abul Basher Mian, who has assisted me and given me overall dictation as a mother nurses her newborn baby from the outset to the end of the dissertation.

I am grateful to all my esteemed teachers, students and employees of the dept. of statistics, R.U, especially to Dr. Nasim Mahmud, (Deputy Chief Technical officer), Md. Abu Baker Siddique (Operation Manager) and Md. Rafiqul Islam

(Lab Assistant), Department of Statistics, University of Rajshahi for their help and cordial inspiration.

I wish to acknowledge my profound gratitude to all my respected colleagues for their helpful suggestions and kind co-operation.

I am thankful to all primary school teachers, madrassa teachers, kindergarten teachers, high school teachers, college teachers, student guardians and public representatives especially who have contributed to our research by providing their valuable opinions.

I would like to acknowledge my family members friends and well-wishers, especially to my mother, elder brother, wife and daughter for their tremendous sacrifice, encouragement and continuous inspiration throughout the period of my research, which lead me to all the success in this study.

The Author

May 2014.

ABSTRACT

The aims of this study is to search for ways and means for a school system at the primary level of education based on a curriculum and terminal competencies with an unanimous and conscience acceptability of the people in general without much disturbance to the present set up. Such a system may be termed as Universal Primary Education system. The right of education is recognized as a human right and is understood to establish an entitlement to education. It is one of the five basic rights. Education is classified into three broad classes: informal, non-formal and formal. This study belongs to the problem of prevailing multi-channel formal education at primary level in Bangladesh. The learners mainly educated by three different streams-General stream, Ebtedayee Madrassa stream and Kindergarten stream possess three kinds of knowledge. So their thoughts and ideas, plans and programs are not co-linear and they are not guided and led to the same line. Universal primary education, as is emphasized by different world bodies and organization is indicative of uniform or uni-channel one. Almost all the education commissions set by the Bangladesh Govt. the NGO's and many individual researchers highlighted this problem and considered it as a barrier towards the implementation of universal primary education. But neither the Government nor any NGO's taken any initiative or highlighted any way to solve this problem. General objective of the study is to see the socio-economic and educational attainment impacts of Demand for Universal Primary Education in Bangladesh.

Though Bangladesh is a country of unique language-Bengali, here prevails a multi-channel education right from primary level which is

against and hinders the spirit of universal primary education. This region including Bangladesh was ruled by many rulers with different religious faith. Brief history of the educational reforms in Bangladesh, as well as in the Indian sub-continent is discussed. This justifies the existence of a multi-channel education in a country of univocal language. Having the history scrutinized, we can say that primary education that we find today is not shaped in a day or two.

This dissertation is an exploratory one and based on mainly primary data. The data was collected from the study area in two different phases to serve different objectives. At the first phase, data was collected two times from 523 respondents. In the second phase, two examinations were conducted on the students of class V. Two stage stratified PPS cluster sampling design for collecting data followed by analysis of data and the underlying tools and methodology used in inference procedure are discussed in brief.

Twenty variables/covariates associated with the respondents including the demand for universal primary education have been studied of which nine has no association and nine has significant at $p \leq 0.01$ and one has $p \leq 0.05$ level of significance indicated by the calculated chi-square value with the demand for universal primary education. The cross relationship between social identity and year of schooling, basic education at primary level, land holding size, monthly family income, expenditure are highly associated. A stepwise logistic regression shows that associated variables to affect the demand for universal primary education. Younger people in comparison to aged, smaller land holding size in comparison to larger land holding size and alternative demand to General and Madrassa education in comparison to Kindergarten highly demand the Universal Primary Education. The logistic regression model

is observed to be well fit as is indicated by LR statistic = 222.588. Cox and Snell R^2=0.593, Negelkerke $\bar{R}^2$= 0.808 and Model χ^2=470.294. It is observed that when the value of $\bar{R}^2$ exceeds 0.5 that data fit binary logistic regression model fit. So the model can be used for the significant prediction about the demand for a universal primary education in Bangladesh.

The ratio regression model produced a good result with $R^2 = 0.9818$ and adjusted $\bar{R}^2 = 0.9492$. Results of logit regression analysis are left out because, logit transformation of demand proportions yield a large number of indeterminate out puts making the analysis useless.

Two surveys were conducted with changed order of terminal competencies at each survey among the dissimilar (76-28) =48 of the three different streams. The Pearson frequency correlation =0.533 and rank correlation =0.511 that the correlation is significant at the 0.01 level. So, survey result is reliable.

There is no hard and first rule for selecting the 30 terminal competencies out of 48. We have proposed five arbitrary rules (Test-Re-Test method) in order to eliminate the 30 (maximum) out of 48 dissimilar terminal competencies among the streams. Spearman rank correlation 0.911 and Pearson correlation coefficient 0.909 are in close agreement indicating the high reliability of survey results selected under rule-IV.

To test the validity of rule IV, two set of questions are prepared. One set comprised of original terminal competencies of each stream. Another set with the newly selected 30, in addition to common 28 for all the streams. Correlation (Pearson) coefficient of marks in the two separate examinations considered as measure of validity of the terminal competencies obtained by rule IV for streams separately and for the total

system. Correlation between the scores of two examinations is observed to be highly consistent and nearly constant, justifying the validity of the proposed model.

Hence, the set of terminal competencies selected under rule-IV along with existing common 28 in total (28+30) = 58 terminal competencies may be recommended as reliable and valid terminal competencies for the uniform and universal primary education in Bangladesh.

To develop a measure of efficiency for education system based on academic performance of students. Advantage of the proposed measure is that it can be used at each and every situation, for individual school to national level, for sub system to aggregate system and for uniform and multi-channel education systems. Efficiency of the existing multi-channel primary education is compared with a proposed uniform and universal primary education in Bangladesh by using the proposed measure. Results obtained are observed to be useful and encouraging. Proposed universal system may be run experimentally in some of the schools and results of those schools may be compared with existing multi-channel schools for relative efficiency of the universal primary education.

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CHAPTER ONE
Preliminaries

1.1 Introduction

Education is a social process by which our knowledge, character, behavior, morality, humanity, attention and mental strength comparatively become permanent and cause massive development and change. It is one of the five basic rights. It basically enhances our knowledge. It is the pre-condition of developing the quality and the sense of humanity. Aristotle, the great philosopher and educationist said “The difference between the educated and the uneducated is comparable to that of a living person and a dead man”. The importance of education in human development is not a new invention. The history of educational research is of recent past. Before the industrial revolution [Britain's Industrial Revolution (1780-1850)] in Europe, education was in the hands of voluntary agencies, mostly religious and informally organized, all over the world. In those days, the aim of education was the ethical development in ritualistic societies. The classical economist irrespective of cast, creed and color admits that education is the key to economic and social development. Education fulfills the latent possibility of men and opens new vistas of life. It is used as a catalyst to empower and enliven human being to participate meaningfully in all out development.

Education is classified into three broad classes: Informal, Non-formal and Formal. The earliest education is the informal one which individuals acquire from nature and social culture. It is a lifelong process where individuals acquire values, norms, skills, self-security etc. from day to day experience in their environment and infractions with friends, family

and colleagues. As a process, it influences on the life of each and every one from birth to death.

Systematically organized educational activities outside the formal frame work education for selected learning to a particular section of people are known as non-formal education. Disadvantaged persons of various backgrounds who are lacking opportunities for formal education are targets of non-formal education to train this in life suits and work skills to enhance earning capabilities for poverty reduction. Its design is non-ladder and of diverse duration.

A formal education involves regular teaching and set curriculum within an organized institution governed by set rules. It is a hierarchical, graded and ladder system running from lowest to the highest grade - preprimary to university, including a variety of special programs like medicine, engineering, etc. It provides certificates, degrees, diplomas and/or other formal credentials controlled by authorities of national governments. This study belongs to the problem of formal education at primary levels in Bangladesh.

1.2 Statement of the problem

It is evident from literature review that curriculum (Heath 1964 and Eisner 1967) and quality of teachers (Anderson 1971) are most important factors for efficient implementation of an education system. An analysis of the history of education reveals that the issue of curriculum is governed by the political and theological motivation of Govt. in power in collaboration with ‘Aid Giving Agencies’ down through the ages up to the date. Guardians are helpless but to send their children to the nearest available school, being influenced by the local elites and teachers,

irrespective of their choice about the school system or the curriculum that is taught in the schools. 11 kinds of primary education systems are running in our country. Out of these 11, 6 are under the direct or indirect control of our national Govt. as well as education policy and administration (Monzoor, 2008). The name of these schools is given in Appendix- I.

The remaining 5 are beyond the control of our national Govt. as well as education policy and administration. The name of these schools is given in Appendix-II.

Of the eleven categories of primary schools our students are being really educated through three streams of education. These are

(1) General stream — the left out of British system

(2) Madrassa stream — the follow-up of Dars-i-Nizami system

(3) Kindergarten stream — local version of Anglo Missionaries system.

The students of General stream are mainly taught about native art and culture, geography and history of the country and liberation war. In Madrassa stream students are mainly taught about the history of prophets and the history of Islam. On the other hand the students of English stream follow the curriculum of British and other advanced countries and they are inspired by their history, art and culture and life style. As a result, citizen of the three different views and idealisms are being produced by the three different streams. Citizens of different idealisms and thoughts produced by different streams of education do not rely on each other and fail to agree on any national issue and crisis. Consequently our national development is hampered and we are exploited internationally to a great

extent. Development programs under taken by the Govt. of one political party are suspended or rejected if the party fails to form the Govt. for the next session. The thoughts, ideas, awareness and plans of country building, plans of solving national and international problem are different for citizens with different educational background. The views and ideas of the citizen are different for their being educated through different stream from the early stage of life. The learners educated by three different streams possess three kinds of knowledge. So their thoughts and ideas, plans and programs are not co-linear and they are not guided and led to the same line. Thus we cannot come to a single and right decision unitedly to solve any national problem. Consequently the problem of the country remains the problem. Besides it gets deeper from deep due to the different views and idealisms.

Attainments of some terminal competencies are set by the respective authorities of General stream, Madrassa stream and Kindergarten stream for primary graduates. Fifty terminal competencies are set by the curriculum of General stream primary schools. These are given in Appendix- III.

Terminal Competencies set by the Madrassa Education Board is forty seven in numbers for the Madrassas at primary level. These are given in Appendix- IV.

In addition to fifty terminal competencies of General stream primary schools, more twenty two there are in Kindergarten stream. The additional twenty two are given in Appendix-V.

Terminal competencies set by the three systems are not all different. Twenty eight of these are common and are given in Appendix- VI.

The constitution of Bangladesh admits that the state shall adopt effective measures for the purpose of — "establishing a uniform, mass oriented and universal system of education".

Bangladesh government's major objectives and policy priorities are reflected in FFYP. Some key policy goals without a specific time frame are indicated in National Education Policy (NEP) 2000. NEP recognizes the existence of various forms of institutions and provisions at the primary level and recommended to take measures to establish a common system of basic education for all as stipulated in the constitution. Revision of curriculum to make them relevant to learners need is also proposed. NEP accepted the continuation of English medium private schools but proposes that 'uniform standards' of education through mother tongue should be practiced in all primary schools. The Madrassa should follow the 'new coordinated education program' with a common curriculum at the primary level. Assessment of the quality of primary education in local schools at the end of class V is also included in NEP. Strengthening of efficiency of primary education was also a goal of NEP 2000. There has been some debate in the media and in professional circles, especially in the area of primary education. There are different views about how these goals can be achieved effectively.

The mentioned recommendations of NEP are not getting implemented by the government accepted introducing coordinated examination at the end of class V under two different authorities — Directorate of Primary Education (DEP) and the Madrassa Education Board (MEB).

1.3 Literature Review

Research works on education problems began at the first half of the nineteen century. At the beginning, it was psycho-analytical in nature. Fisher (1864) is credited with the first application of quantitative methods in educational research who constructed objective measures of achievement. In fact, organized research on education started as early as 1888 under the guidance of Sir Francis Galton with the help of the members of the Teachers Guild of Great Britain and Ireland. The standard score and correlation graph devised by Galton (1883) formed the foundation of statistical methods in educational research. Coefficient of correlation formulated by Pearson (1896) strengthened it further. Thirty years after Fisher (l.c), Rice (1894) constructed a comparative achievement test which established objective measurement in education. Following the method of principle axes by Pearson (1901), factor model designed by Spearman (1904) in connection with a psychological problem opened the gate for statistical methods in educational research. Binet and Simon (1905) built the first intelligence scale. Thorndike (1900-27) is the pioneer of statistical research in education. Stone (1908), a student of Thorndike (l.c) formulated the first standardized achievement test. The first successful applier of experimental psychology on educational problem is Maumann (1907). Publication of Thorndike's (l.c) 'Handwriting scale' (1910) emancipated educational research from psychology which inspired Sir Jhon Adams (1912) to declare that education had captured psychology. Thus, at the beginning of the 20^{th} century, educational research transpassed to scientific stage with the simultaneous adaptation of (i) statistical methods in collecting and analyzing educational data and (ii) the techniques evolved in the

psychological laboratory. It is evident from the statement of problems in section 1, 2 that we are facing a multi-channel education at primary level which should be uniform and universal as per our constitution and national education policy. The major barrier on this way is the curriculum and terminal competencies of different streams.

Rugg (1917) and Nunn (1920) is credited for outlining the principles of collecting, analyzing and interpreting educational data, in particular, applied to curriculum research. At the outset of the third decade of the 20th century, a cold war began between the progressive and the conservative educations of Europe in designing curriculum. Progressive theorists demanded education for subsistence while the conservatives insisted education for the development of the human faculties of mind. After a long debate, Spencer (1929) made a compromise between the progressive and the conservatives balancing the thoughts by their degree of use determined by statistical method. We are facing a similar but not parallel problem as of Europe in the 20th century. They had curriculum problem but uni-channel education. We have the curriculum problem but in a multi-channel education. We are to modify our curriculum in a coordinated way to establish a uniform and universal education at primary level instead of multi-channel education.

> "Children Right Charter, 1989" adopted by the UNO advocated the achievement of Universal Primary Education (UPE) with the assumption of the existence of a uniform education system and set two targets for all children, everywhere, boys & girls alike will ensure
>
> - Enrolment in primary education

- Completion of primary education

Bangladesh is the first country in the world to launch food for education under, "Universal Primary Education Project"(1976) at Meher Panchagram in the district Chandpur by the effort of Dr. A. Satter and Dr. Elen Satter in joint collaboration of Education, Culture, Sports and Land Ministry, Local Government, Rural development and Co-operative Ministry. During this launching project enrolment of primary school aged children in primary schools was very poor and number of schools was not sufficient. As a result, the prime object of the project was to bring the school aged children in school and keep them in the school system. To bring most of the students eligible for going to school of the area of Meher Panchagram to school within June 1977 was the secondary objective of the project (Gupto-1978). This project was closed in 1980.

Bangladesh education sector review by Japan Bank of International Cooperation (2002) emphasized to take measures to establish a common system of basic education for all as stipulated in the constitution.

In USA, education is the responsibility of states and the states have made efforts to define the outcomes they seek from their education systems and popularly known as standards. Each state articulate their desired outcomes and provide flexibility to the districts, schools, administrators, teachers and students to meet the standards in ways that make the most sense given local circumstances. Generally, states are setting minimum standards that can be exceeded by local authorities, individual students.

Shahrin Monzoor and Dewan Muhammad Humayn Kabir (2008) investigated the disparities of different streams of primary education in

Bangladesh and recommended pathways for a unified system. This work was done under the banner of Unnayan Onneshan — The Innovators financed by Commonwealth Education Fund, managed by Action-Aid, Oxfam and Save the children. The authors have recommended unified systems of education at primary level but they have avoided the idea of universal primary education set by the United Nations (UN).

They have also investigated the disparities among different systems in terms of financial and other physical facilities, not in terms of curriculum and terminal competencies to earn.

At the beginning of the 20th century concept of educational efficiency was brought forward by Merium (1905) of USA. Educators felt ambivalent about the pursuits of efficiency in education. Some advocated that efficiency is a good and worthy goal; some others opposed it from the sense of worry that efforts to improve efficiency will ultimately undermine the high quality education. The concept of efficiency is connected to a moral imperative to obtain more desired results from fewer resources and the quest of greater efficiency is never over which is a source of permanent anxiety. Shannon (1936) concluded that education serves many outcomes from a variety of different combination of inputs such as teachers, buildings, class size, curriculum, etc. Directly measurable outcome of a school is the school final result and considered as the efficiency of the school. A large number of works relating academic achievement of students and their correlates are available in literature. Sheenan (1973) discussed the problem of educational efficiency. According to him, efficiency of a system, unlike an estimator or a test statistic is a complex thing and difficult to define. In practice,

education system has no single well-defined function as such no single defined indicator of output but academic achievement of students is a major one. Education for All (EFA), Jomtian Convention (1990) and Dakar convention (2000), along with other Millennium Development Goals (MDGs, 2000) emphasized quality education and measurable learning outcomes. European council, Lisbon (2000) considered (i) Overall education expenditure (ii) Per pupil/student expenditure (iii) Programme for International Student Assessment (PISA) testing results and cumulative expenditure per pupil (iv) Drop-out rate and (v) Average schooling duration as indicators of educational quality and efficiency.

Organization for Economic Co-operation and Development (OECD) countries in collaboration with World Bank (2003) considered (i) Average annual teacher's salary as compared to per capita GDP, (ii) Pupil – teacher ratio, (iii) Expenditure on teaching aid and co-curricular activities, and (iv) Average failures rate as the indicators of educational quality and efficiency.

In USA, (i) A relative mix of performance outcomes of standardized test scores and value added by schooling, (ii) The degree of performance across students, (iii) The level of capacity at which the system operates are considered as the indicators and measures of educational efficiency (Tayck, 1974).

Ruben Klein (1998), in measuring internal efficiency of Brazilian school system recommended the following indicators of efficiency (i) The enrolment by grade and age, (ii) The transition rates between grades, that is, the promotion, repetition and drop-out rates, (iii) The percentage of an age cohort which has access to school and at which age, (iv) The

percentage of a school cohort which concludes each grade and graduates, (v) What the students know and are able to do at each or some grades, (vi) The available resources to finance the system and how it is being spent.

A rich review of literature on the analysis of academic achievements is available in Mian (1983). It is evident from literature that impact of teachers, institutional environment, economic inputs and attendance of students are principal correlates of academic achievement as well as efficiency of education.

1.4 Research Gap

Bangladesh government set ten education commissions so far. Each of the commissions recognized the problems of multi-channel education and recommended for a uniform and universal education at primary level. Only a few commission suggested remedial measures to narrow down the gaps between the channels but not for a uniform system. The same thing is reflected in the National Education Policy (NEP) 2000. Bangladesh is a country of unique language. A uniform education should prevail here. But in reality, we have a multi-channel education which has significant historical back ground. History of education in Bangladesh is available partially in different works. A brief history of education in Bangladesh is necessary to being with this study.

A clear cut definition of Universal Primary Education (UPE) is not available anywhere. The indicators set by world bodies for UPE are applied to a uniform education, not for diverse multi-channel education. In addition to the indicators of world bodies, we are to search for criterions that would result a uniform education at primary level. Curriculum is the fundamental issue for all educational systems. Theories

available for curriculum construction are broad enough no doubt, but construction of curriculum for particular use through which a multi-channel education should be converted to a uniform one is a very tough job. Opinion survey is a general practice in curriculum practice. Question arises, who will survey of whose opinion? Who are the potential consumers of education? What is their demand in the learning perspective? Where do they differ? What is the degree of differences? How to compromise?

It is unfortunate to note that members of all the ten education commissions in Bangladesh were high level administrators and experts who had no access to the grass root levels. National education policy members are also of same category. Members of NEP meet several times with high level experts to prepare their recommendations but never with the teachers and guardians working at the grass root level. They never used any sampling design in meeting the experts and decisions are taken based on the opinion of a cluster of educationists without any feasibility study in respect of resources, facilities and acceptability without producing any fruitful results.

No systematic and deep rooted research is undertaken for a uniform and universal primary education in Bangladesh. A study on universal primary education in the context of Bangladesh and its demand may be carried out. The demand survey will dictate the barriers on way to switch over for a uniform primary education in Bangladesh.

An integrated curriculum interms of terminal competencies UPE model is necessary for a uniform education. It may be sorted out from the existing terminal competencies of different channels through opinion survey at the

grass root level using appropriate sampling design and statistical methods.

Efficiency of the developed UPE model with that of existing multi-channel of primary education in Bangladesh may be compared empirically through academic achievement of students by channels (streams) and for the total system. Channel bias in academic performance of students may be tested empirically.

1.5 Objective of the study

The term Universal Primary Education is told in different places. But what is meant by the term is not clearly explained anywhere. Even the explanation is not included in our constitution and UN charter. When any Govt. comes in power, they explain it in their own way. But it changes with the change of power i.e. the advent of another Govt. It started its journey at Meher Panchagram in the (Gupto, l.c) district Chandpur in 1976. The explanation given there is out-of-date in the context of present time.

Our education policy is formulated again and again by experienced persons, experts, institutions and white color people. But the compositors of this policy never tried to consult the general public who are the consumer of this policy regarding their hopes and aspirations that should be appended in the education policy and reflected in the curriculum. So their attainment from this policy is very limited. The number of research on curriculum at Primary level in Bangladesh is very much limited. General objective of the study is to see the socio-economic and educational attainment impacts of Demand for Universal Primary Education in Bangladesh. However, there are specific objectives to address the research title and those objectives are given below:

The objectives are:

(i) To discuss the History of primary education in Bangladesh.

(ii) To investigate the demand of Universal Primary Education in relation to Socio-economic and educational attainment of its shadow consumers.

(iii) To develop a model of Universal Primary Education in terms of terminal competencies in the light of our constitution and UN charter.

(iv) To study system bias of the streams in terms of terminal competencies.

(v) To study efficiency of UPE model with respect to the present curriculum in different streams and primary education as a whole in terms of terminal competencies.

1.6 Data and Methodology

This research is an exploratory study in nature. Both primary and secondary data sources and quantitative and qualitative data are used for the present research. Primary data is collected by the researcher using structured questionnaire consistent with the objectives of the study from the selected study respondents through established sampling designs. The secondary data sources are the policy and plans for universal primary education, annual reports of primary education published by Ministry of Primary and Mass education and Directorate of Primary Education, educational statistics, relevant books and journals, different reports of Govt. and NGO's, unpublished theses, reports of Bangladesh Bureau of

Educational Information and Statistics (BANBEIS) etc.; are extensively used in this study.

1.7 Scope and Limitation of the study

There are mainly three types of primary schools. The research work has addressed the General stream primary schools, Ebtedayee Madrassa and Kindergarten schools as the basis of our study. This study is limited on information or data based on one Upazila out of 500 Upazilas of 64 districts (Ali, AMM, S.,2006). It is a very small part of the huge store of information. It is a trifle effort of highlighting the universal picture of Primary education in Bangladesh. It was not possible to increase the area of data collection owing to the financial constraints and lack of time. This is the limitation of this research. But a hard endeavor is carried out to complete the underlying research within the timeframe. Departments of Statistics, Rajshahi University have enormous facilities in terms of seminar library, computer laboratory, website and supervisory academic staff to complete this research nicely.

A two stage stratified PPS sampling designed is used in this study.

Quantitative data collected from primary and secondary sources is edited and processed to minimize the error before analysis. Statistical tools such as proportion, mean, simple and multiple correlations, ANOVA are used for data analysis. Logit and ratio type models are tried for analyzing qualitative data. Results of data analysis are presented in tabular form as per convenience. SPSS (version-15.0) is used to enter process and analyze data.

Causal comparative analyses are used for interpretation of findings to infer the causations and develop a synthesis of the research. Results and

findings are discussed at the end of each chapter and woven together at the end of the thesis in chapter eight — Concluding Remarks. Details of sampling design, methods used in analyzing and interpreting results of analysis are given in chapter three — Data and Methodology.

CHAPTER TWO

History of Education

2.1 Introduction

Present Bangladesh – the erst while East Pakistan is a part of Pakistan: while Pakistan is a part of the Indo-Pak sub-continent. Hence all the early history of this region is very much related with the history of the sub-continent.

Most of human history lies in prehistory, the period before the use of writing, and before written history. Throughout pre-history, most education was achieved orally and through observation and imitation. The origin of our species, thought by many anthropologists to has been around 200,000 years ago. Until about 10,000 BC, most humans lived as hunter-gatherers. Some were settled in a given local/region and others exhibited a nomadic life style across a large territory. These bands or tribes had traditions, beliefs, values, practices and local knowledge which were passed orally for generations from person to person. The young learned informally from their parents, extended family and kin. At later stages (Hughes, Paul; More, Arthur J-1997) of their lives, they received instruction of a more structured and formal nature, imparted by people not necessarily related, in the context of initiation, religion or ritual.

Some forms of traditional knowledge were expressed through stories, legends, folklore, rituals, and songs, without the need for a writing system. Oral tradition, oral culture and oral lore are messages or testimony transmitted orally from one generation to another (Vansina, 1985). The messages or testimony are verbally transmitted in speech or

song and may take the form, for example, of folktales, sayings, ballads, songs, or chants. Communities grew larger, there was more opportunity for some members to specialize in one skill or activity or another, becoming priests, artisans, traders, builders or laborers. Many skills would have been learned from an experienced person on the job. The increased size of communities also brought changes to methods of leadership, politics and organization, together with early institutions. A person's social class, caste or gender might in turn determine or limit the occupations which he or she might follow and the education that he or she would receive. Before the development of writing, it is probable that there were already epic poems, hymns to gods and incantations, and other oral literature. In ancient India, the Vedas (Mookerji, 1990) were learnt by repetition of various forms of recitation. By means of memorization, they were passed down through many generations. According to Kendall D, Murray J & Linden R (2004) the passing on of culture is also known as enculturation and the learning of social values and behaviors is socialization.

2.2 Vedic Period (BC 1500 - 600)

In ancient India, during the (Sharma & Sharma, 2004) Vedic period from about 1500 BC to 600 BC, most education was based on the Veda (hymns, formulas, and incantations, recited or chanted by priests of a pre-Hindu tradition) and later Hindu texts and scriptures. Vedic education included: proper pronunciation and recitation of the Veda, the rules of sacrifice, grammar and derivation, composition, versification and meter, understanding of secrets of nature, reasoning including logic, the sciences, and the skills necessary for an occupation.

Some medical knowledge existed and was taught. There is mention in the Veda of herbal medicines for various conditions or diseases, including fever, cough, baldness, snake bite and others. Education, at first freely available in Vedic society, became over time more discriminatory as the caste system, originally based on occupation, evolved, with the Brahman (priests) being the most privileged of the castes. The oldest of the Upanishads - another part of Hindu scriptures - date from around 500 BC. These texts encouraged an exploratory learning process where teachers and students were co-travellers in a search for truth. The teaching methods used reasoning and questioning. Nothing was labeled as the final answer. The Gurukul system of education supported traditional Hindu residential schools of learning; typically the teacher's house or a monastery. Education was free, but students from well-to-do families paid "Gurudakshina," a voluntary contribution after the completion of their studies. At the Gurukuls, the teacher imparted knowledge of Religion, Scriptures, Philosophy, Literature, Warfare, Medicine, Astrology, and History. The corpus of Sanskrit literature encompasses a rich tradition of poetry and drama as well as technical scientific, philosophical and general Hindu religious texts, though many central texts of Buddhism and Jainism have also been composed in Sanskrit.

According to Dr. A. S. Altekar (1965), “Home, of course, was the main Centre of the education of girls in the domestic science. Women were taking part in every ritual with their husbands. Education of girls was looked after in the same way as that of the boys and many amongst them gained highest education. These were called ‘Brahman Vadini’ and achieved the status of ‘Rishika’. Some of the woman were regarded as

'Devis', women even composed hymns. Apala, Homasha, Shashpati, Ghoshala, Mamata, Lopamudra were notable among Vedic scholars."

Women were also given practical and useful education such as spinning, weaving, etc. which is mentioned in 'Rigveda' and 'Atharvaveda'. Word 'Duhita' used for daughter is derived from 'Duh' root and means one who milks the cows, etc. Thus it is clear that women were given 'Shastriya' as well as practical education.

2.3 Buddhist Period (BC 600 - AD 800)

The aim of education, according to Buddhist system, was to influence the younger sections of society according to the Buddhist thought. To fulfill this primary aim, its secondary aim was to train monks and nuns for the purpose. Therefore, the system had a missionary aim. However, gradually the monastic schools admitted even the lay students. In concurrence with the above mentioned aim of education the Buddhist system developed a curriculum around Buddhist religion. However, gradually it also included comparative study of Hinduism and Jainism. The curriculum which initially included theology, philosophy and logic was gradually extended to Sanskrit literature, astronomy, astrology, medicine, law, polity, administration, music, art and technical education concerning so many trades. Thus the curriculum of the Buddhist universities was almost as much versatile and varied as any of the modern university. Therefore, the institution used to attract students not only from all parts of India but also from distant countries such as Korea, China and Tibet. At that time of 'Pabbaja' the new monk of 8 years would go to the teacher and say with folded hands, "You are my teacher (Guru)". Thus their relationship was established. The 'Upasampada' was performed before the entire 'Sangh'.

Therefore, 'Upasampada' was given unanimously or on the decision of the majority. The medium of Buddhist education was the common language of the people. Lord Buddha himself gave his teaching in local languages. These replaced Sanskrit in Buddhist education. Yantra-Mantra-Tantra, etc. were prohibited in Buddhist education. Only those people were admitted in Buddhist sanghs who had renounced the worldly attractions and accepted the life of a monk. They were educated in Buddhism.

The first millennium and the few centuries preceding it saw the flourishing of higher education at Nalanda, Takshashila University, Ujjain and Vikramshila Universities. Amongst the subjects taught were Art, Architecture, Painting, Logic, Mathematics, Grammar, Philosophy, Astronomy, Literature, Buddhism, Hinduism, Arthashastra (Economics & Politics), Law, and Medicine. Each university specialized in a particular field of study. Takshashila specialized in the study of medicine, while Ujjain laid emphasis on astronomy. Nalanda, being the biggest center, handled all branches of knowledge, and housed up to 10,000 students at its peak. Nalanda was a Buddhist , (Garten, Jeffrey E., 2006) center of learning founded in Bihar, India around the 5th century AD and conferred academic degree titles to its graduates, while also offering post-graduate courses. It has been called "one of the first great universities in recorded history". Vikramshila University, another important center of Buddhist learning in India, was established by King Dharmapala (783 to 820) in response to a supposed decline in the quality of scholarship at Nalanda.

2.4 Muslim Period (AD 1200 - 1760)

The period between 750 and 1200 is referred to as an early medieval period of Indian History. It was earlier treated by historians as a 'dark phase'. It was so because during this time the whole country was divided into numerous regional states which were busy fighting with each other. In fact, some best specimens of temple architecture and Indian literature belong to this period. Thus, far from being 'dark' it may be treated as a bright and vibrant phase of Indian history. Muslim connectivity to large sub-continent began with the fall of Sind (712) defecting King Dahier by Mohammad-bin-Quasam a great commander of Hazzaj-bin-Yousuf.

Independent Muslim government was established by a freed slave Qutub-ud-Din Aibak (1206-1210). Slaves were actually bought by Mohammad Ghauri who provided the best available education and training to selected slaves who later on conquered and took the rule of India in their(Nizami, 1958) hands. Almost all the Muslim rulers of the sub-continent were lover of education. Each of them contributed towards the expansion of education, basically religious education. In the Muslim world, Bagdad was the highest seat of bearing where Dars-i-Nizami curriculum of education was developed. At the fall of Bagdad due to repeated attack of Moughals, a substantial number of scholars from Bagdad migrated to India. Muslim rulers embraced then with great honor and established a large number of Madrassa at Delhi, Agra, Raiberily, Jaunpur, Kanpur and other parts of the sub-continent.

The aim of education during the Muslim period was the extension of knowledge and the propagation of Islamic principles, laws and social conventions. Education was based on religion with to make persons

religious-minded. The Muslim education also aimed at the achievement of material prosperity.

Education was organized in 'Maktabs' and 'Madrassa'. Primary education was given in 'Maktabs' and higher education was given in 'Madrassa'.

In the Muktab children of all people were given primary education. Along with religious education they were also taught reading, writing and arithmetic. The children of rich people generally did not attend Maktabs. Their parents used to make private arrangement at their homes for their education.

At first reading and writing were taught in the Maktab. Then the child was taught arithmetic and a certain portion of Koran. He was not expected to know the meaning of Koran; it was enough for him to memorize it. When the child was fully acquainted with the Persian script, he was taught its grammar. Then he was taught some love literature of Persian, e.g., Laila-Majanu and Yusuf-Julekha, etc. General practical education was also given in Maktabs. Letter writing, writing applications and accountancy were taught. Hindu boys could also be admitted in Maktabs.

The children of royal families were taught in palaces under the strict control of Maulavis. The princesses were taught Arabic and Persian and Islamic religion. Besides, they were also taught political science, law jurisprudence and military science in order that they could be able administrators. It was compulsory for princes to receive military training. Thus the children of the higher class people were given both theoretical and practical education.

After completing the primary education, the children were sent to 'Madrassa' to receive higher education. Hence there were separate teachers for different subjects. Special emphasis was given to the education of religious as well as secular subjects. The religious education included the study of 'Quran', 'Haditch', Islamic laws and Islamic history, etc. The secular education included the study of Arabic literature, Grammar, History, Philosophy, Mathematics, Geography, Politics, Economics, Greek language, Astrology and Agriculture, etc.

During the Muslim period education received a great patronage of state. The Muslim rulers established many Maktabs, Madrassas, Libraries, etc., and patronized many scholars. They also granted scholarships to many students.

Oral education and memorization of the assigned lessons were the chief methods of teaching during the Muslim period. The Muslim students were required to memorize certain portions of Holy Koran. Writing and Arithmetic were also taught in some Maktabs. There was no university in Muslim education. Education imparted in 'Maktabs' and 'Madrassa' had the stamp of religious orthodoxy. Hence Hindus were not interested in it. The provision of higher education was only for higher and middle classes. There were no means for imparting higher education to the children of common people. Arabic and Persian languages had been adopted as media of instruction and the vernacular languages had been altogether neglected.

Maktabs used to fulfill religious objective of education. But in the Madrassas, practical affairs of life were also attended too along with religious objective of education. Akbar tried to give a practical shape to

education in an unprecedented manner. But education remained religious in spirit and form in spite of his efforts. After completing Maktab education one could go for higher education in a Madrassa. Islamic religion was compulsorily taught to all the students though Akbar stopped this tradition of compulsory Islamic education to all. He provided study of Hindu religion and philosophy also in many Madrassas. He provided books for the same in some Madrassas of his days. But the Muslim students were compulsorily taught Muslim religion, Sufi philosophy and sermons ascribed to Muslim prophets. A Hindu was also free to study Muslim religion and philosophy. Akber introduced the study of medicine, history, geography, economics, political science, philosophy, astrology, law and mathematics, etc. He made the study of Vedant, Jurisprudence and Patanjali compulsory for Sanskrit students. In his famous book "Aine-a-Akbari" Abul Fazl has described the educational system introduced by Akbar. Aurangzeb understood the importance of practical education. Some person was appointed in the Muslim courts to record historical events from time to time. Because of this tradition many Muslim rulers have themselves written their autobiographies which are still preserved as precious historical documents. Law in those days was based on religious practices. So the study of religious principles was in a way education in law. As some Muslim rulers were interested in music also, so provision was made for education in music as well.

In order to ensure the maintenance of institutional discipline, the teachers were empowered to give different types of physical punishments to the students.

There was also the system of giving degrees after the completion of education. The students, who acquired special knowledge in religion, were given the degree of 'Alim'. The students completing the education of logic were conferred the degree of 'Fazil'.

Although there was 'Pardah' system during the Muslim period, yet Islam did not oppose the education of women. These two contrary factors influenced the education of women in two ways. The girls were entitled to receive education equal to that of the boys up to a definite age but thereafter their education was stopped. However, the girls of higher classes used to continue their studies at home.

Muslim rulers were often engaged in had to wage constant wars. Keeping this situation in view provision of military education was made compulsory.

Muslim education was compulsory, especially for boys, proper co-ordination between religious values and material or worldly needs and well-being, great stress was laid on character building, personal touch between the teacher and the taught, curriculum included arrangement for the teaching of various subjects, great stress was laid on practical utility. There was arrangement for rewards and scholarships for meritorious and intelligent students. This provided an incentive to leadership and education. Under Muslim rulers, through educational system, a good deal of development of literature took place. The education during the Muslim rule was mostly free. During this period, the tendency to write history was developed. This tendency was different from the tendency of the ancient India. It helped preservation of record. And great attention was paid towards establishment of educational institutions. Prosperous people

were encouraged to establish institutions. There were Centre's of specialized education.

Indigenous education was widespread in India in the 18th century, with a school for every temple, mosque or village in most regions of the country. The subjects taught included Reading, Writing, Arithmetic, Theology, Law, Astronomy, Metaphysics, Ethics, Medical Science and Religion. The schools were attended by students' representative of all classes of society.

2.5 British Period (AD 1760-1947)

Actually Britishers came to India for (Singh, Y. & Nath, R., 2007) trade in the year 1600. At that time, there was a net-work of large number of schools all over the country which were mostly single teacher schools with multiple class teaching.

The educational system which the British introduced in India is known as the modern education. Under this system greater emphasis was laid on the teaching of English language and its literature and the study of Indian languages were generally neglected. Now on wards the study of such languages as Arabic, Persian and Sanskrit was left to the individual efforts of the people themselves. Moreover, the modern education was based on logic and scientific research rather than on faith and ritualism (Padmanabhan, 2011). As a result, Mosque and temple based schools were automatically closed in absence of patronage. In the same ground, renowned Madrassas were closed except Darul-Ulim Deobond.

In October, 1780 Calcutta Madrasa followed by Sanskrit college was established on the personal initiative of the Governor-General Warren Hastings on political grounds (Kochhar, 2011).

In 1792, Jonathan Duncan a Resident of Benares took special interest in spreading education and started several English schools and colleges were English was taught and established the Wilson College at Bombay, the Christian College at Madras and the St. John College at Agra. Some progressive Indians like Raja Ram Mohan Roy also started English schools and colleges here English was taught (Padmanabhan, l.c).

The Charter Act 1813 was considered to be one of the landmark legislation with regard to educational development in British India. This is also the first time the company started looking and moving toward taking responsibility in the domain of education. The Charter Act of 1813 gave permission to Christian missionaries to work in India and spread education.

The East India Company first recognized their responsibility towards education in British India in the Charter Act of 1813, where they highlighted the need to promote and uplift oriental languages and literature as well as increase the knowledge of western sciences among the Indian population (Kumar, 1991). Thomas Macaulay (1800-1859), a member of the Governor General's Council, supported the education of the upper classes, and made a vigorous plea for spreading Western learning through the medium of English (Ghosh, 1993). Consequently in 1837, English was made the language of administration. As a result of the new policy there was a rapid growth in English schools and colleges (Seal, 1968) and English as the medium of instruction began to dominate

the entire educational field (Roy, 1993). The indigenous educational institutions had to go through hard times due to financial crisis and the English domination (Chatterjee, 1976). Most importantly, English became a compulsory subject in high schools, for matriculation and a requirement for university and college admissions (Mukerji, 1956). However, at the beginning of the nineteenth century a system of liberal English-language schools based on the British model was also instituted in the region that now constitutes Bangladesh (Ali, 1986). Giving attention and importance to secondary education system and for its expansion, the British established 12 Zila schools and 3 collegiate schools (Public schools) in present Bangladesh land area during the years 1832-55.

