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Pattern of Migration in Joypurhat District of Bangladesh: A Case Study

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University of Rajshahi

Pattern of Migration in Joypurhat District of Bangladesh: A Case Study.

A Thesis submitted to the Department of Statistics, University of Rajshahi, Bangladesh in Fulfillment of the Requirements for the Degree of Master of Philosophy (M. Phil) in Statistics.

Under the Supervision of

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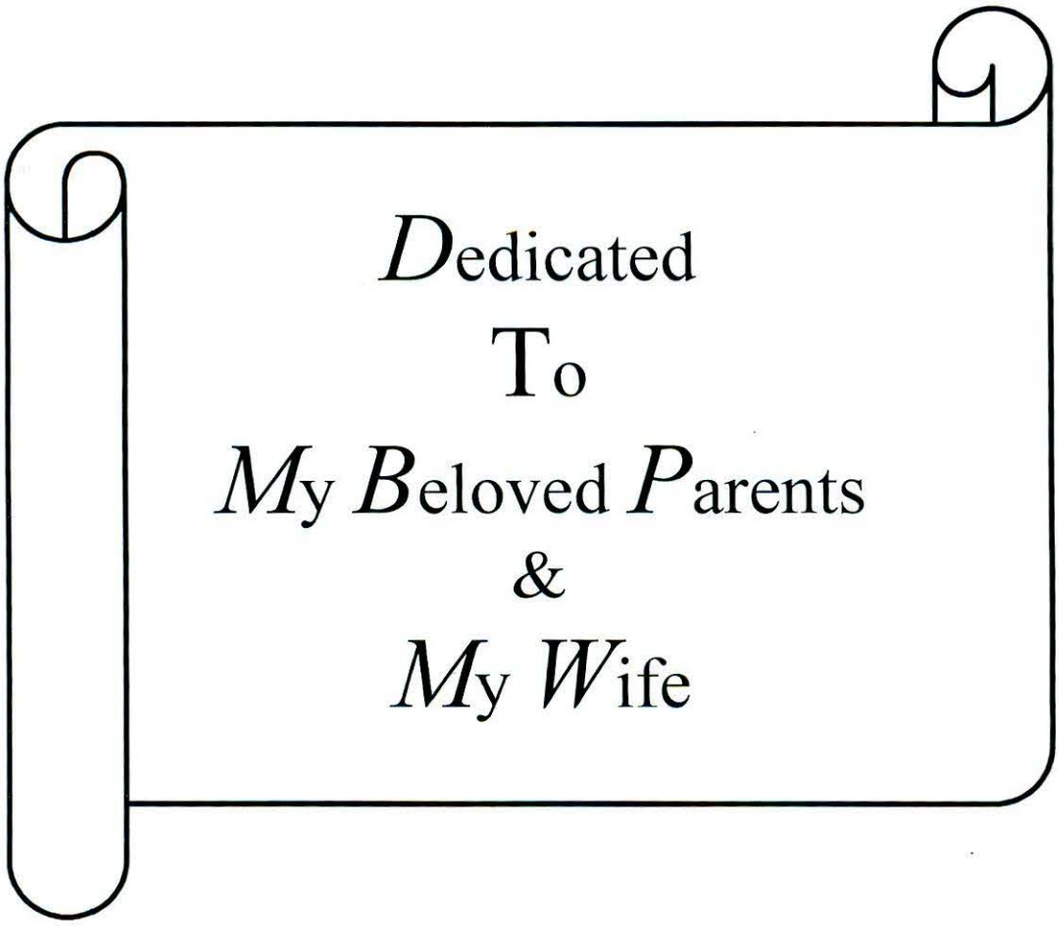
*D*edicated
To
*M*y *B*eloved *P*arents
&
*M*y *W*ife

Certificate

We have the pleasure in certifying that the M. Phil. Thesis entitled '**Pattern of Migration in Joypurhat District of Bangladesh: A Case Study**' submitted by Md. Ashraful Alom Talukder in fulfillment of the requirement for the degree of M. Phil. in Statistics, University of Rajshahi, Bangladesh has been completed under our supervision. We believe that this research work is an original one and it has not been submitted elsewhere for any degree.

We wish him a bright future and every success in life.

14.1.10

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সুপারভাইজার
এম, ফিল/পি, এইচ, ডি
পরিসংখ্যান বিভাগ
রাজশাহী বিশ্ববিদ্যালয়।

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Declaration

I hereby certify that the thesis entitled '**Pattern of Migration in Joypurhat District of Bangladesh: A Case Study**' submitted to the University of Rajshahi, Bangladesh for the degree of M. Phil is based on my research work carried under the supervisor Professor Dr. Md. Ripter Hossain, Department of Statistics and co-supervisor Md. Mostafizur Rahman, Associate Professor, Department of Population Science & HRD, University of Rajshahi , Bangladesh.

To the best of my knowledge this work has not been submitted before as candidature for any other degree.

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January, 2010 The Author

Abstract

This study is based on primary data. The primary data were collected from Joypurhat district by PPS sampling method. The main purpose of this study is to identify the effects of demographic and socio-economic variables on rural migration, trends and volume of migration and constructed some probability models on such data in Joypurhat district, Bangladesh. Both unvaried and multivariate techniques have been used to study the differentials and determinants of migration.

The study reveals that the migration rate was found significantly higher for the people age groups 15-29 (about 28 per cent). The age distribution of migrants clearly shows that majority of them were very young at the time of their first migration. Education of migrants show that the 58 per cent of migrants were passed both SSC to graduate and above. The pre-migration occupation are 41 per cent of migrants were involved with studies, but after migration it was found 48 per cent of migrants were employed in job/service. In study area we found that about 44 per cent of migrants were migrated in Dhaka city. We also observed that more than 51 per cent of migrants were migrated with influencing of their family members (puss factor) and it is remarkable that about 74 per cent of migrants were migrated due to job/service at a particular place of destination(pull factor). The findings indicate that the variables 'education', 'occupation', and 'family size' included in the analysis have had significant effect on rural out-migration. The risk of out-migration was remarkably higher for the households whose member(s) attained at least primary education and the risk of out-migration was significantly higher for the household with occupation as non-agricultural labour. The multivariate logistic regression analysis has been used to identify the determinants of out-migration at household level. The risk of migration was 1.85, 5.00, 10.83 and 10.69 times higher for the households with educational level- primary, secondary, SSC/HSC (secondary school certificate/higher secondary certificate) and graduate respectively as compared to households with no education.

The volume of migration showed that a positive relationship with diversity of social status(.307), education(.373) and occupation(.539). Only the education and occupation diversity have been found to be significantly related with volume of out-migration. The migration model proposed by Sivamurthy and Kadi (1984) were found suitable to describe the volume of out-migration for Bangladesh.

Finally, we found that the probability distribution under such assumptions fitted well. The distribution of male migrants aged 15 years and above and the probability model have been worked out to describe the distribution of households according to total number of migrants under different assumptions.

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Chapter 1

Introduction

1.1 Background of the Study

The population growth of a region or country depends upon three basic components, namely fertility, mortality and migration. Fertility and mortality are usually considered biological components of population growth, which influence population mainly within the biological frame work, though socio-economic and cultural factors also have its impact on them. Migration is a complex phenomenon involving a number of social, economic, cultural, political and behavioural factors. The studies in relation to nature and behaviour of these components have always been handled with great interest, because the development of a country, to a great extent, depends on them.

A study of migration is of key importance in social science, particularly in population studies. The study of migration in Bangladesh has remained neglected and adequate attempts have not been made to document its effect on different demographic variables. Owing to limited resources/opportunities in the rural areas, a large number of people continue to move towards towns/cities and/or abroad for their livelihood. It plays a significant role in influencing urban growth and assisting the rural development.

The propensity of migration is usually influenced by a combination of push-pull factors. People migrated to cities and towns because they are attracted by livelihood opportunities. Studies on migration have established a positive association between levels of infrastructural development of a region and the magnitude of out-migration (CUS, 1990). Migration studies in different regions of developing countries have generally dealt with the economic aspects of migration. However, majority of these studies have dealt with the differentials and determinants of migration focusing mainly on causes and consequences of migration (Afsar, 1995a; 1995b; Hossain, 1996; Hugo, 1991; Krishnan and Rowe, 1978; Mclnnis, 1971; Mehta 1991; Mehta and Kohli, 1993; Selvaraj and Rao, 1993; Stoeckel *et al.*

1972; Wintle, 1992; Yadava, 1988). It is important to understand intentions of migration, extent of migration and its effect on the growth of urban population for proper urban planning, as well as, for furthering rural development.

In Bangladesh, adequate attention to migration aspects has not given which may be due to lack of national level data. The existing micro-level studies mostly investigated the characteristics of migrants at destination places mainly Dhaka city (CUS, 1988, 1990 and 1996), giving a little attention to the causes of out-migration from villages (Afsar, 1995a; Chaudhury, 1978). Majumder *et al.* (1989) and Amin (1986) studied the economic consequences of migration based on sample surveys conducted in Dhaka city. Chaudhury (1980) found that out-migration is generally higher from the villages characterised by land scarcity, unequal distribution of land, and high proportion of agricultural labourer. Afsar (1995a) argued that migrants often benefitted more than non-migrants because of their innovative, risk taking and desperate nature. The benefits included higher or regular income, gain in wealth, greater access to public services and education.

The rural-urban migration is very common in Bangladesh. The census data of Bangladesh is not sufficient to study the causes and consequences of migration because only some information about place of birth is available in the census schedule. Accordingly, it is important to give attention to micro-level studies based on sample surveys, which have the advantage of identifying regional heterogeneity. In fact, the existing studies in Bangladesh have failed to address causes and consequences of migration at the individual and/or household level of a particular region. The studies carried out in Bangladesh are mainly destination based, and attention on causes and consequences of migration at individual or household level of a particular origin is ignored. Usually, a migration study covers some parts or all the areas, *viz.* (i) estimation of migration from direct or indirect method, (ii) migration differentials and characteristics, (iii) determinants of migration decision, and (iv) implications and consequences of migration on socio-economic, demographic and cultural factors. This study deals with some aspects of migration, particularly differentials and determinants of migration, patterns and trends of migration, and volume and direction of migration.

1.2 Country setting

Bangladesh is one of the most densely populated countries in the world. It is located in flat and fertile land in South Asia, being located $20^0 34'$ and $26^0 38'$ North latitude and $88^0 01'$ and $92^0 41'$ East longitude. Bangladesh is a small country of 147570 square kilometres area. Bangladesh's population estimated to be 123.8 million in census 2001. It is growing at the rate of 1.06 percent per annum(census, 2001).The Bangladesh Population Policy indicates that the population should stabilize at 210 million by 2060, if replacement-level fertility is reached by 2010. This estimate of future population size is reasonably consistent with the World Bank projections from 1994 (Bos et.al., 1994) and (United Nation,1996).The population density has increased from 463 to 806 person per square kilometre between 1970 and 1994(WB,1996), and in 2001 census it is increased 843 person per square kilometre. Population density is expected to continue rising until to year 2025, when 1,632 persons are expected to be living per square kilometre (UN,1991a). Another major demographic trend is the rapid rate of urbanization. In 1970-75 only 9.3 percent of the population lived in urban area. It raised to 13.4 in 1980-85. During 1989-94, urban population has become 17.8 percent and the census 2001, it is 23.52 per cent. By the year 2020, 38 percent are expected to be living in urban areas (WB, 1996).

In the mid-seventies, Bangladesh was Asia's fifth and world's eighth most populous country of the world. Now, it ranks as the sixth and the ninth respectively indicating that the population control programmes have a more than average success in Bangladesh (GOB, 1998). The 1991 census reveals that 45 percent of the population is below 15 years of the age, 52 percent are between the ages of 15 and 64 years and only 3 percent at age 65 or over(BBS, 1994), and 39 percent of the population is below 15 years of the age, 57 percent are between the ages of 15 and 64 years and only 4 percent at age 65 or over(census,2001) From 1975 to 2001, the elderly population (age 65 and above) increased from 2 to 4 per cent. The total fertility rate has decreased from 3.45 in 1995 to 2.41 in 2006 (BBS,1206). There has been a substantial decline in the crude birth rate in Bangladesh. It was 28.5 birth per 1000 population in 1993, declined to 27.0 in 1995 and then to 20.6 in 2006 (BBS,2006). The crude death rate also has fallen dramatically in

Bangladesh from about 11.0 per 1000 population in 1992 to 8.6 in 1995 and 5.6 in 2006(BBS,2006). The infant mortality rate was 92 deaths per 1000 live births in 1991, and has further fallen to about 75 in 1994 to 77 and to 45 in 2006(BBS,2006). There is evidence of modest improvement in life expectancy during the past decade. Life expectancy at birth was 56 years for males and 55 years for females in 1991. These have increased to 58.4 years for men and 58.1 years for women in 1995(BBS,1995) and it also increased to 64.5 years for male and 66 years for women in 2006 (BBS, 2006).

Bangladesh is predominantly rural. About 80 percent of its population live in rural areas. Rural Bangladesh society continues to remain largely conservative, traditional, and agrarian, much as it has been for centuries, although some change has been observed during the recent times. Economic conditions are not improving for the vast majority. Despite fertile soil and abundant water reserves, the performance in the agricultural sector continues to be low due to constraints on resources for irrigation and fertilizers needed for the high-yield crops[1]. The demand for jute, the principal foreign exchange earner after overseas remittances, has declined in international markets, thus worsening the prospects of growth in the agricultural sector. The share of agricultural in GDP still remains quite high, and the share of the industrial sector in GDP, although higher than in the past, continues to remain low.

The low rate of growth in the agricultural sector, and indeed, the economy as a whole coupled with a doubling of the rural population over the past three decades has resulted in increase in an underemployment, widespread fragmentation and subdivision of land, increased distress scale of land, and a sharp rise in landlessness. All these have worsened income distribution[2]. Whatever improvements have taken place in the

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[1] This is not to say that there have been no improvements in the agricultural sector, but that the performance remains below the expected level. In fact, cropping intensity, the percentage of cropped acreage under irrigation, and the use of fertilizers have increased during the past decade or so on (GOB, 1988).

[2] The benefits of the green revolution have not been uniformly distributed among all groups of the rural population. There is evidence to suggest that the landed rice have benefited much more than the others owing to their command over various resources (financial and physical) that enable them to obtain inputs required for the high-yielding varieties. This, inequality has, it is believed, worsened income distribution among the rural population, worsening economic equality has been elaborately discussed in Alamgir, 1974; , UN, 1981).

agricultural sector, it has been argued that increases in agricultural productivity has not kept pace with population growth(Alamgir,1974; Hossain,1977), and consequently, food deficit continues to be a serious problem in the country.

Bangladesh achieved a GDP growth rate higher than5.94% (99/00) and 6.43% in 2006/07 years. Census, 2001). Despite this steady progress, population growth has meant that per capita income grew annually only by 2.0%. So per capita income which stood at US $208 in 1990, increased only to US $270 by 1996(WB,1997). The growth in income also remains very skewed: Over the ten years to 1991/92, income distribution scarcely changed-the top 5% of the population received nearly 19% of the national income while the bottom 40% received only 17%. The Bangladesh Institute for Development Studies estimates that between 1987 and 1994 the proportion of people living in poverty fell from 58% to 52%. In 1995-96, Household expenditure survey, about 40% of the population were below the lower poverty line and as many as 57% percent were below the upper poverty line (BIDS, 1987 & 1994).