William Adam's three reports (1835, 1836 & 1838) show the opening stage for overall educational developments (both vernacular and English) in Bengal. In his reports Adam made some valuable recommendations. The colonial government paid lip-service to the importance of vernacular education but refused to act on William Adam's plan to improve the indigenous schooling system. Despite the (Rabbi, A F M Fazle, 2007) unwillingness of the government, some private individuals and societies; missionaries, chaplains, zamindars, and British officials; acting in their personal capacity, came forward for providing basic education to the youngsters. Sometimes individual officers of the company gave some encouragement to education here and there, and used public fund for the purpose. Average age of (Singh & Nath, l.c) admission was 8 years and that of leaving school was 14 years and the average pay of teachers was Rs. 5 to 8 per month. Female education was practically non-existent.

Some educational institutions were established mainly by missionaries in different areas of Bengal. There were also few Bengali schools established in Chittagong, Dinajpur and Jessore districts during the same period. The missionaries emphasized that a sound education must start with teaching the pupils effectively to read and write their mother tongue (Laird, l.c).

Macaulay who had some other plan in his mind opposed Adam's plan vehemently and he wrote a very (Singh & Nath, l.c) scathing criticism of that plan, consequently when this plan was submitted to the Government, it was rejected by Auckland a representative of the progressive Indians, made efforts so that a decision was taken in 1835 to promote the teaching of Western sciences and literature through the medium of English alone. Wilson and Several Indians opposed this decision but Lord William Bentinck upheld the Macaulay view and another important step was taken to encourage English learning in 1874, when it was decided during the period of Lord Harding, that only those Indians who had sufficient knowledge of English be appointed on Government jobs. Even the meager amount of one lakh set aside for educational purposes could not be spent till 1833(Padmanabhan, l.c).

The government's attempt served the rich and high class because most of the schools were established in cities, towns and important commercial places (Basu, 1941). Moreover, a large number of indigenous elementary schools in the rural areas gradually withered away as a result of the neglect to which they were subjected on the plea that they were not efficient enough to serve a useful purpose.

In July 1854, the Court of Directors of the East India Company sent a 'despatch' to the Governor General of India in Council suggesting the establishment of the Universities of Calcutta, Madras and Bombay. In pursuance of the despatch, the University of Calcutta was founded on January 24, 1857. The function of the University were granting affiliation to colleges, inspecting the affiliated colleges and raising their standards of teaching, examining the students of the colleges and awarding degrees to them, and organizing departments of Arabic, Sanskrit and Persian. The Despatch recommended for opening of more and more elementary schools in every district and for improving those indigenous schools that were imparting elementary education to the children and for granting scholarships to the capable students so that they also may be able to go higher upon the education (Singh & Nath, l.c). "Wood's Despath is said to be the corner stone of Indian education. It is said have laid the foundation of our present system of education." (A.N. Basu) "The Despatch was a statement like document wisely worded and wide in outlook and the suggestions contained therein were quite sound. It did layout a plan for a comprehensive system of education for this country."

Lord Rippon appointed the first Indian Education Commission in 1882 under chairmanship of Sir William Hunter; key recommendations: Special attention to primary education, encouragement of indigenous education, Secondary education (at least one model high school in each district), Bifurcation of secondary education, forbade religious education (Jayapalan, l.c).

Lord Curzon appointed Indian (Krishnaswamy & Krishnaswamy, 2006) University Commission, 1902, to enquire into the condition and prospects

of the universities; finally passed Indian University Act in 1904 which made the condition for recognition and affiliation rigorous. Lord Curzon's view in Primary and Secondary education was reflected in the Resolution of Govt. on Educational Policy (1904). Gaekwar of Baroda introduced compulsory education throughout State in 1906. The Govt. Resolution on Educational Policy, 1913 state that local govt. should extend the application of the principle of free elementary education for the poorer and more backward sections of the population. The Bombay Legislation Council was the first to pass the Bombay Primary Education Act, 1918, which was followed by other provinces. The expansion of primary education was very rapid in the quinquennial 1922-27.

The Government of India Act, 1919 decided to make education mainly a provincial and a transferred subject and to limit the 'control' of the Central Government over it to the minimum. Under the Govt. of India Act, 1919, the Indians first obtained the control of education department. This recommendation made the adoption of the recommendation of the Calcutta University Commission all the more imperative and accordingly, a Central Advisory Board of Education was set up in 1920 under the chairmanship of Education Commissioner to the Government of India. It is a good deal of useful work but owing to a financial crisis calling for drastic retrenchments was abolished in 1923.

On November 8, 1927, the British government announced the appointment of Simon Commission. Under the Simon Commission, an auxiliary committee under the leadership of Mr. Hartog was formed to enquire into the status of education in India. Hartog committee submitted its report in 1929. While presenting the educational progress during 1917-

1927 along with other prevailing situation, it also insisted that too much attention is devoted to higher education and primary education was relatively neglected (Hartog, 1929).

In August 1935, the Government of India Act (Mukerji, S., 1974) emerged after the long process, which started 8 years earlier with the appointment of Simon Commission in 1927. By then, Gandhi had suggested a scheme of universal compulsory education for all children in the age group of 6 to 13 years through the medium of their mother tongue and also that vocational training should be a part of the school education. The Central Advisory Board of Education, was revived in 1935 and has been in existence ever since. In 1936, CABE instituted Abbot and Wood Committee on Vocational and General Education.

The first Congress of National Education was called at Wardha on 22nd and 23rd October, 1937 to discuss Basic Education System. Zakir Hussain Committee submitted report known as Wardha Scheme of Basic Education. The plan of Post-War Educational Development in India prepared by the Central Advisory Board of Education, popularly known as the Sargent Plan (1944), adopted the scheme of Basic Education with some modifications. "Plan of Post-War Educational Development" (1944) was the first document that visualized a national system of education.

After the Second World War, the Sergeant Commission Report (1944), for the development of education was published. It was the first report to recognize pre-primary education. As the British rule ended in 1947, the Sergeant Commission Report remained unimplemented (Primary Education, 2003).

With the end of the British rule in 1947, the sub-continent was partitioned into two independent countries, India and Pakistan. Bangladesh became one of the provinces of Pakistan and was named as East Pakistan. There was a general awareness of the need to restructure the education system to meet the needs of the new nation.

2.6 Pakistan Period (AD 1947-1971)

14 August, 1947 the time establishment of Pakistan, splitting off from India. The Muslim majority province of East Bengal (subsequently East Pakistan) joined Punjab, North-West Frontier Province, Sind and Baluchistan to form the undivided Pakistan.

The evolution of education policy and planning in Pakistan can be traced in various national education commissions and five-yearly plan documents. Following the Pakistan Education Conference held in 1947, the policy of Universal Primary Education (UPE) was adopted in principle.

In line with the central government, the government of the then East Bengal introduced compulsory primary education in the province in 1947; but the scheme was suspended in 1953 and finally abolished in 1957 (Khatun, 1992).

Despite the fact, the government initiated various experiments regarding primary schooling, and amended the Bengal (Rural) Primary Education Act in 1951. In order to make primary education compulsory, the government selected 5000 primary schools in the rural areas to be run as ‘compulsory primary schools’, and the rest were to operate as ‘non-compulsory primary schools’. As a result of split of the primary schools into ‘compulsory primary schools’ and ‘non-compulsory primary

schools', discontent spread amongst the teachers. The government, therefore, in 1957 renamed the 5000 compulsory primary schools as 'Model Primary Schools', and the rest as 'Non-Model Primary Schools'.

So far, government gave emphasis on universal access to primary education in the First Five Year Plan. In an attempt to increase student's enrollment in the schools, the government enhanced educational facilities and increased allocations for the development of the primary education in the Second and Third Five Year Plans. Besides, government arranged national conferences and established various education commissions. November 27th to December 1st in 1947, First Education Conference held in Karachi and the Second Education Congress was also took place in Karachi from 4 – 6 December in 1951. In the following year, primary education was made a 5-year program instead of its earlier 4 year term. The government simultaneously formed four Education Commissions named viz. (i) Maulana Akram Khan was established in 1949, (ii) S M Sharif was established in 1958, (iii) Justice Hamidur Rahman was established in 1964 and (iv) Air Marshal Noor Khan was established 1969 respectively. Maulana Akram Khan Commission recommended that within the next 15 years, primary education should be an eight years course, and liberal promotion on the basis of age should be introduced. But various recommendations along with these recommendations were not implemented later on. In 1959, Sharif Commission, emphasized on the proper learning of the national language at the primary education and set realistic aims for a five year course (Sharif Commission Report. 1959). Hamoodur Rahman commission (1966) appreciated the importance of religious and moral education (Rabbi, l.c).

However, the efforts and expenditures of the decade 1947-57 failed to produce the desired results. A review of the decade long efforts (Bengali, K. 1999) showed that the literacy rate actually remained unchanged or declined, albeit marginally. "At the end of 1950's, the literacy ratio went down by 0.1% from 16.4 percent in 1951 to 16.3 percent after a decade". The failure was attributed to the fact that "the administrative and organizational arrangements were unstable."

Under the Pakistan government, the then East Pakistan faced serious inequality in all sphere of primary education. This disparity was due to poor allocation of funding, non-fulfillment of commitment and introducing policy against the secular aspirations of the Bengali people. Statistics from the Central Bureau of Education of Pakistan in 1969 showed the disparity of growth of the primary schools in two wings of Pakistan.

The 1970 Education Policy (Hossain, M.M., l.c) reaffirmed the government's commitment "to the objective of universal elementary education" accepting it as a "basic principle of State Policy in the Constitutions of 1956 and 1962", and of "the Karachi Plan of 1960 (which) proposed ... compulsory, universal and free primary education as a target for 1980." However, it also lamented that "the attainment of the goal ... seems to have receded further and further with the lapse of time and Pakistan today has one of the highest rates of illiteracy in the world". The policy was never implemented on account of the war with India, secession of East Pakistan, and the collapse of the military government.

2.7 Bangladesh Period (AD 1971 to ---)

The people fought a glorious war to win Independence in 1971. Bangladesh inherited, on Liberation in 1971, a literacy rate of 17.61 per

cent of the population of all ages (GoB, 2004a). The Constitution of the independent Bangladesh states that primary education shall be the responsibility of the State. Recognizing primary education as a national responsibility of the Government, and recognizing the fundamental rights of the people to education ushered in a new time in Bangladesh.

In 1948, there were about 29,633 boys & girls primary schools where 4777 girls primary schools in the region of Bangladesh. The number decreases to 29125 boys & girls primary (Statistical Pocket Book of Bangladesh, 1978) schools where 1393 girls primary schools by 1971. After emergence of Bangladesh the growth was faster. The yearly growth rate was 7.7 percent during 1972-76, but growth in the number of schools slowed down during 1981-90 to less than one percent per annum. The growth rate accelerated again to rise to 4.1 percent during 2000-03 (Ahmad, M., 2009).

The first Education Commission in Bangladesh appointed under Dr. Qudrat-e-Khuda submitted the report in 1974. The report emphasized on secular education at all level, future work-relevant technical and vocational education, improved assessment system, letter grading in the assessment of student performance in all stages of education and making primary education from grade 1 to 8 and secondary from grade 9 to 12 (GoB, 1974). The report firmly asserted that women's education should be such as to be of help to them in their domestic life, and stressed that subjects such as child-care, the nursing of the sick, preservation of health, food and nutrition must be included. It also suggested that girls should be channeled into 'vocations especially suitable to them', such as primary-school teaching, nursing and typing (Jalaluddin & Chowdhury, 1997).

Khuda Education Commission was formed to recommend objectives, strategies and action plans for creating a modern education system suited to the needs of an independent nation and compatible with the systems of the neighboring countries. The report of this Commission in 1974 outlined the following objectives for primary education: To develop and nurture the child's morals, mental and social personality; To bring up the child as a patriotic, responsible, inquiring and law-abiding citizen, and develop in him/her love for justice, dignity, labor, proper conduct and uprightness; To learn to read and write in the mother tongue, and to be able to count and calculate; To be able to acquire the fundamental knowledge and skills needed for a future citizen; To prepare for next stage of higher education. Education is vital for the purpose of satisfying the aspirations of a new nation. In view of the objectives, the Commission placed before the Government the following recommendations for the development of primary education: Introduction of universal Primary Education up to Class- VIII; To attract a greater number of female students, appoint female teachers the primary level; if needed build girl's schools; Implementation of Compulsory Primary Education by 1980 and extension of primary education up to Class-VIII by 1983; Adoption of effective measures for prevention of dropouts. Introduction of an attractive curriculum, development of appropriate textbooks and creation of proper environment in schools; Introduction of a uniform system of education that must be scientific, realistic, and compatible with social conditions and environmental needs; Introduction of pre-primary education; Expansion of teacher-training system, development of appropriate textbooks; Setting up Primary Education Academy and a National Primary Education Board (GoB, 1974). It may be mentioned

here that all of the commission's recommendations were not implemented.

But the Government nationalized 36,165 primary schools in 1973 under an Act named Primary Education Taking Over Act and declared 1,57,724 teachers of those schools as government employees. From then on, strengthening and improving primary education management became a part of the state's responsibilities, and planned steps were gradually taken for the development of primary education (Primary Education in Bangladesh-2003).

However, the government simultaneously adopted various programs and these were addressed in the first five year plan (FFYP). The first five year plan (1973-78) proposed projects to reconstruct the schools, establishment of 5000 new schools, increase enrollment in the primary schools from 58% to 73%, reduction of dropout rate from 63% to 52%, development of PTIs, revision of curriculum, introduction of staggered system of existing schools etc. (FFYP, 1973). Under the FFYP 18.8% of the education budget were allocated to primary education but less than one half of total amount were actually utilized and funds were diverted to the higher levels (Gustavsson, 1990). Consequently, physical targets of the FFYP were not achieved, dropout rate were not reduced, and only 50% of primary schools to be constructed were completed.

Next, the President Ziaur Rahman government eventually adopted some major policy reforms in primary education. Under Two Year Plan (TYP, 1978-80), government took a notable initiative, the significant aspect of which was the establishment of National Academy for Primary Education (NAPE) and development and reconstruction of 52 PTIs (TYP, 1978).

Government decided universal primary education as a goal of education and there was no drop out in the official records (Sattar, 1982). The universal primary education along with abolition of illiteracy was included as the two basic goals of the government. It was vehemently emphasized that every child who enrolls in class-I passes through all classes and completed class-V.

An Advisory Committee was appointed in 1978 to have a fresh look at the issues and problems of education (Shahadat, 1999) which submitted an 'Interim Education Policy 1979' report on 8th February, 1979. The interim education policy document consisting of the recommendations of the National Education Advisory Council, headed by the State Ministry of Education, was hastily formulated as a new blue print for the education sector. The interim policy document put emphasis on increased literacy so that people could take part in the development of the country. The document established the current educational framework with secondary education consisting of three sub-stages; these are - (i) junior secondary (3 years), (ii) secondary (2 years), and (ii) higher secondary (2 years). In addition, the document stipulated the following: "(a) terminal examination will be conducted by the District Education Authorities for all stages of secondary education; (b) vocational, technical, agricultural and medical education will be included and integrated into secondary and higher secondary education; (c) there will be provision of skills development in any technical subject at junior secondary and secondary levels." In regard to Madrassa education, the 'Interim Education Policy' stipulated that it should be reorganized to ensure its equivalence to general education in such a way that the 'dakhil' level would correspond to secondary and 'alim' to higher secondary education (GoB, 1979). The

Madrassa Education Ordinance was also issued in 1978 and in 1981, Govt. introduced, for the first time, service rules and salary subvention system for teachers and staffs of private secondary institutions.

The Second Five Year Plan (SFYP, 1980-85) marked the beginning of prospective plan for Universal Primary Education (UPE) with a goal of enrolling 91% of the primary age group by 2000. The target required a compulsion of about 75% of the primary school age population enrollment by 1990, and subsequently increasing it to 91% by 2000 (Primary Education, 2003). These targets also raised the government obligation of hiring an additional 49000 teachers would have to be hired 128000 classrooms constructed and about 45 million textbook produced and distributed by 1990. The government cautiously went in advance with the UPE project using financial and technical assistance from IDA, UNDP and UNESCO. The important achievements under SFYP were establishment of Directorate of Primary Education (DPE) in 1981, creation of 1834 posts of Assistant Upazila Education Officer (AUEO) and 500 posts of female teachers, free supply and distribution of textbooks among students by 1985, creation of infrastructural facilities for schools (SFYP, 1983). The improvement outlays for primary education under the SFYP were not seen as feasible. The government therefore scaled down the ambitious program to fit more closely with resource availability and absorptive capacity (Rabbi, l.c).

The Second Five Year Plan acknowledged the need to decentralize the administration of education, especially for primary education. In one of the major policy drive, the government intended to decentralize the primary education structure with control and management of schools to

vest almost entirely in local management committees, which were to be formed at the village level (Sattar, l.c). Zia government also passed the Primary Education Act 1981 and made provisions for the establishment of local education authorities at the district. In 1981, a separate Directorate of primary education was created with structures spread at Thana level. The Act also provided for school based management and the formation of the school management committee (SMC).

Under Ershad regime, the government's strategy for achieving UPE remains essentially the same, but emphasis was given to strengthening institutional capacities, increased community participation and low cost solutions to provide education opportunities. These policies were largely influenced by the Ninth Regional Consultation Meeting of Asia and the Pacific Program of Educational Innovation for Development (APEID) in 1984. They emphasized resource allocation based on (UNESCO, 1985) demand and supply, utilization of education facilities, provision of incentives, separate schools for girls, feeder schools, non-formal education, support and training of women teachers, curriculum development, distant learning, early childhood education, community participation, use of mass media and the role of women's organizations. The Ershad government promised to reciprocate all these suggestions on a national scale during the third five year plan period.

The Third Five Year Plan (TFYP) (1985-90) is the second five year investment program of the prospective plan period. The aims of TFYP included raising student enrollment from 60% to 70%, ensuring retention of the enrolled students, reconstruction of 9285 schools, repair of 16257 schools, supplying limited quantity of furniture and educational materials,

reviewing, restructuring and revising curricula and syllabuses and establishing management information system (Third Five Year Plan, 1985). In this plan emphasis has been laid on strengthening institutional capacities, increased community participation and evolving low cost solutions to provide educational opportunities (SAARC Countries Workshop, 1986). The objectives and targets of this plan were only partially achieved. Nevertheless, before its ouster the Ershad government passed the Compulsory Primary Education Act, 1990. Subsequently, a high priority has been accorded by the government in the 1990s to the goal of achieving universal primary education.

The Fourth Five Year Plan (1990-95) gave importance to the primary and mass education and education was identified as a vehicle for the development of human resources. A significant policy undertaken in the fourth plan was to make primary education compulsory. The other important goals were as follows: Ensuring efficient use of existing facilities and safeguarding regional parity while creating new opportunities in primary education, increasing participation of girls in primary education, Ensuring improved in-service training for primary school teachers, reforming primary education curriculum, introducing academic supervision and administrative inspection, filling up 60 % vacant teacher's position from among women and relaxation of qualification for women candidates (Fourth Five Year Plan, 1990). To improve the quality of primary education, three major projects were undertaken that included development of primary education in Dhaka, Rajshahi and Khulna divisions; ADB funded development of primary education in Chittagong, Barisal and Sylhet division.

In order to implement the constitutional provision for free, universal and compulsory education, Khaleda regime launched the Universal Primary Education Program during the early 1990s. During 1990-2000, compulsory primary education for every child is being introduced with a full coverage by year 2000. Important measures taken to expand and improve primary education in the early 1990s include: introduction of the law on free and compulsory primary education; free textbooks for all children in primary school; food for education that provides a food ration to 20% of the poor primary school children in rural areas. It was declared that no child be deprived of education for lack of teacher, learning materials and adequate space; no child be subject to disparities of access to primary education arising from gender, income, family, cultural or ethnic differences and geographic remoteness (EFA, 2000).

March 1990, Bangladesh became an enthusiastic signatory to the World Conference Education for All (WCEFA) framework at Jomtien, Thailand; where the world community has strongly backed the goal of "education for all" at global gatherings (Monzoor, 2008). The international obligations raised by the donor communities were instrumental in bringing about major policy shifts in primary education in 1990.

After coming to power Hasina regime adopted various development works and these were extended up to the Fifth Five Year Plan (FFYP) during 1997-2002.

The achievements during the FFYP were construction of 354 schools in unschooled areas, construction, reconstruction and repair of 4420 satellite schools, providing C-in-Ed training for 30,000 school teachers (Primary Education in Bangladesh, 2003).

National Education Policy adopted by the government in 2000 echoed the findings of the Bangladesh Education Commission of 1974, but faced similar consequence in the long run.

The Government of Bangladesh has made commitment in the World Education Forum held at Dakar, Senegal in April 2000, towards achievement of Education for All goals and every citizen by the year 2015.

The Millennium declaration of the United Nations adopted on 2000 by all member states in the millennium Summit gave birth to eight goals to be achieved by 2015 (UN, 2005). Besides the eight goals, there are 18 targets and 48 indicators in the MDGs. All these aspects are pertinent to combat poverty, hunger, illiteracy, diseases, inequality between man and woman, infant mortality, maternal mortality, environmental degradation and improving global partnership for development. Bangladesh is committed to achieve the MDGs and the goals are included in the countries first Poverty Reduction Strategy Paper (PRSP).

In May 2005, the government developed unlocking the potential: National Strategy for Accelerated Poverty Reduction (PRSP). It takes a rights-based approach and identifies four strategic objectives: creating opportunity towards realizing the full potential of children i.e. access to health, nutrition, education, water and sanitation; ensuring the best interests of children in national, social, family and personal situations i.e. empowerment of children; ensuring safety and security at home and in the public space i.e. protection against abuse, exploitation and violence and establishing and protecting children's rights i.e. social inclusion, decent work and livelihood. PRSP goal is to introduce and strengthen early childhood and pre-school education; introduce a unified and

common primary education opportunity for all children; improve quality of primary education; 100% enrolment, and raise all other targets to achieve quality and completion in primary education; increase literacy rate to 80% and expand the scope of NFE beyond the literacy to reach out to the extreme poor and in remote areas (PRSP, 2005).

In 2003, Bangladesh prepared a national action plan for 'Education for All' with a specific set of goals to be achieved by 2015 and took the Dakar Framework of Action, 2000 as the basis of that work. The plan embraces all the goals of EFA for making education accessible to all and provided for all. The country has prepared 'Primary Education Development Program-II' (PEDP-II) on the basis of Dakar framework and National Plan of Action. The main objectives of PEDP-II are to increase primary school access, participation and completion in accordance with government policy related to EFA and other commitments and to improve the quality of student learning and performance outcomes.

MDGs in education are important but modest objectives, which could not be the totality of educational progress that Bangladesh and other developing countries would pursue. Nor did these objectives capture the multiple ways education could contribute to fighting poverty and achieving other national development priorities (including other MDGs). The six EFA goals embraced a broader range, but were still limited to basic education. The education MDGs and EFA goals had to be regarded as proxies and minimal conditions for educational development in a country. The paradox is that even these minimal goals will not be achieved by 2015 (Ahmed, 2013a, 2013b). The Dakar EFA consultation

on the post-2015 education agenda (March 2013) noted that progress has stagnated since 2010. The emphasis of developing countries on expanding access aided and abetted by the narrow focus of MDG 2 (Goal 2. Achieve universal primary education, Target 3. Ensure that by 2015 children everywhere, boys and girls alike, will be able to complete a full course of primary schooling), has left at least 250 million children unable to read or write even after reaching grade four of primary school (Dakar Outcome document). Equity in educational participation, both in access and learning outcomes, has been a casualty of the strategies and programmes followed by countries and a lack of due attention to this aspect by their external partners (GMR, 2013). The result is a deepening and widening of the gap between educational attainment and skills and competencies needed for life and work for the majority of children and youth in the developing world.

2.8 Kindergarten History

During the end of eighteen century and early nineteenth, industrialization caused many mothers to join the workforce. There has been a shift away from maternal care at home to mothers choosing organizations to care for their children. At this background, in 1779, Johann Friedrich Oberlin and Louise Scheppler founded in Strasbourg an early establishment for caring for and educating pre-school children whose parents were absent during the day (Knapp, S.L. 1846). At about the same time, in 1780, similar infant establishments were established in Bayern. In 1802, Pauline Zur Lippe established a pre-school center in Detmold.

In 1816, Robert Owen, a philosopher and pedagogue, opened the first British and probably globally the first infant school in New Lanark,

Scotland (Vag, Ott, 1975). In conjunction with his venture for cooperative mills Owen wanted the children to be given a good moral education so that they would be fit for work. His system was successful in producing obedient children with basic literacy and numeracy.

Samuel Wilderspin (1823) opened his first infant school in London in 1819, and went on to establish hundreds more.

In 1817, Froebel established a school in Keilhau, Germany, where he incorporated some of Pestalozzi's ideas (Braun & Edwards, 1972). In his school, Froebel (1974) emphasized play, which started with simple activities and later progressed to more complex games. He felt that children should learn through play. He described ten gifts (playthings) that were given to the children by God to help them grow and develop. He spent ten years refining his concept of kindergarten and in the end created 20 gifts or educational toys, songs and finger plays (Moore, 2002). The gifts given to the children allowed them to see diversity of appearance and structure through handling the gifts freely and without structure. Froebel (1967b) also wrote about the three principles of social imitation, learning through expression and systematized play that were incorporated into his kindergarten.

Day nursery was focused on child rearing practices and took the place of mothers who could not care for their children and were deemed deficient in their motherly duties by the society. Professionals who advocated for the establishment of public school kindergarten felt that supervision should consist of not only childrearing but also citizenship and work habits (O'Connor, 1995).

The kindergarten move to the United States began in 1848, Schurz and his wife Margaretha Meyer Schurz being the pioneer.

Research conducted in the sixties led to results that confirmed kindergarten experiences correlate to academic success in later years. The kindergarten school day included reading, writing, speaking, listening, arithmetic, science, social studies, art, music and physical education (Mindess & Mindess, l.c). The subjects were not formal but integrated throughout the day in various activities. Continued push by the parents caused reading instruction to become more formal (Headley, 1965). The age requirement of kindergarten became an issue as reports pointed out those older students had more success in kindergarten than the younger students.

In Bangladesh, the term 'Kindergarten' or 'KG School (Kindergarten School)' is used to refer the schooling of children attend from 3 to 6 years of age. The names of the levels are nursery, shishu (children) etc. But the view of Kindergarten Education has changed much from previous years. Almost every rural area now has at least one Kindergarten School now. Most of it is run in Bangla medium. They also follow the text books published by the National Curriculum and Textbook Board (NCTB) with a modification adding some extra book in syllabus. The grades generally starts from Nursery (sometimes "Play"), "KG" afterwards, ends with the 5th grade. Separately, though, from the National Education System, it's contributing to achieve the Millennium Development Goals (MDG)s.

2.9 Madrassa History

Following the birth of Islam, the Prophet Muhammad (Pbuh) himself actively undertook the promotion of education. In Darul Arkam, at the

base of the Saafa Mountain, the Prophet himself established and taught in the first Madrassa. The first students of the very first educational institute established under Islam were Abu Bakr (RA), Omar (RA) and the other Sahabis (Sattar).

The second phase of the Islamic education began with the reign of Hazrat Umar Bin Abdul Aziz the eighth Khalifa of the Umaiya lineage. During this time, state proclamations were made throughout the country and wages and allowances for teachers and scholarships for students were arranged (Faridi). Separate learning rooms for students and teachers were established in the mosques during this period as well. The whole of Arabia and Iran was transformed into Muslim centers of learning, knowledge and research. However, the Muslim conquest of India did not succeed in presenting a superior educational system to the Indian subcontinent. Instead, following the traditional Indian educational institutions teaching religion and Sanskrit, they established Maktabs and Madrassas (Islam).

The exodus of the Arabs to the Indian subcontinent began in the sixth century in Western India and the -thirteenth century in Eastern India (Momen). Initiatives undertaken by the recently arrived Muslims, alongside the increase in the Muslim population resulted in the growth and expansion of the Madrassa education system in the major cities like Delhi, Lucknow, Rampur, Agra, Madras, Dhaka and other major cities of the Western region of India.

It was in 1203, following the establishment of Muslim rule with Ikhtiaruddin Muhammad Bin Bakhtiar Khilji's conquest of Bengal and Bihar, that Islamic education spread widely throughout this land. The

education policy during this period was completely secular and the education was relevant to the practicality of daily living. All students had to study ethics, mathematics, the times tables, agriculture, weighing and measurements, calendar and time measurement, household science, state policy, medicine, logic, theology, the natural sciences and history (Umar). Students learning Sanskrit had to study Grammer, Logic, Vedanta and Patangali philosophy.

Following the British colonization of India, there was a gradual decline in the Maktabs of Bengal (Sattar). Although Bangladesh was born as a secular and non-communal nation, the report submitted in 1974 by the Education Committee formed under Dr. Kudrat E Khuda, approved retention of the Madrassa system albeit with massive reformation. The Khuda Commission Report proposed many progressive steps to be taken in reforming the Madrassas. The report proposed restructuring and many basic reformations to the (Khuda Commission Report-1974) Madrassa system to bring it in line with the times.

In 1977 an Education Commission was formed under the leadership of the then Education Minister and Advisor Kazi Zaffar. In 1978, the Bangladesh Madrassa Education Board was established. This proposed making Arabic and English compulsory at primary level and substantial expansion of Madrassa education.

The Education Commission formed in 1987 under the leadership of Professor Mafizuddin Ahmed prepared a report after assessing popular opinion, appraising systems in Thailand, China, the Philippines and Japan, reviewing papers presented by educationists, specialists, and relevant essays and critical articles and discussions published in

newspapers, magazines and journals as well as recommendations presented by previous (Education in Bangladesh) committees and commissions. For obvious reasons, the report submitted by this commission should have been more informed and advanced than the reports by the previous commissions. Unfortunately, akin to its previous counterparts, it was not possible for this commission to work independently, free of state influence. The commission's recommendations are in favor of the outmoded Madrassa education system, although it does make a number of suggestions for reform. This report proposes utilizing mosques and the Imams to promote literacy and primary education as well as including religious education in the mainstream education of schools and colleges.

The finalization of the report submitted in 1997 by the Shamsul Haq Commission, which was formed by the incumbent government to develop a complete and comprehensive education policy, was uncertain even then. After the report was presented twice at the Ministerial Committee meeting, it was opined that, the government might encounter an embarrassing situation in the face of massive student protests if the government attempted to implement the finalized report. Hence, it was proposed that the draft report would be edited and added to. Following the necessary corrections and additions, on October 2, 2000, the report was submitted for the third time to the Ministerial Committee by order of the Prime Minister and was (The Daily Prothom Alo, October 3, 2000) accepted. On February 28, 2001, it was presented to and accepted by the National Parliament. The editorial of the Daily Prothom Alo of February 17, 2001, indicates the resentment felt by the Chairperson of the Education Policy Committee Professor Shamsul Haq. He claims that the

Education Policy 2000, which was accepted by the National Parliament, does not directly reflect the text submitted by the committee. The Policy accepted by the Parliament includes recommendations such as: developing identical syllabus and curriculum for the general schools, Madrassas, Kindergartens and English schools, forming a separate Teacher Selection Committee, English, Vocation Education and Religion should be made compulsory from class three of the primary level.

The Policy indicates that this government as well remains oblivious to the deficiencies and backward looking characteristics of Madrassa education. The Policy, prepared by the expert committee (Report, National Education Policy Commission, 1997) proclaims, "Currently, Madrassa education is established as an integral part of the national education system". In the name of religious instruction, this committee asserts the necessity for instruction on the afterlife, the grave, doomsday, heaven, hell, etc. in different classes. The Education Policy that pushes towards this type of learning has no relationship with secular thought or mode of life or scientific reasoning. The individuals who were deeply involved in developing this policy appear to have failed to consider scientific learning, the type of education that is appropriate for our people, and what should be done in reality to implement that type of education in carrying out their responsibilities (Umar).

Qawmi educational practices originate from the traditional Muslim educational system of Bangladesh (Hasan). During the British colonial period, these types of Madrassas were called "Khariji," or outside of government (Abdalla, 2004). Later, the term "Qawmi" emerged from the word "qom" (meaning "the public")—stemming from the fact that Qawmi

Madrassas reject state funding and instead rely on donations from the public (Bano, Masooda, 2008).

After 1971, some Qawmi Madrassas began to modernize their teaching, such as by switching the language of the instruction from Urdu to Bengali and adding some English language and mathematics (Hasan) lessons. In 1978, a government body called the "Non-government Education Board" was established in an attempt to co-ordinate these Madrassas, of which 2,043 registered with that board by 1998 (Hossain, AKMY & Balal. M, 2010).

As of 2006, there were 15,000 registered Qawmi Madrassas with the Befaqul Mudarressin of Bangladesh Qawmi Madrassa Education Board (Ahmad, Samina, 2005); though the figure could be well over double that number if unregistered Madrassas were counted.

There are primarily two types of Madrassas in operation in Bangladesh i) The Aaliyah Nissab Madrassas ii) the Qawmi Nissab Madrassas. In addition to these, maktabs or Forqania Madrassas exist to teach the Qaeda (the Arabic alphabet), Aampara, and the (Bangladesh National Education Policy Commission Report, 1988) Quran and the Hifzul Quran Madrassas which train Quran Hafezes (students who completely memorize the Quran).

2.10 Conclusion

Having the history scrutinized, we can say that primary education that we find today is not shaped in a day or two. It had gone through changes in different time and under different regime. Bangladesh has had a faulty education system through its colonial bequest, though it had a glorious

indigenous elementary education system. Subsequent colonial rules introduced not only exploitation, communalism, and dependence but also incorporate the seeds of these elements of their education. Exploitation remained as a source of conflict and was demonstrated in the enormous gaps between rich and poor. As a result of not having a goal oriented policy, our elementary education system thus became diverse instead of owing to the needs of the society. Various steps had been felt for shaping pro-people primary education but key essence of education was missing. For breaking away from the previous stagnant situation in primary education, a goal oriented national commitment became imperative for the post independent governments of Bangladesh.

CHAPTER THREE

Data and Methodology

3.1 Preludes

This research is exploratory and descriptive in nature. Both qualitative and quantitative data from primary and secondary sources are used in this study. The primary data sources include the study area, individuals necessary for this study and information generated through the selected individuals. The secondary data sources are the official statistics, reports, documents, laws, published materials, ordinances, books, articles, periodicals, Annual reports of concerning agencies, different reports of Bangladesh Bureau of Educational Statistics (BANBEIS), Ministry of Education, Ministry of Primary and Mass Education, Directorate of Secondary and Higher Secondary Education and Various NGO's working with Bangladesh Govt. for development of education. Data from primary sources both qualitative and quantitative collected through face to face interview using structured questionnaire at the first phase. At the second phase it was collected through written examination among the students of class V of selected schools. Data from secondary sources are collected through content and document analysis. Requesting questionnaire and developed to collect necessary primary data for achieving objectives of the study. Before finalization, questionnaires are pre-tested on a small portion [(5-7) %] of selected respondents in the study area.

A brief discussion of statistical tools that have been used in collecting and measuring data followed by interpretation of this study findings are given in this chapter.

3.2 Simple Random Sampling (SRS)

Simple random sampling is a method of selecting n units out of the N such that every one of the ${}_NC_n$ distinct samples has an equal chance of being drawn. In practice a simple random sample is drawn unit by unit. The units in the population are numbered from $1\ to\ N$. A series of random numbers between $1\ and\ N$ is than drawn, either by means of a table of random numbers or by means of a computer program that produces such a table. At any draw the process used must give an equal chance of selection to any number in the population not already drawn. The units that bear these n numbers constitute the sample.

It is easily verified that all ${}_NC_n$ distinct samples have an equal chance of being select by this method. Consider one distinct sample, that is, one set of n specified units. At the first draw the probability that some one of the n specified units is selected is n/N. At the second draw the probability that some one of the remaining $(n-1)$ specified units is drawn $(n-1)/(N-1)$, and so on. Hence the probability that all n specified units are selected in n draws is

$$\frac{n}{N}.\frac{(n-1)}{(N-1)}.\frac{(n-2)}{(N-2)}\dots\dots\dots.\frac{1}{(N-n+1)}=\frac{n!(N-n)!}{N!}=\frac{1}{{}_NC_n}\qquad(1.1)$$

Since a number that has been drawn is removed from the population for all subsequent draws, this method is also called random sampling without replacement. Random sampling with replacement is entirely feasible: at any draw, all N members of the population are given an equal chance of being, no matter how often they have already been drawn. The formulas for the variances and estimated variances of estimates made from the sample are often simpler when sampling is with replacement than when it

is without replacement. For this reason sampling with replacement is sometimes used in the more complex sampling plans, although at first sight there seems little point in having the same unit two or more times in the sample.

In a sample survey we decide on certain properties that we attempt to measure and record for every unit that comes into the sample. These properties of the units are referred to as characteristics or, more simply, as items.

The values obtained for any specific item in the N units that comprise the population are denoted by $y_1, y_2, \dots\dots\dots\dots\dots\dots\dots y_N$. The corresponding values for the units in the sample are denoted by $y_1, y_2, \dots\dots\dots\dots\dots\dots\dots y_n$, or if we wish to refer to a typical sample member, by y_i $(i = 1,2, \dots\dots\dots n)$. Note that the sample will not consist of the first n units in the population, except in the instance, usually rare, in which these units happen to be drawn. If this point is kept in mind, my experience has been that no confusion needs result.

Capital letters refer to characteristics of the population and lowercase letters to those of the sample. For totals and means we have the following definitions. Population total: $Y = \sum_{i=1}^{N} y_i$ and mean: $\bar{Y} = \frac{\sum_{i=1}^{N} y_i}{N}$. Sample total: $y = \sum_{i=1}^{N} y_i = y_1 + y_2 + \cdots\dots\dots\dots\dots + y_n$ and mean: $\bar{y} = \frac{y_1+y_2+\cdots\dots\dots\dots+y_n}{n} = \frac{\sum_{i=1}^{n} y_i}{n}$.

Although sampling is undertaken for many purposes, interest centers most frequently on four characteristics of the population.

1. Mean =$\bar{Y}$ (e.g., the average number of children per school).

2. Total= Y (e.g., the total number of acres of wheat in a region).

3. Ratio of two totals or means $R = Y/X = \bar{Y}/\bar{X}$ (e.g, ratio of liquid assets to total assets in a group of families).

4. Proportion of units that fall into some defined class (e.g., proportion of people with false teeth).

The symbol ^ denotes an estimate of a population characteristics made from a sample. The simplest estimators are considered population mean $\bar{Y}$ and estimated population mean $\hat{\bar{Y}} = \bar{y}$ = sample mean, population total Y and estimated population total $\hat{Y} = N\bar{y} = N\sum_{i=1}^{n} y_i/n$, population ratio R and estimated population ratio $\hat{R} = \bar{y}/\bar{x}$. In $\hat{Y}$ the factor N/n by which the sample total is multiplied is sometimes called the expansion or raising or inflation factor. Its inverse n/N , the ratio of the size of the sample to that of the population, is called sample fraction and is denoted by the letter f.

3.2.1 Properties of the Estimates

The sample mean $\bar{y}$ is an unbiased estimate of $\bar{Y}$.

Here $\hat{Y} = N\bar{y}$ is an unbiased estimate of the population total.