Education is a key factor in sustainable development. It is at the same time a component of well-being and a factor in the development of well being through its links with demographic as well as economic & social facts. Literacy for population 7 years and above has operational significance and according to inter nation usage, this is the rate which is relevant in analysis of trends and inter-country and/or inter regional comparisons. According to Bangladesh Data sheet, the literacy rate which was 32.4 percent in 1990-91 has increased to 46.20 percent in 2001.

Development of infrastructure is reflected by development of roads and communication, mass media, electrification and health institutions. Between 1982 and 1986, cumulative road kilometres increased by about 46 percent, from 7,432 to 10,887(GOB,1988). In between 1991 to 1994 this has increased to about 11 percent from 14,104 to 15,604(BBS,1995).

The percentage of electricity connection both rural and urban are 13.91 and 76.43 in the period 1994, then it is increased 23.25 and 79.92 in 2001(census, 2001). The increase in electricity coverage in rural areas has two important implications: (1) it promotes

employment through expansion in agro-based industries and cottage and small-scale industries, and such industries are believed to have created opportunities for female employment as well, and (2) it enhances mass media coverage, which helps to modernize people's outlook and attitudes in general, and those related to small family size norms and use of family planning in particular (UNFPA, 1990).

The health situation of the population has improved quite remarkably. Smallpox, malaria and cholera have been eradicated or are no longer major killers. Life expectancy at birth reached 64.6 years in 2006. Total fertility was reduced from 3.4 in 1995 to2.41 in 2006. The crude death rate dropped from 9.0 in 1995 to5.6 in 2006 and is expected to decline further. Infant mortality rate has declined to around 45 per 1000 live births in 2006. Similarly, the under-5 mortality dropped from over 133 per 1000 live birth in 1995 and 62 per 1000 in 2006. In terms of physical facilities, there were 1681 hospitals (676 in the public sector and 1005 in the private sector) of different categories with 51484 beds (35379 in the public sector and 16105 in the private sector) in the country in 2006. With regard to health and medical professionals, the country so far produced 42881 graduate doctors by 2006 giving a doctor-population ratio of 1:3032. The doctor-nurse ratio was 2:1. In case of nurse-population ratio, the position was 1:6462 (BBS, 2006). Total expenditure on health and related activities became more than triple during the period 1999-00 and 2006-07, and total expenditure on health and related activities as percent of GDP increased from 4.80 percent to 7.64 percent (BBS, 2006). Thus, although there have been some improvements in health facilities and coverage, total expenditure as percent of GDP still remains quite low.

Over 96.3 (census,2001) percent of the people in the rural areas now use safe drinking water compared to 56 percent only in 1975. There has also been improvement in the coverage of the sanitary methods from 9 percent in 1991 to 55.0 percent in 2006(BBS,2006). Therefore, there is a strong need to improve availability of physicians, hospital beds and nurses, in addition to the need for better quality of medical services.

In the period of 1974-81, 14.2 million people in rural areas and 1.3 million people in urban areas have been migrated internally out of 15.6 million people of Bangladesh (BCR, 1991). This trend is also unchanged in 1981-91, but slightly changed in 1991-95. Dhaka is the highest gaining region in Bangladesh. Because, Dhaka is mainly due to its importance as the capital city where all the top administrative machineries are located, as well as concentration of higher educational institutions, hospitals etc(Statistical Year Book, 1995).

1.3 Review of Literature

Many studies have been carried out on migration by individuals as well as by organizations. This study discusses the different aspects of socio-economic factors, demographic factors, trend and volume of migration, determinants and differentials of migrants household and some probability models. A number of studies have also been done which are related to the present study. Only the relevant literature in the context of the present study is reviewed.

Beaudouin (2006) has been analyzed that the effects of migration on sending countries, more precisely to analyze the direct and indirect effects of migration on the migrant household income, to measure the opposed effects and to discuss the policy implication. This study is based on a Three Stage Least Squares estimator to determine and measure the net impact of migration on the household income. However, this effect is compensated by remittances sent home by migrants.

Mendola (2005) examined that the study the interrelationship between determinants of migration, conceived as a family strategy, and the potential impact of having a migrant household member on people left behind. He found that richer and large-holder households are more likely to participate in closely high-return migration(i.e. international migration) and employ modern technologies, thereby achieving higher productivity. Poorer households, on the other hand, are not able to overcome entry costs of moving abroad and fall back on migration with low entry costs, and low returns(i.e. domestic migration); the latter does not help them to achieve production enhancements and may act as a poverty-trap locking households into persistent poverty.

Ahsan Ullah (2004) found that the flow of migration to the major cities in Bangladesh is the result of rural-urban dichotomies in income, employment opportunity and absorptive capacity. A significantly higher percentage of migrants live in slums as compared to other places($P<.003$). Regrassion analysis shows that migration is influenced by both "push" and "pull" factors, such as the search for work, landlessness, extreme poverty, loss of income, easy access to informal sectors in cities, and joining families or relatives. A factor analysis showed similar determinants.

Ahsan (2003) argued that in the recent literature in explaining internal (e.g. rural-urban) migration in developing countries has been one of insurance motives. According to this, rural households, by placing working family members is geographically dispersed labour markets, potentially achieve diversifications of family income risks.

Uma Kothari (2002) analyzed that an overview of conceptual understandings of, and methodological research issues on, the relationship between chronic, or long-term, poverty and processes of migration. He explored how research can be carried out to examine the characteristics of those who move and those who stay, the processes by which they are compelled or excluded from adopting migration as a livelihood strategy and the circumstances under which migration sustains chronic poverty or presents an opportunity to move out of poverty. Subsequently this study addresses some of the implications of current migration-related policies for chronic poverty.

Rita Afsar (1999) described the main causes and consequences of rural urban migration in Bangladesh and explored their implications for poverty alleviation and spatial distribution policies. Amongst the main factors affecting people's mobility are the impact of structural adjustment and privatization on the country's economy and the related changes in the structure of employment.

Hugo (1992;10) observes that across the LDCs of Asia has been consisted acceleration of urbanization and an increase in the tempo of population redistribution from rural to urban areas, since 1970s. It is generally hypothesized that an early stage of development when the levels of urbanization are low and rates of both urban and rural

natural increase are moderately high, net migration will be mire important to urban population growth than natural increase. At an intermediate stage of urbanization, natural increase is predominated.

Hugo (1981) has analyzed migration differential by age which reveals the impact of migration on socio-economic and demographic structures at both the places of destination and origin. He finds that the loss of young adults through migration from villages leads to undermining of agricultural production by way of educing agricultural labourer. Singh et.al. (1981, one study in Uttar Pradesh, India discover that out migration of young males leads to decline in fertility at the place of origin.

Saleheen (1979, 1984 & 1985) identifies that the inequality of income between rural and urban areas stimulate migration and in maximum cases, it is found by migrant's low income areas to high income areas. He also noted that a perfect migration is never connected with one of these factors and people aged between 15 to 35 years are more migratory in almost all countries.

Chowdhury(1982;34) studied that an estimate based on census data of 1974 about internal migration. He finds that 52 per cent of the total urban population in Bangladesh is life long residents and the remaining 48 per cents are immigrants mostly from rural areas or smaller towns. Richardson (1984) noted that rural-urban migration accounted for 80 to 60 per cent respectively to the urban growth for the sixties and seventies. According to several direct field survey studies (Ali, 1977,5; Begum, 1979,49; CUS,1976, 1977, 1979 & 1980) it has been identified that most of the major areas (Dhaka, Chittagoan, Khulna and Rajshahi) migrants come from the districts of Dhaka, Comilla, Faridpur, Barisal, patuakhali, Noakhali and Mymensingh. CUS (1979) notes that every big city attracts people from its neighbouring districts.

Sharma (1984), Singh and Yadava (1981a) identify that the migration decision of an individual has been influenced by marital status. They observe that the distance moved by a migrant has been found closely associated with the marital status and depends on

some extent his/her responsibilities towards the family. Singh (1985) reports that married persons usually migrate shorter distances in order to visit his family frequently. Some studies also information that family members, as compared to less educated or illiterate migrants, mostly accompany highly educated married migrants.

Sovani (1961),and Samsuddin (1981) recognize that landholding of a household plays an important role in determining rural out migration in an agrarian economy where the people are mostly dependent on land for their livelihood. Several studies are showed by out-migration from rural areas that are closely associated with unequal distributions of resources , particularly land . Hill (1972) establishes that poorer and landless have a greater propensity of migration than richer and big landowners. On the other hand, Sekhar (1993) observes that out-migration is higher for the small and medium land owning families and lower for either landless or big landowners.

Connel et.al. (1976), Sekhar (1993) and Upton (1967) examines that migration is positively related with family size. They have found that people migrate mostly from large household that is easy to spare some members to go outside for work.

Elahi (1985) analyzes that perspectives of internal migration and historical background of urbanization in Bangladesh are elaborately discussed through socio-economic and demographic viewpoints. He also observes that rural to urban migration is widely held to be the chief cause of rapid growth of urban population in the most countries. Besides, population redistribution and development in South Asia edited by Kosinsky and Elahi(1985) has provided some basic information of internal migration of South Asia.

Obaidullah (1967) observe that people of both north and south regions are less mobile than those of the eastern region; the people of southern regions are comparatively more mobile than those of the northern region. Kothari(1980) identified migration that requires on going financial support from the family to the migrant, for instance to obtain further education, only wealthier families encourage such movement. Rural-urban

migration is one of the most significant developmental issues in Bangladesh. Islam (1996) and BBS (1991) examined developing nations in Asia to show rapid rate of urbanization, Bangladesh still remains less urbanized , although the absolute urban population as well as the number of cities and towns in the country has increased manifold during the last few decades. Khan (1982) finds that urbanization takes the form of rapid growth of urban population, largely due to natural growth and rural-urban migration in Bangladesh.

Iwunor, 1995; Sharma, 1988; 1987; 1985; Yadava, 1993; Yadava and Singh, 1983; Yadava *et. al.* 1991; 1994 have suggested tha a good number of studies took place after this work, to study the pattern of rural out-migration through the use of probability models. However, these models do not fit the distribution of total number of migrants including wife and children from a household. (Kushwaha, 1992; Sharma, 1984; 1987; Singh 1985; 1990; 1992; Yadava, 1993; Yadava and Yadava, 1988; Yadava *et. al.*, 1989; 1994). attempts have also been made to describe the distribution of households according to total number of migrants under different assumptions.

1.4 Objective of the Study

Every research has its aim and objectives. Research plays an important role in inventing and discovering the new products in social and natural background. The main objectives of this research should be specifically mentioned. Actually scopes and objectives of a research vary from area to area, time to time, objectives to objectives and phenomenon to phenomenon. The following objectives of this research are:

- to investigate the differentials and isolate the determinants of risk factors which are associated with migration.

- to test Lee's theory related to volume of out-migration using the household and village level data and to examine the suitability of some migration models for

single origin and multiple destinations by considering different opportunity factors at the place of destination.

- to propose a model to describe the distribution of male migrants aged 15 years and above and the total number of migrants.

1.5 Organization of the Study

This study has been organized into six chapters.

The first chapter is the introduction that contains background of the study, country setting, review of the literature, objective of the study and organization of the study.

Chapter 2 contains data and methodology. This chapter includes introduction, geography and economy of the study area, data source and sampling design, preparation of questionnaire, field work and enumeration technique, data processing, statistical processing and data limitation.

Chapter 3 deals with differentials and determinants of migration. Here included introduction, migration differentials by individual level, determinants of migration at the household level and conclusion.

Chapter 4 deals with trends and volume of migration. This chapter included introduction, population diversity, the variables and set up the hypotheses, migration and diversity indices, single origin and multiple destinations migration models and conclusion.

Chapter 5 named, some probability models for the number of migrants. It contains introduction, probability models for male migrants aged 15 years and above, probability model for total number of migrants and conclusion.

Chapter 6 contains Summary of the study, concluding remark and some policy recommendations.

Chapter 2

Data Source and Methodology

2.1 Introduction

Collection of data and research methodology is very important for a research work. The objectives and reliability depend on collection of data and processing of data. The main data for this study has been collected under a sample survey entitled "Pattern of Migration in Joypurhat District of Bangladesh: A Case Study." The aim of the survey was to study the nature and trend of population movement from rural Bangladesh to urban areas or abroad. In a broad spectrum, an attempt was taken to discover the factors that influence migration and the impact of migration on various demographic events at the place of origin. The reason for selection of this district is that it is located in north of Bangladesh and is expected to provide a good representation about migration for the country as a whole. I collected the primary data from Joypurhat district to fulfill my research objectives. The present chapter confined to indicate a description of the survey area, selection of households, sample size, sample technique, preparation of questionnaire, data collection, data processing and analysis, computerization and all the relative issues relevant to the study.

2.2 Geography and Economy of the study area

The survey has been conducted in Joypurhat district of Bangladesh. Most of the areas are rural and few of the mare urban. My study area is rural area. Joypurhat zilla was formerly a sub-division of Bogra district. It became a sub-division in 1980 and was upgraded to a zila in 1982. The name of the zila Joypurhat was probably given after the name of Joy Paul, a Paul king whose capital was at Paharpur, a few kilometres away from the zila headquarters. It is one of the smallest district (*zila*) of Bangladesh with 965.44 *sq. km.* area. Joypurhat district is bounded on the north by Dinajpur *zila*, on the east by Gaibandha and Bogra zilas, on the south by Bogra and Naogaon *zilas* and on the west by Naogaon *zila* and India . The district lies between $24^{\circ}51'$ and $25^{\circ}17'$ north latitudes