The variance of the y_i in a finite population is usually defined as

$$\sigma^2 = \frac{\sum_{i=1}^{N}(y_i - \bar{Y})^2}{N} \quad \text{.....(1.2)}$$

As a matter of notation, results are presented in terms of a slightly different expression, in which the divisor $(N-1)$ is used instead of N.

We take $S^2 = \frac{\sum_{i=1}^{N}(y_i - \bar{Y})^2}{N-1}$ .....(1.3)

The variance of the mean $\bar{y}$ from a simple random sample is

$$V(\bar{y}) = E(\bar{y} - \bar{Y})^2 = \frac{S^2}{n}.\frac{(N-n)}{N} = \frac{S^2}{n}(1-f) \quad \text{.....(1.4)}$$

Where $f = \frac{n}{N}$ is the sampling fraction.

The standard error of $\bar{y}$ is

$\sigma_{\bar{y}} = \frac{S}{\sqrt{n}} \sqrt{(N-n)/N} = \frac{S}{\sqrt{n}} \sqrt{1-f}$ ……..……..…..(1.5)

3.2.2 Random Sampling with replacement

A similar approach applies when sampling is with replacement. In this event the ith unit may appear $0, 1, 2, \ldots\ldots\ldots\ldots n$ times in the sample. Let t_i be the number of times that the ith unit appears in the sample. Then $\bar{y} = \frac{1}{n}\sum_{i=1}^{N} t_i y_i$ ……...……..…(1.6)

Since the probability that the ith unit is drawn is $1/N$ at each draw, the variate t_i distributed as a binomial number of successes out of n trials with $p = 1/N$. Hence

$E(t_i) = \frac{n}{N}, V(t_i) = n\left(\frac{1}{N}\right)\left(1-\frac{1}{N}\right)$ ……..……..…..(1.7)

Jointly, the variates t_i follow a multinomial distribution. For this,

$Cov(t_i t_j) = \frac{n}{N^2}$ ……(1.8)

Using (1.8), (1.9), and (1.10), we have, for sampling with replacement,

$V(\bar{y}) = \frac{1}{n^2}\left[\sum_{i=1}^{N} y_i^2 \frac{n(N-1)}{N^2} - 2\sum_{i<j}^{N} y_i y_j \frac{n}{N^2}\right]$……..……..…..(1.9)

$= \frac{1}{nN}\sum_{i=1}^{N}(y_i - \bar{Y})^2 = \frac{\sigma^2}{n} = \frac{N-1}{N}\frac{S^2}{n}$ ……..…..(1.10)

Consequently, $V(\bar{y})$ in sampling without replacement is only $(N-n)/(N-1)$ times its value in sampling with replacement (Cochran, 1977).

3.3 Stratified Random Sampling

In stratified sampling the population of N units is first divided into subpopulations of $N_1, N_2, \ldots\ldots\ldots\ldots, N_L$ units, respectively. These subpopulations are no overlapping, and together they comprise the whole of the population, so that, $N_1 + N_2 + \cdots \ldots\ldots\ldots + N_L = N$

The subpopulations are called strata. To obtain the full benefit from stratification, the values of the N_h must be known. When the strata have been determined, a sample is drawn from each, the drawing being made independently in different strata. The sample sizes within the strata are denoted by $n_1, n_2, \dots \dots \dots \dots, n_L$, respectively.

If a simple random sample is taken in each stratum, the whole procedure is described as stratified random sampling.

The suffix h denotes the stratum and i the unit within the stratum. The notation is a natural extension of that previously used. The following symbols all refer to stratum h.

N_h = total number of units

n_h = number of units in sample

y_{hi} = value obtained for the ith unit

$W_h = \frac{N_h}{N}$ = stratum weight

$f_h = \frac{n_h}{N_h}$ = sampling fraction in the stratum

$\bar{Y}_h = \frac{\sum_{i=1}^{N_h} y_{hi}}{N_h}$ = true mean

$\bar{y}_h = \frac{\sum_{i=1}^{n_h} y_{hi}}{n_h}$ = sample mean

$S_h^2 = \frac{\sum_{i=1}^{N_h}(y_{hi}-\bar{Y}_h)^2}{N_h-1}$ = true variance

Note that the divisor for the variance is $(N_h - 1)$.

3.3.1 Properties of the Estimates

For the population mean per unit, the estimate used in stratified sampling is $\bar{y}_{st}$(st for stratified), where

$$\bar{y}_{st} = \frac{\sum_{h=1}^{L} N_h \bar{y}_h}{N} = \sum_{h=1}^{L} W_h \bar{y}_h \qquad (2.1)$$

Where $N = N_1 + N_2 + \cdots \dots \dots \dots . + N_L$.

The estimate $\bar{y}_{st}$ is not in general the same as the sample mean. Thus sample mean $\bar{y}$ can be written as

$$\bar{y} = \frac{\sum_{h=1}^{L} n_h \bar{y}_h}{n} \quad \text{..}(2.2)$$

The difference is that in $\bar{y}_{st}$ the estimates from the individual strata receive their correct weights N_h/N. It is evident that $\bar{y}$ coincides with $\bar{y}_{st}$ provided that in every stratum

$$\frac{n_h}{n} = \frac{N_h}{N} \qquad \text{or} \qquad \frac{n_h}{N_h} = \frac{n}{N} \qquad \text{or} \qquad f_h = f$$

This means that the sampling fraction is the same in all strata. This stratification is described as stratification with proportional allocation of the n_h. It gives a self-weighting sample. If numerous estimates have to be made, a self-weighting sample is (Cochran, l.c) time-saving.

If in every stratum the sample estimate $\bar{y}_h$ is unbiased, then $\bar{y}_{st}$ is an unbiased estimate of the population mean $\bar{Y}$.

If the samples are drawn independently in different strata,

$$V(\bar{y}_{st}) = \sum_{h=1}^{L} W_h^2 V(\bar{y}_h) \quad \text{...}(2.3)$$

Where $V(\bar{y}_h)$ is the variance of $\bar{y}_h$ over repeated samples from stratum h. If $\bar{y}_h$ is an unbiased estimate of $\bar{Y}_h$ in every stratum, and sample selection is independent in different strata, then $\bar{y}_{st}$ is an unbiased estimate of $\bar{Y}$ with variance $\sum W_h^2 V(\bar{y}_h)$.

For stratified random sampling, the variance of the estimate $\bar{y}_{st}$ is

$$V(\bar{y}_{st}) = \frac{1}{N^2} \sum_{h=1}^{L} N_h \,(N_h - n_h) \frac{S_h^2}{n_h} = \sum_{i=1}^{L} W_h^2 \frac{S_h^2}{n_h} (1 - f_h) \text{.....,.....}(2.4)$$

If the sampling fractions n_h/N_h are negligible in all strata,

$$V(\bar{y}_{st}) = \frac{1}{N^2}\sum_{h=1}^{L}\frac{N_h^2 S_h^2}{n_h} = \sum_{h=1}^{L}\frac{N_h^2 S_h^2}{n_h} \quad \text{.....(2.5)}$$

This is the appropriate formula when finite population corrections can be ignored.

With proportional allocation, we substitute

$n_h = \frac{nN_h}{N}$ in (2.4). the variance reduces to

$$V(\bar{y}_{st}) = \sum_{h=1}^{L}\frac{N_h}{N}\frac{S_h^2}{n}\left(\frac{N-n}{N}\right) = \frac{1-f}{n}\sum_{h=1}^{L} W_h S_h^2 \quad \text{.....(2.6)}$$

If sampling is proportional and the variances in all strata have the same value, S_w^2 , we obtain the simple result

$$V(\bar{y}_{st}) = \frac{S_w^2}{n}\left(\frac{N-n}{N}\right) \quad \text{.....(2.7)}$$

3.4 Cluster Sampling

Cluster sampling tends to be the most widely used type of probability sampling. It is normally chosen in preference to simple random sampling, though this is the most straight forward and well-known probability sampling method. Random sampling, which involves choosing the units individually and directly through a random process in which each unit has the same chance (probability) of being chosen, requires complete lists of elementary units (e.g., households in the project area). Because these are rarely available and are generally prohibitively expensive to create, random sampling is unlikely to be used as a "stand-alone". Cluster sampling, by contrast, limits the scope of the sample frame construction and field work to a subset or sample of geographic areas to be covered and thus provides a way to control field costs.

A cluster is simply an aggregation of sampling units of interest for a particular survey that can be unambiguously defined and can be used as a sampling unit from which to select a smaller sub-sample. Ideally, clusters should meet four criteria. (1) They should have relatively clear physical boundaries to facilitate identification in the field. (2) They should be located somewhat close to one another; otherwise, costs will soar, defeating the major purpose of cluster sampling. (3) Clusters should not include too many people; this will help minimize the amount of sampling frame development that has to be done. (4) Information on the size of the cluster should ideally be available prior to sample selection. This will permit the use of sample selection procedures designed to improve sampling efficiency, or probability-proportional-to-size (PPS) selection. (The inability to obtain measures of cluster size prior to sample selection does not preclude the use of probability sampling).

Sampling frame development normally involves two steps: (1) selection of first-stage or primary units and (2) selection of elementary sampling units within the primary units. In many applications, for example, villages and/or city blocks will be chosen at the first stage and a sample of households from each at the second. In some cases, individuals from households may need to be selected, adding a third step to the process. When the population of a sample unit is considered too large, selection of the first-stage or primary sampling units may involve two steps. In such cases, the selected cluster is divided into two or more smaller clusters, one of the smaller clusters is selected at random, and the sample frame development and sampling operations are performed within the selected smaller cluster. A potential problem is that bias may occur in the selection of the smaller cluster.

In most applications the cluster units (e.g., counties, cities, city blocks) contain different numbers of elements or subunits (areal units, households, persons). Let M_i be number of elements in the ith unit. For estimation of the population total Y of the y_{ij}, methods are already familiar to us.

Let $y_i = \sum_{i=1}^{M_i} y_{ij} = M_i \bar{y}_i$ denoted the item total for the ith cluster unit. Given a simple random sample of n of the N population units, an unbiased estimate of Y is

$\hat{Y} = \frac{N}{n} \sum_{i=1}^{n} y_i$ .....(3.1)

And its variance is $V(\hat{Y}) = \frac{N^2(1-f)}{n} \frac{\sum_{i=1}^{N}(y_i - \bar{Y})^2}{N-1}$ .....(3.2)

Where $\bar{Y} = Y/N$ is the population mean per cluster unit.

The estimate $\hat{Y}$ is often found to be of poor precision. This occurs when the $\bar{y}_i$ (means per element) vary little from unit to unit and the $M_i$very greatly. In this event the $y_i = M_i \bar{y}_i$ also vary greatly from unit to unit and the variance (3.2) is large.

Again we let, $M_0 = \sum_{i=1}^{N} M_i =$ total number of elements in the population.

If the M_i and hence M_0 are all known, an alternative is a ratio estimate in which M_i is taken as the auxiliary variate x_i.

$\hat{Y}_R = M_0 \frac{\sum_{i=1}^{n} y_i}{\sum_{i=1}^{n} M_i} = M_0$ (Sample mean per element)

In the notation of the ratio estimate the population ratio$= Y/X = Y/M_0 = \bar{\bar{Y}}$, the population mean per element. And that the number of cluster in the sample is large,

$$V(\hat{Y}_R) = \frac{N^2(1-f)}{n} \frac{\sum_{i=1}^{N}(y_i - M_i\bar{\bar{Y}})^2}{N-1} \quad \text{.....(3.3)}$$

$$= \frac{N^2(1-f)}{n} \frac{\sum_{i=1}^{N} M_i^2(\bar{y}_i - \bar{\bar{Y}})^2}{N-1} \quad \text{.....(3.4)}$$

As (3.4) shows, the variance of $\hat{Y}_R$ depends on the variability among the means per element and is often found to be much smaller than $V(\hat{Y})$.

Note that $\hat{Y}_R$ requires a knowledge of the total M_0 of all the M_i, while $\hat{Y}$ does not. The reverse is true when we are estimating the (Singh, D & Chaudhary, F.S., 1997) population mean per element. In this case the corresponding estimates are

$\hat{\bar{\bar{Y}}} = \frac{\hat{Y}}{M_0} = \frac{N}{nM_0}\sum_{i=1}^{n} y_i$, $\hat{\bar{\bar{Y}}}_R = \frac{\hat{Y}_R}{M_0} = \frac{\sum_{i=1}^{n} y_i}{\sum_{i=1}^{n} M_i}$= sample mean per element

Thus, $\hat{\bar{\bar{Y}}}_R$ requires knowledge of only the M_i that fall in the selected sample.

3.5 Two-stage Sampling with unequal first stage units: estimators of mean and their variances

Durbin (1953), Des Raj (1966) and Rao (1975) have discussed various estimators of multi-stage sampling at length. This section is devoted to a description of some estimators that are in common use. Let the population under consideration consist of *N* first-stage units. The ith first stage units consists M_i second-stage units. Further, units are selected without replacement, with equal or unequal probabilities. A sample of n first stage units is selected and from the ith selected first stage unit, a sample of m_i second-stage units is selected.

Let us denote

M_i= the number of second-stage units in the ith first stage unit, $(i = 1, 2, \ldots\ldots\ldots\ldots, N)$

M_0=$\sum_i^N M_i$= the total number of second-stage units in the population

m_i=the number of second second-stage units to be selected from the ith first stage unit included in the sample

m_0=$\sum_i^n m_i$= the total number of second-stage units in the sample

$\bar{Y}_i = \sum_j^{M_i} y_{ij}/M_i$=the ith first stage unit mean

$\bar{Y}_N = \sum_i^N \bar{Y}_i/N$=the overall mean first stage unit means

$\bar{Y} = \frac{\sum_i^N M_i \bar{Y}_i}{\sum_i^N M_i} = \sum_i^N W_i \bar{Y}_i$=the mean per second-stage unit or the population mean or element.

There are several estimators of the population mean $\bar{Y}$ but we propose only to study some of the practical methods which are,

$$\bar{y} = \frac{1}{n}\sum_i^n u_i \bar{y}_{i\cdot} = \frac{\sum_i^n M_i \bar{y}_{i\cdot}}{n\bar{M}} \quad \text{.....(4.1)}$$

$$\bar{y}_1 = \frac{\sum_i^n \bar{y}_{i\cdot}}{n} \quad \text{.....(4.2)}$$

$$\bar{y}_2 = \frac{\sum_i^n M_i \bar{y}_{i\cdot}}{\sum_i^n M_i} \quad \text{.....(4.3)}$$

Where $\bar{y}_{i\cdot} = \sum_j^{m_i} y_{ij}/m_i$, $\bar{M} = M_0/N$ and $u_i = M_i/\bar{M}$

The estimator given by relation (4.1) is unbiased and its sampling variance is given by

$$V(\bar{y}) = (1 - f_1)\frac{S_b^2}{n} + \sum_i^N \frac{M_i^2}{nN\bar{M}^2}(1 - f_{2i})\frac{S_{w_i}^2}{m_i} \quad \text{.....(4.4)}$$

Where $S_b^2 = \frac{\sum_i^N (u_i\bar{Y}_i - \bar{Y})^2}{(N-1)}$ and $S_{w_i}^2 = \frac{\sum_j^{M_i}(y_{ij} - \bar{Y}_i)^2}{(M_i - 1)}$

3.6 Probability Proportional to Size (PPS) Sampling

We have discussed simple random sampling in which the selection probabilities were equal for all units of the population. Whenever the units vary in size, simple random sampling is not an appropriate

procedure as no importance is given to the size of the unit. Such ancillary information about the size of the units can be utilized in selecting the sample so as to get more efficient estimators of the population parameters. One such method is to assign unequal probabilities of selection to different units in the population depending on their sizes. When units vary in their sizes and the variate under study is highly correlated with the size of the unit, the probability of selection may be assigned in proportion to the size of the unit. This type of sampling procedure where the probability of selection is proportional to the size of the unit is known as probability proportional to size sampling, abbreviated as pps sampling.

There is a basic difference between simple random sampling (srs) and pps sampling procedures. In simple random sampling, the probability of drawing any specified unit at any given draw is the same, while in pps sampling; it differs from draw to draw. The theory of pps sampling is consequently more complex than that of simple random sampling.

The procedure of selecting a sample consists in associating with each unit a number or set of numbers equal to its size. The selection of units is done corresponding to a number chosen at random from the totality of numbers associated; there are two methods of selection: (i) Cumulative total method & (ii) Lahiri's method.

In cumulative total method, let the size of the ith unit be X_i $(i = 1, 2, ., N)$,the total being $X = \sum_i^N X_i$. We associate the numbers $1\ to\ X_1$ with the first unit, the numbers $(X_1 + 1)$ to $(X_1 + X_2)$ with the second unit, and so on. A number k is chosen at random from $1\ to\ X$ and the unit with which this number is associated is selected. Clearly, the ith unit in the population is being selected with a probability proportional to X_i. If

the sample of size n is required, the procedure is repeated n times with replacement of the units selected. This procedure of selection is known as the cumulative total method for the method needs cumulation of the unit sizes.

The main difficulty in this procedure is the compulsion to complete successive cumulative totals, which becomes time consuming and costly when the population size is (Singh & Chaudhary, l.c) large.

Consider a population of N units and let y_i be the value of the characteristic under study for the unit u_i of the population $(i = 1, 2, \dots \dots .., N)$. Suppose further that $p_i = X_i/X$ be the probability that the unit u_i is selected in a sample of one such that $\sum_i^N p_i = 1$. Let n independent selections be made with the replacement method and the value of y_i for each selected unit be observed. Further, let (y_i, p_i) be the value and probability of selection of the ith unit of the sample. It can be seen that the random variates y_i/p_i $(i = 1, 2, \dots \dots \dots .., n)$ are independently and identically distributed. If $p_i = 1/N$, it gives rise to a simple random sample. This shows that simple random sampling is a particular case of pps sampling. Here we briefly describe a procedure of estimating the population total by pps sampling with replacement.

In pps sampling with replacement an unbiased estimator of the population total Y is given by $\hat{Y}_{pps} = \frac{1}{n} \sum_i^n (y_i/p_i)$ ……………………………...(5.1)

So that the estimated population mean

$$\hat{\bar{Y}}_{pps} = \frac{\hat{Y}_{pps}}{X} = \frac{1}{nX} \sum_{i=1}^n (y_i/p_i) \dots\dots (5.2)$$

An unbiased estimator of

$$v\left(\hat{\bar{Y}}_{pps}\right) = \frac{1}{n(n-1)} \sum_i^n \left(y_i/Np_i - \hat{\bar{Y}}_{pps}\right)^2 \dots\dots (5.3)$$

$$= \frac{1}{n(n-1)N^2} \left[\sum_i^n (y_i/p_i)^2 - n\hat{Y}_{pps}^2\right] \dots\dots (5.4)$$

3.7 Contingency Analysis

Let us consider two attributes $A\ and\ B$, A divided into r classes $A_1, A_2, \ldots\ldots\ldots\ldots A_r$ and B divided into c classes $B_1, B_2, \ldots\ldots\ldots\ldots B_c$. Such classification in which attributes are divided into more than two classes is known as manifold classification. The various cell frequencies can be expressed in the following table known as $r \times c$ manifold contingency table, where (A_i) is the number of persons possessing the attribute A_i, $(i = 1,2, \ldots\ldots r)$, (B_j) is the number of persons possessing the attribute B_j, $(j = 1,2, \ldots\ldots c)$ and (A_iB_j) is the number of persons possessing both the attribute A_i and B_j , $(i = 1,2, \ldots\ldots r; j = 1,2, \ldots\ldots c)$. Also $\sum_{i=1}^{r}(A_i) = \sum_{j=1}^{c}(B_j) = N$, is the total frequency.

Table # 3.01: $r \times c$ Contingency table

$B\backslash A$	A_1	A_2	…	A_i	…	A_r	Total
B_1	(A_1B_1)	(A_2B_1)	…	(A_iB_1)	…	(A_rB_1)	(B_1)
B_2	(A_1B_2)	(A_2B_2)	…	(A_iB_2)	…	(A_rB_2)	(B_2)
⋮	⋮	⋮		⋮		⋮	⋮
B_j	(A_1B_j)	(A_2B_j)	…	(A_iB_j)	…	(A_rB_j)	(B_j)
⋮							
B_c	(A_1B_c)	(A_2B_c)	…	(A_iB_c)	…	(A_rB_c)	(B_c)
Total	(A_1)	(A_2)	…	(A_i)	…	(A_r)	N

The problem is to test if two attributes A and B under consideration are independent or not.

Under the null hypothesis that the attributes are independent, the theoretical cell frequencies are calculated as follows:

$P[A_i] =$ Probability that a person possesses the attribute A_i

$= \frac{(A_i)}{N}$; $i = 1,2, \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots r$

$P[B_j]$ = Probability that a person possesses the attribute B_j

$= \frac{(B_j)}{N}$; $j = 1,2, \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots c$

∴ $P[A_iB_j]$ = Probability that a person possesses the attribute A_i and B_j

$= P(A_i)P(B_j) = \frac{(A_i)}{N}.\frac{(B_j)}{N}$; $i = 1,2, \ldots\ldots\ldots\ldots r$; $j = 1,2, \ldots\ldots\ldots\ldots c$

∴ $(A_iB_j)_0$ = Expecteb number of persons possessing both the attributes A_i and B_j

$= N.\ P[A_iB_j] = \frac{(A_i)(B_j)}{N}$

$\Rightarrow (A_iB_j)_0 = \frac{(A_i)(B_j)}{N}$, $i = 1,2, \ldots\ldots\ldots r$; $j = 1,2, \ldots\ldots\ldots c$; ……..……(6.1)

By using this formula we can find out expected frequencies for each of the cell-frequencies (A_iB_j), $(i = 1,2, \ldots\ldots\ldots r;\ j = 1,2, \ldots\ldots\ldots c)$, under the null hypothesis of independence of attributes.

The exact test for the (Gupta & Kapoor, 2004) independence of attributes is very complicated but a fair degree of approximation is given, for large samples, (large N), by the χ^2-test of goodness of fit, viz.,

$$\chi^2 = \sum_{i=1}^{r}\sum_{j=1}^{c}\left[\frac{\{(A_iB_j)-(A_iB_j)_0\}^2}{(A_iB_j)_0}\right] \quad \text{.....(6.2)}$$

which is distributed as a χ^2-variate with $(r-1)(c-1)$ degrees of freedom.

3.8 Correlation Analysis

Webster's Online Dictionary defines correlation as a reciprocal relation between two or more things; a statistic representing how closely two variables co-vary; it can vary from −1 (perfect negative correlation) through 0 (no correlation) to +1 (perfect positive correlation).

In statistical terms, correlation is a method of assessing a possible two-way linear association between two continuous (Altman, 1991) variables. Correlation is measured by a statistic called the correlation coefficient, which represents the strength of the putative linear association between the variables in question. It is a dimensionless quantity that takes a (Swinscow & Champbell, 2002) value in the range −1 to +1. A correlation coefficient of zero indicates that no linear relationship exists between two continuous variables, and a correlation coefficient of −1 or +1 indicates a perfect linear relationship. The strength of relationship can be anywhere between −1 and +1. The stronger the correlation, the closer the correlation coefficient comes to ±1. If the coefficient is a positive number, the variables are directly related (i.e., as the value of one variable goes up, the value of the other also tends to do so). If, on the other hand, the coefficient is a negative number, the variables are (Swinscow, l.c) inversely related (i.e., as the value of one variable goes up, the value of the other tends to go down). Any other form of relationship between two continuous variables that is not linear is not correlation in statistical terms. To emphasize this point, a mathematical relationship does not necessarily mean that there is correlation. For example, consider the equation y = 2×2. In statistical terms, it is inappropriate to say that there is correlation between x and y. This is so because, although there is a relationship, the relationship is not linear over this range of the specified values of x. It is possible to predict y exactly for each value of x in the given range, but correlation is neither −1 nor +1. Hence, it would be inconsistent with the definition of correlation and it cannot therefore be said that x is correlated with y.

There are two main types of correlation coefficients: Pearson's product moment correlation coefficient and Spearman's rank correlation coefficient. The correct usage of correlation coefficient type depends on the types of variables being studied. We will focus on these two correlation types; other types are based on these and are often used when multiple variables are being considered.

Pearson's product moment correlation coefficient is denoted as ϱ for a population parameter and as r for a sample statistic. It is used when both variables being studied are normally distributed. This coefficient is affected by extreme values, which may exaggerate or dampen the strength of relationship, and is therefore inappropriate when either or both variables are not normally distributed. For a correlation between variables *x* and *y*, the formula for calculating the sample Pearson's correlation coefficient is given by

$$r = \frac{\sum_{i=1}^{n}(x_i - \bar{x})(y_i - \bar{y})}{\sqrt{[\sum_{i=1}^{n}(x_i - \bar{x})^2][\sum_{i=1}^{n}(y_i - \bar{y})^2]}}$$

where $x_i$and $y_i$are the values of $x$and$y$ for the ith individual.

3.8.1 Correlation Coefficient

The main result of a correlation is called the correlation coefficient (or "r"). It ranges from -1.0 to +1.0. The closer r is to +1 or -1, the more closely the two variables are related.

If r is close to 0, it means there is no relationship between the variables. If r is positive, it means that as one variable gets larger the other gets larger. If r is negative it means that as one gets larger, the other gets smaller (often called an "inverse" correlation).

While correlation coefficients are normally reported as r = (a value between -1 and +1), squaring them makes then easier to understand. The square of the coefficient (or r square) is equal to the percent of the variation in one variable that is related to the variation in the other. After squaring r, ignore the decimal point. An r of 0.5 means 25% of the variation is related (0.5 squared =0.25). An r value of 0.7 means 49% of the variance is related (0.7 squared = 0.49).

3.8.2 Spearman's Rank Correlation Coefficient

Spearman's rank correlation coefficient is denoted as ρ's for a population parameter and as r_s for a sample statistic. It is appropriate when one or both variables are skewed or ordinal (Myers, Jerome L.; Well, Arnold D, 2003) and is robust when extreme values are present. For a correlation between variables *x* and *y*, differences $d_i = x_i - y_i$ between the ranks of each observation on the two variables are calculated the formula for calculating the sample Spearman's correlation coefficient is given by

$r_s = 1 - \frac{6\sum_{i=1}^{n} d_i^2}{n(n^2-1)}$, where d_i is the difference in ranks for *x* and *y*.

3.9 Logistic Regression

The logistic regression model has been used epidemiologic research and in biostatics. Now a day in social statistics data, logistic regression model as well as odds ratios are widely used to identify the risk factors which are significantly affect the dependent variables. Cox (1958) is the pioneer of the logistic regression model. Subsequently this model illustrated by Walker and Duncun (1967) and Cox himself (1970). More recently Lee (1980) and Fox (1984) have further illustrated the Cox's model. The logistic regression model can be explained as follows:

Let Y be the binary response dependent variable which takes on values 1 and 0 with probability π_i and $1-\pi_i$ respectively so that,

$\pi_i = E\left(\frac{Y_i=1}{X_i}\right) = \frac{1}{1+e^{-(\beta_0+\beta_1 X_i)}}$, Where X_i is explanatory variable and

$1-\pi_i = E\left(\frac{Y_i=0}{X_i}\right) = 1 - \frac{1}{1+e^{-(\beta_0+\beta_1 X_i)}} = \frac{e^{-(\beta_0+\beta_1 X_i)}}{1+e^{-(\beta_0+\beta_1 X_i)}}$

Therefore, we can write,

$\frac{\pi_i}{1-\pi_i} = \frac{1+e^{(\beta_0+\beta_1 X_i)}}{1+e^{-(\beta_0+\beta_1 X_i)}} = e^{(\beta_0+\beta_1 X_i)}$ …… (7.1)

Now if we take the natural log of the equation (7.1) we have,

$log_e\left(\frac{\pi_i}{1-\pi_i}\right) = \beta_0 + \beta_1 X_i$ ……..(7.2)

Here, $\frac{\pi_i}{1-\pi_i}$ given in equation (7.1) is known as odds ratio and $log_e\left(\frac{\pi_i}{1-\pi_i}\right)$ given in equation (7.2) is known as log odds.

Instead of single explanatory variable we can use two or more explanatory variables. Let $X_{i1}, X_{i2}, \ldots\ldots\ldots\ldots\ldots\ldots, X_{ik}$ be the vector of k independent explanatory variables for the ith respondent. The natural logarithm of the ratio π_i and $1-\pi_i$ gives the linear function of X_{ij} and the model (7.2) becomes, $log_e\left(\frac{\pi_i}{1-\pi_i}\right) = \sum_{j=0}^{k} \beta_j X_{ij}$ ……..….(7.3)

Where in general we consider $X_{i0} = 1$ and β_j is the parameter relating to X_{ij}. The function (7.3) is the linear function of both the variable *X* and the parameters β and the left side of the equation is known as logit transformation and the whole relationship is called logistic regression model.

3.9.1 Interpretation of the Parameters

Interpretation of the Parameters in logistic regression model is not so straightforward as in linear regression model. Therefore, it is obvious that a brief discussion is necessary to explain parameters in logistic regression model. Since logit transformation $log_e\left(\frac{\pi_i}{1-\pi_i}\right)$ is linear in parameters, we can interpret the parameters using the arguments of linear regression. Thus the interpretation may be introduced as follows:

We have, $\pi_i = \frac{e^{\beta_0+\beta_1X_1+\cdots\ldots\ldots\ldots\ldots+\beta_kX_k}}{1+e^{\beta_0+\beta_1X_1+\cdots\ldots\ldots\ldots\ldots+\beta_kX_k}}$ is a linear in parameters, i.e. $log_e\left(\frac{\pi_i}{1-\pi_i}\right)=\beta_0+\beta_1X_1+\beta_2X_2+\cdots\ldots\ldots\ldots\ldots+\beta_kX_k$, so arguing analogously as in the case of linear regression model we can explain that β_j(j=1,2,……..,k) represent the rate of change in $log_e\left(\frac{\pi_i}{1-\pi_i}\right)$ for one unit change in X_j considering other explanatory variables remaining constant.

Also the parameters in logistic regression model can be interpreted through odds ratio. In order to describe the situation, let us consider that the explanatory variable X_j is dichotomous one. This situation is not only the simplest but also it gives the conceptual foundation for all other situations.

The explanation is given below:

We have, $log_e\left(\frac{\pi_i}{1-\pi_i}\right)=\beta_0+\beta_1X_1+\beta_2X_2+\cdots\ldots\ldots\ldots\ldots+\beta_kX_k$, here we consider X_j is a dichotomous variable taking values 0 and 1, then the odds

ratio 'O' (say) for $X_j = 1$ against $X_j = 0$ (taking all other X's are fixed) is given by

$$O = \frac{\Pr(Y_i=1/X,X_j=1)/\{1-\Pr(Y_i=1/X,X_j=1)\}}{\Pr(Y_i=1/X,X_j=0)/\{1-\Pr(Y_i=1/X,X_j=0)\}}$$

$$= \frac{e^{\beta_0+\beta_1X_1+\cdots\ldots\ldots+\beta_jX_j+\cdots\ldots\ldots+\beta_kX_k}}{e^{\beta_0+\beta_1X_1+\cdots\ldots+0.\beta_j\ldots\ldots\ldots\ldots+\beta_kX_k}} = e^{\beta_j}$$

Hence $log_e O = \beta_j$ so, we can directly estimate the coefficients of a logistic regression model as $log_e \hat{O}$ and hence and can be interpreted. Hence the interpretation of β_j is naturally somewhat different from the interpretation in the linear regression and it is obviously represents the amount by which the log odds change per unit change in X_j. It is somewhat more meaningful, however, to state that a one-unit increase in X_j increases the odds by the multiplicative factor e^{β_j}. If a qualitative independent variable has m categories, we introduce only (m-1) dummy variables and the rest one is taken as reference category.

3.9.2 Determining the worth of the individual regressors

In the following section we have discussed various statistics that have been suggested for assessing the worth of each individual regressor. The results can be generalized to the situation in which more than one regressor is added to an existing model.

3.9.3 Odds Ratio

Goodman and Kruskal (1954, 1959) present a great many measures of association for 2×2 tables that are not function of χ^2 and give their statistical properties in their research work named odds ratio. The odds ratio is a way of comparing whether the probability of a certain event is the same for two groups. The odds ratio takes values between zero and infinity. One is the neutral value and means that there is no difference

between the groups compared; close to zero or infinity means a large difference. An odds ratio larger than one means that group one has a larger proportion than group two, if the opposite is true the odds ratio will be smaller than one. In other words, an odds ratio of 1 implies that the event is equally likely in both groups. An odds ratio greater than one implies that the event is more likely in the first group. An odds ratio less than one implies that the event is less likely in the first group. For more details, let us consider the following typical 2×2 table

Table # 3.02: 2×2 Contingency table

	X^-	X^+	Total
Y^-	a	b	a+b
Y^+	c	d	c+d
Total	a+c	b+d	a+b+c+d

In the above table, the odds ratio for row Y^- are a/b. The odds for row Y^+ are c/d. The odds ratio (OR) is simply the ratio of the two odds given by $R = \frac{a/b}{c/d}$, which can be simplified as $OR = ad/bc$, hence it is clear that if the odds are the same in each row, then the odds ratio is 1.

The odds themselves are also a ratio. To explain this we will take an example with probability. Let's say that the probability of success is $p = 0.8$, then the probability of failure is $q = 1 - p = 0.2$, then the odds of success is defined as 'odds (success0'= $p/q = 0.8/0.2 = 4$, that is, the odds success are 4 to 1. Then the odds of failure would be 'odds (failure)' =$q/p = 0.2/0.8 = 0.25$, that is, the odds of failure are 1 to 4. Next let's compute the odds ratio by OR = odds (success)/ odds (failure) = *4/0.25 = 16*, the interpretation of this odds ratio would be that the odds of success are *16* times greater than for failure. Now if we had formed the odds ratio the other way around with odds of failure in the numerator, we would

have gotten something like this, OR = odds (failure)/odds (success) = *0.25/4 = 0.0625*, interestingly enough, the interpretation of this odds ratio is nearly the same as the one above. Here the interpretation is that the odds of failure are one-sixteenth the odds of success. In fact, if we take the reciprocal of the first odds ratio we get *1/16 = 0.0625*.

3.9.4 Relative Risk

A more direct measure comparing the probabilities in two groups is the relative risk, which is also known as the risk ratio. The relative risk is simply the ratio of the two conditional probabilities. The risk ratio takes on values between zero and infinity. One is the neutral value and means that there is no difference between the groups on the variable concerned. A risk ratio larger than one means that group one has a larger proportion than group two, if the opposite is true the risk ratio will be smaller than one. For the table 3.1 the relative risk for the event X^- can be defined as $= \frac{a/}{c/_{c+d}}$, similarly relative risk for the event X^+ is given by $RR = \frac{b/_{a+b}}{d/_{c+d}}$, the relative risk or risk ratio gives us the percentage difference in classification between group one and group two. For example, *8%* of freezers produced without quality control have paint scratches. This percentage is reduced to *5%* if quality control is introduced. The risk ratio *RR = 8/5 =1.6* and its interpretation as *60%* more freezers are damaged if there is no quality control.

3.10 Analysis of Variance (ANOVA)

This function compares the sample means for *k* groups. There is an overall test for *k* means, multiple comparison methods for pairs of means and tests for the equality of the variances of the groups.

Consider four groups of data that represent one experiment performed on four occasions with ten different subjects each time. You could explore the consistency of the experimental conditions or the inherent error of the experiment by using one way analysis of variance (ANOVA), however, agreement analysis might be more appropriate. One way ANOVA is more appropriate for finding statistical evidence of inconsistency or difference across the means of the four groups.

One way ANOVA assumes that each group comes from an approximately normal distribution and that the variability within the groups is roughly constant. The factors are arranged so that experiments are columns and subjects are rows. The overall *F* test is fairly robust to small deviations from these assumptions but you could use the Kruskal-Wallis test as an alternative to one way ANOVA if there was any doubt.

Numerically, one way ANOVA is a generalization of the two sample t test. The *F* statistic compares the variability between the groups to the variability within the groups:

$$F = \frac{MST}{MSE}, \quad MST = \frac{\sum_{i=1}^{k}(T_i^2/n_i) - G^2/n}{k-1}, \quad MSE = \frac{\sum_{i=1}^{k}\sum_{j=1}^{n_i} Y_{ij}^2 - \sum_{i=1}^{k}(T_i^2/n_i)}{n-k}$$

where *F* is the variance ratio for the overall test, *MST* is the mean square due to treatments/groups (between groups), *MSE* is the mean square due to error (within groups, residual mean square), Y_{ij} is an observation, T_i is a group total, *G* is the grand total of all observations, $n_i$is the number in group *i* and *n* is the total number of observations.

Assumptions: (i) random samples (ii) normally distributed observations in each population (iii) equal variance of observations in each population.

A significant overall test indicates a difference between the population means for the groups as a whole; you may then go on to make multiple comparisons between the groups but this "dredging" should be avoided if possible.

If the groups in this example had been a series of treatments/exposures to which subjects were randomly allocated then a two way randomized block design ANOVA should have been used.

3.11 Paired Sample t-test

Paired sample t-test is a statistical technique that is used to compare two population means in the case of two samples that are correlated. Paired sample t-test is used in 'before-after' studies, or when the samples are the matched pairs, or when it is a case-control study. For example, if we give training to a company employee and we want to know whether or not the training had any impact on the efficiency of the employee, we could use the paired sample test. We collect data from the employee on a seven scale rating, before the training and after the training. By using the paired sample t-test, we can statistically conclude whether or not training has improved the efficiency of the employee. In medicine, by using the paired sample t-test, we can figure out whether or not a particular medicine will cure the illness.

Steps:

1. Set up hypothesis: We set up two hypotheses. The first is the null hypothesis, which assumes that the mean of two paired samples are equal. The second hypothesis will be an alternative hypothesis, which assumes that the means of two paired samples are not equal.

2. Select the level of significance: After making the hypothesis, we choose the level of significance. In most of the cases, significance level is 5%.

3. Calculate the parameter: To calculate the parameter we will use the following formula: $t = \frac{\bar{d}}{\sqrt{s^2/n}}$,Where d bar is the mean difference between two samples, s^2 is the sample variance, n is the sample size and t is a paired sample t-test with n-1 degrees of freedom. An alternate formula for paired sample t-test is: $t = \frac{\sum d}{\sqrt{\frac{n(\sum d^2)-(\sum d)^2}{n-1}}}$

4. Testing of hypothesis or decision making: After calculating the parameter, we will compare the calculated value with the table value. If the calculated value is greater than the table value, then we will reject the null hypothesis for the paired sample t-test. If the calculated value is less than the table value, then we will accept the null hypothesis and say that there is no significant mean difference between the two paired samples.

Assumptions: (i) Only the matched pairs can be used to perform the test (ii) Normal distributions are assumed (iii) The variance of two samples is equal. (iv) Cases must be independent of each other.

3.12 Chi-square test

The chi-square of a standard normal variate is known as a chi-square variate with 1 degree of freedom (d.f). thus if $X \sim N(\mu, \sigma^2)$, then $Z = \frac{X-\mu}{\sigma} \sim N(0,1)$ and $Z^2 = \left(\frac{X-\mu}{\sigma}\right)^2$, is chi-square variate with 1 d.f.