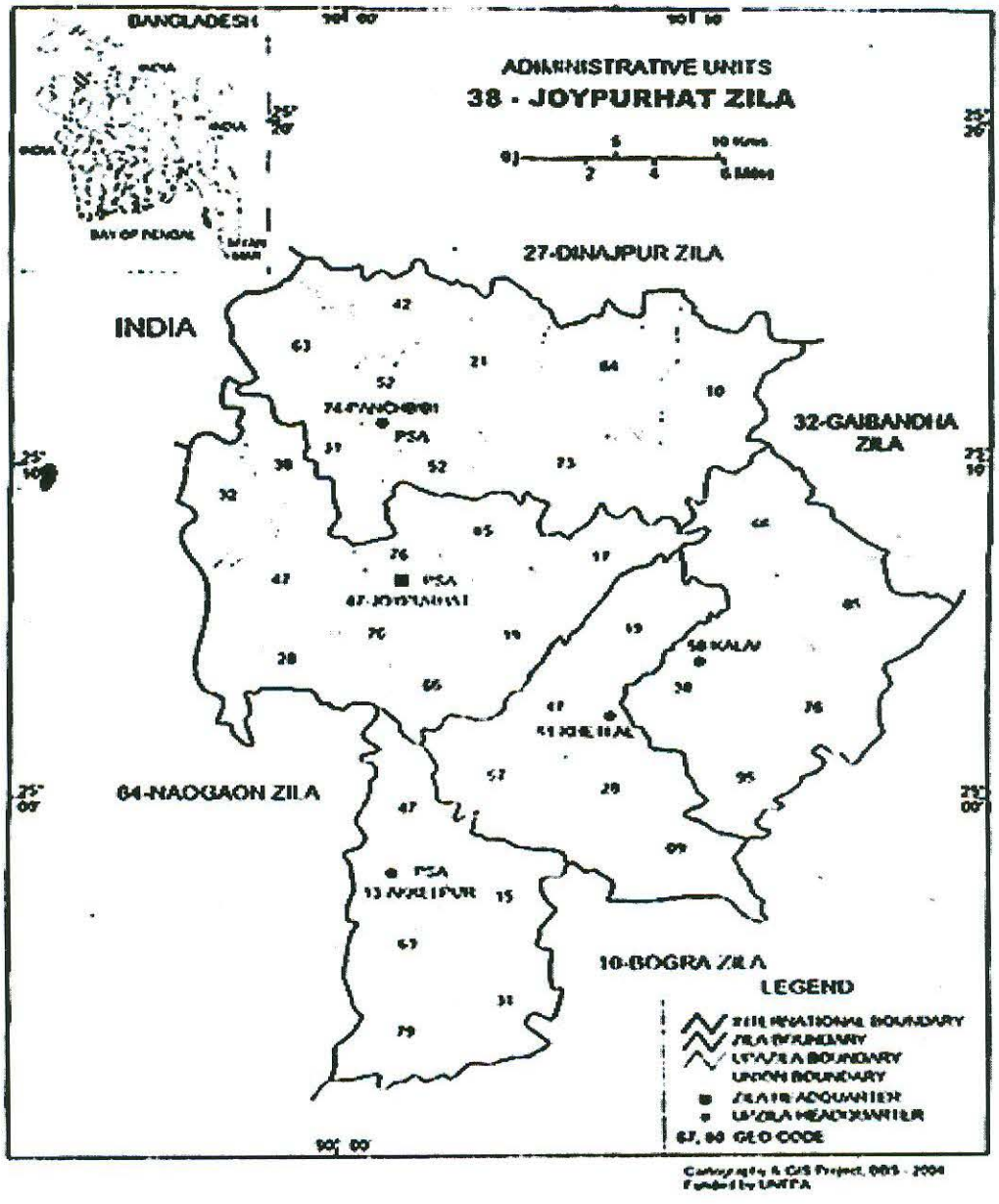


Figure-1: Joypurhat Zilla Map

and between $88^{o}55^{/}$ and $88^{o}17^{/}$ east longitudes. According to 2001 census, a total of 846696 population spread over in 204317 households in Joypurhat district of Bangladesh (BBS, 2005). Joypurhat zilla consists of 5 upazillas , 3 paurashavas, and 32 unions.

These villages/mauzas are absolutely underdeveloped area. Most of the people in study areas are farmers and illiterate. Main crops of these villages are rice, potato, sugarcane, etc.

2.3 Data Source and Sampling Design

Both primary and secondary data are used in my research work. The secondary data are collected from the Bangladesh Population Census 2001, which are officially published by Bangladesh Bureau of Statistics (BBS, 2005). The primary data for this research work were collected from ten Mauzas/villages of Joypurhat district of Bangladesh. Total population of all mauzas of Joypurhat district is a sampling unit. Ten mauzas/villages(smallest revenue unit of Bangladesh which usually comprised one or more villages) are selected out of 638 mauzas/villages by using the sampling with Probability Proportional to Size (PPS). The PPS sampling procedure of selecting the sample consists in associating with each unit a number or numbers equal to its size and selecting the unit corresponding to a number chosen at random from the totality of numbers associated. There are two methods of PPS sampling. One is cumulative total method and other is Lahiri's method. Here we used cumulative total method. Mathemetically it can be expressed as –

Let the size of the ith unit be x_i, ($i = 1, 2, \ldots, N$). We associate the numbers 1 to x_i with the first unit, the numbers (x_1+1) to (x_1+x_2) with the second unit and so on such that the total of the numbers so associated is $X = x_1 + x_2 + \ldots + x_N$. Then a random number r is chosen at random from 1 to X and the unit with which this number is associated is selected.

For example, At first, we collected the Mauzas/villages and their population of Joypurhat district from the population census 2001. All the Mauzas/villages were identified by the serial number. According to serial number, population of all mauzas/villages were prepared a cumulative total. The cumulative total population were 001491 to 706921, which is 6 digits. Now we selected the 6 columns from the random number table. The first random number comes 231576, which was associated to the cumulative total population 232219. Then we selected the first mauza/village which was Jitapur and its serial number was 223. Again, the second random number comes 55455, which was associated to the cumulative total population 56423. Then the name of second mauza and serial number was Kanupur and 55 respectively. According to the above

procedure we selected the others 8 mauzas from the district of Joypurhat. The serial number of the mauzas were 127, 347, 110, 379, 433, 324, 64, 378. Thus by the PPS sampling we selected the following ten mauzas:

Table-2.1: Distribution of Data by Selected Areas.

Serial no.	Serial no of mauzas	Mauzas/villages	Households no.	Pupolation
01	223	Jitapur	89	309
02	55	Kanupur	694	2805
03	127	Kauargaon	764	3480
04	347	Bamangoan	301	1246
05	110	Kaitahar	889	3487
06	379	Kapastikri	91	366
07	433	Baruil	392	1475
08	324	Dudhail	437	1708
09	64	Bhadrakali	128	556
10	378	Hantanabaz	102	426

. It was expected to cover approximately 3957 households of 10 Mauzas. 10 Mauzas have been interviewed of which 453 were found as migrant household, and we interviewed 240 non-migrant households. The data has been collected during September to December, 2007.

2.4 Method of Analysis

This study provided by the following steps:

2.4.1 Preparation of Questionnaire

According to the aim of my study, a questionnaire was prepared under the cordial supervision of my respectable and honourable supervisor and co-supervisor. After this, pre-testing of questionnaire was performed and necessary correction was allowed. Language of the questionnaire should be simple and easy to understand which is the keystone of the survey.

The structured questionnaire included information on Household Structure, Household Facilities, Migration and Fertility. The household structure was used to list all the members of the households. Some basic information was collected on the characteristics of each person listed, including his/her age, sex, education, marital status, age at marriage, relationship to the head of the household, residential status, letter writing ability and occupation. The purpose of the household structure was to identify the migrated member and women who were eligible to interview in Migration and Fertility sections. The household facilities section was used to collect the information on homestead land, agricultural land, source of water, type of toilet facilities, communications from village, materials used to construct house, ownership of various consumer goods, income & expenditure of the household. This section in addition to household structure may help to identify the social and economic condition of the household.

The migration section was used to collect information from the migrated member of the households. It included information on year of migration, age at migration, nature of migration, present place of migration, distance from village, occupation at origin and destination, reasons of migration(push factor and pull factor), number of visits in last two years, monthly income, remittances sent in last two years *etc*.

2.4.2 Field work and enumeration technique

The head of the household was considered as principal respondent for interview. If the head of the household was absent at the time of interview then any senior member of the household was considered as respondent. The definition of a household according to type (migrant and non-migrant) and member of household are discussed below.

Household: In the survey, a household was defined as a dwelling unit where a group of persons usually live together and take food from common kitchen. It, however, includes those who live outside the village but claim the household to be their own.

Persons of this category work outside the villages and often send remittances. Such persons are called the migrated members of the household and such households are known as migrant households. If there is no migrant member in a household, it is considered as non-migrant household. In the present study marriage migrants (persons who migrated through marriage) was not considered as migrants member. Naturally, complete household migration is included in this study. It is to be noted here that married daughters were not included as a member of her father's household though she stayed at the time of interview. For obvious reason, the daughter-in-law of a household was considered as member even if she was absent at the time of data collection.

Household Head: A person who is regarded as the head by the other members of the household and who makes the decisions of a household is considered as Household Head. Generally, the eldest active male or female member of the household is considered to be the head of the household.

2.4.3 Data Processing

For data processing and analysis the following stages were followed:

Editing: I carefully checked the completion of the data collection and each schedule of the questionnaire day by day. The data were edited rigorously to make correction of any existing inconsistencies in data and to minimize the non sampling error in the study. During the edition period following consideration were kept in mind: (a) the data should be completed, (b) the data should be consistent, (c) the data should be accurate, (d) the data should be homogeneous. After editing the questionnaires, I proceed for coding.

Coding: All the recorded data were coded in cod sheets according to a comprehensive code plan. I did coding the data in the following way: for example the variable education coded as (1=illiterate,2=primary, 3=secondary, 4=SSC/HSC, 5=graduate).Other variables were coded in the same process. After completing the coding , the data are ready for processing in the computer.

2.4.4 Statistical Processing

The data was analyzed individually. Data were then processed and analyzed by using different statistical methods. In any situation where a multivariate problem is encountered, the method of analysis should proceed from simple to complex in an orderly manner (Srinivasan, 1979). In this study, simple and constructive analysis has been made from each and every frequency table. Both univariate and bivariate tables have been prepared to meet the objectives of the study. We were desired to perform analysis step by step in the following chapters. We have performed univariate analysis in order to find percentage of different factors. A multivariate technique named as logistic regression analysis is used for determining factors that are associated with household migrant. Finally, demographers and other social scientists have given their due attention on the formulation of models and their applications due to its usefulness and applicability in social sciences. In this context, we construct some probability models and estimated their parameters and variances using Maximum Likelihood Estimator (MLE). All the analyses of the study are done by most extensively using software SPSS (Statistical Package for Social Sciences) for windows (version 15.0).

2.5 Data Limitation

The present study was carried out to collect information on demographic and socio-economic variables like age , occupation, education, income, marital status, couple information, etc. The whole data collection was very systematic and up-dated, but even then there were some limitations regarding the data owing to the constraint of sufficient manpower, enough time and finance and due to small sample size.

The major problem was determination of exact age of house hold members. Any question relating to age in Bangladesh can be expected to receive that is affected memory lapse. Again, my study is in rural area and most of them are illiterate, they did not know their exact age. The head of household or second head of household in my survey period was absent then we faced problem for question of questionnaire. Some of the respondent

have hesitated to give answer for some question belonging to questionnaire. Some elite persons were unwilling to give answers to the entries questionnaire.

Chapter 3

Differentials and Determinants of Migration

3.1 Introduction

Migration is one the component of population dynamics. It not only affects the size and growth of population of an area but it can also produce remarkable alternations in socio-economic structure and distribution of population.The population movement and its effect on social, economic and demographic aspects have recently occupied a considerable place in social science research. It has a significant implication on regional as well as national planning. Migration, particularly rural to urban, in developing countries plays an important role in changing the socio-economic and cultural environments of the people involved in the process of migration. Though the incidence of rural-urban migration in any developing country is higher, a distinct selectivity with respect to age, sex, caste, marital status, education, occupation *etc*., occurs and the propensity of migration differs significantly among these socio-economic groups (Lee, 1966; Sekhar, 1993; Sivakumar, 1998; Yadava, 1988).

Migration differentials have significant role in identifying the nature and strength of the socio-economic and demographic impacts of the population concerned. Many researchers have tried to establish some uniformly applicable migration patterns for all countries at all times. However, only migration by age has been found to be more or less similar for developed as well as developing countries. It is established that adult males are more inclined to migrate than other people of the community (Caldwell, 1969; Rogaia, 1997; Singh and Yadava, 1981a). Generally, the differentials in migration (selectivity of certain person or group to be more mobile than others) have been studied mainly by age, sex, marital status, education and occupation. Several studies reported that determinants of migration vary from country to country and even within a country, it varies depending on the socio-economic, demographic and cultural factors. High

unemployment rate, low income, high population growth, unequal distribution of land, demand for higher schooling, prior migration patterns and dissatisfaction with housing have been identified as some of the prominent determinants of rural out-migration (Banerjee, 1986; Bilsborrow *et al.*, 1987; Kadioglu, 1994; Nabi, 1992; Sekhar, 1993; Singh, 1986; Yadava, 1987; 1988).

The existing studies on migration have either dealt with the problems related to place of destination or place of origin. It would be useful to understand the motivative factors and constraints in migration decision process by analyzing the data for both the places of origin and destination in a single study. So, an attempt has been made in this chapter to study the differentials and determinants of migration by using the data collected at both the places of origin and destination.

3.2: Migration Differentials by Individual Level

The migration differentials at individual level have been discussed into four aspects of migration: selectivity of migrants, nature of migration, factors active for migration and destination of migrants. The selectivity of migrants limits to age, marital status, education and occupation of the migrants. The migration rate which helps to understand the insight of migration differentials in community, is discussed in relation to some individual characteristics viz, present age, education and occupation. These rates are computed by considering the migrants who migrated during times 1983 to 1991, 1992 to 1999 and 2000 to 2007. It is expected that these above mentioned individual characteristics will not change for a community within a short period of time. Further, migration rate from different mauzas/village have also been computed based on the total number of migrants obtained from different villages at the survey point.

3.2.1: Age of the Migrants

Analysis of migration differential by age reveals the impact of migration on socio-economic and demographic structures at both the places of destination and origin.

Hugo(1981) contends that the loss of young adults through migration from villages leads to undermining of agricultural production by way of reducing agricultural labourer. One study in Uttar Pradesh, India found that out-migration of young males leads to decline in fertility at the place of origin (Singh et at,1981). Migration differential by age has been almost generalized and it is higher for the people aged between 15 and 40 (Yadava,1988).

Table-3.1.1: Distribution of Migrants and Rate of Migration According to Age.

Age in Year	Population	No. Migrants (Present Age)	No. of Migrants (Age at Migration)	Percentage of Migrants at		Migration Rate
				Present Age	Age at Migration	
00-14	5425	126	170	16.30	21.99	2.32
15-19	1234	93	174	12.03	22.51	7.54
20-24	1273	147	195	19.02	25.23	11.55
25-29	1620	145	122	18.76	15.78	8.95
30-34	1688	84	67	10.86	8.67	4.98
35-39	1486	81	34	10.48	4.40	5.45
40 and above	3132	97	11	12.55	1.42	3.10
Total	15858	773	773	100	100	4.47

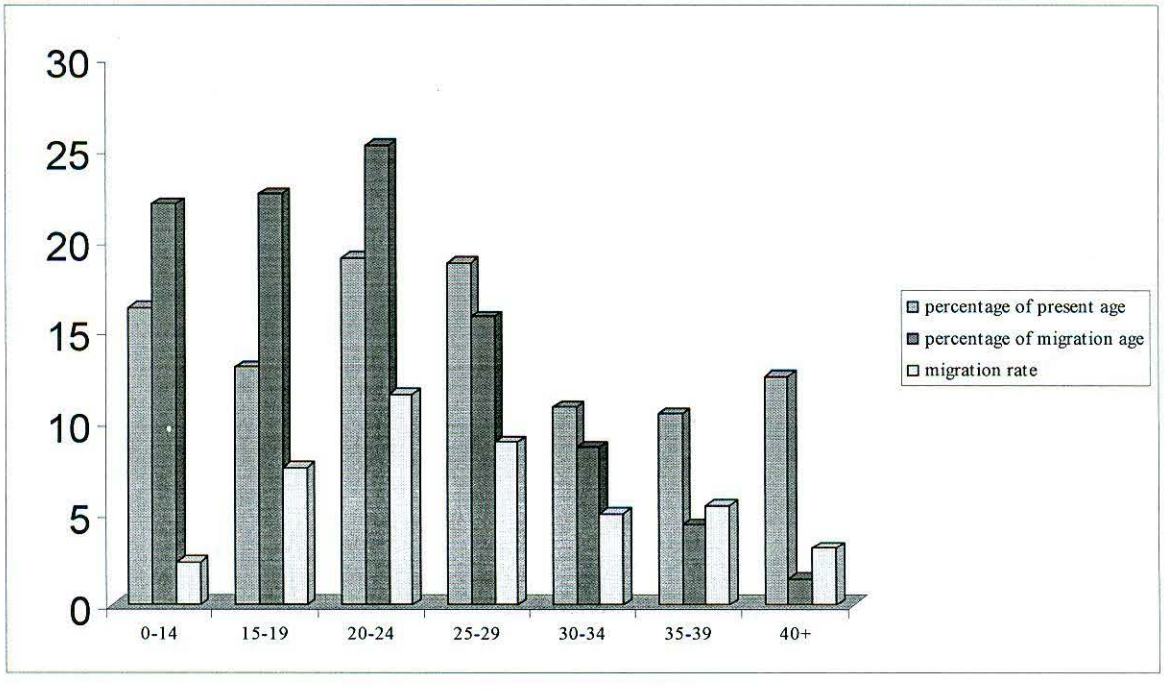


Figure- 2: Distribution of Migrants and Rate of Migration According to Age.