In general, if X_i, $(i = 1, 2, \ldots\ldots n)$are n independent normal variates with mean μ and variance σ^2, $(i = 1, 2, \ldots\ldots n)$, then

$\chi^2 = \sum_{i=1}^{n} \left(\frac{X_i-\mu_i}{\sigma_i}\right)^2$, is a chi-square variate with n d.f. ……..(8.1)

3.12.1 Conditions for the Validity of χ^2-test

Chi-square test is an approximate test for large values of n. For the validity of chi-square test of 'goodness of fit' between theory and experiment, the following conditions must be satisfied:

1. The sample observations should be independent.
2. Constrains on the cell frequencies, if any, should be linear, e.g., $\sum n_i = \sum \lambda_i$ or $\sum O_i = \sum E_i$.
3. N, the total frequency should be reasonably large, say, greater than 50.
4. No theoretical cell frequency should be less than 5. If any theoretical cell frequency is less than 5, then for the application of χ^2-test, it is pooled with the preceding or succeeding frequency so that the pooled frequency is more than 5 and finally adjusted for the d.f. lost in pooling.
5. It may be noted that the χ^2-test depends only on the set of observed and expected frequencies and on degrees of freedom (d.f.). it does not make any assumptions regarding the parent population from which the observations are taken. Since χ^2 does not involve any population parameters, it is termed as a statistic and the test is known as Non-Parametric test or Distribution-Free test.
6. Let ${\chi^2}_n(\alpha)$ denote the value of chi-square for n d.f. such that the area to the right of this point is α, i.e.,

$$P\left[\chi^2 > {\chi^2}_n(\alpha)\right] = \alpha \quad \text{.....(8.2)}$$

The value ${\chi^2}_n(\alpha)$defined in (8.2) is known as the upper (right-tailed) α-point or Critical Value or Significant Value of chi-square for n d.f. and has been tabulated for different values of n and α from χ^2-table. From

χ^2-tables we observe that the critical values of χ^2 increases as n (d.f.) increases and level of significance (α) decreases.

3.12.2 Chi-square test of Goodness of fit

A very powerful test for testing the significance of the discrepancy between theory and experiment was given by Prof. Karl Pearson in 1900 and is known as "Chi-square test of goodness of fit". It enables us to find if the deviation of the experiment from theory is just by chance or is it really due to the inadequacy of the theory to fit the observed data.

If O_i, $(i = 1, 2, \ldots . n)$is a set of observed (experimental) frequencies and E_i, $(i = 1, 2, \ldots . n)$ is the corresponding set of expected (theoretical or hypothetical) frequencies, than Karl Pearson's chi-square, given by

$\chi^2 = \sum_{i=1}^{n} \left(\frac{O_i - E_i}{E_i}\right)^2$, where $\sum O_i = \sum E_i$……..……(8.3)

follows chi-square distribution with $(n - 1)$ d.f.

3.13 Kruskal-Wallis Test

When we can assume that our data is normally distributed and that the population standard deviations are equal, we can test for a difference among several populations by using the One-way ANOVA F test. However, when our data is not normal, or we aren't sure if it is, we can use the nonparametric Kruskal-Wallis test to compare more than two populations as long as our data come from a continuous distribution.

In the One-way ANOVA *F* test, we are testing to see if our population means are equal. Since our data might not necessarily be symmetric in the nonparametric setting, it is better to use the median as the measure of center, and so in the Kruskal-Wallis test we are testing to see if our population medians are equal.

Recall the analysis of variance idea: we write the total observed variation in the responses as the sum of two parts, one measuring variation among the groups (sum of squares for groups, *SSG*) and one measuring variation among individual observations within the same group (sum of squares for error, *SSE*). The ANOVA *F* test rejects the null hypothesis that the mean responses are equal in all groups if *SSG* is large relative to *SSE*.

The idea of the Kruskal-Wallis rank test is to rank all the responses from all groups together and then apply one-way ANOVA to the ranks rather than to the original observations. If there are *N* observations in all, the ranks are always the whole numbers from 1 to *N*. The total sum of squares for the ranks is therefore a fixed number no matter what the data are. So we do not need to look at both *SSG* and *SSE*. Although it isn't obvious without some unpleasant algebra, the Kruskal-Wallis test statistic is essentially just *SSG* for the ranks. When *SSG* is large, that is evidence that the groups differ.

Draw independent SRSs of sizes $n_1, n_2, \ldots, n_I$ from *I* populations. There are *N* observations in all. Rank all *N* observations and let R_i be the sum of the ranks for the ith sample.

The Kruskal-Wallis statistic is $H = \frac{12}{N(N+1)} \sum \frac{R_i^2}{n_i} - 3(N+1)$

When the sample sizes n_i are large and all *I* populations have the same continuous distribution, *H* has approximately the chi-square distribution with $I - 1$ degrees of freedom.

The Kruskal-Wallis test rejects the null hypothesis that all populations have the same distribution when *H* is large.

So like the Wilcoxon rank sum statistic, the Kruskal-Wallis test statistic is based on the sums of the ranks for the groups we are comparing. The more different these sums are, the stronger is the evidence that responses are systematically larger in some groups than in others. As usual, we again assign average ranks to tied observations.

Including correction for ties, Kruskal-Wallis H becomes

$$H = \frac{\frac{12}{N(N+1)}\sum_{i=1}^{k}\frac{R_i^2}{n_i} - 3(N+1)}{1 - \frac{\sum T}{N^3 - N}} \sim \chi^2_{k-1}$$

Where $N = \sum n_i$= Total number of cases in all sub-system combined.

n_i = Number of cases in the ith sub-system.

R_i = Sum of the ranks in the ith (column) sub-systems, K is the number of sub-systems.

$T = t^3 - t$; t is the no. of tied observations in a tied group of scores.

3.14 Wald Test

In linear regression, t-statistics are used in assessing the value of individual regressors when other regressors are in the model. In logistic regression, $W = \hat{\beta}_i / S_{\hat{\beta}_j}$ is called a Wald statistic. First, it should be noted that W does not have a t-distribution, even though it does have the same from as a t-statistic. Rather, W is asymptotically normally distributed, with a large sample size n. It should be noted that there is no agreement as to the general form of what is being called a Wald statistic. The definition given herein is that given by Hosmer and Lemeshow (1989) and Hauck and Donner (1977). But $\hat{\beta}_j^2 / S^2_{\hat{\beta}_i}$, written in a different but equivalent form, is termed as Wald statistic by Rao (1973), Cytel Software Corporation (1993), and also by Wald (1943). If the latter

definition is used, the statistic would be regarded as approximately a chi-square random variable with one degree of freedom. Also there is some critical about Wald statistic discussed by Hosmer and Lemeshow (l.c), Hauck and Donner (l.c) and they found that Wald statistic performed poorly, and Jennings (1986) also questioned the use of $\hat{\beta}_i / S_{\hat{\beta}_j}$.

3.15 Sampling Design of the Study

Our study area is Jhinaidah Dsitrict of Bangladesh. One of the six Upazilas of Jhenaidah district is selected at random at the first stage. The selected Upazila is Moheshpur. We have collected data in two phase using separate sampling design and separate target population to serve separate objectives. The second phase sampling design is described first because it is inclusive in the first phase. There are 151 Govt. and associated primary schools, 24 Ebtedayee Madrassa and 38 Kindergarten schools in Moheshpur Upazila. In total, 213 primary institutions in Moheshpur Upazila. List of three categories of primary institutions are given in appendix – VII. Each of the three categories of primary institutions forms a stratum because each category follows a definite curriculum. Schools within a stratum do not differ with respect to curriculum.

It is observed that largest stratum size (no. of schools) is too large in comparison to the smallest stratum. We have no money to study a large number of schools.

So, we have decided to cover all the three stratums, taking one school from the smallest stratum and proportional number of schools from the others two stratums.

Accordingly, we decided to study on 9 schools in total, six from first stratum, one from second stratum and two from the third stratum. Distribution of number of schools by category (stratum) is shown in table # 3.03.

Table # 3.03: Sampling design (Phase – II)

Category of schools	No. of schools in the population	No. of schools in the sample
Govt. and associated primary schools	151	6
Ebtedayee Madrassa	24	1
Kindergarten	38	2
Total number of schools	213	9

Our target population is the students of class V. Students of same stratum follow the same curriculum. But numbers of students vary from school to school and students themselves vary from one another in respect of performance. So, we have used PPS sampling considering number of students in class V as the weight.

Cumulative density method due to Hansen-Hurwitz (1943) is used to select the school(s) from each stratum. Cambridge Elementary Statistical Tables (Random Number Table) by D.V. Lindley and J.C.P. Miller (1966), page-12 is used for selecting schools (cluster) from each category (stratum). Thus, our sampling design is a mixed one - Two stage stratified PPS cluster sampling. The selected schools under this sampling design are given in table # 3.04 – 3.06.

Table # 3.04: Stratum I: Govt. and associated Primary Schools

Serial no. of selected schools	Name of selected schools	Number of teachers	Students of class V
60	Jalilpur Model Govt. Primary school.	6	74(77)
116	Kochurpota Reg. Non-Govt. Primary school.	4	27(30)
38	Chandratonpur Govt. Primary school.	4	45(47)
65	Bir Shreshtho Hamidur Rahman Govt. Primary school.	4	31(34)
34	Paschim Purandarpur Reg. Non-Govt. Primary school.	3	19(22)
14	Purandarpur Govt. Primary school.	4	47(50)

Figures in the parenthesis indicate total students of class V.

Table # 3.05: Stratum II: Ebtedayee Madrassa

Serial no. of selected Madrassa	Name of selected Madrassa	Number of teachers	Students of class V
6	Samonta Dakhil Madrassa	4	58(63)

Figures in the parenthesis indicate total students of class V.

Table # 3.06: Stratum III: Kindergarten Schools

Serial no. of selected schools	Name of selected Kindergarten	Number of teachers	Students of class V
21	Hazi Eman Ali Pre-Cadet,Jadoppur.	7	22(24)
20	Ideal Pre-Cadet school, Khalishpur.	5	18(19)

Figures in the parenthesis indicate total students of class V.

Apart from 213 primary institutions, there are 35 high schools, 24 senior Madrassa and 9 colleges in Moheshpur upazila. List of higher institutions is given in appendix-VIII. List of the elected public representatives (168) is given in appendix-IX. It was not possible to prepare a frame for guardians/parents of students because name and address of guardians/parents available in school register was incomplete and not up to date. Rather we have selected 10% students (270) at random from the register of selected primary institutions. Of the selected (270) students, two had same parent/guardian in 58 cases. Thus, number of guardians/parents reduces to (270 – 58) = 212 who are considered as selected guardians in the survey. All the teachers of selected primary institutions (41), all the teachers of randomly selected approx. 10% higher institutions (112) and all available public representatives (158) constitute the respondents (523) of the first phase sampling results a mixed sampling design. The selected higher institutions (Fisher & Yates, 1957) under phase-II sampling are given below in table # 3.07.

Table # 3.07: List of selected higher (high school, senior madrassa and college) institutions

Serial no.	Institution serial no.	Name of (high school, senior madrassa and college) institution	No. of teachers
1	25	Bakashpota high school, Napa.	12
2	3	Natima- Kuripol high school, Natima.	14
3	10	M. P. B high school, Shambazar.	11
4	16	Mandarbaria high school, Mandarbaria.	10
5	6	Samonta Dakhil Madrassa, Samonta.	14
6	16	Khalishpur Dakhil Madrassa, Khalishpur.	17
7	4	Shahid Ziaur Rahman degree college, Fatepur.	34

***** Publication of individual names of respondents of any survey is not permissible by local law.

3.16 Data Collection

Two sets of data are collected for this dissertation. One set to study the factor responsible for Universal Primary education in Bangladesh. The other set of data to study the reliability and validity of the proposed universal model followed by the study of relative efficiency of the existing multi-channel primary education in relation to the proposed universal and unified primary education in Bangladesh. For first set of data, teachers of the selected Primary institutions, Senior Madrassa, Kindergarten, High schools and Colleges of the study area, all elected public representative of the study area and student guardians of selected primary institutions are the respondents. In total, there are 523 respondents — students guardians (Fisher & Yates, l.c) 212, Primary teachers 41, Senior Madrassa teachers 31, High schools teachers 47, College teachers 34 and elected representatives 158.

Information on 20 personal covariates (given details in chapter four) of the respondents including demands for universal primary education and preferred terminal competencies to be included in the syllabus of primary education from among the 48 uncommon terminal competencies of the three form of existing primary education. This survey is repeated twice with an interval of one month to study validity of the responses on the selection of terminal competencies by the respondents. Informations collected through these surveys constitute the first phase of data for this study.

The second phase of the data of this study is collected from selected primary school students of class V using multi-channel primary education terminal competency based on questionnaire and the other set of proposed universal and unified primary education terminal competency based on

questionnaire. The examination was conducted separately in a gap of one month. Scores obtained by the students in each separate examination is considered as a measure of performance of students under the separate models and forms the data base for the Sixth chapter- A curriculum Based Universal Primary Education Model for Bangladesh and Seventh chapter- Efficiency of Primary Education in Bangladesh.

CHAPTER FOUR

Demand for Universal Primary Education in Bangladesh

4.1 Universal Primary Education: Meaning and Scope

Article 17 of Bangladesh Constitution highlighted education policy of the country where universal system of education is emphasized but without any explanation to the term 'Universal'. A review of 'Children Right Charter, 1989' adopted by the United Nations Organization(UNO)s., proceedings of the world conference 1990 at Jamtian, Thailand on 'Education for all', 'Universal Primary Education Project of Bangladesh' 1976 – 80', 'The Satellite School Project of Bangladesh, 1998 – 2004', 'Bangladesh Education Sector Review by Japan Bank of International Co-operation, Dhaka, 2002 and the constitution of Bangladesh itself reveals that the Universal system of education is characterized by the following components:

(i) The state will take all necessary and possible steps and opportunities to facilitate the schooling of children to an age limit bound by law

(ii) Every child irrespective of his/her identity will have equal right of access to education

(iii) Unanimous and conscience approval and acceptability to the curriculum and terminal competencies relating to social needs by the citizens

(iv) The curriculum will have an urge to perform in a competitive world without losing comparison and caring virtues

Components (i), (ii) & (iv) are more or less satisfied by the Primary Education system of Bangladesh but not the third one.

The system is divided into the following three major streams directly or indirectly controlled by the Govt. of Bangladesh.

(i) The General stream — the left out of the British system.

(ii) The Ebtedayee Madrassa stream — the follow up of Dars-i-Nizami system.

(iii) The Kindergarten stream — local version of Anglo Missionaries system.

Apart from these three, there is another system of schools known as Qawmi Madrassa; National Govt. has no control over this system of schools. Our analysis is based on the Govt. controlled schools mentioned in (i) – (iii).

There is a wide range of diversification in curriculum and terminal competencies of the schools under different streams but we are committed for a uniform school system as per constitution of Bangladesh.

Aim of this study is to search for ways and means for a school system at the primary level of education based on a curriculum and terminal competencies with an unanimous and conscience acceptability of the people in general without much disturbance to the present set up. Such a system may be termed as Universal Primary Education system.

Similar problem was faced by Europe during and immediate after the industrial revolution (1780 – 1850). Before the industrial revolution, education was in the hands of Churches and voluntary agencies mostly religion based. National government throughout Europe compromised

with the then existing school authorities to set up curriculum and terminal competencies at different levels to fulfill the national need and establish new schools to meet the large scale demand for manpower in running the accelerating speed of expanding national economy.

In western countries, Government schools along with Catholic, Convent, Missionary and all other voluntary schools are running side by side without any conflict at the national level. Sorry to say, that we could not overcome this problem and facing a lot of crazy situations, especially at the higher level of education and job opportunities.

4.2 Demand for Universal Primary Education

Primary Education may be considered as a consumer good, consumers of which are the school aged children of 5 – 14 years that enable them eventually to acquire skills to fulfill their aims in life.

The reality is that, it is not the children but their parents/guardians, teachers and the social leaders are the chooser of the school system based on merits and demerits of the systems, specially the curriculum and terminal competencies as per their judgment.

So, Demand for Universal Primary Education do not depend on its direct consumers (children) but on the indirect consumers, the parents and/or the guardians of real consumers. Consequently, the Demand for Universal Primary Education is linked with the socio-economy of the parents and/or guardians of the children aged 5 – 14 years.

4.3 Selection of Covariates Affecting the Demand

The sampling design for this study which is discussed in chapter three has produced 523 respondents of whom 326(62%) Demand Universal Primary Education.

We have considered 19 covariates of the respondents excluding the Demand for Universal Primary Education – Age (X_1), Profession (X_2), Gender (X_3), Religion (X_4), Year of schooling (X_5), Basic education at Primary level (X_6), Marital status (X_7), Land holding size (X_8), Pattern of residential house (X_9), Monthly family income (X_{10}), Monthly family expenditure (X_{11}), Access to mass media (X_{12}), Family financial condition (X_{13}), Existance of 6 – 12 years aged children in the family (X_{14}), Schooling pattern of the children (X_{15}), Monthly expenditure for school going children (X_{16}), Future plan about children (X_{17}), Demand for Alternative Primary Education (X_{19}) and Social identity (X_{20}).

Tables # 4.01 – 4.19 below depicts the categorical Demand for Universal Primary Education by each of the covariates and the corresponding chi-square (χ^2) with the level of significance to infer if the given covariate has significant association affecting the Demand for Universal Primary Education.

Table # 4.01: Age × Demand for Universal Primary Education

		Demand for Universal Primary Education		Total	χ^2
		No	Yes		
Age	<30	23	27(54.00)	50	10.742**
	30 – 45	126	185(59.48)	311	
	45+	48	114(70.37)	162	
	Total	197	326	523	

** ($p \leq 0.01$), Figures in the parenthesis indicate percent of row total.

The First covariate considered in table # 4.01 is the age of the respondents. Respondents are classified into three groups or categories: < 30 years, between 30 – 45 years and 45+ years. Overall association of age with the Demand for Universal Primary Education is observed to be significant at one percent level of significance indicated by the calculated

chi-square value 10.742 for 2 degrees of freedom. Demand is observed minimum (54.00%) at the lowest age category while it is maximum (70.37%) at the highest age category. This implies that Demand for Universal Primary Education is directly proportional to age of the respondent, irrespective of their other identity.

Table # 4.02: Profession × Demand for Universal Primary Education

		Demand for Universal Primary Education		Total	χ^2
		No	Yes		
Profession	White Color Job	81	118(59.30)	199	4.745
	Agriculture/Fisherman	53	83(61.03)	136	
	Businessman	29	69(70.41)	98	
	Others	34	56(62.22)	90	
	Total	197	326	523	

Figures in the parenthesis indicate percent of row total.

The second covariate considered in table # 4.02 is the profession of the respondents. Respondents are classified into four groups or categories: White color job, Agriculture/Fisherman, Businessman & Others. Overall association of the profession with the Demand for Universal Primary Education is observed not to be significant indicated by the calculated chi-square value 4.745 for 3 degrees of freedom. Demand is observed minimum (59.30%) at the profession category White color job and it is maximum (70.41%) at the profession category Businessman.

Table 4.03: Gender × Demand for Universal Primary Education

		Demand for Universal Primary Education		Total	χ^2
		No	Yes		
Gender	Female	24	47(66.19)	71	1.046
	Male	173	279(61.72)	452	
	Total	197	326	523	

Figures in the parenthesis indicate percent of row total.

The third covariate considered in table # 4.03 is the gender of the respondents. Overall association of the gender with the Demand for Universal Primary Education is observed not to be significant indicated by the calculated chi-square value 1.046 for 1 degrees of freedom. Demand is observed minimum (61.72%) for males and it is maximum (66.19%) for females.

Table # 4.04: Religion × Demand for Universal Primary Education

		Demand for Universal Primary Education		Total	χ^2
		No	Yes		
Religion	Hindu & others	5	13(72.22)	18	1.554
	Muslim	192	313(61.98)	505	
	Total	197	326	523	

Figures in the parenthesis indicate percent of row total.

The fourth covariate considered in table # 4.04 is the religion of the respondents. Respondents are classified into two groups or categories: Hindu & others and Muslim. Overall association of the religion with the Demand for Universal Primary Education is observed not to be significant indicated by the calculated chi-square value 1.554 for 1 degrees of freedom. Demand is observed minimum (61.98%) at the religion category Muslim and it is maximum (72.22%) at the religion category Hindu & others.

Table # 4.05: Year of schooling × Demand for Universal Primary Education

		Demand for Universal Primary Education		Total	χ^2
		No	Yes		
Year of schooling	Illiterate	18	27(60.00)	45	5.288
	<6	44	52(54.17)	96	
	6 – 10	34	61(64.21)	95	
	10+	101	186(64.81)	287	
	Total	197	326	523	

Figures in the parenthesis indicate percent of row total.

The fifth covariate considered in table # 4.05 is the year of schooling of the respondents. Respondents are classified into four groups or categories: illiterate, less than 6 years schooling, between 6 – 10 years schooling and above 10 years schooling. Overall association of the schooling years with the Demand for Universal Primary Education is observed not to be significant indicated by the calculated chi-square value 5.288 for 3 degrees of freedom. This implies that Demand for Universal Primary Education is disproportional to schooling year of the respondents, irrespective of their other identity.

Table # 4.06: Basic education at primary level × Demand for Universal Primary Education

		Demand for Universal Primary Education		Total	χ^2
		No	Yes		
Basic education at primary level	Illiterate	18	27(60.00)	45	16.20**
	General Education	112	226(66.86)	338	
	Ebtedayee Madrassa	56	61(52.13)	117	
	Kindergarten	11	12(52.17)	23	
	Total	197	326	523	

**: ($p \leq 0.01$), Figures in the parenthesis indicate percent of row total.

The sixth covariate considered in table # 4.06 is the basic education at primary level of the respondents. Respondents are classified into four groups or categories: illiterate, General Primary stream, Ebtedayee Madrassa stream and Kindergarten stream. Overall association of the basic education at primary level with the Demand for Universal Primary Education is observed to be significant at one percent level of significance indicated by the calculated chi-square value 16.20 for 3 degrees of freedom. Demand is observed minimum (52.13%) at the basic category Ebtedayee Madrassa when it is maximum (66.86%) at the basic education category General Primary stream.

Table # 4.07: Marital Status × Demand for Universal Primary Education

		Demand for Universal Primary Education		Total	χ^2
		No	Yes		
Marital status	Married	180	315(63.63)	495	13.386**
	Unmarried	17	11(39.28)	28	
	Total	197	326	523	

**: ($p \leq 0.01$), Figures in the parenthesis indicate percent of row total.

The seventh covariate considered in table # 4.07 is the marital status of the respondents. Respondents are classified into two groups or categories: married and unmarried & others. Overall association of the marital status with the Demand for Universal Primary Education is observed to be significant at one percent level of significance indicated by the calculated chi-square value 13.386 for 1 degrees of freedom. Demand is observed minimum (39.28%) at the marital status category unmarried & others it is maximum (63.63%) for the married persons.

Table # 4.08: Land holding size × Demand for Universal Primary Education

		Demand for Universal Primary Education		Total	χ^2
		No	Yes		
Land holding size(acre)	<1	75	117(60.93)	192	24.105**
	1 – 3	87	101(53.72)	188	
	3+	35	108(75.52)	143	
	Total	197	326	523	

**: ($p \leq 0.01$), Figures in the parenthesis indicate percent of row total.

The eighth covariate considered in table # 4.08 is the land holding size of the respondents. Respondents are classified into three groups or categories: less than 1 acre land holding, between 1 – 3 acre land holding and above 3 acre land holding size. Overall association of the land holding size with the Demand for Universal Primary Education is observed to be significant at one percent level of significance indicated

by the calculated chi-square value 24.105 for 2 degrees of freedom. Demand is observed minimum (53.72%) at the land holding size category between 1–3 acre. It is maximum (75.52%) at the highest land holding category above 3 acre. This implies that Demand for Universal Primary Education is not proportional land holding size of the respondent, irrespective of their other identity.

Table # 4.09: Pattern of residential house × Demand for Universal Primary Education

		Demand for Universal Primary Education		Total	χ^2
		No	Yes		
Pattern of residential house	Pacca	70	152(68.46)	222	13.044**
	Semi pacca	55	80(59.26)	135	
	Completely Tin shed	32	54(62.79)	86	
	Thesed house	40	40(50.00)	80	
	Total	197	326	523	

**: ($p \leq 0.01$), Figures in the parenthesis indicate percent of row total.

The ninth covariate considered in the table # 4.09 is the pattern of resident house of the respondents. Respondents are classified into four groups or categories: Pacca building, Semi pacca building, completely Tin shed and Thesed house. Overall association of the pattern of resident house with the Demand for Universal Primary Education is observed to be significant at one percent level of significance indicated by the calculated chi-square value 13.044 for 3 degrees of freedom. Demand is observed minimum (50.00%) at the resident category Thesed house. It is maximum (68.46%) at the resident category Pacca building. This implies that Demand for Universal Primary Education is observed not to be proportional of pattern of resident house of the respondent, irrespective of their other identity.

Table # 4.10: Monthly family income × Demand for Universal Primary Education

		Demand for Universal Primary Education		Total	χ^2
		No	Yes		
Monthly family income (in taka)	<5000	22	26(54.17)	48	12.89*
	5000 - 10000	63	74(54.01)	137	
	10000 - 20000	84	152(64.40)	236	
	20000 - 30000	20	51(71.83)	71	
	30000+	8	23(74.19)	31	
	Total	197	326	523	

*: ($p \leq 0.05$), Figures in the parenthesis indicate percent of row total.

The tenth covariate considered in table #4.10 is the monthly family income of the respondents. Respondents are classified into five groups or categories: less than 5000 taka, between 5000 – 10000 taka, between 10000 – 20000 taka, between 20000 – 30000 taka and above 30000 taka. Overall association of the monthly family income with the Demand for Universal Primary Education is observed to be significant at five percent level of significance indicated by the calculated chi-square value 12.89for 4 degrees of freedom. Demand is observed minimum (54.01%) at the monthly family income category 5000-10000 taka. It is maximum (74.19%) at the highest monthly family income category above 30000 taka. This implies that Demand for Universal Primary Education in directly proportional to monthly family income of the respondent, irrespective of their other identity.

Table # 4.11: Monthly family expenditure × Demand for Universal Primary Education

		Demand for Universal Primary Education		Total	χ^2
		No	Yes		
Monthly family Expenditure (in taka)	<5000	24	31(56.36)	55	18.615**
	5000 - 10000	76	85(52.79)	161	
	10000 - 20000	80	173(68.37)	253	
	20000 - 30000	14	29(67.44)	43	
	30000+	3	8(72.72)	11	
	Total	197	326	523	

**: ($p \leq 0.01$), Figures in the parenthesis indicate percent of row total.

The eleventh covariate considered in table # 4.11 is the monthly family expenditure of the respondents. Respondents are classified into five groups or categories: less than 5000 taka, between 5000 – 10000 taka, between 10000 – 20000 taka, between 20000 – 30000 taka and above 30000 taka. Overall association of the monthly family expenditure with the Demand for Universal Primary Education is observed to be significant at one percent level of significance indicated by the calculated chi-square value 18.615 for 4 degrees of freedom. Demand is observed minimum (52.79%) at the second lowest monthly family expenditure category between 5000 – 10000 taka. It is maximum (72.72%) at the highest monthly family expenditure category above 30000 taka. This implies that Demand for Universal Primary Education is not proportional monthly family expenditure of the respondent, irrespective of their other identity.

Table # 4.12: Access to the mass media × Demand for Universal Primary Education

		Demand for Universal Primary Education		Total	χ^2
		No	Yes		
Access to the mass media	Have Mass Media	179	304(62.93)	483	1.984
	No Mass Media	18	22(55.00)	40	
	Total	197	326	523	

Figures in the parenthesis indicate percent of row total.

The twelfth covariate considered in table # 4.12 is access to the mass media of the respondents. Respondents are classified into two groups or categories: have access to mass media and do not have access to mass media. Overall association of access to the mass media with the Demand for Universal Primary Education is observed not to be significant indicated by the calculated chi-square value 1.984 for 1 degrees of freedom. Demand is observed minimum (55.00%) at no access to the mass media category. It is maximum (62.93%) for the access to the mass media category.

Table # 4.13: Family Financial condition × Demand for Universal Primary Education

		Demand for Universal Primary Education		Total	χ^2
		No	Yes		
Family financial condition	Deficit	51	68(57.14)	119	3.287
	Solvent	62	101(61.96)	163	
	Surplus	84	157(65.14)	241	
	Total	197	326	523	

Figures in the parenthesis indicate percent of row total.

The thirteenth covariate considered in table # 4.13 is the family financial condition of the respondents. Respondents are classified into three groups or categories: deficit, solvent and surplus. Overall association of the family financial condition with the Demand for Universal Primary Education is observed not to be significant indicated by the calculated chi-square value 3.287 for 2 degrees of freedom. Demand is observed minimum (57.14%) at the lowest family financial condition category deficit. It is maximum (65.14%) at the highest family financial condition category surplus. This implies that Demand for Universal Primary Education is directly proportional to family financial condition of the respondent, irrespective of their other identity.

Table # 4.14: Existence of 6 – 12 years aged children in the family × Demand for Universal Primary Education

		Demand for Universal Primary Education		Total	χ^2
		No	Yes		
Existence of 6 – 12 years aged children in the family	Have any children	133	236(63.96)	369	2.816
	No children	64	90(58.44)	154	
	Total	197	326	523	

Figures in the parenthesis indicate percent of row total.

The fourteenth covariate considered in table # 4.14 is the Existence of 6 – 12 years aged children in the family of the respondents. Respondents are classified into two groups or categories: have any children and have no children of the age between 6 – 12 years. Overall association of the existence of 6 – 12 years aged children in the family with the Demand for Universal Primary Education is observed not to be significant indicated by the calculated chi-square value 2.816 for 1 degrees of freedom. Demand is observed minimum (58.44%) at the absence of 6 – 12 years aged children in the family in comparison to having children (63.96%).

Table # 4.15: Schooling pattern of the children × Demand for Universal Primary Education

		Demand for Universal Primary Education		Total	χ^2
		No	Yes		
Schooling pattern of the children	No children	64	90(58.44)	154	14.599**
	General Education	69	149(68.35)	218	
	Ebtedayee Madrassa	32	28(46.67)	60	
	Kindergarten	32	59(64.83)	91	
	Total	197	326	523	

**: ($p \leq 0.01$), Figures in the parenthesis indicate percent of row total.

The fifteenth covariate considered in table # 4.15 is the schooling pattern of the children of the respondents. Respondents are classified into four groups or categories: have no children, children attending General Primary stream, Ebtedayee Madrassa stream and Kindergarten stream respectively. Overall association of the schooling pattern of the children with the Demand for Universal Primary Education is observed to be significant at one percent level of significance indicated by the calculated chi-square value 14.599 for 3 degrees of freedom. Demand is observed minimum (46.67%) for the Ebtedayee Madrassa. It is observed maximum (68.35%) for General Primary stream.

Table # 4.16: Monthly expenditure for school going children × Demand for Universal Primary Education

		Demand for Universal Primary Education		Total	χ^2
		No	Yes		
Monthly expenditure for school going children	No children	64	90(58.44)	154	6.931
	<150	6	14(70.00)	20	
	150 – 500	90	134(59.82)	224	
	500 – 1000	16	39(70.90)	55	
	1000+	21	49(70.00)	70	
	Total	197	326	523	

Figures in the parenthesis indicate percent of row total.

The sixteenth covariate considered in table # 4.16 is the monthly expenditure for school going children of the respondents. Respondents are classified into five groups or categories: have no children resulting zero expenditure, less than 150 taka, between 150 – 500 taka, between 500 – 1000 taka and above 1000 taka. Overall association of the monthly expenditure for school going children with the Demand for Universal Primary Education is observed not to be significant indicated by the calculated chi-square value 6.931 for 4 degrees of freedom. Demand is

observed minimum (58.44%) for those having no children. It is maximum (70.00%) at the highest monthly expenditure category above 1000 taka. This implies that Demand for Universal Primary Education is disproportional to monthly expenditure for school going children of the respondent, irrespective of their other identity

Table # 4.17: Future plan about children × Demand for Universal Primary Education

		Demand for Universal Primary Education		Total	χ^2
		No	Yes		
Future plan about children	No children	64	90(58.44)	154	6.073
	White color job	111	204(64.76)	315	
	Agriculture/Fisherman	0	3(01.00)	3	
	Businessman	14	20(58.82)	34	
	Others	8	9(52.94)	17	
	Total	197	326	523	

Figures in the parenthesis indicate percent of row total.

The seventeenth covariate considered in table # 4.17 is the future plan about children of the respondents. Respondents are classified into five groups or categories: have no children, white color job, agriculture/fisherman, businessman & others. Overall association of the future plan about children with the Demand for Universal Primary Education is observed not to be significant indicated by the calculated chi-square value 6.073 for 4 degrees of freedom. Demand is observed minimum (1.00%) at the category agriculture/fisherman. It is maximum (64.76%) at the category white color job. This is implies that Demand for Universal Primary Education is disproportional to future plan about children of the respondent, irrespective of their other identity.

Table # 4.18: Demand for Alternative Primary Education × Demand for Universal Primary Education

		Demand for Alternative Primary education			Total	χ^2
		General education	Ebtedayee Madrassa	Kindergarten education		
Demand for Universal Primary education	Yes	222(68.09)	70(21.47)	34(10.43)	326	121.751**
	No	62(31.47)	67(34.01)	68(34.52)	197	
	Total	284	137	102	523	

** ($p \leq 0.01$), Figures in the parenthesis indicates percent of row total.

The nineteenth covariate considered in table # 4.18 is the Demand for Alternative Primary Education of the respondents. Alternative demand is classified into three groups or categories: General primary education, Ebtedayee Madrassa education and Kindergarten education. Overall association of the Demand for Alternative Primary Education with the Demand for Universal Primary Education is observed to be highly significant at 1 percent level of significance indicated by the calculated chi-square value 121.751 for 2 degrees of freedom. Demand is observed maximum (68.09%) at the category General education system. It is minimum (10.43%) at the category Kindergarten education system. This implies that Demand for Universal primary education is highly influenced by the Demand for Alternative General Education. Both Kindergarten and Ebtedayee Madrassa system negatives the demand for Universal Primary education but the degree of negation is higher in case of Kindergarten than the Ebtedayee Madrassa system.

Table # 4.19: Social Identity × Demand for Universal Primary Education

		Demand for Universal Primary Education		Total	χ^2
		No	Yes		
Social Identity	Primary teachers.	9	16(64.00)	25	42.341 **
	Madrassa teachers.	21	14(40.00)	35	
	Kg. teachers	12	0(0.00)	12	
	High school teachers	13	34(72.34)	47	
	College teachers	13	21(61.76)	34	
	Social leaders	43	115(72.78)	158	
	Students Guardians	86	126(59.43)	212	
	Total	197	326	523	

**: ($p \leq 0.01$), Figures in the parenthesis indicate percent of row total.

The twentieth covariate considered in table # 4.19 is the Social identity of the respondents. Respondents are classified into seven groups or categories: Primary school teachers, Madrassa teachers, Kindergarten school teachers, High school teachers, College teachers, Social leaders and Students Guardians. Overall association of Social identity of respondent with the Demand for Universal Primary Education is observed to be significant at one percent level of significance indicated by the calculated chi-square value 42.341 for 6 degrees of freedom. Demand is observed minimum (0.00%) at the Social identity category Kindergarten school teachers. It is observed maximum (72.34%) for the Social identity category Social leaders followed by High school teachers (72.34%), Primary school teachers (64.00%), College teachers (61.76%), Students Guardians (59.43%) and the Madrassa teachers (40.00%).

Tables # 4.20 – 4.24 depicts the cross relationship between Social Identity and some others important covariates of respondents. That may result in multi-colinearity problems in logistic regression analysis.

Table # 4.20: Social Identity × Year of schooling

		Year of schooling				Total	χ^2
		illiterate	<6	6 -10	10+		
Social Identity	Primary teachers	0	0	0	25	25	701.013**
	Madrassa Teachers	0	0	0	35	35	
	Kg. teachers	0	0	0	12	12	
	High school teachers	0	0	0	47	47	
	College teachers	0	0	0	34	34	
	Social Leaders	0	8	50	100	158	
	Students Guardians	45	88	43	36	212	
	Total	45	96	93	289	523	

** ($p \leq 0.01$), Figures in the parenthesis indicate percent of row total.

Table # 4.21: Social Identity × Basic education at primary level

		Basic education at primary level				Total	χ^2
		Illite	General	Ebted	K.G		
Social identity	Primary teachers	0	21	4	0	25	256.84**
	Mad. teachers	0	14	19	2	35	
	Kg. teachers	0	4	2	6	12	
	High school teachers	0	39	7	1	47	
	College teachers	0	29	5	0	34	
	Social leaders	0	102	48	8	158	
	Students Guardians	45	129	32	6	212	
	Total	45	338	117	23	523	

**: ($p \leq 0.01$), Figures in the parenthesis indicate percent of row total.

Table # 4.22: Social Identity × Land holding size

		Land holding size			Total	χ^2
		< 1	1 – 3	3+		
Social Identity	Primary teachers	11	8	6	25	217.197**
	Madrassa Teachers	8	20	7	35	
	Kg. teachers	5	7	0	12	
	High school teachers	16	20	11	47	
	College teachers	8	18	8	34	
	Social leaders	35	38	85	158	
	Students Guardians	109	77	26	212	
	Total	192	188	143	523	

**: ($p \leq 0.01$), Figures in the parenthesis indicate percent of row total.

Table # 4.23: Social Identity × Monthly family Income

		Monthly family Income					Total	χ^2
		<5000	5000 - 10000	10000 - 20000	20000 - 30000	30000 +		
Social Identity	Primary tea.	0	7	15	2	1	25	495.05**
	MadrassaTea	0	6	24	4	1	35	
	Kg. teaache	1	8	3	0	0	12	
	High tea.	0	7	34	4	2	47	
	College tea.	0	0	15	13	6	34	
	Social lead.	0	8	91	42	17	158	
	Students Gu.	48	101	58	6	4	212	
	Total	48	137	236	71	31	523	

**: ($p \leq 0.01$), Figures in the parenthesis indicate percent of row total.

Table # 4.24: Social Identity × Monthly family expenditure

		Monthly family expenditure					Total	χ^2
		<5000	5000 - 10000	10000 - 20000	20000 - 30000	30000 +		
Social Identity	Primary tea.	0	9	15	0	1	25	578.70**
	Madrassa Tea.	0	9	23	3	0	35	
	Kg. teachers	2	8	2	0	0	12	
	High tea.	1	8	33	4	1	47	
	College tea.	0	3	20	10	1	34	
	Social lead.	0	9	120	22	7	158	
	Students Guar.	52	115	40	4	1	212	
	Total	55	161	253	43	11	523	

**: ($p \leq 0.01$), Figures in the parenthesis indicate percent of row total.

4.4 Development of the Model

Let y_j measures the Demand for Universal Primary Education by the jth respondent, while X_{ij} be the ith covariate of jth respondent affecting the demand y_j, $i = 1,2,3,\ldots\ldots\ldots\ldots\ldots\ldots\ldots k; j = 1,2,3,\ldots\ldots\ldots\ldots\ldots\ldots\ldots n.$ y_j measuring demand is a dichotomous variable taking values (0,1) with $P(y_j = 1) = p_j$ and $P(y_j = 0) = 1 - p_j$ that is $y_j = 1$ if the respondent Demand Universal Primary Education and $y_j = 0$, if jth respondent do not demand Universal Primary Education with

$E(y_j) = p_j$ and $Var(y_j) = p_j(1 - p_j)$, $0 < p_j < 1$. The covariate, X_{ij} may be coded, indicator, discrete or continuous variable. Whether a respondent *j* having a set of covariates X_{ij}, demands Universal Primary Education or not depends on the linear combination value $d_j = \sum_{i=1}^{k} \gamma_i x_{ij}$, popularly known as the tolerance of the respondent $j = 1,2,3, \ldots \ldots \ldots \ldots \ldots n$. Respondents with smaller tolerance values may be more likely in demanding the Universal Primary Education or vice-versa. Since variance of y_j is a function of the expected value of Y_j, a direct linear relationship between p_j and d_j is not permissible.