Table 3.1.1 and figure 2 show that the distribution of migrants according to present age and age at migration. The rate of migration was found significantly higher for the people who belonged to the age groups 20-24 and 25-29 years (about 11.55 per cent and 8.95 per cent) respectively, followed by the age group 15-19 years (7.54 per cent), the age group 35-39 years (5.45 per cent), 30-34 years were 4.98 per cent, the age group 40 and above years(3.10 per cent) and only the lowest percentage (2.32 per cent) of age group 0-14 years.

The age distribution of migrants clearly shows that majority of them were very young at the time of their first migration. Maximum numbers of migrants were of ages between 20-24 years (25.23 per cent) at the time of migration, followed by those (22.51 per cent) having age between 15 and 19 years (Table 3.1.1 & Figure 2) , 15.78 per cent were aged between 25 and 29. Only 6 per cent people migrated at their age 35 years and above and about 22 per cent of migrated before reaching age 15 years. Most of them were dependent migrants aged at the migration less than 15 years.

The Table 3.1.2 and Figure 3 show that the Migration rate at specific length of years(Present age).Here we showed that the maximum migrants are migrated at the year during 2000-2007, which is higher than the year duration 1983-1991 and 1992-1999.

Table-3.1.2 : Computation of Migration Rate at Specific Length of Years(Present Age)

Age in Year	Population	No. Migrants (Present Age)	No. of Migrants during 1983-1991	No. of Migrants during 1992-1999	No. of Migrants during 2000-2007	Migration Rate	Migration Rate during 1983-1991	Migration Rate during 1992-1999	Migration Rate during 2000-2007
00-14	5425	126	0	4	51	2.32	0	.27	.94
15-19	1234	93	0	4	82	7.54	0	.27	6.64
20-24	1273	147	1	5	139	1155	.07	.39	10.92
25-29	1620	145	0	14	132	8.95	0	.46	8.15
30-34	1688	84	0	21	62	4.98	0	1.24	3.67
35-39	1486	81	4	28	47	5.45	.27	1.88	3.16
40 +	3132	97	22	22	33	3.10	.70	.70	1.05
Total	15858	773	27	98	546	4.47	.17	.62	3.44

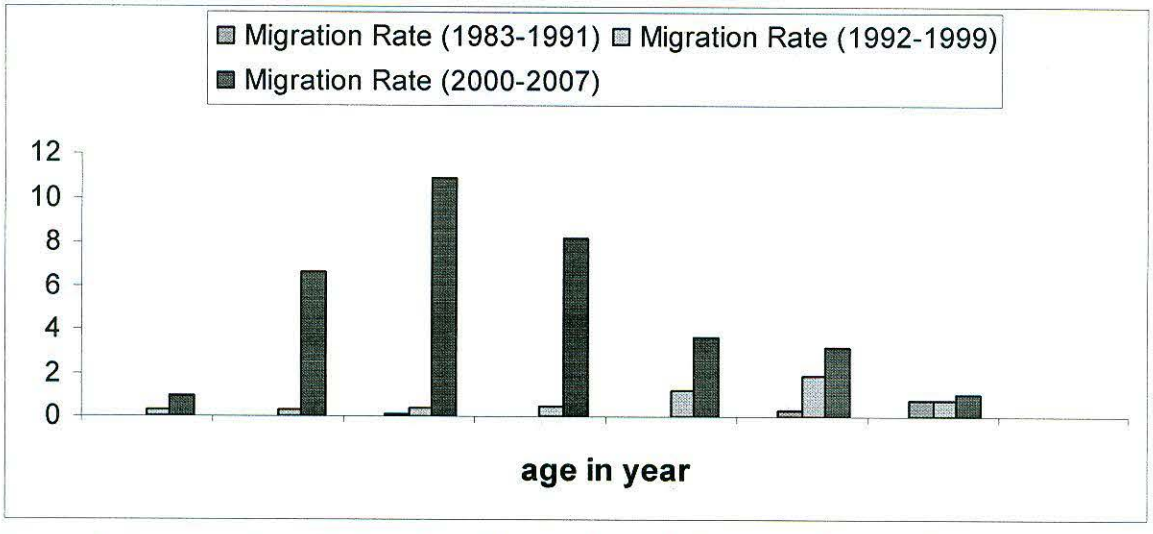


Figure-3: Computation of Migration Rate at Specific Length of Years(Present Age)

3.2.2: Marital Status of Migrants

The migration decision of an individual is influenced by marital status. It is observed that the distance moved by a migrant is found closely associated with the marital status, and depends, to some extent on his/her responsibilities towards the family. Singh (1985) reported that married persons usually migrate shorter distances in order to visit his family frequently. Some studies have also reported that highly educated married migrants are mostly accompanied by family members , as compared to less educated or illiterate migrants(Sharma, 1984, Singh and Yadava, 1981)

Table 3.1.3 and Figure 4, it was found that the percentages of married and unmarried migrants were 48 and 52 respectively. The proportion of married migrants was found comparatively low in our study areas as compared to rural Northern India (about 85 per cent; Yadava, 1988). In our study areas unmarried (52 per cent) migrants are higher than the married (48 per cent) migrants. A few number of migrants who are married at the age of migration, they are unmarried. It may be due to the fact that a large proportion of them were found migrated before the age of twenty and it is likely that they may get married after being migrated.

Table-:3.1.3: Distribution of Migrants According to Marital Status

Marital Status	No. of Migrant	Percentage of Migrant
married	399	48
UnMarried	371	51.62
Others	3	.38
Total	773	100

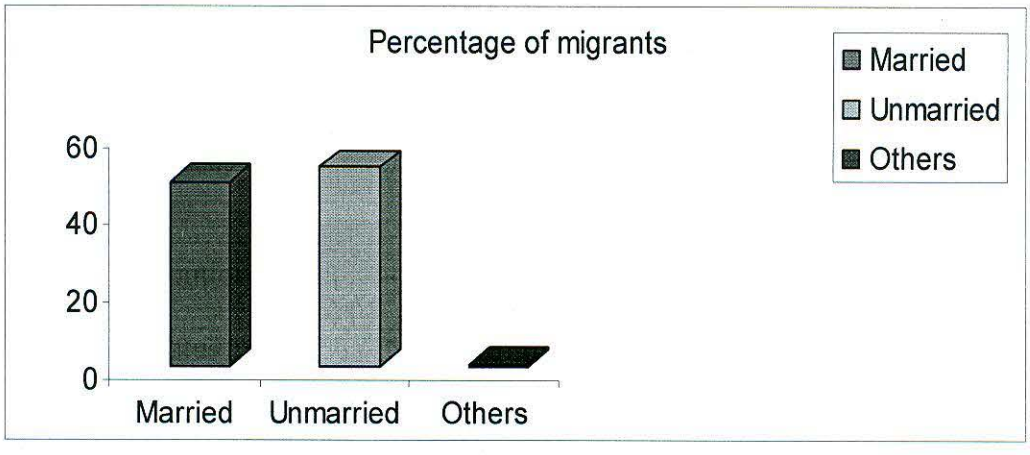


Figure-4: Distribution of Migrants According to marital Status.

3.2.3: Education of the Migrants

Selectivity of migration varies according to education of the migrants. Several studies showed that migrants are usually more educated than non-migrants with respect to the place of origin, and less educated than non-migrants with respect to the place of destination (Singh and Yadava, 1981b; Singh, 1985). Educated people are less interested in taking up agriculture as their occupation (Singh and Yadava, 1981b).