Let U be the random variable associated with the tolerance distribution and let u be the tolerance of a particular respondent.

Then probability of Demand for universal Primary Education by the jth respondent,

$$p_j = P(U \leq d_j) = \int_{-\infty}^{d_j} f(u)du$$

Three theoretical distributions are available for the random variable U in statistical literature based on the nature of p_j's . For values of p_j's lying between $0 < P_j < 1$, normal distribution is suggested for U[Finny. D.J (1947), Fieler (1940)] resulting Probit transformation for p_j's . For values of p_j's lying between, $0.2 < P_j < 0.8$, logistic distribution is suggested for U [Berkson(1951). Cox (1970), Pregibon(1981)] resulting logit transformation of p_j's . For non–symmetric and larger values at extreme points of p_j's , Gumble distribution is suggested for U [Fisher. R. A (1922). Whitehead (1998)] resulting complementary log–log transformation for p_j's . In the present course, it is observed for all

classification of covariates x_i's, with respect to demand for universal primary education, $0.2 < P_j < 0.8$.

Hence, $f(u) = \frac{\exp\left\{\frac{u-\mu}{\delta}\right\}}{\delta\left[1+\exp\left\{\frac{u-\mu}{\delta}\right\}\right]^2}$, $-\infty < U < \infty$,

$$-\infty < \mu < \infty,\ \delta > 0\ ,\ \mu = E(U) \text{ and } Var(u) = \frac{\pi^2\delta^3}{3}$$

$$\Rightarrow p_j = \int_{-\infty}^{d_j} f(u)du = \frac{\exp\left\{\frac{d_j-\mu}{\delta}\right\}}{\delta\left[1+\exp\left\{\frac{d_j-\mu}{\delta}\right\}\right]} = \frac{\exp\left(\beta_0+\sum_{j=1}^{n}\beta_i x_{ij}\right)}{\left[1+\exp\left(\beta_0+\sum_{j=1}^{n}\beta_i x_{ij}\right)\right]}.$$

Where, $\beta_0 = -\frac{\mu}{\delta}$ and $\beta_i = \frac{\gamma_i}{\delta}$

$$\Rightarrow \text{logit } p_j = \log\left(\frac{p_j}{1-p_j}\right) = \beta_0 + \beta_1 x_{1j} + \beta_2\ x_{2j} + \cdots \ldots\ldots\ldots\ldots + \beta_k x_{kj}.$$

4.5 Measurement of Variables

In my problem the dependent variable is Demand for Universal Primary Education (X_{18}) which is taken to be dichotomous one. It indicates the demand for Universal Primary Education of the respondents. It takes on the value one (Yes=1) with probability p(say) if the respondent demands Universal Primary Education and zero (No=0) with probability $1 - p$ if the respondent do not Demand Universal Primary Education.

Most of the explanatory variables in our analysis are qualitative. In order to interpret the quantitative independent variable, age of the respondent has been taken into an interval scale, such as age group <30, 30 – 45 and 45^+ and the corresponding variables are denoted by x_{11} = Age group <30, x_{12} = Age group 30 – 45 and x_{13} = Age group 45^+ respectively. Each of the age group is considered as an indicator variable i.e. the respondent belongs to a particular age group has the value 1 and 0 otherwise.

The profession is a qualitative variable and we denote these professions by x_{21} = White color job, x_{22} = Agricultural/Fisherman, x_{23} = Businessman and x_{24}= others. Each of the sub -variables is an indicator variable.

Gender is another qualitative variable of the respondent and denoted by x_{31}= Male and x_{32}= Female. Each of the sub-variables is an indicator variable.

Next, religion is a qualitative variable and various religious groups are denoted by x_{41}= Muslim and x_{42}= Hindu and others. Each of the religious groups is considered as an indicator variable.

The level of schooling years of the respondent is taken as qualitative and has been expressed into interval scale and denoted by x_{51}= Illiterate, x_{52} =Completed less than 6 years schooling, x_{53}= Completed between 6 – 10 years schooling and x_{54}= Completed above 10 years schooling. Each of the sub-variables is an indicator variable.

The stream of primary education of the respondent is taken as qualitative and we denoted by x_{61}= Illiterate, x_{62}= General stream, x_{63}= Ebtedayee Madrassa stream and x_{64}= Kindergarten stream are respectively. Each of the sub-variables is an indicator variable.

The marital status of the respondent is denoted by x_{71} = Married and x_{72}= Unmarried & others than married category. Each of the marital status is considered as an indicator variable.

The land holding size of the respondent is taken as quantitative and has been expressed into interval scale and denoted by x_{81}= Land holding size

is less than 1 acre, x_{82}= Land holding size between 1 – 3 acre and x_{83}= Land holding size above 3 acre respectively. Each of the sub-variables is an indicator variable.

Next, the pattern of resident house of the respondent is qualitative and we denoted these pattern by x_{91}= Pacca building, x_{92}= Semi pacca building, x_{93} = Completely tin shed and x_{94}= Thesed house. Each of the patterns of residential house of the respondent is considered as an indicator variable.

The monthly family income of the respondent is quantitative and has been expressed into interval scale and denoted by x_{101} = less than 5000 taka, x_{102} = between 5000 – 10000 taka, x_{103} = between 10000 – 20000 taka, x_{104} = between 20000 – 30000 taka and x_{105} = above 30000 taka. Each of the sub-variables is an indicator variable.

The monthly family expenditure of the respondent is quantitative and has been expressed into interval scale and denoted by x_{111} = less than 5000 taka, x_{112} = between 5000 – 10000 taka, x_{113} = between 10000 – 20000 taka, x_{114} = between 20000 – 30000 taka and x_{115} = above 30000 taka. Each of the sub-variables is an indicator variable.

The variable access to the mass media is also a qualitative variable. The media radio, television, mobile, dish antenna and everything is denoted by x_{121} and do not have access to mass media is denoted by x_{122} . Each of the sub-variables is an indicator variable.

The family financial condition of the respondent is another qualitative variable is denoted by x_{131} = Deficit, x_{132} = Solvent and x_{133} = Surplus respectively. Each of the sub-variables is an indicator variable.

The Existence of 6 – 12 years aged children in the family of the respondent is a qualitative variable. Respondent have any children and have no children of age between 6 – 12 years are denoted by x_{141} and x_{142} respectively. Each of the variables is an indicator variable.

The level of schooling pattern of the children is taken as qualitative and expressed by x_{151} = Respondent have no children, x_{152} = General stream, x_{153} = Ebtedayee Madrassa stream and x_{154} = Kindergarten stream. Each of the sub-variables is an indicator variable.

Another qualitative variable monthly expenditure for school going children of the respondent is denoted by x_{161} = have no children, x_{162} = less than 150 taka, x_{163} = between 150 – 500 taka, x_{164} = between 500 – 1000 taka and x_{165} = above 1000 taka. Respondent monthly expenditure for school going children groups are consider as indicator variable.

Future plan about children of the respondent is taken as qualitative variables and denoted by x_{171} = Have no children, x_{172} = White color job, x_{173}=Agriculture/Fisherman, x_{174} = Businessman and x_{175} = Others. Each of the future plan about children of the respondent is an indicator variable.

The variable Demand for Universal Primary Education is qualitative as well as dichotomous one and it is denoted by x_{18} .

The another variable Demand for Alternative Primary Education to Universal Primary Education are existing three types of schooling viz., Government Primary schools or General stream indicated by x_{191}, Ebtedayee Madrassa stream by x_{192} and Kindergarten stream by x_{193}. Each of the sub-variables is indicator variables.

Similarly the variable Social identity is also a qualitative one. The mentioned categories of Social identity are denoted by x_{201} = Primary school teachers, x_{202} = Madrassa teachers, x_{203} = Kindergarten school teachers, x_{204} = High school teachers, x_{205} = College teachers, x_{206} = Social leaders and x_{207} = Students Guardians respectively. Each of the variables is an indicator variable.

Examination of cross tables indicates that 9 of the covariates are not associated with the demand for Universal Primary Education. Excluding the covariates having no significant association with the Demand for Universal Primary Education, the expression p_j is given by

$$p_j = E[X_{18} = 1 \mid X_{11} = x_{11},\ X_{12} = x_{12}, X_{13} = 0, X_{61} = x_{61},\ X_{62} = x_{62}, X_{63} = x_{63}, X_{64} = 0, X_{71} = x_{71}, X_{72} = 0, X_{81} = x_{81}, X_{82} = x_{82}, X_{83} = 0, X_{91} = x_{91},\ X_{92} = x_{92},\ X_{93} = x_{93},\ X_{94} = 0,\ X_{101} = x_{101},\ X_{102} = x_{102}, X_{103} = x_{103},\ X_{104} = x_{104},\ X_{105} = 0,\ X_{111} = x_{111}, X_{112} = x_{112},\ X_{113} = x_{113},\ X_{114} = x_{114},\ X_{115} = 0, X_{151} = x_{151,} X_{152} = x_{152}, X_{153} = x_{153}, X_{154} = 0,\ X_{191} = x_{191}, X_{192} = x_{192},\ X_{193} = 0,\ X_{201} = x_{201}, X_{202} = x_{202},\ X_{203} = x_{203}, X_{204} = x_{204},\ X_{205} = x_{205}\ , X_{206} = x_{206}, X_{207} = 0].$$

(Here the values of the variables corresponding to the reference category are considered as "0")

Table # 4.25: Fitted Logistic Regression Model

Variables	Levels	Regression coefficient	Stander Error	Sig.	Odds ratio [Exp(β)]
Age in years	<30	-0.510	0.701	0.467	0.601
	30 – 45	-0.430	0.465	0.355	0.651
	45+ (r)	-	-	-	-
Basic education at primary level	Illiterate	0.020	1.435	0.989	1.020
	General Primary	-0.685	0.895	0.444	0.504
	Ebtedayee Madrassa	-0.155	1.019	0.879	0.856
	Kindergarten (r)	-	-	-	-
Marital Status	Married	1.573	0.920	0.087	4.823
	Unmarried (r)	-	-	-	-
Land holding size	<1 Acre	-0.666	0.584	0.254	0.514
	1 – 3 Acre	-0.589	0.517	0.254	0.555
	3+ Acre (r)	-	-	-	-
Pattern of residential house	Pacca	-0.131	0.794	0.869	0.877
	Semi Pacca	-0.677	0.761	0.373	0.508
	Tin Shed	-0.492	0.776	0.526	0.611
	Thesed (r)	-	-	-	-
Monthly family income in taka	<5000	0.965	2.178	0.658	2.626
	5000-10000	-0.411	1.595	0.797	0.663
	10000-20000	-0.573	1.357	0.673	0.564
	20000-30000	-0.582	1.244	0.640	0.559
	30000+ (r)	-	-	-	-
Monthly family expenditure in taka	<5000	1.261	2.160	0.559	3.530
	5000-10000	1.769	1.894	0.350	5.865
	10000-20000	1.382	1.717	0.421	3.983
	20000-30000	0.689	1.615	0.670	1.991
	30000+ (r)	-	-	-	-
Schooling pattern of the children	No children	1.199	0.545	0.028	3.317
	General Stream	1.689	0.483	0.000	5.414
	Ebtedayee Madrassa	1.185	0.918	0.196	3.271
	Kindergarten (r)	-	-	-	-
Alternative Demand	General Stream	2.206	0.304	0.000	9.079
	Ebtedayee Madrassa	-1.103	0.615	0.060	0.332
	Kindergarten (r)		-		-
Social Identity	Primary school teachers	0.942	1.137	0.407	2.566
	Madrassa teachers	-0.484	0.695	0.486	0.616
	Kindergarten teachers	-22.947	10857.017	0.998	0.000
	High school teachers	1.361	0.737	0.065	3.899
	College teachers	0.992	0.837	0.236	2.698
	Social leaders	1.043	0.593	0.078	2.839
	Students Guardians (r)	-	-	-	-
	Intercept	-0.246			
	-2log likelihood	222.588			
	Cox & Snell R^2	0.593			
	Nagelkerke R^2	0.808			
	Model χ^2	470.294			
	df	30			

r = Reference category,

4.6 Empirical results and discussion

The estimated binary logistic regression model is given by

$$\text{Log}_e \frac{p_j}{1-p_j} = -0.246 - 0.510x_{11} - 0.430x_{12}$$
$$+0.020x_{61} - 0.685x_{62} - 0.155x_{63} + 1.573\,x_{71}$$
$$-0.666x_{81} - 0.589x_{82} - 0.131x_{91} - 0.677x_{92}$$
$$-0.492x_{93} + 0.965x_{101} - 0.411x_{102} - 0.573x_{103}$$
$$-0.582x_{104} + 1.261x_{111} + 1.769x_{112} + 1.382x_{113}$$
$$+0.689x_{114} + 1.199x_{151} + 1.689x_{152} + 1.185x_{153}$$
$$-2.206x_{191} + 1.103x_{192} + 0.942x_{201} - 0.484x_{202}$$
$$-22.947x_{203} + 1.361x_{204} + 0.992\,x_{205} + 1.043x_{206}$$

In logistic regression, regressor variables are splitted into groups or categories to identify the relative importance of groups or categories in comparison to a specified group, called reference group or category in affecting the response variable.

If the regressor variables are subject to multi-colinearity, step wise regressing should be done to single out statistically significant regressors.

An inspection through tables number 4.20, 4.21, 4.22, 4.23 & 4.24 shows that social identity is highly associated with year of schooling, basic education at primary level, land holding size, monthly family income and monthly family expenditure.

Similarly, monthly income is associated with year of schooling, land holding size, monthly expenditure etc.

This demands for a stepwise regression. The results of stepwise regression are given in table # 4.26.

Table # 4.26: Stepwise regression

Variables	Levels	Regression coefficient	Stander Error	Sig	Odds ratio [Exp(β)
Age in years	<30	-1.141	0.538	0.034	0.319
	30 – 45	-0.575	0.406	0.056	0.563
	45^+ (r)	-	-	-	-
Marital status	Married	1.274	0.611	0.037	3.574
	Unmarried (r)	-	-	-	-
Land holding size	< 1 Acre	-0.937	0.468	0.045	0.392
	1 – 3 Acre	-1.052	0.436	0.016	0.349
	3^+ Acre(r)	-	-	-	-
Schooling pattern of the children	No children	0.984	0.412	0.017	2.676
	General Education	1.814	0.419	0.000	6.136
	Ebtedayee Madra	1.638	0.790	0.038	5.147
	Kindergarten (r)	-	-	-	-
Demand for Alternative Primary Education	General Educa	2.036	0.271	0.000	7.662
	Ebtedayee Madra	-0.941	0.297	0.002	0.3902
	Kindergarten(r)	-	-		-
	Intercept	0.876			
	-2log likelihood	267.993			
	Cox & Snell R^2	0.556			
	Nagelkerke $\overline{R}^2$	0.758			
	Model χ^2	424.890			
	df	10			

r = Reference category.

4.7 Empirical result of stepwise regression and discussions

The stepwise estimated binary logistic regression model is given by

$$\log_e \frac{p_j}{1-p_j} = 0.876 - 1.141x_{11} - 0.575x_{12} + 1.274x_{71} - 0.937x_{81} - 1.052x_{82} + 0.984x_{151} + 1.814x_{152} + 1.638x_{153} - 2.036x_{191} + 0.941x_{192}$$

The logistic regression coefficients of the respondent age groups <30, 30 – 45 and 45^+ are calculated. Considering highest age group 45^+ as reference category the regression coefficients of eligible respondents corresponding to age group <30 and 30 – 45 are -1.141 and -0.575 respectively and these are negative in sign. The results illustrate that the respondent age group < 30 and 30 – 45 are likely to Demand for Universal Primary Education less and the results are statistically significant as compared to the reference age group 45^+. The odds ratio corresponding to the age group <30 and 30 – 45 are 0.319 and 0.563 respectively. It indicates that the respondent age group < 30 and 30 – 45 have (1 – 0.319) × 100 = 68.1 and (1 – 0.563) × 100 = 43.7 percent of Demand for Universal Primary Education as compared to the age group 45^+.

The logistic regression coefficients of the Marital status groups, married and unmarried are calculated. Considering unmarried group as reference category, the regression coefficients of eligible respondents corresponding to married group are 1.274 positive in sign. The odds ratio corresponding to the marital status for married group is 3.574. It indicates that the Married group's demand for Universal Primary Education is 3.574 times higher than that of unmarried group.

The logistic regression coefficients of the respondent land holding size are classified into three groups, < 1 acre, 1 – 3 acre and 3^+ acre are calculated. Considering highest land holding size 3^+ acre as reference category the regression coefficients of eligible respondent corresponding to land holding size <1 acre and 1 – 3 acre are -0.937 and -1.052 respectively and these are negative in sign. The result illustrate that the respondent land holding size < 1 acre and 1 – 3 acre are likely to demand

Universal Primary Education less as compared to the reference land holding size 3^+ acre and the results are statistically significant.

The odds ratio corresponding to the land holding size <1 acre and 1 - 3 acre are 0.392 and 0.349 respectively. It indicates that the respondent land holding size <1 acre and 1 – 3 acre have (1 – 0.392) × 100 = 60.8 and (1 – 0.349) × 100= 65.1 percent of Demand for Universal Primary Education as compared to the land holding size 3^+ acre.

The logistic regression coefficients of the respondents schooling pattern of the children are classified into four groups No children, General stream, Ebtedayee Madrassa stream and Kindergarten stream are calculated. Considering Kindergarten schooling pattern of the children as reference category the regression coefficients of eligible respondent corresponding to schooling pattern of the children No children, General stream and Ebtedayee Madrassa are 0.984, 1.814 and 1.638 respectively and these are positive in sign.

The results illustrate that the schooling pattern of the children, No children, General stream and Ebtedayee Madrassa are likely to Demand for Universal Primary Education higher and the results are statistically significant as compared to the reference schooling pattern of the children Kindergarten.

The odds ratio corresponding to the schooling pattern of the children, No children, General stream and Ebtedayee Madrassa stream are 2.676, 6.136 and 5.147 times respectively.

It indicates that the schooling patterns of the children Demand for Universal Primary Education are 2.676, 6.136 and 5.147 times higher than that of Kindergarten stream.

The logistic regression coefficients of the respondent Demand for Alternative Primary Education are classified into three groups or categories: General stream education, Ebtedayee Madrassa stream education and Kindergarten stream education are calculated. Considering Kindergarten schooling as reference category, the regression coefficients of eligible respondents corresponding to the Demand for Alternative Primary Education General Stream education and Ebtedayee Madrassa stream education are 2.036 and -0.941 respectively. This coefficient of General stream education is positive in sign and Ebtedayee Madrassa education is negative in sign.

The odds ratio corresponding to the Demand for Alternative Primary Education, General stream Education and Ebtedayee Madrassa are 7.662 and 0.3903 respectively. It indicates that the respondents Demand for Alternative Primary education, General Primary education are 7.662 times higher of Demand for Universal Primary Education in comparison to Kindergarten stream. On the other hand Ebtedayee Madrassa stream education (1-0.3902)×100=60.98 percent of Demand for Universal Primary Education in comparison to Kindergarten stream.

4.8 Measuring the worth of the Model

There are various statistics that have been proposed for assessing the worth of a logistic regression model, analogous to those that are used in linear regression. We examine two of the proposed statistics in the following.

4.9 R^2 in logistic regression

The worth of linear regression model can be determined by using R^2, but R^2 computed as in linear regression should not be used in logistic regression, at least not when the possible values of Y are zero and one. It is evident that R^2 can be dropped considerably for every misfitted point, so R^2 can be less than 0.9 even for near-perfect fitting. Cox & Wermuth (1992) also advocates that calculated R^2 should not be used when Y has only two possible values, and display that frequently $R^2 \approx 0.1$ when good model are used.

For the binomial logit model various alternative forms of R^2 have been proposed. Maddala (1983) and Magee (1990) proposed this equation

$$R^2 = 1 - \left\{\frac{L(0)}{L(\hat{\beta})}\right\}^2 \quad \text{.....(4.1)}$$

with $L(0)$ denoting the likelihood for the null model (i.e., eith no regressions) and $L(\hat{\beta})$ responding the likelihood function that would result when π_i is replaced by P_i in the following equation

$$g(Y_1, Y_2, \dots\dots\dots\dots, Y_n) = \prod_{i=1}^{n} \pi_i^{Y_i}(1-\pi_i)^{1-Y_i} \quad \text{.....(4.2)}$$

Essentially the same expression, except that $\frac{2}{n}$ was misprinted as $\frac{1}{n}$, was given by Cox & Snell (1989). [Equation (4.1) is motivated by the form of the likelihood ratio test for testing the fitted model against the null model. It can be shown that R^2 as defined in linear regression is equivalent to the right hand side of equation (4.1). Hence, this is a natural form for R^2 in logistic regression.] Since the likelihood function $L(\hat{\beta})$ is product of probabilities, it follows that the value of the function must be less than 1. Thus, the maximum possible value for R^2 defined by equation (4.1) is

$\max R^2 = 1 - \{L(0)\}^{\frac{2}{n}}$. In linear regression $\hat{Y} = \overline{Y}$ is used for the null model. Similarly, in logistic we would have $\hat{\pi} = \gamma_1$ for the null model, with γ_1 denoting the percentage of 1's in the data set. It follows that $\max R^2 = 1 - \left\{\gamma_1^{\gamma_1 n}(1-\gamma_1)^{n-\gamma_1 n}\right\}^{\frac{2}{n}}$. For example, if $\gamma_1 = 0.5$, then $\max R^2 = 0.75$. This is the largest possible value of R^2 defined by equation (4.1). When the data are fairly aspersed, the maximum possible value will be neighboring to zero. Therefore, Nagelkerke (1991) proposed that $\overline{R}^2$ be used, with $\overline{R}^2 = R^2/\max R^2$.

For the above fitted model the Cox & Snell $R^2 = 0.556$ and Nakgelkerke $\overline{R}^2 = 0.758$. It is observed that when the value of $\overline{R}^2$ exceeds 0.5 that data fit binary logistic regression model fit. So the model can use for the significance prediction about the demand for a universal primary education.

4.10 Residual Analysis

Measures of agreement between an observation on a response variable and the corresponding fitted value are known as residuals. For example, let a linear logistic model is fitted to n binomial observations of the form $y_i/n_i, i = 1,2, \ldots\ldots\ldots n,$ and the corresponding fitted value of y_i is $\hat{y}_i = n\hat{p}_i$. The ith raw residual is then the difference $y_i - \hat{y}_i$. These raw residuals are the basic material to assess the adequacy of a fitted model. But variations of n_i and hence the success probability p_i make it difficult to interpret these raw residuals. To overcome these difficulties, different modified and standardized residuals are defined and used by different authors and researchers. Of these, Pearson residuals, standardized

Pearson residuals, deviance residuals, standardized deviance residuals and likelihood residuals are frequently used.

The overall deviance of a fitted logistic model (Collet,91) to n binomial observations is given by

$$D = 2\sum_i \left\{ y_i log_e \left(\frac{y_i}{\hat{y}_i}\right) + (n_i - y_i) log_e \left(\frac{n_i - y_i}{n_i - \hat{y}_i}\right)\right\}.$$

In special cases, where $n_i = 1, i = 1,2, \ldots\ldots\ldots, n$, the deviance reduces to $D = -\sum_i \{\hat{p}_i logit(\hat{p}_i) + log(1 - \hat{p}_i)\}$.

Contribution of the ith observation to the overall deviance D is given by

$$d_i = sign(y_i - \hat{y}_i)\left[2y_i log\left(\frac{y_i}{\hat{y}_i}\right) + 2(n_i - y_i) log_e \left(\frac{n_i - y_i}{n_i - \hat{y}_i}\right)\right]^{\frac{1}{2}}.$$

The quantity d_i is known as deviance residual and $D = \sum d_i^2$.

The deviance depends on the binary observation y_i only through the fitted probabilities $\hat{p}_i$ and so it can tell us nothing about the agreement between the observations and their corresponding fitted probabilities. Hence, the deviance on fitting a model to binary response data cannot be used as a summary statistic for the goodness of fit of the fitted model unless we study the distribution of the deviance. Under certain conditions, the deviance is asymptotically distributed as chi-square (McCullagh and Nelder, 1989) with $(n - p)$ degrees of freedom, where n is the number of binomial observations and p is the number of unknown parameters included in the current logistic regression model. Since the expected value of a chi-square random variable is equal to its degrees of freedom, a useful rule of thumb is that when the deviance on fitting a linear logistic model is approximately equal to its degrees of freedom, the model is satisfactory.

Standardized deviance residual $r_{D_i} = \frac{d_i}{\sqrt{(1-h_i)}}$, corresponding to ith observation where h_i is the ith diagonal element of the hat matrix $H = W^{1/2}X(X'WX)^{-1}X'W^{1/2}$, W being a diagonal $(n \times n)$ matrix of weights in fitting the model and X is the $(n \times r)$ design matrix. For linear logistic model, the ith diagonal element of w is $n_i\hat{p}_i(1-\hat{p}_i)$, the estimated variance of y_i. h_i is popularly known as leverage corresponding to ith observation.

Pearsonian residual, $X_i = \frac{y_i - n\hat{p}_i}{\sqrt{n_i\hat{p}_i(1-\hat{p}_i)}}$

on standardization reduces to

$r_{p_i} = \frac{y_i - n\hat{p}_i}{\sqrt{v_i(1-h_i)}}$, where $v_i = n_i\hat{p}_i(1-\hat{p}_i)$.

A linear combination of standardized deviance residual r_{D_i} and standardized Pearsonian residual r_{p_i} gives the approximate standardized logit residuals or likelihood residuals as

$$r_{L_i} = sign(y_i - \hat{y}_i)\sqrt{\{h_i r_{p_i}^2 + (1-h_i)r_{D_i}^2\}}.$$

For moderately large sample, all the three standardized residuals lead to the same quantity (Collet, l.c) and thus, analysis of all the three residuals for model adequacy or lack of model fit led to the same conclusion.

The built-in-computer package SPSS verson-15.0 providing the fitting of the linear logistic model of binary responses also provides us deviance residuals. The distribution of deviance residuals corresponding to the stepwise logistic regression model is given in table # 4.27.

Calculated value of the overall deviance $D = \sum f_i\ d_i^2$ with $(n-p) = (523-11) = 512$ d.f. is given at the end of the table, where d_i is the mid-value of the ith interval and f_i is the corresponding frequency.

Table # 4.27: Distribution of deviance residual

Sl	Class Interval	Frequency
1	-2.8228 to - 2.3228	8
2	-2.3228 to - 1.8228	12
3	-1.8228 to - 1.3228	27
4	-1.3228 to - 0.8228	55
5	-0.8228 to - 0.3228	90
6	-0.3228 to 0.0772	108
7	0.0772 to 0.5772	86
8	0.5772 to 1.0772	60
9	1.0772 to 1.5772	44
10	1.5772 to 2.0772	33

Overall deviance,

$D = \sum f_i d_i^2 = 505.2984$

$D(ungroupeddata) = 498.7061$

Degrees of freedom, $(n - p) = 523 - 11 = 512$. The distribution of standardized deviance r_{D_i} generated by SPSS version-15.0 is given in table # 4.28. Mean, Variance, Skewness & Kurtosis of the standardized deviances are given below the table.

Table # 4.28: Frequency distribution of Standardized deviances, r_{D_i}

Sl	r_{D_i} Interval	Frequency
1	-2.179 to - 1.779	17
2	-1.779 to - 1.379	30
3	-1.379 to - 0.979	41
4	-0.979 to - 0.579	57
5	-0.579 to - 0.179	71
6	-0.179 to 0.221	99
7	0.221 to 0.621	69
8	0.621 to 1.021	55
9	1.021 to 1.421	43
10	1.421 to 1.821	28
11	1.821 to 2.221	13

Mean= - 0.00041,

Variance = 0.924054,
Skewness = 0 and
Kurtosis = 2.422531.

Scattered plot of predicted $X\hat{\beta}$ corresponding to deviances is given in figure # 4.01 below.

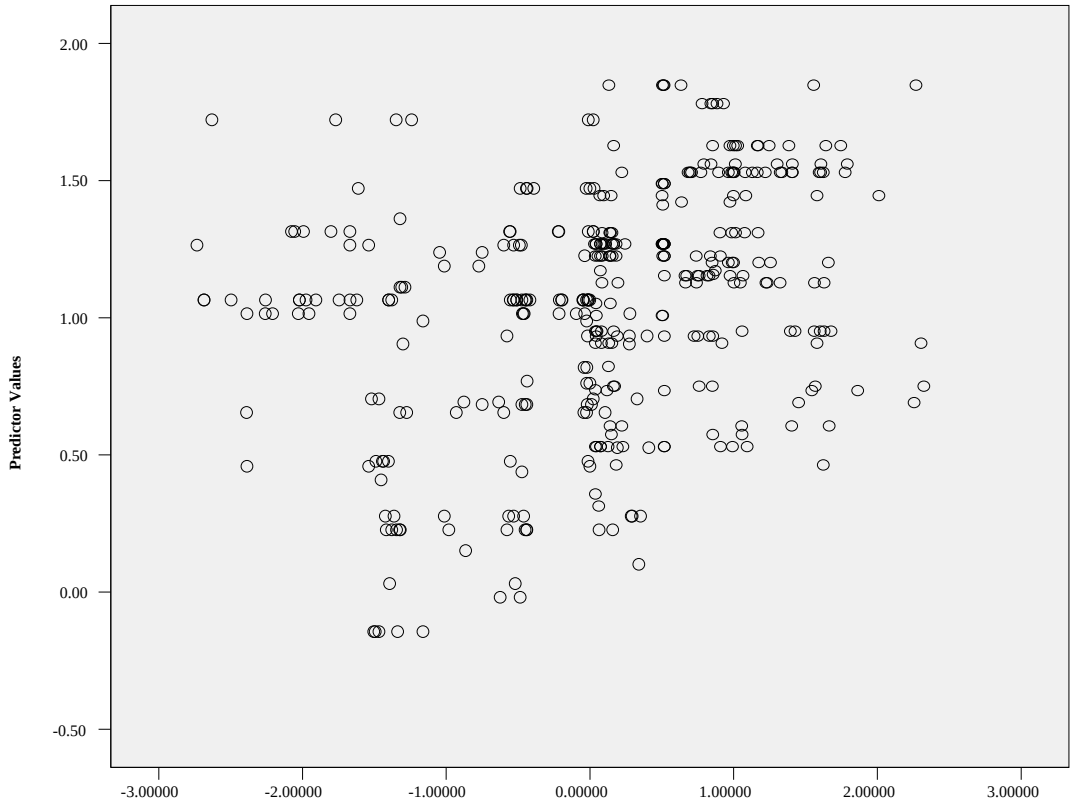
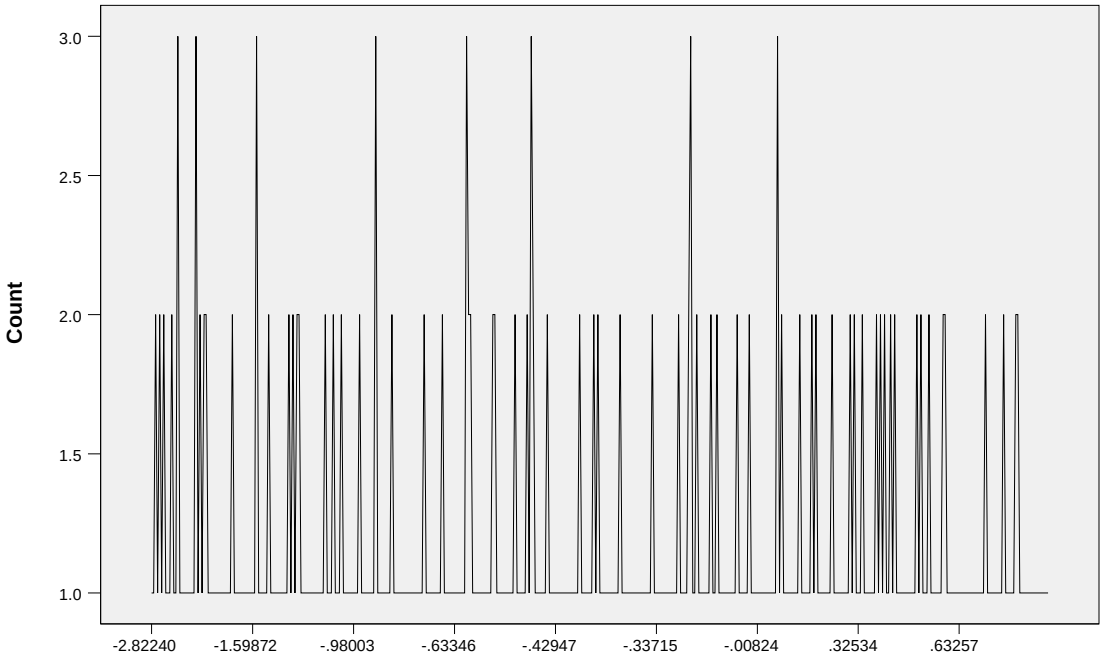


Figure no. – 4.01

Index plot of raw deviances are given in figure # 4.02 below.



Index Graph
Figure no. – 4.02

4.10.1 Result and Discussion

From table # 4.27, the value of the overall deviance D is approximately equal to the number of degrees of freedom of the deviance analysis which supports that the distribution of overall deviance D is approximately and/or asymptotically chi-square (McCullah & Nelder, l.c). Thus, we may conclude that the fitted linear logistic model does not suffer from lack of fit or the fit is satisfactory.

From table # 4.28, it is observed that the distributions of standardized deviances are approximately /asymptotically normal with mean = -0.00041, variance = 0.924054 (SD = 0.961277), skewness = 0 and kurtosis = 2.422531. It is slightly platikurtik and heaped around the mean.

It is revealed from figure # 4.01 that probably there is no outlier or extreme value in the data but possibility of heteroscedasticity cannot be ruled out. Index graph of raw deviances given in figure # 4.02 also gives indication of the presence of heteroscedasticity. Of course, this may be due to limited sample size. Both the figures also indicate that there is no systematic variation in the data.

CHAPTER FIVE

Ratio and Logit Regression Models to Analyze Demand for Universal Primary Education

5.1 Introduction

Logistic regression model used to analyze multifactor demand for universal primary education is subjected to the following objections:

a) We never know the exact form of the tolerance distribution but guess it from the cross classification analysis of demand and the covariates affecting the demand. Observed proportions of such classifications are always greater than zero and mostly lies between 0.2-0.8 leading to the logistic distribution of tolerance variable.

b) The probability p_j of jth individual demanding universal primary education is estimated using random values of the tolerance $d_j$which is not related with observed proportions. Different individuals with same value or level of covariates may have different tolerance and thus probability of demand for universal primary education.

c) The estimated parameters of logistic regression model cannot reproduce the estimated probabilities of demand because, coefficient of the reference categories are omitted.

d) Factors are assumed to be independent but in practice, most of the factors are associated, which require the estimation of interaction parameters. In logistic regression, interaction is not permissible but stepwise regression. Even after stepwise regression, the resulting factors

may still show association. Table 5.01-5.03 shows that all the factors studied in the previous chapter are interrelated but land holding size × marital status.

Table # 5.01: Marital status, Land holding size, Schooling pattern of the children × Age of the respondent.

		Age			Total	χ^2
		<30	30-45	45+		
Marital status	Married	35	300	160	495	158.266**
	Unmarried	15	11	2	28	
	Total	50	311	162	523	
Land holding size	<1	18	137	37	192	90.023**
	1-3	23	110	55	188	
	3+	9	64	70	143	
	Total	50	311	162	523	
Schooling pattern of the children	No child	24	74	56	154	43.592**
	Gen. educ	14	147	57	218	
	Ebt. Mad	5	34	21	60	
	Kg	7	56	28	91	
	Total	50	311	162	523	

Table# 5.02: Marital status, Land holding size ×Schooling pattern of the children.

		Schooling pattern of the children				Total	χ^2
		No child	General primary	Ebt. Madrassa	Kinder garten		
Marital Status	Married	130	215	59	91	495	129.616**
	Unmarried	24	3	1	0	28	
	Total	154	218	60	91	523	
Land holding size	<1	38	111	22	21	192	96.40**
	1-3	56	69	23	40	188	
	3+	60	38	15	30	143	
	Total	154	218	70	91	523	

Table # 5.03: Land holding size × Marital Status.

		Marital Status		Total	χ^2
		Married	Unmarried		
Land holding size	<1	183	9	192	0.862
	1-3	177	11	188	
	3+	135	8	143	
	Total	495	28	523	

c) Some of the factors may be subjected to sampling fluctuation, having a few observations in a particular classification yielding imbalance in the analysis.

f) Study of deviances of a fitted logistic regression may sometime indicate the presence of extreme values in the data. Dropping out of these extreme values from the analysis degrades the R^2 and fitting of the model has become questionable.

In spite of all the disadvantages, logistic regression model has the advantage of detecting the relative importance of a particular classification in comparison to the other classification of a particular factor in a multifactor multiple classification of the response variable and thus highly favored by the social scientists working in the field of socio-economic development.

Analysis of variance (ANOVA) is a powerful technique in statistical studies. Coded response variables associated with multifactor regressor variables having variable factor levels can be analyzed using suitable ANOVA models like ratio regression and logit regression models discussed in subsection 5.5.

5.2 Multi-way Factorial Analysis of Variance

We know that a factorial experiment with unequal number of levels of involved factors is called a mixed factorial or asymmetrical factorial experiment. In theory, there is no limit to the number of factors that might be analyzed simultaneously, but the number of possible interactions to be dealt with soon becomes unwieldy as larger analyses are considered, and interpretation becomes very difficult for interactions of more than three or four variables.

If sample size is not large enough but factor level combinations are moderately large, some of the combinations may have no respondent. Even if there is smaller number of respondents, none may favors or disfavors the response variable. As a result, we may have some indeterminate proportions or exactly 0 or 1 proportions. Presence of such situations makes the analysis difficult or even sometimes impossible. Moreover, logit transformation in such cases becomes indeterminate making the analysis impossible.

Once the sums of squares for all factors and interactions have been computed, the degrees of freedom and mean squares are readily determined. However, most available computer programs also provide the degrees of freedom and mean squares. If all factors are fixed, then the required F to test each null hypothesis is obtained by dividing the appropriate mean square by the error MS. If however, any of the factors represent random effects, then the analysis becomes considerably more complex, and in some cases impossible. In the present study three factors are considered one of which are involved in replication. Marital status is dropped from the analysis because only 28 respondents are found in

unmarried category while 495 are married, creating an imbalance and sampling fluctuation in the analysis. Alternative demand is also dropped for the same reason. All the effects corresponding to the selected factors are assumed to be fixed and perform ANOVA through software SPSS version 15.0.

5.3 Measurement of variables

5.3.1 Age of the respondent

It is observed that the age of the respondent significantly influence the Demand for Universal Primary Education in Bangladesh. So that the variable age of the respondent is divided into three categories (i) age less than 30 which is indicated by A_1 (ii) age 30-45 which is indicated by A_2 (iii) age above 45 which is indicated by A_3. The corresponding levels of the variable are indicated by the dummy variable 1, 2 and 3.

5.3.2 Land holding size

It is observed in chapter four the Demand for Universal Primary Education in Bangladesh can vary over different land holding size. The demand is higher among the land holding size less than 1 acre and above 3 acre as compared to land holding size 1-3 acre. Therefore the variable land holding size of the respondent is partitioned into three categories (i) land holding size less than 1 acre which is indicates L_1 (ii) land holding size 1-3 acre which is indicates L_2 (iii) land holding size above 3 acre which is indicates L_3.

5.3.3 Schooling pattern of the children

It is observed in chapter four the demand for Universal Primary Education in Bangladesh can vary over different schooling pattern of the

children of the respondent. The demand is higher No child, Kindergarten and General primary education as compared Ebtedayee Madrassa schooling level respondent. The schooling pattern of the children is divided into four categories (i) no childrenwhich is indicates S_1 (ii) General primary education which is indicates S_2 (iii) Ebtedayee Madrassa andwhich is indicates S_3 (iv) Kindergarten which is indicates S_4. The schooling pattern of the children No children, General primary education, Ebtedayee Madrassa and Kindergarten are indicated by the dummy variables 1, 2, 3 and 4 respectively.

5.4 Demand

Proportion of respondent aspirant for age from a particular classification is considered as Demand for Universal primary education in Bangladesh in that classification. Let n_{ijk} be the total number of respondents in the ith level of age, jth level of land holding size and kth level of schooling pattern of the children of which n'_{ijk} expressed aspiration of Demand for Universal Primary Education in Bangladesh.Then $Y_{ijk} = n'_{ijk}/n_{ijk}$is taken as a Demand for Universal primary education in Bangladesh in the $(ijk)th$ classification.

5.5 Data, Models and Methodology

It is observed that the factors Age, land holding size and schooling pattern of the children are found to significantly affect the Demand for Universal Primary education in Bangladesh. Three levels of variable age are considered as replication in three-way ANOVA. Primary data are used which is collected from our study area is Jhenaidah district of Bangladesh (Details given in chapter three).

Andrews, Morgan and Sonquist (1967) showed that for multiple classifications, if proportions lie between 0.2-0.8, the variance $p(1-p)$ of the proportion π is approximately constant. In that case they recommended ordinary least square when dependent variable is a proportion. Most of the demand proportions lie between this limit. Hence, a multiple regression model with demand proportion as dependent variable and dummy independent variables defined for each level of each factor and their interactions may be used. Thus the ratio multiple regression model for analyzing demand for Universal Primary education in Bangladesh is defined as

$$Y_{ijk} = m + a_i + b_j + c_k + (ab)_{ij} + (ac)_{ik} + (bc)_{jk} + e_{ijk} \ldots\ldots\ldots (5.01)$$

$$i = 1,2,3; j = 1,2,3; k = 1,2,3,4;$$

This is a standard three way analysis of variance model with equal number of observations per cell. Here m is the general mean, a_i is the effect due to ith level of the factor age, b_j is the effect due to jth level of the factor land holding size, c_k is the effect due to kth level of the factor schooling pattern of the children, $(ab)_{ij}, (ac)_{ik}, (bc)_{jk}$ are the interaction terms and e_{ijk} is error term. The above model is assumed to follow all the standard assumptions of ordinary least squares. Cox and Snell (1970) suggested logit transformation as $log_e\left(\frac{\pi_i}{1-\pi_i}\right)$ to use as dependent variable instead of proportion π for ordinary least square estimation when the proportion π varies between 0 and 1. A multiple regression model with logits as dependent variable and dummy independent variables defined as in the previous model may also be used in analyzing demand for universal primary education in Bangladesh. Therefore the logit multiple regression models is defined as

$$log_e\left(\frac{Y_{ijk}}{1-Y_{ijk}}\right) = \mu + \alpha_i + \beta_j + \gamma_k + (\alpha\beta)_{ij} + (\alpha\gamma)_{ik} + (\beta\gamma)_{jk} + e_{ijk} \ldots. (5.02)$$

$$i = 1,2,3; j = 1,2,3; k = 1,2,3,4;$$

The parameters of the above model bear usual meaning, mentioned in the ratio model. It is also assumed that this model conforms to least square principles. But logit transformation of observed proportions produce indeterminate logit values in a substantial number of cells making the analysis difficult.

Table # 5.04: Data showing the demand for universal primary education in Bangladesh by level combinations of variables.

Age	Land holding size	Demand for universal primary education Yes=1, No=0	Schooling pattern of the children		Ratio	Logit transformation
<30	<1	1	4	No child	0.5714	0.2877
		0	3			
		1	3	General	0.4286	-0.2877
		0	4			
		1	0	Ebtedayee	0	-
		0	2			
		1	0	Kg	0	-
		0	2			
	1-3	1	3	No child	0.4286	-0.2877
		0	4			
		1	2	General	0.4	-0.4055
		0	3			
		1	3	Ebtedayee	0.75	1.0986
		0	1			
		1	2	Kg	0.6667	0.6931
		0	1			
	3+	1	4	No child	0.6667	0.6931
		0	2			
		1	0	General	0	-
		0	2			
		1	3	Ebtedayee	0.75	1.0986
		0	1			
		1	0	Kg	0	-
		0	1			
	<1	1	13	No child	0.4483	-0.2076
		0	16			
		1	59	General	0.8676	1.8803
		0	9			
		1	8	Ebtedayee	0.5333	0.1335
		0	7			
		1	0	Kg	0	
		0	13			

30-45	1-3	1	14	No child	0.5185	0.0741
		0	13			
		1	25	General	0.5319	0.1278
		0	22			
		1	5	Ebtedayee	0.4545	-0.1823
		0	6			
		1	13	Kg	0.5200	0.0800
		0	12			
	3+	1	13	No child	0.5417	0.1671
		0	11			
		1	16	General	0.6154	0.4700
		0	10			
		1	7	Ebtedayee	0.7778	1.2528
		0	2			
		1	13	Kg	0.8667	1.8718
		0	2			
45+	<1	1	1	No child	0.5000	-
		0	1			
		1	18	General	0.6923	0.8109
		0	8			
		1	5	Ebtedayee	0.7143	0.9163
		0	2			
		1	1	Kg	0.2500	-1.0986
		0	3			
	1-3	1	13	No child	0.7222	0.9555
		0	5			
		1	13	General	0.7647	1.1786
		0	4			
		1	4	Ebtedayee	0.5000	-
		0	4			
		1	10	Kg	0.8333	1.6094
		0	2			
	3+	1	22	No child	0.6111	0.4598
		0	14			
		1	12	General	0.8571	1.7918
		0	2			
		1	5	Ebtedayee	0.8333	1.6094
		0	1			
		1	12	Kg	0.8571	1.7918

5.6 Results and discussion

Fitted constants and comparative analysis of variance corresponding to the ratio and the logit models of demand for universal primary education in Bangladesh is shown in the following table # 5.05. The results are obtained from SPSS version 15.0.

Table # 5.05: Fitted constants and ANOVA tables for Age × Land holding size × Schooling pattern of the children

Independent variable	Ratio model	Logit model
Age(V_1)		
A_1	-0.1524	-0.2751
A_2	0.0154	-0.0436
A_3	0.1370	0.3188
SS(V_1)	0.5070	2.1506
df	2	2
F-cal	66.4173**	2.2382
Land holding size(V_2)		
L_1	-0.1238	-0.3131
L_2	0.0499	-0.1042
L_3	0.0738	0.4172
SS(V_2)	0.2792	3.3952
df	2	2
F-cal	36.5671**	3.5334
Schooling pattern of the children (V_3)		
S_1	0.0156	-0.2788
S_2	0.0322	0.1025
S_3	0.0494	0.1428
S_4	-0.0972	0.0338
SS(V_3)	0.1185	0.9876
df	3	3
F-cal	10.3447**	0.6852
Interaction($V_1 \times V_2$)		
SS($V_1 \times V_2$)	0.5070	2.1506
df	4	4
F-cal	33.2086*	1.1191
Interaction($V_1 \times V_3$)		
SS($V_1 \times V_3$)	0.5070	2.1506
df	6	6
F-cal	22.1391*	0.7461
Interaction($V_2 \times V_3$)		
SS($V_2 \times V_3$)	0.5550	3.3952
df	6	6
F-cal	24.2344*	1.1778

*indicates $p < 0.01$, ** indicates $p < 0.05$

For ratio model $R^2 = 0.9818$ and $\bar{R}^2 = 0.9492$, for logit model $R^2 = 0.7117$ and $\bar{R}^2 = 0.1591$

It is evident from the analysis that main effect for age of the respondent, land holding size and schooling pattern of the children two factor interaction effects for Age × Land holding size, Age × Schooling

pattern of the children, Land holding size × Schooling pattern of the children are statistically significant for the ratio model but none for the logit model. It is due to the fact logit transformations produced about 30% indeterminate values which makes the analysis invalid. Thus, we discord the result of logit regression analysis from this study.

CHAPTER SIX

A Curriculum Based Universal Primary Education Model for Bangladesh

6.1 Introduction

Literature review reflects that most of the educational researches have been done in developed countries. A few regional researches have done by UNESCO without any depth into the problems and none of these studies cover any particular country. Problems of developed, developing and under developed countries are quite different. A few studies done in Bangladesh with the financial assistance of donor agencies are either too much comprehensive or with very little coverage to represent the country as a whole. Independent, deep-rooted and foresighted researches on specific problems ought to be under taken for the greater interest of the nation. We are facing acute political, social and economic crisis in every sphere of life. Scarcity of educational facilities, unemployment and under employment, mal-utilization of educated manpower, over population, tribal problem, conflicts of political views, politicization of administration, law enforcing agencies and courtyards, want of public life security, corruptions inside and outside the government, etc., which directly affects the educational outcomes and put barriers on way to uniform and universal primary education.

An unanimous agreement towards the uniform education may not be possible right at this moment but opinion of consumers of education from all walks of life may be cautiously collected and analyzed that may give a solution for at least coexistence leading to a uniform and universal

primary education in Bangladesh. In this context, we may take help from Tyler (1931), Finlayson (1951), Akeju (1972), Wood and Quinn (1976) and Murphy (1978). Each of them used correlation method in different forms to solve reliability and validity of different test scores.

6.2 Development of the Model

Existence of uniform or one channel education is the pre-condition for universal primary education. In Bangladesh, multi-channel education is prevailing for decades due to historical reasons of changing rules in the sub-continent. National governments of Bangladesh tried and succeeded in many areas to fulfill the demand of world bodies and donors agencies in respect of enrollment, sex issue, drop-out, ethnical issues etc. A little effort is taken towards a uniform education at primary level which requires unanimous and conscience approval of citizens at large. Searching such a uniform education at primary level requires participation of all concern including guardians/parents of children who are the real representative of general public. On way to establish a uniform education at primary level, drastic change should be avoided but a compromise among the channels (streams) may serve a good solution with mutual reliance.

In chapter one, we have mentioned that General stream of primary education has 50 terminal competencies, Ebtedayee Madrassa has 47 and Kindergarten has 72. Of the 72 terminal competencies of Kindergarten system, 8 are the split up of 2 of General stream, with duplication of some others. In total, we obtained 76 independent terminal competencies for the three different systems under consideration. Of these 76, 28 are observed to be common to all the systems. We are to choose a set of

compromised terminal competencies from the remaining 48 based on opinion of the 523 respondents (Guardians, Social leaders and Teachers of various category), so that reliability and validity of the selected set are statistically significant leading to a balance among the streams.

6.3 Selection of Compromised Terminal Competencies

To select a set of acceptable terminal competencies from the (76-28) =48, we have thoroughly randomized the order of these 48 terminal competencies and placed before the respondents to select as many as they think suitable to be in the curriculum of primary education in Bangladesh. Two surveys were conducted with changed order of terminal competencies at each survey, respondents reaming the same, in an interval of one month to test the reliability of surveys as well as the selected terminal competencies by Test-Re-Test method. Reliability is a measure of correlation coefficient of ranks or scores of the items in the two surveys. Frequency or choice of each item by the respondents may be considered as score of that item (terminal competencies); while ordered frequency from highest to the lowest is considered as the rank of the item. Frequency of each of the terminal competencies and hence their corresponding ranks provided by the two different survey are given in the following table # 6.01.

Table # 6.01: Frequency of each of the terminal competencies and corresponding ranks obtained from surveys.

Survey I		Terminal	Survey II	
Ranks	Frequency	competency no.	Frequency	Ranks
2.0	304	1	368	2.0
19.5	282	2	339	13.0
1.0	307	3	322	19.0
37.0	255	4	253	44.5
34.0	260	5	274	35.0
11.0	293	6	351	7.0
16.0	285	7	271	37.5
4.0	301	8	360	4.0
29.5	269	9	309	23.0
29.5	269	10	346	9.0
21.0	280	11	312	22.0
23.0	277	12	353	6.0
43.0	244	13	257	42.0
22.0	279	14	305	24.5
9.0	295	15	367	3.0
32.0	266	16	357	5.0
6.0	299	17	317	21.0
12.0	292	18	260	40.0
45.0	242	19	304	26.0
8.0	297	20	336	15.0
5.0	300	21	377	1.0
38.0	254	22	275	34.0
46.0	241	23	271	37.5
19.5	282	24	337	14.0
27.0	272	25	254	43.0
40.0	252	26	246	47.0
7.0	298	27	283	31.0
41.0	250	28	340	12.0
35.0	259	29	320	20.0
39.0	253	30	343	11.0
18.0	283	31	335	16.0
36.0	258	32	284	29.5
13.5	290	33	284	29.5
48.0	230	34	247	46.0
42.0	249	35	324	18.0
15.0	288	36	347	8.0
3.0	302	37	345	10.0
24.0	276	38	272	36.0
33.0	263	39	287	28.0
28.0	270	40	253	44.5
47.0	240	41	258	41.0
17.0	284	42	282	32.0
25.0	275	43	277	33.0
26.0	274	44	299	27.0
31.0	268	45	245	48.0
13.5	290	46	325	17.0
44.0	243	47	264	39.0
10.0	294	48	305	24.5

Table # 6.02: Frequency correlation and Rank correlation of the survey results.

	Pearson correlation	Spearman correlation	Kendall's tau-b correlation
Frequency	0.533**	0.379**	0.534**
Rank	0.511**	0.361**	0.510**

The frequency correlation and rank correlation table shows that the correlation is significant at the 0.01 level. So, survey result is reliable.

6.4 Rules for Compromised Terminal Competencies

Maximum numbers of terminal competencies recommended by the respondents at Primary level from among the dissimilar 48 of the three different streams are 30 while minimum is 25. For a better accommodation of streams, we agree to the maximum 30. But "how to select those 30 out of 48?"

There is no hard and first rule for selecting the 30 terminal competencies out of 48. We have proposed the following rules for selecting the desired terminal competencies.

Rule I: Exclude those items having rank 40 or more in either of the survey. Average the ranks of the remaining items and select those 30 items with minimum average rank and test for reliability.

Rule II: Exclude those items having rank 40 or more in both the surveys. Average the ranks of the remaining items and select those 30 items with minimum average rank and test for reliability.

Rule III: Average the rank of items in the two surveys and select those 30 items having minimum average rank and test for reliability.

Rule IV: Let $d_j = R_{1j} \sim R_{2j}$; j= 1,2, ...,48 and select those 30 items with minimum d_j values and test for reliability, Where R_{ij} is the rank of the jth item in the ith survey, i=1,2.

Rule V: Let $d_j = R_{1j} \sim R_{2j}$; j= 1,2, ...,48. Exclude those items with $d_j \geq 18$. Average the ranks of the remaining items $G_k = \frac{R_{1k}+R_{2k}}{2}$, k = 1, 2 ...48($\#d_j \geq 18$). Select those 30 items with minimum G_k values and test for reliability.

6.5 Compromised Terminal Competencies

Selected terminal competencies by each rule are shown in table # 6.03, and reliability of the selected terminal competencies are shown in table # 6.04.

Table # 6.03: Selected Terminal Competencies by Different Rules.

Rule I	Rule II	Rule III	Rule IV	Rule V
1	1	1	1	1
2	2	2	2	2
3	3	3	4	5
6	6	6	5	6
7	7	7	6	8
8	8	8	8	9
9	9	9	9	11
10	10	10	11	12
11	11	11	13	14
12	12	12	14	15
14	14	14	15	17
15	15	15	20	20
16	16	16	21	21
17	17	17	22	22
18	20	18	23	24
20	21	20	24	25
21	24	21	26	29

Rule I	Rule II	Rule III	Rule IV	Rule V
24	27	24	31	31
27	29	27	32	32
28	30	28	34	33
29	31	29	36	36
30	33	30	37	37
31	36	31	38	38
33	37	33	39	39
36	38	36	41	40
37	42	37	43	42
42	43	42	44	43
44	44	44	46	44
46	46	46	47	46
48	48	48	48	48

Table # 6.04: Reliability of Selected Terminal Competencies under Different Rules.

Selected Sets Under Rules	Reliability Coefficient	
	Frequency	Rank
I	0.026	0.030
II	0.185	0.186
III	0.026	0.030
IV	0.902**	0.909**
V	0.683	0.680

**: $(p \leq 0.01)$

Reliability Coefficients displayed in table # 6.04 indicates that Terminal Competencies selected under rule IV has highest reliability of statistical significance with p-value less than 0.01 and may be finally selected as a compromised set of terminal competencies among the streams along with the common 28 leading to a uniform and Universal Primary Education.

6.6 Validity of the selected terminal Competencies

Finally, we have selected the set of 30 terminal competencies having highest reliability. We have prepared two sets of questions; one set with original terminal competencies of the three different school system having 50 percent questions from common terminal competencies and the rest 50 percent from stream based terminal competencies and conducted a

written examination of the students of class V of the selected schools in the 1st week of October, 2012. Another set of question was prepared with common 28 terminal competencies and the newly selected 30 terminal competencies, in total (28+30) = 58 terminal competencies having no preference on any portion. At the end of October, 2012, another examination was conducted with this new question to the same students. Coefficient of correlation between the marks of these two examinations obtained by the students, which is a measure of validity of selecting the terminal competencies for a balanced curriculum among the different streams leading to a uniform Universal Primary Education system are shown in the following table # 6.05 by streams and for the total.

Table # 6.05: Coefficient of correlation between the marks of these two examinations obtained by the students.

Name of Stream	Validity Coefficient
General Primary stream	0.680
Ebtedayee Madrassa stream	0.661
Kindergarten stream	0.694
Combined Total	0.695

6.7 Proposed Terminal Competencies for Universal Primary Education

The 58 terminal competencies recommended for a uniform and universal primary education are given below:

1. To have a firm faith to Allah the almighty and creator of the universe.

2. To know the biography of Hazrat Muhammad(s) of Allah and the preacher of own religion and to follow their teaching and idealism.
3. To love all creatures of the Creator.
4. To show honor and tolerance to all religions.
5. To take pride in national tradition and culture (Language, folk song ,art and fine arts and famous personalities) and to know and love.
6. To show respect to the National Flag and National song.
7. To avoid waste of wealth.
8. To understand the importance for living a sound and healthy life.
9. To know and carryout the physical and environmental code of health.
10. To know balanced diet, realize its importance and to practice such habit.
11. To know about common diseases its causes and its precautionary in adopting precaution.
12. To be able to write down observation, experience and attitude in accurate Bengali, to write common letters and application and fill up various types of forms.
13. To understand the gist of the conversation, speech and description of the simple native language.

14. To achieve the concept of the elementary idea of figure and to know how to use it.

15. To know about the four elementary rules of mathematics and to know how to use them.

16. To be able to know how the prophets led their lives and to mold their lives according to the teaching of Islam.

17. To know how to use the units of currency, length, weights, measurement, volume and time.

18 To be able to detect and find out the geometrical figures.

19. To achieve the ability of gathering information.

20. To achieve the ability of thinking freely and expressing one's own ideas and opinions.

21. To find out the relation between the cause and effect and to make an experiment on the common problems of daily life.

22. To build up the habit of keeping one's own things neat and clean and beautifying the surroundings.

23. To follow the order and discipline.

24. To take care of the personal and public property.

25. To build up the habit of punctuality.

26. To be able to read the printed and easy hand-written things in English.

27. To be able utter simple sentences in English to understand ones owe observation and conception.

28. To be able to write down clearly and correctly about the brief account of a familiar things.

29. To be able to learn how to love the younger.

30. To know about common diseases its causes and it's precautionary in adopting precaution.

31. Students are able to copy teachers writing from slip, notebook and blackboard.

32. Students are able to express her/his thinking to write in an organized way.

33. To express gratefulness to Allah for his bestowing infinite blessings and mercy upon us and this gratefulness to be translated into being through the recollection of Him.

34. To be energetic in building up the strong body through the participation in games, sports and physical exercise.

35. To play an active role unanimously about different activities accepted by Institution.

36. To express our attitude and feeling accurately and effectively. To be enable to speak and communication with others in correctly native language.

37. To be eager to accept others constructive criticism for self-development and efflorescence.

38. To observe as well as to materialize the beauty of natural and social environment.

39. To be interested in manual work and to show regard to the working class people.

40. To know own responsibility and duty perform the citizenship responsibility as a Bangladeshi citizen.

41. To lead one's life first to last in commemoration of Allah.

42. Students are able to write a paragraph on any issue.

43. Students are able to know how to use diary and how to maintain diary.

44. To grow up as an eligible leader and its member in observing duties and responsibilities devotedly.

45. To accept new concepts and ideas and to be eager to exchange them with others.

46. To be able to write short sentences in English language.

47. Draw a picture known substance and describe the picture.

48. To be able to write short sentences in Arabic language.

49. To be able to make words with Bengali letters

50. To be able to write the English letters nicely.

51. To know about the life and trends of the children of different countries.

52. To be able to know how to call for prayer and to know the meaning of it.

53. Students are able to write sentences with the help of personal dictionary.

54. To enable in learning knowledge continuously, reading the subject matter written in Bengali through the acquisition of reading skill.

55. To be able make words with া, ি, ী, ু, ূ, ৃ, ে, ৈ, ো, ৌ.

56. To be able to know how to quote sure Fatiha and Other sure from memory.

57. To observe the influence of science and technology in developing the modes of daily life, to find out and to realize the importance of it.

58. To enable to read correctly understanding the subject matter printed written in simple Bengali.

6.8 Results and Discussions

Degree of preference of the 48 open terminal competencies by the 523 respondents (guardians, teachers, social leaders etc.) to be included in the curriculum of Primary education in Bangladesh on way to establish a uniform and universal primary education is depicted in table # 6.01 for two consecutive survey in the form of frequency and rank of each item (terminal competence). Spearman rank correlation coefficient 0.911 and Pearson correlation coefficient 0.909 are in close agreement indicating the highest reliability of survey results.

Five arbitrary rules are set in order to eliminate the 30 (maximum) out of 48 dissimilar terminal competencies among the streams. Terminal competencies selected through each rule are depicted in table # 6.03 and their corresponding reliabilities in table # 6.04. A comparison of reliability measures show that rule IV is most reliable.

To test the validity of rule IV, two set of questions are prepared. One set comprised of original terminal competencies of each stream. Another set

with the newly selected 30, in addition to common 28 for all the streams. Students were examined with the two different question set in an interval of 28 days. Correlation (Pearson) coefficient of marks in the two separate examinations considered as measure of validity of the terminal competencies obtained by rule IV and displayed in table # 6.05 for streams separately and for the total system. Correlation coefficients so obtained are statistically significant with $p \leq 0.01$ which indicates validity of selected items under rule — IV.

6.9 Concluding Remarks

An examination of table # 6.05 reveals that correlation Coefficients of examination marks under the original Terminal Competencies of each system with that of new Terminal Competencies selected for Universal Primary Education are almost nearly equal for all the three systems separately and for the total. These correlations are statistically significant with ($p \leq 0.01$) .

Hence, the set of Terminal Competencies selected under rule — IV along with existing common 28 in total (28+30) = 58 Terminal Competencies may be recommended as reliable and valid terminal Competencies for the uniform and Universal Primary education. Of the 18 terminal competencies dropped are 6 from general primary education 9 from Ebtedayee Madrassa and 3 from the Kindergarten.

CHAPTER SEVEN

Efficiency of Primary Education in Bangladesh

7.1 Concept of Efficiency in Education

At the verge of the First World War, Britain desired to speed out its munition products. But it was reported that the total cost of production increases with the speed out of work performance because speeding up of production involves a definite increase of energy needed. This leads to the investigation, as reported by Major Greenwood (1919), "……. What are the conditions, excluding those determining the efficiency of inanimate machines, which help or hinder industrial output? In other words-what are the factors of human efficiency?" With this end in view, perhaps, the first systematic study on organizational behavior started. As desired by Greenwood (l.c), British Institute of Management (BIM) formulated a Standardized measure of efficiency for comparing the health of different industries from the economic point of view.

For a given set of inputs, efficiency of the industry is defined as the ratio of actual to maximum possible out puts which is always less than or equal to one. Murray and Frenk (1999) defined health system efficiency in the same line. In case industry, actual output may be zero in the absence of inputs. But it is not true for health system because all people cannot be ill simultaneously.

The notion of efficiency, in the modern times, applies to a remarkably large number of fields beyond industry or economy, including education.

Though the educator often feel ambivalent about the pursuits of efficiency in education, some people think that efficiency is a good and worthy goal; while others are worry those efforts to improve efficiency will ultimately undermine the quality education. The concept of efficiency is often connected to a moral imperative to obtain maximum outputs from limited resources. In relation to education various outcomes can result from a variety of different combinations of inputs such as teachers, buildings, class size, curriculum etc. A teacher may be thought of as an ingredient of input while teaching is an important part of output process. Sheenan (1973) discussed this problem at length and concluded that education system in practice have no single well defined function as such no single defined indicator of output.

7.2 International Indicators of Educational Efficiency

Having no unique relationship between the resources invested and education results, policy decisions are heavily dependent on indicators, as tools for analyzing these relations. Education committee of Organization for Economic Co-operation and Development (OECD) countries in collaboration with World Bank (2003) considered four indicators for quality and efficiency of education. These are

(i) Average annual teacher's salary as compared to per capita GDP
(ii) Pupil – teacher ratio
(iii) Expenditure on teaching aid and co-curricular activities, and
(iv) Average failures rate

The member states of European Union (EU) considered the following indicators of education for this improvement of the quality and effectiveness in the EU (European Council, Lisbon, 2000)':

(i) Overall education expenditure

(ii) Per pupil/student expenditure

(iii) Relationship between the Programme for International Student Assessment (PISA) testing results and cumulative expenditure per pupil

(iv) Drop-out rate

(v) Average schooling duration

In USA, education is the responsibility of states and the states have made efforts to define the outcomes they seek from their education systems and popularly known as standards. Each state articulate their desired outcomes and provide flexibility to the districts, schools, administrators, teachers and students to meet the standards in ways that make the most sense given local circumstances. Generally, states are setting minimum standards that can be exceeded by local authorities, individual students. The American system recommends the following indicators as measures of educational efficiency (Tayck, 1974):

(i) A relative mix of performance outcomes of standardized test scores and value added by schooling

(ii) The degree of performance across students

(iii) The level of capacity at which the system operates

Ruben Klein (1998), in measuring internal efficiency of Brazilian school system recommended the following indicators of efficiency:

(i) The enrolment by grade and age

(ii) The transition rates between grades, that is, the promotion, repetition and drop-out rates

(iii) The percentage of an age cohort which has access to school and at which age

(iv) The percentage of a school cohort which concludes each grade and graduates

(v) What the students know and are able to do at each or some grades

(vi) The available resources to finance the system and how it is being spent

Klein (l.c) conducted his study using indicators (i) – (iv) through the transition rates and its derived measures. To give some idea on (v), Klein (2011) himself studied the PISA and some other standardized test scores and concluded that standardized tests fail to measure the differential effects on scores to variation in input ingredients.

7.3 Efficiency in the Present Study

The fifth indicator of Rubel Klein (l.c) is not studied elsewhere at length. From statistical points in view, efficiency is a measure of variability. The standardized test scores used by American and British system fail to measure the different effects on scores to variation in input ingredients.

Efficiency of a system, unlike an estimator or a test statistic, is a complex thing and difficult to define. It depends on many factors like working manpower, management, machines, materials, environment, etc.

In a schools system, students are the materials, teachers are working manpower, schools authorities, that is, Govt. officials who supervise the school activities is the management, training of teachers inclusive of educational equipment's may be considered as machineries, school buildings, furniture's, local atmosphere, co-operation of guardians etc.

may be included in the school environment. All these together are responsible for the output, that is, performance of students in their schools final examination.

At the very first outlook, school final results are considered as the output of schools and a measure of school efficiency. Assuming the students to be uniform, variability in individual results may be considered as random effect of school system. Aggregation of variability of all schools of one stratum may be considered as the stratum variation and aggregate variations of all the stratum accounts for total variation in the system.

7.4 A Measure of Efficiency for Education system

Efficiency of a system is a measure of closeness of its ideal (maximum) and actual performance (Murray and Frenk, 1999) the measure should be such that inter unit comparison within the group and inter group comparison within the overall system are possible. Again, efficiency by a system may vary over time and should have room for comparison over time.

Ideal performance is always unique while actual performance is a variable overtime, space and individuals measured in terms of average score (μ) in the school system along with a measure of dispersion about the average.

Generally, we use standard deviation (σ) as a measure of dispersion and dispersion per unit mean is termed as coefficient of dispersion (C.D).

Thus, the absolute efficiency of school system, sub-system or individual schools may be defined as

$$E = 1 - C.D = 1 - \frac{\sigma}{\mu} = \frac{\mu - \sigma}{\mu}$$

Where μ and σ is the mean score and standard deviation of scores for the whole system, sub-system or individual schools as the case may be.

Replacing μ and σ by their sample estimates $\bar{y}$ and s respectively, we may write estimated efficiency of our Primary school system in term of examination scores based on terminal competencies as

$$\hat{E} = \frac{\bar{y} - s}{\bar{y}}$$

$\Longrightarrow 100\hat{E} = 100 - C.V$ (Coefficient of variation).

$100\hat{E}$ being the percent efficiency of the systems.

For the stream i , $\hat{E}_i = \frac{\bar{y}_i - s_i}{\bar{y}_i}$ and for jth schools in the ith stratum, it is i,

$$\hat{E}_{ij} = \frac{\bar{y}_{ij} - s_{ij}}{\bar{y}_{ij}}$$

Relative Efficiency of sub-system r with respect to sub- system s is defined as

$$(RE)_{rs} = \frac{E_r}{E_s} = \frac{\frac{1}{E_s}}{\frac{1}{E_r}} \; ; r, s = 1, 2, 3.$$

In similar manner, relative efficiency of school l with respect to school m of sub-system $(stratum)_i$ may be defined as

$$(RE)_{lm:i} = \frac{E_{li}}{E_{mi}} = \frac{\frac{1}{E_{mi}}}{\frac{1}{E_{li}}} \; ; \; i = 1,2,3; l, m = 1,2, \ldots\ldots\ldots\ldots n_i$$

Table # 7.01: Descriptive Statistics of scores under existing (E) primary education system for schools by streams.

Schools stream	Mean scores and sum of squared deviations of scores for schools																	
	1			2			3			4			5			6		
	n_{ij}	Mean	Dss	n_{ij}	Mean	Dss	n_{ij}	Mean	Dss	n_{ij}	Mean	Dss	n_{ij}	Mean	Dss	n_{ij}	Mean	Dss
General stream	74	72.50	6216.534	27	75.37	1824.29	45	72.18	3356.584	31	73.06	2245.86	19	70.89	1961.784	47	74.02	3266.966
Ebtedayee Madrassa	58	65.98	5396.988															
Kindergarten	22	75.73	1884.372	18	66.72	1615.612												

Table # 7.02: Descriptive Statistics of scores under proposed uniform and universal (U) primary education system for schools by streams.

Schools stream	Mean scores and sum of squared deviations of scores for schools																	
	1			2			3			4			5			6		
	n_{ij}	M	D	n_i	M	D	n_{ij}	M	D	n_{ij}	M	D	n_{ij}	M	D	n_{ij}	M	D
General stream	74	82.64	6017.974	27	83.74	2104.076	45	83.09	2916.76	31	83.22	1440.57	19	80.39	1824.066	47	86.80	1938.578
Ebtedayee Madrassa	58	78.45	4883.703															
Kindergarten	22	86.18	1039.941	18	81.57	1858.185												

Table # 7.03: Efficiency of primary education by schools under existing (E) and proposed uniform and universal model (U).

Streams (1)	Schools (2)	Students (3)	Mean score (4)		Std. Deviation (5)		Estimated Efficiency (6)		Relative Efficiency of U wrt E (7)
			E	U	E	U	E	U	
General Stream	1	74	72.50	82.64	9.228	9.080	0.873	0.890	1.0194
	2	27	75.37	83.74	8.376	8.996	0.889	0.893	1.0045
	3	45	72.18	83.09	8.734	8.142	0.879	0.902	1.0261
	4	31	73.06	83.22	8.652	6.930	0.882	0.917	1.0396
	5	19	70.89	80.39	10.440	10.067	0.852	0.875	1.0269
	6	47	74.02	86.80	8.427	6.492	0.886	0.925	1.0440
Ebtedayee Madrassa	1	58	65.98	78.45	9.731	9.256	0.852	0.882	1.0352
Kindergarten	1	22	75.73	86.18	9.473	7.037	0.875	0.918	1.0490
	2	18	66.72	81.57	9.749	10.455	0.854	0.872	1.0211

Table # 7.04: Efficiency of primary education by Streams under existing (E) and proposed uniform and universal model (U).

Sl (1)	Streams (2)	Students (3)	Mean score (4)		Standard deviation (5)		Estimated Efficiency (6)		Relative Efficiency of U wrt E (7)
			E	U	E	U	E	U	
1	General	243	73.00	83.55	8.909	8.382	0.878	0.899	1.0239
2	Ebtedayee Madrassa	58	65.98	78.45	9.731	9.256	0.853	0.882	1.0339
3	Kindergarten	40	71.67	84.11	10.504	8.927	0.854	0.894	1.0468
4	Total	341	71.65	82.75	9.581	8.795	0.867	0.894	1.0311

Results of the study are displayed in tables 7.03 & 7.04. Descriptive statistics of scores for individual schools under existing multi-channel

system and proposed uniform and universal system in the study area are given in column (4) and (5) of table ─ 7.03. These statistics the calculation of absolute and relative efficiency of each school separately, for each stream and for the total systems. Column (6) and (7) of table ─ 7.03 give the efficiency calculations, absolute and relative of the systems under consideration for each school separately. Table ─ 7.04 gives the efficiency calculation, absolute and relative of the systems by streams and for the total.

An examination of tables show that mean scores increased considerably under the proposed uniform and universal system in comparison to the existing multi-channel system but standard deviation of scores remaining more or less the same for each and every schools, each stream and the total system. This implies that student achievement under uniform and universal system is higher than the existing multi-channel system but institutional effect on student achievement remains the same so that gain in efficiency is not noticeable in spite of marked increase in the mean scores. In the existing system, efficiency is observed to be 86.7 percent for the total with stream variation of 85.3 percent for Ebtedayee Madrassa, 85.4 percent for Kindergarten and 87.8 percent for the General stream. The corresponding figures under proposed uniform and universal system are 89.4, 88.2, 89.4 and 89.9 percent respectively. Unless standard deviation of scores decreases in the same ratio as the mean score increases, benefit from the uniform and universal system will not be satisfactory.

7.5 Testing Equality of Mean Scores of Different sub-systems (streams)

It follows that the scores are not exactly normal but approximately normal. About 10% of the standard scores lie beyond the 95% confidence interval. A sample of larger size may tend the data to be normal. However, we precede our analysis assuming normality of data.

Hypothesis to be tested:

H_0 : Performance of the three sub-systems of primary education do not differ in terms of terminal competencies.

H_1 : H_0 is not true.

Model : $Y_{ijk} = \mu + \alpha_i + \varepsilon_{ijk}$

μ is the general mean, $\alpha_i (\alpha_i = \mu_i - \mu)$ the differential effect of ith system over the general mean, ε_{ijk} is the error terms associated with y_{ijk}

$$S.S\ Total = \sum_{i=1}^{3}\sum_{j=1}^{n_i}\sum_{k=1}^{n_{ij}}\left(y_{ijk} - \bar{y}\right)^2$$

$$=\sum_{i=1}^{3} n_i(\bar{Y}_i - \bar{Y})^2 + \sum_{i=1}^{3}\sum_{j=1}^{n_i}\sum_{k=1}^{n_{ij}}\left(y_{ijk} - \bar{y}_i\right)^2$$

The same hypothesis had good for common, uncommon and total terminal competencies for each of the sub-system and the system as a whole.

Table # 7.05: ANOVA table for common, uncommon and total scores of students obtained from examination.

		Sum of square	Degree of freedom	Mean SS	F-cal	Sig.
Common 50 marks for all sub-system	Between groups	612.291	2	306.146	10.268	0.000
	Within groups	10078.049	338	29.817		
	Total	10690.340	340			
Uncommon 50 marks for all sub-system	Between groups	564.281	2	282.140	8.778	0.000
	Within groups	10864.253	338	32.143		
	Total	11428.534	340			
Total 100 marks	Between groups	2305.714	2	1152.857	13.481	0.000
	Within groups	28905.758	338	85.520		
	Total	31211.472	340			

Conclusion: The calculated value of F is found to be 13.481which is highly significant for $F_{(2,338)}$ rejecting the null hypothesis of equal mean performance of all the streams. That is the three sub-systems of existing primary education in the study area of Bangladesh differ from each other with respect to performance based on terminal competencies.

The same result follows for common and uncommon portion of terminal competencies.

7.6 Alternative test of Equality of Mean Scores

Since our data is approximately normal only, we have tried an alternative test to test the null hypothesis of equal performance in all the three sub-systems for common, uncommon and total terminal competencies.

Kruskal-Wallis (Rank Sum) H Test:

Including correction for ties, Kruskal-Wallis H becomes

$$H = \frac{\frac{12}{N(N+1)}\sum_{i=1}^{k}\frac{R_i^2}{n_i} - 3(N+1)}{1 - \frac{\sum T}{N^3 - N}} \sim \chi^2_{k-1}$$

Where $N = \sum n_i$= Total number of cases in all sub-system combined.

n_i = Number of cases in the ith sub-system.

R_i = Sum of the ranks in the ith (column) sub-systems, K is the number of sub-systems.

$T = t^3 - t$; t is the no. of tied observations in a tied group of scores.

H_{0j}: Stratums (sub-systems) are equal with respect to location (performance scores).

H_{1j} : H_{0j} is not true. j= 1, 2, 3;

Table # 7.06: Empirical result of Kruskal-Wallis (Rank Sum) Test

Marks	Result of H test	$\chi^2_{(2)}$	
		1%	5%
Common 50 marks for all sub-system	15.56	9.21	5.99
Uncommon 50 marks for all sub-system	17.30	9.21	5.99
Total 100 marks	22.18	9.21	5.99

Conclusion: Tabulated value of $\chi^2_{(2)}$ at 1% and 5% level of significance for 2 degrees of freedom (df) are 9.21 and 5.99. Calculated value of H is

found to be 22.18. Which is large than the tabulated values and hence the null hypothesis is rejected. That is stratums are not equal with respect to location (Mean performance).

The same result follows for common and uncommon portion of terminal competencies.

7.7 Stream bias in Primary Education

Uncommon terminal competencies are designed to represent the streams while common terminal competencies are composed of socio-economy and cultural heritage, and national needs. If the average achievement in uncommon terminal competencies is significantly higher than the average achievements in common terminal competences by the students of the ith sub-stream, than the ith sub-stream will have stream bias, otherwise not.

Let $\bar{y}_{i1}$ and $\bar{y}_{i2}$ be the average score, in the common and uncommon terminal competencies by the students of ith sub-systems (stream)

Then, $\theta_i = \bar{y}_{i2} - \bar{y}_{i1} > 0, (\text{i} = 1,2,3)$.

$\Longrightarrow$ Bias in the ith stream, θ_i being the component of bias in the ith stream.

Table # 7.07: System bias in Primary level by streams

Streams	$Bias\theta_i = \bar{y}_{i2} - \bar{y}_{i1}$
General education	-1.23 <0
Ebtedayee Madrassa	-1.086 <0
Kindergarten	-0.575 <0

It is interesting to note that all the sub-system have $\theta_i < 0, i = 1, 2, 3$ indicating that there is no system bias. Significance of system bias may be tested through paired t-test. It is observed that for all the three sub-systems, average scores achieved by the students in common terminal competencies is larger than the average scores of uncommon terminal competencies. This implies that uncommon terminal competencies either less important to teachers and thus, they take less care for those or unattractive to students so that they feel less interest to those terminal competencies.

7.8 Paired t-test for difference of means

Hypothesis to be tested:

H_{0i} : There is no difference between the performance of the common and uncommon terminal competencies of the ith stream.

H_{1i}: H_{0i} is not true.

Test statistics $t = \frac{(\bar{y}_{i1} - \bar{y}_{i2}) - (\mu_{i1} - \mu_{i2})}{S.E(\bar{y}_{i1} - \bar{y}_{i2})}$; i= 1, 2, 3.

Table # 7.08: Empirical result of Paired t-test for difference of mean scores

		Paired Differences		t	df	Sig.(2-tailed)
		Difference of means $\bar{y}_{i1} - \bar{y}_{i2}$	Std. Error of mean difference			
General stream	Pair 1: First 50 marks & second 50 marks	1.23	0.41	3.001	242	0.003
Ebtedayee Madrassa stream	Pair 2: First 50 marks & second 50 marks	1.086	0.799	1.36	57	0.179
Kindergarten stream	Pair 3: First 50 marks & second 50 marks	0.575	0.748	0.768	39	0.447

Conclusion: Tabulated value of t at 1% and 5% level of significance for 242, 57 & 39 degrees of freedom (d.f) are 2.58 and 1.96. The calculated value of t is found to be 3.001, 1.36 and 0.768 for streams General, Ebtedayee Madrassa & Kindergarten in order. Calculated value of general stream is found larger than the tabulated value and hence the null hypothesis is rejected. That is the performance in common and uncommon terminal competencies differ significantly in the general streams of primary education in the study area of Bangladesh. The calculated values of Ebtedayee Madrassa & Kindergarten streams are found smaller than the tabulated value and hence the null hypotheses are accepted. That is the performance in common and uncommon terminal competencies do not differ significantly in Ebtedayee Madrassa & Kindergarten of primary education in the study area of Bangladesh.

CHAPTER EIGHT

Concluding Remarks

8.1 Contributions

A casual glance in the chapter of this dissertation, perhaps, could have given an impression that discussions on statement of the problem and the review of literature could have been given in more details in chapter one. This in our impression would have certainly enlengthened the volume of the dissertation without providing much worthwhile information on background leading to the major contributions. To keep the size of the dissertation at a desired optimum, only basic materials have been discussed and supplemented with references leaving rooms for in-depth and detailed information, wherever it is necessary. Similarly in making review of literature, only the fringes of role and the significance of the socio-economic factors have been touched. Because the major emphasis has been given on methodological aspects, viz., appropriate statistical tools and techniques amenable to collect and analyze data, a separate chapter is contributed for the purpose.

Though Bangladesh is a country of unique language-Bengali, here prevails a multi-channel education right from primary level which is against and hinders the spirit of universal primary education. This region including Bangladesh was ruled by many rulers with different religious faith. Before the British rule, education here and all over the world was religion based. Up to 7^{th} century AD, Vedic Aryans followed by Brahmans, Buddhists and Jains ruled over this territory and form of education were of Hindu religion based. From 8^{th} to 18^{th} century AD,

before the advent of East India Company, this territory was ruled by Muslims and hence the form of education was of Islamic religion based. During the British rule, new form of education emerged that was based on scientific reasoning, not on religion, called secular education.

Since Islamic education in pre-British India was rich and religion based indigenous oriented primary education was available in all most everywhere in rural areas and at the beginning, British rulers were indifferent to primary education, it continued in rural areas, especially among the poor's and the orthodox.

Brief history of the educational reforms in Bangladesh, as well as in the Indian sub-continent is discussed in chapter two of this dissertation. This justifies the existence of a multi-channel education in a country of univocal language. Limited discussions of this chapter are also supplemented with necessary references.

This dissertation is an exploratory one and based on mainly primary data. The data was collected from the study area in two different phases to serve different objectives. At the first phase, data was collected from 523 respondents from among the student guardians, teachers of different level categories and elected public representatives to study the demand for universal primary education in the study area assuming that they are the indirect consumers of primary education. In addition to that, opinions of those 523 respondents are sought on the dissimilar 48 terminal competencies of the three different channel of primary education to be included in the curriculum of the proposed universal primary education.

Some body may raise question why illiterate parents/guardians are included in the survey of an important issue of education. In response, we may argue that Parents/guardians bear and brought up their children/wards and meet their educational expenses. So, they have every right to choose what their off-springs should learn, especially from social, ethical and religious context. An illiterate person is lacking of formal schooling but has informal and/or non-formal education. It may be seen from table # 4.19 that exclusion of Kg-teachers (who have formal education) from the study reduces the chi-square value to 0.39 resulting guardians a homogeneous set with the rest five categories with respect to demand for universal primary education and thus justifies their inclusion in the study.

In the second phase, two examinations were conducted on the students of class V in pre-selected schools of different channels using set questions. One set on existing channels as usual and the other set on universal setup. Examination scores of students constitute the second phase data that is used to test the validity of the opinion survey based selected terminal competencies for the universal primary education and efficiency of the universal primary education in relation to the multi-channel primary education in the study.

Details of sampling design for collecting data followed by analysis of data and the underlying tools and methodology used in inference procedure are discussed in brief in chapter three of this dissertation.

Universal primary education, as is emphasized by different world bodies and organizations is indicative of uniform or uni-channel one. Almost all the education commissions set by the Bangladesh Govt. the NGO's and

many individual researchers highlighted this problem and considered it as a barrier towards the implementation of universal primary education. But neither the Government nor any NGO took any initiative or highlighted any way to solve this problem.

Chapter four of this dissertation is contributed in analyzing demand for universal primary education in the study area. Twenty variables associated with the respondents including the demand for universal primary education have been studied of which nine is observed to have no association with demand for universal primary education. The variables affecting the demand for universal primary education are Age, Basic education at Primary level, Marital status, Land holding size, Pattern of residential house, Monthly family income, Monthly family expenditure, Schooling pattern of children, Alternative demand and Social identity. Social identity is again associated with others like income, expenditure, land holding size, basic education at primary level and year of schooling. A stepwise logistic regression shows that age, marital status, land holding size, schooling pattern of children and the alternative demand are responsible to affect the demand for universal primary education. Younger people in comparison to aged, smaller land holding size in comparison to larger land holding size and alternative demand to General and Madrassa education in comparison to Kindergarten highly negate, the demand for universal primary education while schooling of children to General system and Madrassa in comparison to Kindergarten and married people in comparison to unmarried positively demands universal primary education. The logistic regression model is observed to be well fit as is indicated by LR statistic. Cox and Snell R^2, Negelkerke R^2 and Model χ^2.

Variables affecting the logistic demand positively cannot be enhanced externally. The only variable, alternative demand to universal primary education can be affected by Govt. policy to increase the demand for universal primary education, specially, the Madrassa education system.

Logistic regression, apart from its inherent limitations, fails to estimate the contribution of individual factors but focus on the relative importance of sub-division or classification of factors into category to the reference category. In chapter five, Ratio regression model and Logit regression model is developed based on the ANOVA principle to analyze the Universal Primary Education demand.

The ratio regression analysis model is observed to fit the demand for Universal Primary Education very nicely with an R^2 value of 0.9818 and adjusted $\bar{R}^2$ value of 0.9492. Results of logit regression analysis are discarded due to data discrepancies leading to non-conformability to model assumption and creating non-orthogonality to model design.

All through discussions, it is reflected that universal primary education without a uniform curriculum is meaningless, that is, existence of multi-channel education and universal education alongside cannot run. On the other hand, unification of channels is a challenging job from socio-political and religious points in view. An attempt is made in the sixth chapter of this dissertation for a compromise among the existing channels based on opinion of the shadow consumers of primary education from all walks of life and society leading to a universal primary education under the name – 'A Curriculum Based Universal Primary Education Model for Bangladesh'. For selecting the compromised terminal competencies, five selection rules are proposed.

Reliability of these selection rules and the underlying opinion polls are tested using the Test-Re-Test method. The selection rule with highest reliability (0.909**) with (**:$p \leq 0.01$) is accepted to select the compromised terminal competencies for the proposed Universal Primary Education model in Bangladesh.

To test the validity of the proposed compromised terminal competencies, two set of questions are prepared, one covering the terminal competencies proposed under universal model and the other set on existing multi-channel basis. Examinations are conducted on students of class V of selected schools under phase-II sampling design separately with the two set of questions in an interval of 4 weeks. Correlation between the scores of two examinations is observed to be highly consistent and nearly constant, justifying the validity of the proposed model.

The concept of efficiency in education is a controversial debate among the economist, planners and the educationists. Economists and planners of advanced countries and aid giving agencies have postulated some macro-economic indicators of education to provide budget and aid educational upliftment. From statistical point in view, efficiency is a measure of variability. Efficiency of a system, unlike an estimator or a test statistic, is a complex thing and difficult to define. It depends on factors like working manpower, management, machines, materials, environment, etc.

In a school system, students are the materials, teachers are the working manpower, school authorities is the management, training of teachers inclusive of educational equipment's may be considered as machineries, school building, furniture, local atmosphere, cooperation of guardians etc.

may be included in the school environment. All these together are responsible for the output, that is, performance of students in their school final examination.

Assuming the students to be uniform variability in individual results may be considered as a random effect of school system. Aggregation of variability of all schools of one stream may be considered as stratum (channel) variation and the aggregate variation of the entire stratum, accounts for total variation in the system.

Chapter seven of this dissertation is contributed in the development of a model to compare the efficiency of a curriculum based universal system in relation to the existing multi-channel system.

In case of multi-channel education, channel or system bias may be a barrier to unification. Methods are also developed in this chapter to test the system bias if any. Empirical study provided no evidence of channel bias in the performance of students; while universal system is observed to be slightly efficient than the existing multi-channel systems.

8.2 Drawbacks

Statement of the problem and review of literatures could be given in more details for clarification of the problems and critical observations on cited literature are given in appendices I-V.

History of education could be discussed in more details. Specially, the Muslim period and the British period that could justify the existence of a multi-channel primary education in a uni-lingual society. Since, this

dissertation is an exploratory study, we have avoided detailed discussions of history but supplemented with appropriate references.

Someone may argue that data collected in the second phase may be appended in the dissertation. This will unnecessarily increase the volume of the dissertation and avoided for practical reasons.

Demand for primary education is somewhat a different issue than other consumer's goods. Statisticians are not unanimously agreed to a particular type of model. Some body advocates for logit analysis while others for probit analysis. Some others also advocates for universal factorial analysis of variance. We have developed a logistic regression model and studied it empirically. The main disadvantage of this model lies in the fact that alternative demand to universal system stands as the main factor for this model. Use of alternative demand to explain the demand for Universal Primary Education is not appreciating. On the contrary, its exclusion from the model is also questionable. In that case, R^2 falls below 0.5 and significance of the logistic regression model cannot be justified. This implies that there exits some other variables associated with the Demand of Universal Primary Education that we failed to identify and not included in the study.

For assessing the reliability of the conducted survey on way to select the compromised set of terminal competencies from among the dissimilar 48 terminal competencies of the three streams, five selected rules are proposed and studied. Since there is no hard and first rule for constructing selection rules, someone may construct other set of rules beyond the five we have considered. We have used Test-Re-Test method for validity of

the opinion survey, others may use a different method because there are multiple methods of testing validity of test scores (survey results).

The concept of efficiency and its measure is based on the aggregate measure of variability and dependent on the school system and it's associated components like teachers quality, academic environment, logistics required etc. Someone may breakdown the efficiency in terms of components that may results a more in-depth study.

8.3 Scope for Further Works

A logistic regression model is developed and fitted to study demand for universal primary education in the study area. Fit of the model is observed to be satisfactory considering value of the computed R^2. The data is checked for the presence of extreme values and systematic variation through residual analysis of the fitted stepwise logistic regression model. No extreme or contaminated value or systematic variation is observed to be present in the data but presence of heteroscadisticity cannot be discarded which is left as an exercise for future work. Exploratory researchers of future may take lesson from this study about the sufficiency of data size in multifactor studies.

Logistic regression analysis can identify the risk factors affecting the dependent variable but cannot estimate the contribution of individual risk factors separately. If a qualitative independent risk factor has m categories, only $(m-1)$ dummy variables can be introduced and the rest one is taken as reference category. The amount of risk of each category is expressed in relation to the reference category. Logistic regression also fails to provide the amount of risk due to interaction of the variables.

In chapter five, we have used ratio regression model to analyze the demand for Universal Primary Education. According to the theory, we should have all the demand proportions lying between 0.2-0.8. But in practice, we observed only about 70 percent of demand proportions lying in this limit due to sampling fluctuation. We could consider only three regressor variables out of five. Yet, the ratio regression model produced a good result with $R^2 = 0.9818$ and adjusted $\bar{R}^2 = 0.9492$.

Logit regression is exempted from this study because, logit transformation of demand proportions yield a large number of results indeterminate making the analysis impossible. A full model of ratio regressions analysis and that of logit regression analysis may be done if a large data set is available so that demand proportion in all classifications should lie between $0 < P_{ijk}\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots < 1$ with no indeterminate logit transformation. This may be left as a scope for further works.

In chapter six, we have proposed a set of 58 terminal competencies to be included in the curriculum of primary education in Bangladesh leading to the uniform and universal systems.

A fresh survey may be repeated among the previously selected 523 respondents. If the higher proportion of respondents accepts the proposed terminal competencies than the original survey for universal primary education, it may be concluded that the proposed model (terminal competencies) would work well.

If result is found unsatisfactory, fresh selection results may tried followed by study of reliability and validity of the selected terminal competencies.

In chapter seven, efficiency concept was developed based on total variation of student performance. These variations may be partitioned into component variations like teacher effect, environmental effect, co-curricular effect, etc. But in that case, fresh data is to be collected for each school separately and may be aggregated for each of the sub-system. Proposed universal system may be run experimentally in some of the schools and results of those schools may be compared with existing multi-channel schools for relative efficiency of the universal primary education.

APPENDIX

Appendix – I

1. Government primary school.
2. Registered Non-Government primary school.
3. Un-Registered Non-Government primary school.
4. Ebtedayee Madrassa.
5. Community primary school.
6. Pre-primary school Mosque oriented (Conducted by Islamic Foundation).

Appendix – II

1. Kindergarten (Bangla Medium)
2. Kindergarten (English Medium)
3. Pre-Cadet.
4. NGO's school.
5. Qwami Madrassa.

Appendix – III

Terminal competencies set by the curriculum of General Stream Primary Schools.

1. To have a firm faith to Allah the almighty and creator of the universe.
2. To express gratefulness to Allah for his bestowing infinite blessings and mercy upon us and this gratefulness to be translated into being through the recollection of Him.

3. To know the biography of Hazrat Muhammad(s) of Allah and the preacher of own religion and to follow their teaching and idealism.
4. To love all creatures of the Creator.
5. To show honor and tolerance to all religions.
6. To show honor all in irrespective of male and the female, the rich and the poor, occupation and variety of life.
7. To be interested in manual work and to show regard to the working class people.
8. To know own responsibility and duty as a member of the family and participate in household chore.
9. To know own responsibility and duty perform the citizenship responsibility as a Bangladeshi citizen.
10. To giving facilities to express the opinions of others and show honor to the expressed opinions.
11. To play an active role unanimously about different activities accepted by Institution.
12. To grow up as an eligible leader and its member in observing duties and responsibilities devotedly.
13. To take pride in national tradition and culture (Language, folk song ,art and fine arts and famous personalities) and to know and love the country.
14. To show respect to the National Flag and National song.
15. To avoid waste of wealth.
16. To understand the importance for living a sound and healthy.
17. To be energetic in building up the strong body through the participation in games, sports and physical exercise.

18. To know and carryout the physical and environmental code of health.
19. To know balanced diet, realize its importance and to practice such habit.
20. To know about common diseases its causes and its precautionary in adopting precaution.
21. To enable to read correctly understanding the subject matter printed written in simple Bengali. And to enable in learning knowledge continuously, reading the subject matter written in Bengali through the acquisition of reading skill.
22. To be able to write down observation, experience and attitude in accurate Bengali, to write common letters and application and fill up various types of forms.
23. To express our attitude and feeling accurately and effectively. To be enable to speak and communication with others in correct native language.
24. To understand the gist of the conversation, speech and description of the simple native language.
25. To achieve the concept of the elementary idea of figure and to know how to use it.
26. To know about the four elementary rules of mathematics and to know how to use them.
27. To apply the easy techniques of solving the problems of daily life.
28. To know how to use the units of currency, length, weights, measurement, volume and time.
29. To be able to detect and find out the geometrical figures.
30. To achieve the ability of gathering information.

31. To build up the habit of reading curricular and extra-curricular books, texts, newspapers, journals and magazines.
32. To achieve the ability of thinking freely and expressing one's own ideas and opinions.
33. To accept new concepts and ideas and to be eager to exchange them with others.
34. To be eager to accept others constructive criticism for self-development and efflorescence.
35. To know and understand natural and social environment through observation and investigation.
36. To make the inquiry into particular, to observe various things of the environment and to classify them and to achieve the ability of carrying on scientific research.
37. To find out the relation between the cause and effect and to make an experiment on the common problems of daily life.
38. To observe the influence of science and technology in developing the modes of daily life, to find out and to realize the importance of it.
39. To express oneself through artistic activities like designing, drawing, earth work, paper work, music, dancing and plays.
40. To observe as well as to materialize the beauty of natural and social environment
41. To build up the habit of keeping one's own things neat and clean and beautifying the surroundings.
42. To follow the order and discipline.
43. To take care of the personal and public property.
44. To build up the habit of punctuality.

45. To know how to behave with different persons depending on their social status and to cultivate etiquette as it demands.
46. To know about the life and trends of the children of different countries.
47. To be able to read the printed and easy hand-written things in English.
48. To understand the conversation, stories, limerick in English and to get pleasure.
49. To be able utter simple sentences in English to understand ones owe observation and conception.
50. To be able to write down clearly and correctly about the brief account of a familiar things.

Appendix – IV

Terminal competencies set by the curriculum of Ebtedayee Madrassa stream.

1. To be able to write the Bengali letters nicely.
2. To be able to write the English letters nicely.
3. To be able to write the Arabic letters nicely.
4. To be able make words with া , ে , ি , ী , ু , ূ , ৃ , ো া .
5. To be able to make words with Bengali letters.
6. To be able to make words with English letters.
7. To be able to make words with Arabic letters.
8. To able to write in detail in Bengali about known substance.
9. To be able to write short sentences in English language.
10. To be able to write short sentences in Arabic language.
11. To be able to speak in native language fluently.

12. To be able to read the printed and hand-written topics in English.
13. To find out the relation between the cause and effect and to make an experiment on the common problems of daily life.
14. To be able utter simple sentences in English to understand ones owe observation and conception.
15. To be able to write down on something about familiar things.
16. To be able to write down letter and application in Bengali to express thoughts and ideas.
17. To be able to learn how to love the younger.
18. To learn how to respect the elders.
19. To show respect to the National Flag and National song.
20. To be able to know how to call for prayer and to know the meaning of it.
21. To be able to know how to read the kalimia with meaning.
22. To be able to know how to recite the Holy Quern correctly.
23. To be able to know how to quote sure Fatiha and Other sure from memory.
24. To be able to know how to perform 'salat' perfectly.
25. To be able to have firm faith in Allah the Almighty.
26. To be able to know how the prophets led their lives and to mould their lives according to the teaching of Islam.
27. To love all creatures of the Creator.
28. To show honor and tolerance to all religions.
29. To lead one's life first to last in commemoration of Allah.
30. To achieve the fundamental idea of figure and be able to use it.
31. To know the four elementary rules of mathematics and be able to use it.

32. To apply the easy techniques of solving the problems of daily life.
33. To know how to use the units of currency, length, weights, measurement, volume and time.
34. To be able to detect and find out the geometrical figures.
35. To build up the habit of keeping one's own things neat and clean and beautifying the surroundings.
36. To follow the rules and discipline.
37. To take care of personal and public property.
38. To build up the habit of punctuality.
39. To achieve the capacity of gleaning information.
40. To take pride in national tradition and culture (Language, Arabic song, art and fine arts and famous personalities) and to know and love the country.
41. To think as usual and to gain the ability of expressing ones own opinion.
42. To listen to the conversation, speech and description in a native language and to be able to understand the main theme of it.
43. To understand the importance of building up a sound body and sound mind for leading a health life.
44. To know and understand the importance of balanced diet and to cultivate the habit of taking such kinds of food.
45. To avoid waste of wealth.
46. To know and carryout the physical and environmental code of health.
47. To know about common diseases its causes and its precautionary in adopting precaution.

Appendix – V

In addition to general stream Primary Schools terminal competencies more twenty two set by Kindergarten system:

1. Draw and describe the picture.
2. Students are attempting to copy teachers writing from notebook.
3. 1-2 letters can be recognized from students writing.
4. 50% letters can be recognized from students writing.
5. 1-2 words can be recognized from student's writing.
6. 75% words can be recognized from student's writing.
7. Students are attempting to copy teachers writing from slip.
8. Students are able to copy teachers writing from notebook.
9. Students are able to write 2-3 sentences with the help of personal dictionary.
10. Students are able to write 3-6 sentences with the help of personal dictionary.
11. Students started to use diary.
12. Students able to maintain diary.
13. Students can write her/his thinking in an unorganized way.
14. Students can write her/his thinking in an organized way.
15. Students are able to create story looking at picture.
16. Students are able to write a paragraph on issues instructed by the teacher.
17. Students are able to write a paragraph on any issue.
18. Students are attempting to write letters.
19. Students are attempting to write applications.
20. Students are able to write any letter.

21. Students are able to write any application.
22. Students are able to use punctuation marks (. , ; : ‘ “ - / ?).

Appendix – VI

The common terminal competencies

	General Primary system	**Ebtedayee Madrassa**
1.	(1) To have a firm faith to Allah the almighty and creator of the universe.	(25) To be able to have firm faith in Allah the Almighty.
2.	(3) To know the biography of Hazrat Muhammad(s) of Allah and the preacher of own religion and to follow their teaching and idealism.	(26) To be able to know how the prophets led their lives and to mould their lives according to the teaching of Islam.
3.	(4) To love all creatures of the Creator.	(27) To love all creatures of the Creator.
4.	(5) To show honor and tolerance to all religions.	(28) To show honor and tolerance to all religions.
5.	(13) To take pride in national tradition and culture (Language, folk song ,art and fine arts and famous personalities) and to know and love the country.	(40) To take pride in national tradition and culture (Language, Arabic song, art and fine arts and famous personalities) and to know and love the country.
6.	(14) To show respect to the National Flag and National song.	(19) To show respect to the National Flag and National song.

7.	(15) To avoid waste of wealth	(45) To avoid waste of wealth.
8.	(16) To understand the importance for living a sound and healthy life.	(43) To understand the importance of building up a sound body and sound mind for leading a healthy life.
9.	(18) To know and carryout the physical and environmental code of health.	(46) To know and carryout the physical and environmental code of health.
10.	(19) To know balanced diet, realize its importance and to practice such habit.	(44) To know and understand the importance of balanced diet and to cultivate the habit of taking such kinds of food.
11.	(20) To know about common diseases its causes and it's precautionary in adopting precaution.	(47) To know about common diseases its causes and it's precautionary in adopting precaution.
12.	(22) To be able to write down observation, experience and attitude in accurate Bengali, to write common letters and application and fill up various types of forms.	(16) To be able to write down letter and application in Bengali to express thoughts and ideas.
13.	(24) To understand the gist of the conversation, speech and description of the simple native language.	(42) To listen to the conversation, speech and description in a native language and to be able to understand the main theme of it.
14.	(25) To achieve the concept of the	(30) To achieve the

	elementary idea of figure and to know how to use it.	fundamental idea of figure and be able to use it.
15.	(26) To know about the four elementary rules of mathematics and to know how to use them.	(31) To know the four elementary rules of mathematics and be able to use it.
16.	(27) To be able to know how the prophets led their lives and to mould their lives according to the teaching of Islam.	(32) To apply the easy techniques of solving the problems of daily life.
17.	(28) To know how to use the units of currency, length, weights, measurement, volume and time.	(33) To know how to use the units of currency, length, weights, measurement, volume and time.
18.	(29) To be able to detect and find out the geometrical figures.	(34) To be able to detect and find out the geometrical figures.
19.	(30) To achieve the ability of gathering information.	(39) To achieve the capacity of gleaning information.
20.	(32) To achieve the ability of thinking freely and expressing one's own ideas and opinions.	(41) To think as usual and to gain the ability of expressing one's own opinion.
21.	(37) To find out the relation between the cause and effect and to make an experiment on the common problems of daily life.	(13) To find out the relation between the cause and effect and to make an experiment on the common problems of daily life.

22.	(41) To build up the habit of keeping one's own things neat and clean and beautifying the surroundings.	(35) To build up the habit of keeping one's own things neat and clean and beautifying the surroundings.
23.	(42) To follow the order and discipline.	(36) To follow the rules and discipline.
24.	(43) To take care of the personal and public property.	(37) To take care of personal and public property.
25.	(44) To build up the habit of punctuality.	(38) To build up the habit of punctuality.
26.	(47) To be able to read the printed and easy hand-written things in English.	(12) To be able to read the printed and hand-written topics in English.
27.	(49) To be able utter simple sentences in English to understand ones owe observation and conception.	(14) To be able utter simple sentences in English to understand ones owe observation and conception.
28.	(50) To be able to write down clearly and correctly about the brief account of a familiar things.	(15) To be able to write down on something about familiar things.

And the rest are different.

Appendix – VII

A. List of General Primary Schools

SL	Name of General Primary schools	Stu of I to V	C Stu of I to V	Stu of Class V	C Stu of Class V
1	Khalishpur Govt. Primary School.	282	282	42	42
2	Bhalaipur Govt. Primary School.	338	620	57	99
3	Bozrapur Govt. Primary School.	290	910	48	147
4	Sundorpur Govt. Primary School.	232	1142	31	178
5	Kakiladari Govt. Primary School.	158	1300	21	199
6	Saratala Govt. Primary School.	222	1522	27	226
7	Porapara Govt. Primary School	448	1970	51	277
8	Fatapur Govt. Primary School.	236	2206	30	307
9	Akterpur Govt. Primary School.	158	2364	29	336
10	Bhoitala Govt. Primary School.	204	2568	39	375
11	Manikdehe Govt. Primary School.	208	2776	36	411
12	Pirgasa Govt. Primary School.	206	2982	15	426
13	Pantapara Govt. Primary School.	419	3401	42	468
14	**Purandarpur Govt. Primary School.**	**324**	**3725**	**50**	**518**
15	Kushadanga Govt. Primary School.	421	4146	45	563
16	Dottonagar Govt. Primary School.	739	4885	75	638

17	Shoruppur Govt. Primary School.	573	5458	47	685
18	Gurdah Govt. Primary School.	494	5952	69	754
19	Shamkur Govt. Primary School.	434	6386	65	819
20	Talsar Govt. Primary School.	285	6671	30	849
21	Padmapukur Govt. Primary School.	317	6988	36	885
22	Malibaria Govt. Primary School.	335	7323	24	909
23	Kullah Govt. Primary School.	323	7646	28	937
24	Solamanpur Govt. Primary School.	335	7981	27	964
25	Baghadanga Govt. Primary School.	443	8424	50	1014
26	Kazirbir Govt. Primary School.	395	8819	75	1089
27	Jhiktipota Govt. Primary School.	230	9049	40	1129
28	Islampur Govt. Primary School.	229	9278	21	1150
29	Samonta Govt. Primary School.	285	9563	32	1182
30	Samonta Govt. Primary School	329	9892	40	1222
31	Dumortola Govt. Primary School.	114	10006	17	1239
32	Satpota Govt. Primary School.	259	10265	36	1275
33	Bhanpota Govt. Primary School.	333	10598	50	1325
34	**Pacham Purandarpur Registered Non-Govt. Primary School.**	**214**	**10812**	**22**	**1347**

35	Bholadangha Govt. Primary School.	431	11243	40	1387
36	Patra Govt. Primary School.	153	11396	21	1408
37	Jululi Govt. Primary School.	224	11620	30	1438
38	**Chadratonpur Govt. Primary School.**	**324**	**11944**	**47**	**1485**
39	Gopalpur Govt. Primary School.	165	12109	27	1512
40	Borobarirajapur Govt. Primary School	204	12313	22	1534
41	Bathangashi Govt. Primary School.	205	12518	27	1561
42	Mirjapur Govt. Primary School.	285	12803	29	1590
43	Bhatpara Govt. Primary School.	243	13046	24	1614
44	Joka Govt. Primary School.	149	13195	11	1625
45	Habashpur Govt. Primary School.	132	13327	11	1636
46	Ramchanropur Govt. Primary School.	276	13603	20	1656
47	Bolevodropur Govt. Primary School.	118	13721	14	1670
48	Alampur Govt. Primary School.	166	13887	25	1695
49	Biddadorpur Govt. Primary School.	341	14228	61	1756
50	Modonpur Govt. Primary School.	152	14380	12	1758
51	Gorinatpur Govt. Primary School.	150	14530	15	1783
52	Noydagram Govt. Primary School.	120	14650	12	1795

53	Gariabaria Govt. Primary School.	280	14930	15	1810
54	Kuripol Govt. Primary School.	308	15238	25	1835
55	Gaguasha Govt. Primary School.	119	15357	13	1848
56	Mandartala Govt. Primary School.	196	15553	28	1876
57	Shabinondopur Govt. Primary School.	253	15806	35	1911
58	Dariapur Govt. Primary School.	160	15966	19	1930
59	Nostiuzzilpur Govt. Primary School.	201	161677	32	1962
60	**Jalilpur Model Govt. Primary School.**	536	16703	77	2039
61	Baruypara Govt. Primary School.	152	16855	31	2070
62	Moheshpur Poyro Govt. Primary School.	260	17115	50	2120
63	Noydagram Poyro Govt. Primary School.	228	17343	25	2145
64	Sajia Govt. Primary School.	277	17620	32	2177
65	**Birshasto Shahid Hamidur Rahman Govt. Primary School.**	**274**	**17894**	**34**	**2211**
66	Labutala Govt. Primary School.	186	18080	30	2241
67	Bhairaba Registered Non-Govt. Primary School.	230	18310	19	2260
68	Manderbaria Registered Non-Govt. Primary School.	192	18502	25	2285

69	Sherampur Registered Non-Govt. Primary School.	165	18667	17	2302
70	Azompur Registered Non-Govt. Primary School.	185	18852	23	2325
71	Bhogardary Registered Non-Govt. Primary School.	222	19074	35	2360
72	Kanaidanga Registered Non-Govt. Primary School.	165	19239	21	2381
73	Shrinathpur Registered Non-Govt. Primary School.	268	19507	42	2423
74	Goashpur Registered Non-Govt. Primary School.	238	19745	31	2454
75	Napa Registered Non-Govt. Primary School.	298	20043	42	2496
76	Kagmary Registered Non-Govt. Primary School.	179	20222	17	2513
77	Polianpur Registered Non-Govt. Primary School.	196	20418	17	2530
78	Bhobnagar Registered Non-Govt. Primary School.	288	20706	40	2570
79	Kola Registered Non-Govt. Primary School.	269	20975	31	2601
80	Durgapur Registered Non-Govt. Primary School.	152	21127	14	2615
81	Jogehuda Registered Non-Govt. Primary School.	260	21387	27	2642

82	Bagumpur Registered Non-Govt. Primary School.	171	21558	21	2663
83	Rakhalvoga Registered Non-Govt. Primary School.	161	21719	19	2682
84	Chachonpur Registered Non-Govt. Primary School.	206	21925	20	2702
85	Gopalpur Registered Non-Govt. Primary School.	192	22157	29	2731
86	Bhabdia-Garapota Registered Non-Govt. Primary School.	404	22521	53	2784
87	Khora Mandartala Registered Non-Govt. Primary School.	171	22692	25	2809
88	Chaygoria Registered Non-Govt. Primary School.	257	22949	13	2822
89	Irshaldanga Registered Non-Govt. Primary School.	204	23153	24	2846
90	Shahapur Registered Non-Govt. Primary School.	138	23291	16	2862
91	Alampur 4 No Cholonipara Kasham Munshi Registered Non-Govt. Primary School.	197	23488	20	2882
92	Noyanypara Registered Non-Govt. Primary School.	163	23651	26	2908
93	Nolbilpara Registered Non-Govt. Primary School.	262	23913	40	2948
94	Adorsho Registered Non-Govt. Primary School.	200	24113	19	2967

95	Basbaria Govt. Primary School.	195	24308	18	2985
96	Patibila Registered Non-Govt. Primary School.	154	24462	12	2997
97	Nolpatua Registered Non-Govt. Primary School.	181	24643	22	3019
98	Kalupur Alipur Registered Non-Govt. Primary School.	169	24812	17	3036
99	Gugri Registered Non-Govt. Primary School.	154	24966	20	3056
100	Mokordaspur Registered Non-Govt. Primary School.	299	25265	28	3084
101	Alampur Dhakhan Para Registered Non-Govt. Primary School	139	25364	8	3092
102	Bhogoboti tola Kola Registered Non-Govt. Primary School.	310	25404	44	3136
103	Maladorpur Registered Non-Govt. Primary School.	126	25840	8	3144
104	Matila Registered Non-Govt. Primary School.	162	26002	17	3161
105	Idrakpur Registered Non-Govt. Primary School.	120	26122	27	3188
106	Khoshalpur Registered Non-Govt. Primary School	193	26315	24	3212
107	Bayoli Registered Non-Govt. Primary School.	244	26559	33	3245
108	Hanifpur Registered Non-Govt. Primary School.	160	26719	30	3275

109	Natima Registered Non-Govt. Primary School.	189	26908	26	3301
110	Dhannoharia Registered Non-Govt. Primary School.	158	27066	26	3327
111	Rupdah Registered Non-Govt. Primary School.	132	27198	15	3342
112	Shakhargari Registered Non-Govt. Primary School.	110	27308	15	3357
113	Koikhali Baganmat Registered Non-Govt. Primary School.	165	27473	20	3377
114	Alampur 1 No Koliny Braze Ghat Registered Non-Govt. Primary School.	171	27644	27	3404
115	Kanaidanga Registered Non-Govt. Primary School.	206	27850	24	3428
116	**Khochorpota Registered Non-Govt. Primary School.**	**270**	**28120**	**30**	**3458**
117	Shabazpur Registered Non-Govt. Primary School.	152	28272	18	3476
118	Krishno Chonropur Registered Non-Govt. Primary School.	151	28423	13	3489
119	Hudadurgapur Registered Non-Govt. Primary School.	172	28595	21	3510
120	Bararmat Registered Non-Govt. Primary School.	162	28757	19	3529
121	Batbaria Registered Non-Govt. Primary School.	167	28924	16	3545

122	Uzzalpur Uttorpara Registered Non-Govt. Primary School.	189	29113	28	3573
123	Shurjodia Registered Non-Govt. Primary School.	160	29273	18	3591
124	Babla Mathavanga Registered Non-Govt. Primary School.	160	29433	20	3611
125	Murotala Shahid Royshon Ali Registered Non-Govt. Primary School.	161	29594	16	3627
126	Shonkurhuda Registered Non-Govt. Primary School.	198	29792	26	3653
127	Nimtala Registered Non-Govt. Primary School.	165	29957	15	3668
128	Shonaidanga Registered Non-Govt. Primary School.	118	30075	14	3682
129	Gopalpur Registered Non-Govt. Primary School.	212	30287	25	3707
130	LB(Bagdirait) Registered Non-Govt. Primary School.	172	30459	18	3725
131	Chapatala Registered Non-Govt. Primary School.	257	30716	21	3746
132	Baganmath Shokor Khal Registered Non-Govt. Primary School.	141	30857	18	3764
133	Kashipur Registered Non-Govt. Primary School.	138	30995	18	3782

134	Kashipur Shahid Sanaur Registered Non-Govt. Primary School.	154	31149	19	3801
135	Kulbagan Adorsho Registered Non-Govt. Primary School.	163	31312	20	3821
136	Shripur Pabnapara Registered Non-Govt. Primary School.	157	31469	12	3833
137	Sayedpur non-registered non-govt. primary school.	130	31599	7	3840
138	Boyalia non-registered non-govt. primary school.	170	31769	13	3853
139	Taitupy non-registered non-govt. primary school.	109	31878	4	3857
140	Mothurapur non-registered non-govt. primary school.	95	31973	16	3873
141	Likhipur non-registered non-govt. primary school.	108	32081	14	3887
142	Zeetarpur Community Primary school.	150	32231	14	3901
143	Adompur Community Primary school.	160	32391	13	3914
144	Poradah Community Primary school.	165	32556	10	3924
145	Nolpatua Community Primary school.	81	32637	5	3929
146	Ghutnolpara Community Primary school.	154	32791	10	3939

147	Paddorajpur Community Primary school.	81	32872	12	3951
148	Shamkur Pachampara Community Primary school.	155	33027	15	3966
149	Annontopur Community Primary school.	203	33230	20	3986
150	Dakatia Community Primary school.	152	33382	12	3998
151	Loraighat Community Primary school.	101	33483	11	4009

B. List of Ebtedayee Madrassas

SL	Name of Madrassas	Stu of I to V	C Stu of I to V	Stu of Class V	C Stu of Class V
1	Natima Fazil Madrasah	160	160	50	50
2	Jalilpur Alim Madrasah	146	306	32	82
3	Khalishpur Dakhil Madrasah	275	581	72	154
4	Bhoiroba Alim madrasah	105	686	28	182
5	Moheshpur Dakhil Madrasah	148	834	22	204
6	**Samonta Dakhil Madrasah**	**326**	**1160**	**63**	**267**
7	Mandarbaria Dakhil Madrasah	193	1353	30	297
8	Boichatala Dakhil Madrasah	235	1588	45	342
9	Modonpur Dakhil Madrasah	145	1733	35	377
10	Joluly Dakhil Madrasah	262	1995	42	419

11	Roghunathpur Dakhil Madrasah	165	2160	22	441
12	Kirsnopur Dakhil Madrasah	292	2452	70	511
13	Bamongasi Dakhil Madrasah	243	2695	55	566
14	Vashanpota Aminnagar Dakhil Madrasah	230	2925	45	611
15	Napa Senior Madrasah	302	3227	55	666
16	Talsar Dakhil Madrasah	240	3467	40	706
17	S.P.K Dakhil Madrasah	185	3652	25	731
18	Maladorpur Dakhil Madrasah	210	3862	40	771
19	Porapara Dakhil Madrasah	225	4087	40	811
20	Fatepur Dakhil Madrasah	115	4202	28	839
21	Gorinathpur Dakhil Madrasah	145	4347	22	861
22	Poliyanpur Dakhil Madrasah	245	4592	50	911
23	Anondobazar Dakhil Madrasah	170	4762	20	931
24	Poddopukur Dakhil Madrasah	223	4985	35	966

C. List of Kindergarten schools

SL	Name of Kindergarten Schools	Stu of I to V	C Stu of I to V	Stu of Class V	C Stu of Class V
1	New Children Grach Kindergarten School,Moheshpur.	323	323	56	56
2	Chid Pri-Cadet school.	112	435	15	71
3	Cosmopolitan Model School,	172	607	16	87

	Khalishpur.				
4	Uddipon Kindergarten, Moheshpur.	124	731	17	104
5	Notunkuri Model Academy.	140	871	10	114
6	The Brightstar, Jhunnagar.	125	996	10	124
7	Jadobpur Ideal Pri-Cadet, Jadobpur.	95	1091	16	140
8	Samonta Pri-Cadet, Kajirbar.	73	1164	5	145
9	Jahanara Pri-Cadet, Fatepur.	85	1249	7	152
10	Sunrise Kindergarten, Pantapara.	214	1463	42	194
11	The Bright Star, Ginnager, Kajirbar.	73	1536	9	203
12	Hazi Mohammad Mohasin Pri-Cadet, Moheshpur	158	1694	16	219
13	Bhuya Modelm Academy, Pantapera.	140	1834	13	232
14	Niber English Medium Pri-Cadet, Mandarbaria .	100	1934	10	242
15	Bagadanga Pri-Cadet, Napa.	176	2110	21	263
16	The Sunrise Academy,Nayanipara, Natima.	116	2226	4	267
17	Summoon Kindergarten,Sageya, Napa.	52	2278	6	273
18	Dafodill Pri-Cadet, Sageya, Napa.	62	2340	8	281
19	Ginnanagor Pri-Cadet, Kagirbar.	112	2452	9	290
20	**Ideal Pricadet School, Khalishpur.**	**212**	**2664**	**19**	**309**
21	**Hazi Eman Ali Pri-Cadet, Jadoppur.**	**220**	**2884**	**24**	**333**
22	Child Progress Pri-Cadet, Napa.	72	2956	5	338
23	Sufiya Model Kindergarten, Gurdah, Shamkur.	59	3015	11	349

24	The Lotus Kindergarten, Bhoiroba, Basbaria.	83	3098	9	358
25	Abdul Jabbor Kindergarten,Gagusha, Natima.	49	3147	5	363
26	Friendship Kindergarten,Habashpur, Mandarbaria.	75	3222	11	374
27	Ohedul Islam Kindergarten, Basbaria.	106	3328	11	385
28	Fulkuri Kindergarten and Pri-Cadet, Shamkur.	77	3405	12	397
29	Molla Mofizuddin Kindergarten, Shamkur.	162	3567	14	411
30	N.B Pri-Cadet, Bozrapur,SBK.	63	3630	6	417
31	Sunrise Kindergarten, Fatepur.	65	3695	10	427
32	Hazi Abdul Ohab Shishumala Kindergarten, Soruppur.	121	3816	3	430
33	Mandarbaria Adorsho Kindergarten and Pri-Cadet, Natima.	140	3956	10	440
34	Ashirbad KG School, Badargari, SBK.	58	4014	7	447
35	Uddoyan Kindergarten,Shamkur.	201	4215	20	467
36	Unik Child Prograsess School, Moheshpur.	107	4322	7	474
37	Rafsa Q and Q's Kindergarten, Bashbaria.	78	4400	9	483
38	Evergreen English School, Moheshpur.	161	4561	18	501

Appendix-VIII

A. List of high schools

Serial no.	Name of high school	Number of teachers
1	Sundarpur high school, Sundarpur.	10
2	Khalishpur multilateral high school, Khalishpur.	18
3	**Natima- Kuripol high school, Natima.**	**14**
4	Rahatullah sardar high school, Bhaliapur.	11
5	Boichatala high school, Boichatala.	10
6	Biddadarpur high school, Biddadarpur.	12
7	J.H.G.P Pouro high school,Kukurpota, Moheshpur.	9
8	D.P.G girl school, Dhaanoharia.	7
9	K.B.S high school, Kunchanpur.	10
10	**M. P. B high school, Shambazar.**	**11**
11	Talsar high school, Talsar.	6
12	Gugry-Pantapara high school, Gugry.	14
13	Joluly Model school, Joluly.	9
14	Gopalpur Cola collegiate school, Cola.	9
15	Moheshpur high school, Moheshpur.	21
16	**Mandarbaria high school, Mandarbaria.**	**10**
17	Habashpur high school, Habashpur.	9
18	Progoty Biddanikaton high school, Jadoppur.	13
19	Samonta high school, Samonta.	11
20	Shankarhuda-Bathangachi high school, Bathangachi.	10

21	Idrakpur high school, Idrakpur.	10
22	Gurdah high school, Gurdah.	8
23	Sosta secondary school, Sosta.	14
24	Satpota Model school, Satpota.	15
25	**Bakashpota high school, Napa.**	**12**
26	Dottonogor high school, Dottonagor.	13
27	Moheshpur girl school, Moheshpur.	10
28	Sagia high school, Sagia.	10
29	Shamkur high school, Shamkur.	13
30	Samsuddin Sardar high school, Bhalaipur.	14
31	Patra high school, Patra.	10
32	Jinnanagar high school, Jinnanagar.	11
33	Al-Haz Mofizuddin Academy,Rully.	11
34	Alampur high school, Alampur.	11
35	B. R. A. K. S high school, Ramchanropur.	10

B. List of Senior Madrassas

Serial no.	Name of Madrassa	No. of teachers
1	Natima Fazil Madrassa, Natima.	23
2	Jalilpur Alim Madrassa, Jalilpur.	19
3	Talsar Dakhil Madrassa, Talsar.	9
4	Bhoiroba Alim Madrassa, Bhoiroba.	14
5	Moheshpur Dakhil Madrassa, Moheshpur.	13
6	**Samonta Dakhil Madrassa, Samonta.**	**18**

7	Mandarbaria Dakhil Madrassa, Mandarbaria.	16
8	Boichatala Dakhil Madrassa, Boichatala.	14
9	Modonpur Dakhil Madrassa, Modonpur.	17
10	Joluly Dakhil Madrassa, Joluly.	18
11	Roghunathpur Dakhil Madrassa, Roghunathpur.	13
12	Kirsnopur Dakhil Madrassa, Kirsnopur.	15
13	Bamongasi Dakhil Madrassa, Bamongasi.	13
14	Vashanpota Aminnagar Dakhil Madrassa, Vashanpota.	15
15	Napa Senior Madrassa, Napa.	18
16	**Khalishpur Dakhil Madrassa, Khalishpur.**	**17**
17	S.P.K Dakhil Madrassa, Azompur.	18
18	Maladorpur Dakhil Madrassa, Maladorpur.	18
19	Porapara Dakhil Madrassa, Porapara.	15
20	Fatepur Dakhil Madrassa, Fatepur.	12
21	Gorinathpur Dakhil Madrassa, Gorinathpur.	15
22	Poliyanpur Dakhil Madrassa, Poliyanpur.	15
23	Anondobazar Dakhil Madrassa, Anondobazar.	17
24	Podmapukur Dakhil Madrassa, Podmapukur.	14

C. List of colleges

Serial no.	Name of college	No. of teachers
1	Moheshpur Govt. degree college, Moheshpur.	40
2	Moheshpur mohela college, Moheshpur.	37
3	Birshasto Shahid Hamidur Rahman Govt. degree college, Khalishpur.	61

4	**Shahid Ziaur Rahman degree college, Fatepur.**	**34**
5	Alfatunnassa college, Shambazar.	25
6	Jadoppur degree college, Jadoppur.	22
7	Padmapukur degree college, Padmapukur.	38
8	Katgora degree college, Purapara.	31
9	Shamsul Huda degree college, Biddadorpur.	19

D. List of selected higher institutions (high school, senior madrassa and college)

Serial no.	Institution serial no.	Name of institution(high school, senior madrassa and college)	No. of teachers
1	25	Bakashpota high school, Napa.	12
2	3	Natima- Kuripol high school, Natima.	14
3	10	M. P. B high school, Shambazar.	11
4	16	Mandarbaria high school, Mandarbaria.	10
5	6	Samonta Dakhil Madrassa, Samonta.	18
6	16	Khalishpur Dakhil Madrassa, Khalishpur.	17
7	4	Shahid Ziaur Rahman degree college, Fatepur.	34

Appendix-IX

List of elected public representatives in Moheshpur upazilla.

Sl no.	Name of union	Chairman	Councilor	Lady councilor	Total
1	S. B. K union parishad.	1	9	3	13(13)

2	Fatepur union parishad.	1	9	3	13(13)
3	Pantaparta union parishad.	1	9	3	12(13)
4	Shauruppur union parishad.	1	9	3	13(13)
5	Shamkur union parishad.	1	9	3	13(13)
6	Napa union parishad.	1	9	3	11(13)
7	Kazirbar union parishad.	1	9	3	12(13)
8	Bashbaria union parishad.	1	9	3	13(13)
9	Jadoppur union parishad.	1	9	3	12(13)
10	Natima union parishad.	1	9	3	12(13)
11	Mandarbaria union parishad.	1	9	3	13(13)
12	Azompur union parishad.	1	9	3	13(13)
13	Moheshpur pourashava.	1	6	3	8(10)
	Total				158(168)

Appendix- X

Opinion survey

Demand for Universal Primary Education in Bangladesh: A case study of Jhenaidah district.

1. Name of respondent:……Age:……

   Fathers name:……

   Profession:……Designation (if any):……

   Address(if you in service, address of service place): ……

   ……...

2. Religion: Islam ☐ Sonaton ☐ Christian ☐ Buddhist ☐ Others ☐

3. Educational qualification:

   (a) How many years you received education?….....

   (b) Which system of education you received at primary level? General education/ Ebtedayee Madrassa education/ Kindergarten education.

4. Marital status: Married ☐ Unmarried ☐ Others ☐

6. Amount of cultivable land (Acre): ……

7. Pattern of resident house: Pacca/ Semi pacca/ Completely Tin shed/ thesed house.

8. Monthly family income (in taka):

Source of income	Agriculture	Wage	Business	Service	Others	Total
Amount						

9. Monthly family expenditure (in taka):

Category of exp.	Food	Education	Clothes	Medication	Others	Total
Amount						

10. Access to mass media: Radio/Television/Mobile/Dish Antenna/ All/ None
11. Family financial condition: Deficit/ Solvent/ Surplus.
12. If you have any child of 6-12 years old? Yes ☐ No ☐
14. Schooling of child: Primary school/ Ebtedayee Madrassa/ Kindergarten?
15. In primary level educational expenditure for one child per month: Amount (in taka): …….....
16. Expected profession of your child studying at primary level: Govt. officer/ General Service/ Teacher/ Lawyer/ Doctor/ Engineer/ Businessman/ Professional/ Others?
17. Do you think that a single education system acceptable to all should exists at primary level in place of multi-channel (General education, Ebtedayee Madrassa education and Kindergarten education) system? Yes ☐ No ☐
18. Which system will you prefer, in absence of Universal Primary education? General system/ Ebtedayee/ Kindergarten?

Give tik (✓) marks that you feel important for primary level of the following terminal competencies:

1. To be able to learn how to love the younger. ☐
2. To know about common diseases its causes and it's precautionary in adopting precaution. ☐
3. To learn how to respect the elders. ☐

4. Students are able to copy teachers writing from slip, notebook and blackboard. ☐
5. Students are able to express her/his thinking to write in an organized way. ☐
6. To express gratefulness to Allah for his bestowing infinite blessings and mercy upon us and this gratefulness to be translated into being through the recollection of Him. ☐
7. Students are able to copy teachers writing. ☐
8. To be energetic in building up the strong body through the participation in games, sports and physical exercise. ☐
9. To play an active role unanimously about different activities accepted by Institution. ☐
10. To able to write in detail in Bengali about known substance. ☐
11. To express our attitude and feeling accurately and effectively. To be enable to speak and communication with others in correctly native language. ☐
12. To be able to make words with English letters. ☐
13. To be eager to accept others constructive criticism for self-development and efflorescence. ☐
14. To observe as well as to materialize the beauty of natural and social environment. ☐
15. To be interested in manual work and to show regard to the working class people. ☐
16. To be able to know how to perform ‘salat’ perfectly. ☐
17. To know own responsibility and duty as a member of the family and participate in household chore. ☐

18. Students are able to write a paragraph on issues instructed by the teacher. ☐
19. To be able to make words with Arabic letters. ☐
20. To know own responsibility and duty perform the citizenship responsibility as a Bangladeshi citizen. ☐
21. To lead one's life first to last in commemoration of Allah. ☐
22. Students are able to write a paragraph on any issue. ☐
23. Students are able to know how to use diary and how to maintain diary. ☐
24. To grow up as an eligible leader and its member in observing duties and responsibilities devotedly. ☐
25. To express oneself through artistic activities like designing, drawing, earth work, paper work, music, dancing and plays. ☐
26. To accept new concepts and ideas and to be eager to exchange them with others. ☐
27. To make the inquiry into particular, to observe various things of the environment and to classify them and to achieve the ability of carrying on scientific research. ☐
28. To be able to write the Bengali letters nicely. ☐
29. To be able to write the Arabic letters nicely. ☐
30. To be able to know how to read the Kalima with meaning. ☐
31. To be able to write short sentences in English language. ☐
32. Draw a picture known substance and describe the picture. ☐
33. To be able to know how to recite the Holy Quern correctly. ☐
34. To be able to write short sentences in Arabic language. ☐

35. Students are able to use punctuation marks appropriately. ☐
36. To be able to make words with Bengali letters. ☐
37. To be able to write the English letters nicely. ☐
38. To know about the life and trends of the children of different countries. ☐
39. To be able to know how to call for prayer and to know the meaning of it. ☐
40. To build up the habit of reading curricular and extra-curricular books, texts, newspapers, journals and magazines. ☐
41. Students are able to write sentences with the help of personal dictionary. ☐
42. To show honor all in irrespective of male and the female, the rich and the poor, occupation and variety of life. ☐
43. To enable in learning knowledge continuously, reading the subject matter written in Bengali through the acquisition of reading skill. ☐
44. To be able make words with া, ি, ী, ু, ূ , ে, ৈ, ো, ৌ. ☐
45. To giving facilities to express the opinions of others and show honor to the expressed opinions. ☐
46. To be able to know how to quote sure Fatiha and Other sure from memory. ☐
47. To observe the influence of science and technology in developing the modes of daily life, to find out and to realize the importance of it. ☐
48. To enable to read correctly understanding the subject matter printed written in simple Bengali. ☐

REFERENCES

1. Adam, J (1912): Address in British Association, London.
2. Ahmad, M., Ahmad, K. S., Khan, N. I. & Ahmad, R.,(2009): Access to Education in Bangladesh Country Analytic Review of Primary and Secondary Education, Institute of Educational Development BRAC University, House 113, Road 2, Block A, Niketon, Gulshan 1, Dhaka 1212, Bangladesh.
3. Ahmed, M. (2013a): Comments on HLP Final Report. NORRAG, June 6, 2013.
4. Ahmed, M. (2013b): The Post-2015 MDG and EFA Agenda and the National Discourse about Goals and Targets –A Case Study of Bangladesh. NORRAG Working paper No.5, August 2013. Geneva: Graduate Institute of International and Development Studies (IHEID).
5. Akeju, S. A. (1972): The reliability of GCE examination English composition papers in West Africa, J. Ed. Measure, 9, 175-80.
6. Ali, AMM S., (2006): "Thana". In Sirajul Islam. Banglapedia: National Encylopedia of Bangladesh. Asiatic Society of Bangladesh. Retrieved December 5, 2012.
7. Ali, M. A. (1986): Shikhar Songkhipto Itihash (in Bangla) Dhaka: Bangla Academy.
8. Altekar, Anant Sadashiv (1965): Education in Ancient India, Sixth, Varanasi: Nand Kishore & Bros.
9. Altman DG.(1991): Practical Statistics for Medical Research. London: Chapman & Hall.

10. Andrews, F. M., Morgan, J. N., Sonquist, J. A., (1967). Multiple classification analysis. Ann Arbor Institute for Social Research, University of Michigan, USA.

11. Anderson, H, J (1931): Correlation between academic achievement & teaching success. Elementary school Journal, 32, 22-29.

12. Basu, A. N., (1941): Reports on the state of education in Bengal (1835 & 1838) by William Adam. Calcutta University Press, Calcutta. CIA world fact book 2005. Internet

13. Bengali, K., (1999): History of Educational Policy Making and Planning in Pakistan, Working Paper Series # 40.

14. Berkson, J. (1951): Why I prefer logits to probits. Biometrics 7(4): 327-339.

15. Binet & Simon (1905): Intelligence scale. In Freeman, F.N edited Mental tests: There History, Principles & applications, Houghton Mifflin Co.

16. Braun, S. J., & Edwards, E. P. (1972): History and theory of early childhood education. California: Wadsworth Publishing Company.

17. Bruns, B. A. Mingat and R. Rakotomalala (2003): Jumpup^ http://www.google.com/search?q=B.Bruns,+A.+Mingat+and+R+Rakotomalala+2003&prmd=ivnsb&ei=AFbjgIIeFrAf6w4C4Bg&start=60&sa=N

18. Collet, D (1991): Modeling Binary Data. Chapman & Hall, London.

19. Chatterjee, K. K. (1976): English education in India: issues and opinions. New Delhi: The Macmillan Company of India Ltd.

20. Cochran, W.G. (1977): Sampling Techniques, Third Edition, Wiley & Sons, Inc. New York. Contingent Valuation," Indian Journal of Applied Economics, 7, 77-94, 1998.

21. Cox, D.R., (1958): "The regression analysis of binary sequences" (with discussion), J. R. Statist. Soc. B 20, pp. 215-242.

22. Cox, D.R., (1970): The Analysis of Binary Data. London: Methuen, Chapman and Hall.

23. Cox, D. R., and E. J. Snell (1989): "The Analysis of Binary Data", Second Edition, London: Methuen, Chapman and Hall.

24. Cox, D. R., and N. Wermuth (1992): "A comment on the coefficient of determination for binary responses", The American Statistician, Vol. 46, pp. 1-4.

25. Cytel Software Corporation (1993): Log Xact-Turbo user Guide, Cambridge, MA: Cytel Software Corporation.

26. Dakar Framework for Action. (2000): Education for all: meeting our collective commitments. World Education Forum. Dakar, Senegal, 26-28 April 2000

27. Des Raj (1966): Some remarks on a simple procedure of sampling without replacement. Jour. Amer. Stat. Assoc., 61, 391-396.

28. Duncan, Oits Dudley, (1966): "Path Analysis: Sociological Examples." The American Journal of Sociology, 72(1), 1-16.

29. Durbin, J (1953): Some results in sampling theory when the units are selected with unequal probabilities. Jour. Amer. Stat. Assoc., 70, 84-87.

30. EFA, 2000: Education for all 2000 assessment country report, Bangladesh. UNESCO Regional Office for Education in Asia and the Pacific, Bangkok.

31. Eisner, E.W (1967): Educational objectives, School Review, 75, 250-66.

32. Faridi, A. H., Madrasah Education: Bangladesh, Bangla Academy, Dhaka.

33. Feller, W. (1940): On the logistic law of growth and its empirical verification in biology. Acta Biotheoretica 5, 51–66.

34. Finlayson, D. S (1951): The reliability of marking essays, BJEP, 21, 126-34.

35. Finney, D. (1947): Probit Analysis (First ed.). Cambridge: Cambridge University Press.

36. Fisher, R. A., (1922): On the mathematical foundations of theoretical statistics, Philos. Trans, Roy. Soc. A222, p. 309-368.

37. Fisher, R.G (1864): Scale books, Quoted by E.B. Chadwick in "Statistics of educational results". The Museum, 3, 480-84.

38. Fisher, R.A., and Yates, F. (1957): Statistical Tables for Biological, Agricultural and Medical Research. Oliver and Boyd, London.

39. Fox, J. (1984): Linear statistical models and related methods: With applications to social research. New York: John Wiley and Sons.

40. Froebel, F. (1967b): Pedagogics of the kindergarten. In I. M. Lilley (Ed.), Friedrich Froebel: A selection from his writings (pp. 92-117). New York: Cambridge University Press.

41. Froebel, F. (1974): The education of man (Rev. Ed.). Clifton, NJ: Augustus M. Kelley (Original work published 1887).

42. Galton, F (1883): Standard Score, Correlation graph, In Garrett, H.L(ed) Great Experiments in Psychology. The Century Co., N., Y., 1930.

43. Ghosh, S. C. (1993): English in Taste, in Opinions, in words and intellect: Indoctrinating the Indian through textbook, curriculum,

and education. In J.A. Mangan (Ed), The imperial curriculum: Racial images and education in British colonial experience (pp 175-193). London and New York: Routledge.

44. GMR - EFA Global Monitoring Report (2013) Proposed Post-2015 Education Goals: Emphasizing Equity, Measurability and Finance. March, 2013.

45. Goodman, L.A., Kruskal, W.H. (1954): "Measures of association for cross classifications". Part I. Journal of the American Statistical Association, 49, 732-764. JSTOR 281536

46. Goodman, L.A., Kruskal, W.H. (1959): "Measures of association for cross classifications". II: Further Discussion and References". Journal of the American Statistical Association, 52, 123-163. JSTOR 2282143

47. Government of Pakistan (GoP). (1947): Pakistan Educational Conference: Proceedings of the meeting (27 November-1 December 1947). Lahore. Feroze printing works.

48. Government of Pakistan (GoP). (1949): Proceedings of the meetings of advisory board of education for Pakistan. Karachi. Education division.

49. Government of Pakistan (GoP). (1960): Report of the commission on national education (CNE). Karachi: Ministry of Education.

50. Government of Pakistan (GoP). (1966): Report of the commission on student problems and welfare (RCSP): Summary of the important observations and recommendations. Karachi: Ministry of Education.

51. Government of Pakistan (GoP). (1969): Proposals for a new educational policy (PNEP). Islamabad: Ministry of Education and Scientific Research.

52. Government of People's Republic of Bangladesh (GoB). (1974): Bangladesh Education Commission Report 1974. Dhaka: Ministry of Education.

53. Government of Bangladesh (GoB). (1979): Interim Education Policy 1979. Dhaka: Ministry of Education.

54. Government of Bangladesh (GoB), (2004a): Bangladesh Moves Ahead. Dhaka: Ministry of Education.

55. Greenwood, M (1919): Problems of Industrial Organizations, JRSS, A82, 186-209.

56. Gupta, S.C., and Kopoor, V.K., (2004): Fundamentals of Mathematical Statistics, Sultan Chand & Sons, Educational Publishers, New Delhi. Revised Edition 2004, ISBN 81-7014-120-6.

57. Gupto, D.D., (1978): Meher Panchagram Universal Primary Education Project. Bangladesh Rural Development Academy, Kotbari, Comilla, First Annual Report 1976-77.

58. Gustavsson, S. (1990): Primary education in Bangladesh for whom? The University Press Limited, Dhaka.

59. Hamoodur Rahman Commission Report. 1966: Report of the commission on student problems and welfare. Pakistan.

60. Hansen, M.H., and Hurwitz, W.N. (1943): On the theory of sampling from finite populations. Ann. Math. Stat., 14, 333-362.

61. Hauck, W.W. and A. Donner (1977): Wald's Test as applied to hypothesis in logit analysis, Journal of the American Statistical Association, 72, pp. 851-853.

62. Headley, N. (1965): The kindergarten: Its place in the program of education. (3rd Ed). New York: The Center for Applied Research in Education.

63. Heath, R.W (1964): Curriculum, cognitional & educational measurements. Education and Psychological Measure, 24, 239-53.

64. Hartog. (1929): Interim Report of the Indian Statutory Commission. Calcutta, India: Government Printing.

65. Hosmer, D.W. and S. Lemeshow (1989): "Applied Logistic regression", First Edition, John Wiley & Sons, Inc. New York.

66. Hossain, M. M., (2012): Development of higher education system in Bangladesh, VOL 20 NO 188 REGD NO DA 1589 | Dhaka, Sunday August 12 2012

67. Hughes, Paul; More, Arthur J. "Aboriginal Ways of Learning and Learning Styles", Paper presented at the Annual Conference of the Australian Association for Research in Education Brisbane, December 4, 1997

68. Islam, S.: Modern Education in Bangladesh: Historical Background, Education in Bangladesh: The Past, the Present, the Future, Bangladesh Lekhak Shibir.

69. Jalaluddin, A. & Chowdhury, M.R. (1997): Getting Started: universalising quality primary education in Bangladesh. Dhaka: University Press

70. Japan Bank for International Cooperation (JBIC), Bangladesh Education Sector Overview, Dhaka, 2002.

71. Jennings, D.E. (1986): "Judging inference adequacy in logistic regression", Journal of the American Statistical Association, 81, pp. 471-476.

72. Jumpup^ Abdalla, Amr, et al. Pre-primary and Primary Madrasah Education in Bangladesh. United States Agency for International Development. July 2004

73. Jumpup^ Ahmad, Samima. Testimony of Samina Ahmed to U.S. Senate Foreign Relations Committee. 19 April, 2005.

74. Jumpup^ Bano, Masooda, Allowing for Diversity State-Madrasa Relations in Bangladesh. Relitions and Development, Working Paper 13. 2008.

75. Jumpup^ Hasan, Zeeshan. Market solutions for Qawmi madrasas

76. Jumpup^ Hossain, AKM Y. and Balal, M. "Madrasah". Banglapedia, 2006. Retrieved 28 January 2014.

77. Jump up^ Manfred Berger, "Kurze Chronik der ehemaligen und gegenwärtigen Ausbildungsstätten für Kleinkindlehrerinnen, Kindergärtnerinnen, Hortnerinnen ... und ErzieherInnen in Bayern" in ''Kindergartenpädagogik - Online-Handbuch'', ed. Martin R. Textor

78. Jumpup^MDG(2000): Millennium Development Goals. From Wikipedia, the free encyclopedia, Retrieved 12 November 2013

79. Jumpup^OECD Financial Education Project: Background and Implementation (Retrieve, December 16, 2013): http://www.oecd.org/daf/fin/financialeducation/oecdfinancialeducationprojectbackgroundandimplementation.htm Retrieved 12 November 2013

80. Jumpup^Padmanabhan, N. (2011): Modern Indian History, http://www.universityofcalicut.info/syl/MODERNINDIANHISTORY18571992.pdf

81. Jumpup^ "Qawmi madrasas under watch." The Daily star. Thusday, March 31, 2009.

82. Jumpup^ "Really Old School," Garten, Jeffrey E. New York Times, December 9, 2006. Retrieved February 3, 2014.

83. Jump up^ “Socialist-Courer: Robert Owen and New Landmark”. Socialist-courer.blogspot.co.uk. Retrieved February 1, 2014.

84. Jumpup^ Vansina, Jan: "Oral Tradition as History", 1985, James Currey Publishers, ISBN 0852550073, 9780852550076; at page 27 and 28, where Vasina defines oral tradition as "verbal messages which are reported statements from the past beyond the present generation" which "specifies that the message must be oral statements spoken, sung or called out on musical instruments only"; "There must be transmission by word of mouth over at least a generation". He points out that "Our definition is a working definition for the use of historians. Sociologists, linguists or scholars of verbal art propose their own, which in the first case (sociology) might well stress common knowledge, in the second features that distinguish the language from common dialogue (linguists), and in the last features of form and content that define art (folklorists)."

85. Jumpup^ UNSPECIFIED (2000) Lisbon European Council 23-24 March 2000. Presidency conclusions. [EU European Council]

86. Jump up^Vag, Otto (March 1975): “The Infulence of the English Infant School in Hungary”. International Journal of Early Childhood (Springer).

87. Jump up^ Wilderspin, Samuel (1823): The Importance of Educating the Infant Poor. London.

88. Kendall D, Murray J, Linden R "Sociology In Our Times" Third Canadian Edition, 2004, Nelson Education Ltd.

89. Khatun, S. (1992): Development of primary education policy in Bangladesh. University of Dhaka, Dhaka.

90. Klein, Ruben (1998): Measuring Internal Efficiency of the Education system.isi.cbs.nl/iamamember/CD5 Mexico1998/document/…/In4_klei.doc

91. Klein, Ruben (2011): "A reanalysis of PISA results: comparability problems." Aval. Pol. Públ. Educ., Rio de Janeiro, v. 19, n. 73, p. 743-768, out./dez.

92. Knapp, S.L. (1846): "Female biography: containing notices of distinguished women'' Philadelphia: Thomas Wardle. p. 230

93. Kochhar, R. (2011): Muslims and English education in colonial Bengal: Calcutta Madrasa and Hooghly Mohsin College in a historical perspective. In: Hooghly College175,pp. 17-39(ed: S. K. Mukhopadhyay (Hooghly: Hooghly Mohsin College)

94. Krishnaswamy, N. & Krishnaswamy, L. (2006): The Story of English in India, Published by- Foundation Books Pvt. Ltd., Cambridge House, 4381/4, Ansari road, Daryaganj. New Delhi- 110002.

95. Kumar, K. (1991): A Political Agenda of Education: A Study of Colonist and Nationalist Ideas. New Delhi: Sage.

96. Laird, M.A. (1972): Missionaries and education in Bengal 1793-1837. Clarendon Press, Oxford University Press, Oxford.

97. Lee, E.T. (1980): "Statistical Methods for Survival Data Analysis" Lifetime Learning Publications, Belmont, CA.

98. Lindly, D.V. & Miller, J.C.P (1966): Cambridge Elementary Statistical Tables, page-12.

99. Maddala, G.S. (1983): "Limited-Dependent and Qualitative Variables in Econometrics", Cambridge, Cambridge University Press.

100. Magee, L. (1990): "R^2 measures based on Wald and likelihooh ratio joint significance test", The American Statistician, Vol. 44, pp. 250-253.

101. McCullagh, P and Nelder, J.A (1989): Generalized Linear Models, 2nd edition, Chapman & Hall, London.

102. Merium, J.L (1905): Normal school education & efficiency in teaching. Contributions to Education, No. 1, p. 152.

103. Meumann (1907): Vorle sungen zur einfuhrung. Die Experimentalle Padagogik (translated by Wilhelm Engelman, Leipzig, 1911).

104. Mian, M. A. B (1983): A Brief Survey on Educational Research. The Rajshahi University Studies, (Part A) XI: 143-167.

105. Mindess, D. & Mindess, M. (1972): Guide to an effective kindergarten program. New York: Parker.

106. Monzoor, S. & Kabir, D. H. M. (2008): Primary education in Bangladesh streams, disparities and pathways for unified system. Unnayan Onneshan. Dhaka.

107. Momen, A.: Madrasah Education in Bangladesh (Background, Present Status and the Position of Women), Bangladesh Nari Pragati Sangha, Dhaka.

108. Mookerji, R. K., (1990): "Ancient Indian Education: Brahmanical and Buddhist", (there are previous and subsequent editions) ISBN : 8120804236

109. Moore, M. R. (2002): An American's journey to kindergarten's birthplace. Childhood Education, 79(1), 15-20.

110. Mukerji, S.N. (1956): Higher education and rural India. Baroda: Acharya Book Depot.

111. Mukerji S. (1974): History of education in India. Baroda, India: Acharya Book Depot.

112. Murphy, R. J. L (1978): Reliability of marking eight GCE examinations. BJEP, 48, 196-200.

113. Murray, CJL, Frenk J (1999): A WHO frame work for health system performance assessment, Genava, Switzrland.

114. Myers, Jerome L.; Well, Anrold D., (2003): Research Design & Statistical analysis, Second Edition, books.google.com.bd/books? ISBN 1135641080.

115. Nagelkerke, N. J. D. (1991): "A note on the general definition of the coefficient of determination", Biometrika, Vol. 78, pp. 691-692.

116. National education policy, (2000): Ministry of Education, Government of the People's Republic of Bangladesh.

117. Nizami, K. A. (1958): Salatin-i-Delhi Ke Muzhabi Rujhanat (Urdu), (Reprint, Lahore: Nigarshat, 1990), 135-36.

118. Nunn, T.P (1920): Education, Its Data & First Principle. E. Arnold, London.

119. O'Connor, S. M. (1995): Mothering in public: The division of organized child care in the kindergarten and day nursery, St. Louis, 1886-1920. Early Childhood Research Quarterly, 10, 63-80.

120. Pearson, K. (1896): Mathematical contributions to the theory evolution, II, Regression, heredity and panmixia, Phil. Trans. A 186, 343-414. Reprinted in K. Pearson (1956), pp. 41-112.

121. Pearson, K. (1900): "On the Criterion That a Given System of Deviations From the Probable in the Case of a Correlated System of Variables Is Such That It Can Be Reasonably Supposed to Have Arisen From Random Sampling," London, Edinburgh and Dublin Philosophical Magazine and Journal of Science 50, Ser. 5, 157-175.

122. Pearson, K (1901): On lines & planes of closest fit to system of points in space, Phil. Mag., 6, 559-72.

123. PEDP-II gender action plan (2005 – 2010): Directorate of Primary Education, Ministry of Primary and Mass Education, Government of the Peoples Republic of Bangladesh.

124. Pirce, D. A and Schafer, D.W (1986): Residuals in generalized linear models. JASA, 81, 977-986.

125. Pregibon, D. (1981): Logistic regression diagnostics, Annals Statistics, 9, 724.

126. Primary education in Bangladesh, 2003: Directorate of Primary Education, Ministry of Primary and Mass Education, Government of the People's Republic of Bangladesh.

127. PRSP, 2005: Unlocking the potential national strategy for accelerated poverty reduction. Planning Commission. Government of the People's Republic of Bangladesh.

128. Rabbi, A F M Fazle (2007): "Primary Education in Bangladesh," Viability of Achieving Millennium Development Goals, pp. 1-86.

129. Rao, C.R. (1973): "Linear Statistical Inference and its applications". Second Edition, John Wiley & Sons, Inc. New York.

130. Rao, J.N.K. (1975a): On the foundations of survey sampling. In A Survey of Statistical Design and Linear Models, J. N. Srivastava (ed.), American Elsevier Publishing Co. New York, 489-505.

131. Rice, J.M (1894): The measurement of educational products. In seventeenth year book of the National society for the study of education, II. Public School Publishing Co., Bloomington, 1918.

132. Roy, M. (1993): The Englishing of India: Class Formation and Social Privilege. Social Scientist, 21(5-6 May-June), 36-62.

133. Rugg, H. O (1917): Statistical Methods Applied to Education.

134. SAARC countries workshop on contemporary problems of primary education. 1986. National Academy for Primary Education, Mymensingh.

135. Sattar, A.,: The History of the Aaliyah Madrasah, Islamic Foundation, Dhaka.

136. Sattar, E. (1982): Universal primary education policy in Bangladesh. University Press Limited, Dhaka.

137. Seal, A. (1968): The Emergence of Indian Nationalism: Competition and Collaboration in the Later Nineteenth Century. Cambridge: Cambridge University Press.

138. Shahadat H. C. (1999): NFE interventions in Bangladesh. Dhaka. Directorate of Non-formal Education.

139. Shamsul Haque Education Commission report 1997. Later, a five member committee was formed to implement the report which in turn submitted their report to the Prime Minister in 1998.

140. Shannon, J. R (1936): A comparison of three means for measuring efficiency in teaching. JER, 29, 501-08.

141. Sheehan, J., (1973): Teacher Supply and Demand, Economics of Education. Allen & Unwin, London, pp: 106.

142. Sheenan, J (1973): The Economics of Education, London; George Allen Ltd.

143. Sharma, R.N. & Sharma, R.K., (2000, 2004): Published by Atlantic Publishers & Distributors, B-2, Vishal Enclave, Opp. Rajouri Garden, New Delhi-110027.

144. Sharif Commission Report. 1959. Report on the commission on national education. Pakistan

145. Singh, D. & Chaudhary, F.S. (1997): Theory and Analysis of Sample Survey Designs, Third Reprint, September 1997, New Age International (P) Limited, 4835/24, Ansari Road. Daryaganj, New Delhi.

146. Singh, Y.K. & Nath, R. (2007): History of Indian education System, Published by- S.B. nangia, A P H publishing corporation, 4435-36/7, Ansari Road, Darya Ganj, New Delhi-110002.

147. Spearman, C (1904): general intelligence, objectively determined & measured, Applied Journal of Psychology, 15, 201-93.

148. Spencer, H (1929): Education. Watts, London.

149. Stone, C.W (1908): Arithmatical abilities & some factors determining them. Contributions to Education, No. 9.

150. Swinscow, TDV. & Champbell, M.J., (2002): Statistical at Square One. Tenth Edition, BMJ Books, www.bmjbooks.com ISBN 0727915525.

151. The Daily Prothom Aalo, October 3, 2000, Pg. 1

152. The first five year plan 1973-1978. November, 1973. Government of the People's Republic of Bangladesh.

153. The Kudrat E Khuda Education Commission Report, Bangladesh School and College Teachers Association, Pg. 57

154. The two year plan 1978-1980. March, 1978. Government of the People's Republic of Bangladesh

155. The second five year plan 1980-1985. May, 1983. Government of the People's Republic of Bangladesh.

156. The third five year plan 1985-1990. December, 1985. Government of the People's Republic of Bangladesh

157. The fourth five year plan 1990-1995. June, 1990. Government of the People's Republic of Bangladesh

158. The fifth five year plan 1997-2002. March, 1998. Government of the People's Republic of Bangladesh

159. Thorndike, E.L (1904): An Introduction to the Theory of Mental & Social Measurements, Teachers College, Columbia university, N.Y.

160. Tyack, D. B (1974): The one Best System, Cambridge, Mass,: Harvard University Press.

161. Tyler, A. W (1931): A generalized technique for consulting achievement tests. Educational Research Bulletin, No. 8, 199-208.

162. UNESCO. 1985. Towards equity of educational opportunity. UNESCO Regional Office for Education in Asia and the Pacific, Bangkok.

163. UN, 2005. The millennium development goals report 2005. The United Nations. New York.

164. United Nations General Assembly Resolution 25 session 44, Convension on the Rights of the child, on 20 November (1989)

165. Umar, B., The Education Commission Report and Regarding Madrasah and Religious Education, 25th Sangskriti, Anniversary Issue, Pg. 19

166. Wald, A. (1943): Tests of statistical hypothesis concerning several parameters when the number of observations is large, Transactions of the American Mathematical Society, Vol. 54, pp. 426-482.

167. Whitehead, John C., "A Methodological Comparison of Theoretical Approaches in Dichotomous Choice

168. Williams, D. A (1984): Residuals in generalized linear models. Proceedings of the 12th International Biometrices conference, Tokyo, 59- 68.

169. Wood, R & Quinn, B (1976): Double impression marking of English language essays & summery questions. Educational Review, 28, 226-46.

170. World Conference on EFA, Jomtian, Thailand (5-9 March 1990). Meeting Basic Learning Needs: A Vision for the 1990s.