Our studies show that the distribution of migrants according to their educational attainment. More than 38 per cent of migrants are passed secondary and higher-secondary examination (passed SSC/HSC), whereas about 20 per cent of migrants are graduate and above. (Table-3.1.4 & Figurre-5)

Table- 3.1.4 : Distribution of Migrants According to Education.

Education	No. of Migrants	Percentage of Migrants
Illiterate	71	9.18
Primary	117	15.14
Secondary	137	17.72
SSC/HSC	293	37.91
Graduate/ Others	155	20.05
Total	773	100

About 18 per cent of migrants attained their secondary education, the percentage of illiterate and primary education migrants are about 9 and 15 per cent. Here 58 per cent of migrants are passed both SSC to graduate and above and lowest per cent (9 per cent) of migrants are illiterate. we showed that the highest percentage of migrants are educated migrants. This may be due to the fact that there is a little scope for them for getting a suitable job in the rural areas.

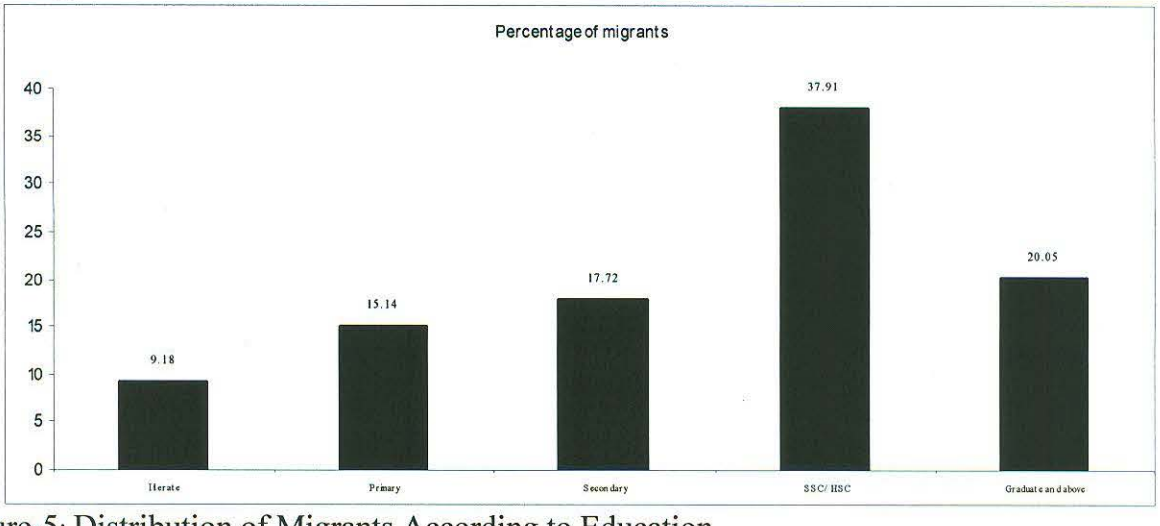


Figure-5: Distribution of Migrants According to Education.

3.2.4: Nature of Migration

The nature of migration gives an idea about the employment status of the migrants at the place of destination. The distribution of migrants according to nature of migration is shown in Table 3.1.5 and Figure 6. About 60 per cent of the migrants moved for temporary migration and about 13 per cent were permanent migrants. About 13 per

cent of migrants migrated for education and about 14 per cent migrated as dependent members.

Table-3.1.5: Distribution of Migrants According to Nature of Migration

Type of Nature	Number of Migrants	Percentage of Migrants
Permanent	100	12.94
Temporary	462	59.77
Studies	104	13.45
Dependent	106	13.71
Other	1	.13
Total	773	100

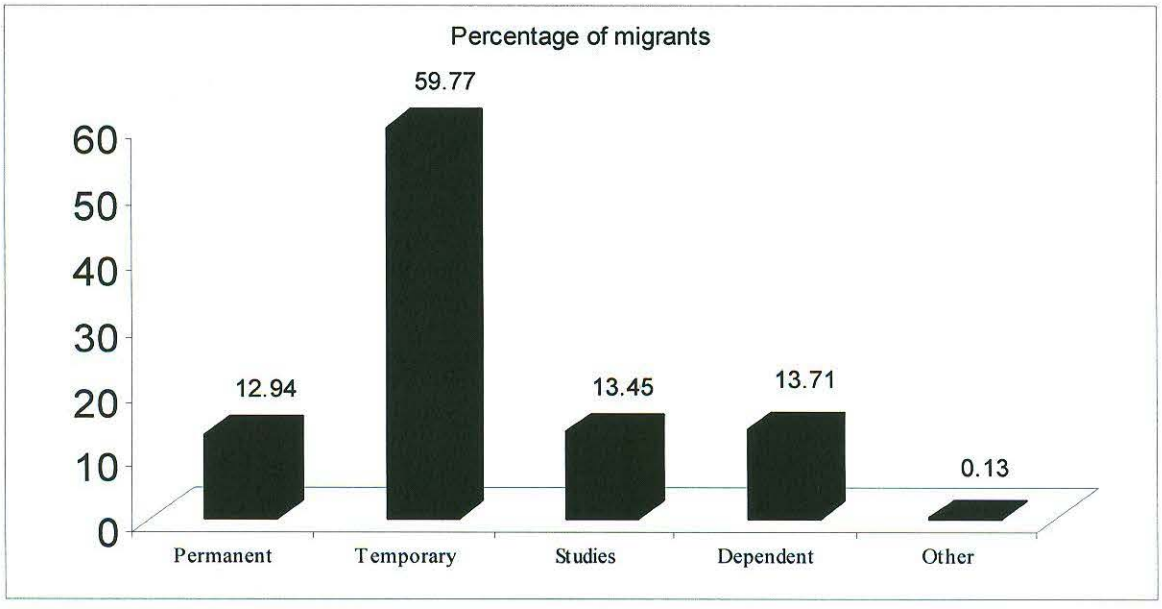


Figure-6: Distribution of Migrants According to Nature of Migration

The nature of migration showed a significant and consistent relationship with the educational level of migrants(Table 3.1.6). Migration due to permanent migrants was increased with the increased level of education.

Table-3.1.6: Percentage Distribution of Migrants According to Nature of Migration and Education

Education	Nature of Migration					
	Permanent	Temporary	Studies	Dependent	Other	Total
Illiterate	16.90 12 12.00	19.72 14 3.03	0	61.97 44 41.51	1.41 1 100	71
Primary	13.68 16 16.00	50.43 59 12.77	1.71 2 1.92	34.19 40 37.74	0	117
Secondary	11.68 16 16.00	75.91 104 22.51	3.65 5 4.81	8.86 12 11.32	0	137
SSC/HSC	9.90 29 29.00	68.26 200 43.29	19.45 57 54.81	2.39 7 6.60	0	293
Graduate and above	17.42 27 27.00	54.84 85 18.40	25.81 40 38.46	1.54 3 2.83	0	155
Total	100	462	104	106	1	773

Figure in upper line of each cell represent the percentages of row total, lower line indicate the percentages of column total.

Among illiterates, it was found that more than 42 per cent were dependent members, 12 per cent were permanent migrants and 3 per cent were temporary migrants. Among SSC/HSC passed migrants, about 55 per cent of migrants were migrated for education, about 43 per cent were temporary migrants, and about 29 per cent of migrants were permanent. Among graduates, more than 38 per cent were migrated for education, about 27 per cent of migrants were permanent migrants and more than 18 per cent were temporary migrants. Both primary and secondary level, it was found that about 38 per cent of dependent migrants as primary level, 23 per cent were temporary migrants as secondary level, about 16 per cent were permanent migrants as both primary and secondary level. Those who migrated for studies, their rate is significantly higher for the migrants who obtained SSC/HSC or more.

3.2.5: Occupation of the Migrant

Availability of job opportunities at the place of destination, whatsoever be the quality, play a very important role in regard to the process of migration decision. On the other hand pre-migration occupation also helps to understand the causes i.e., push factors and pull factors behind migration. In this section migrant's profiles are discussed according to their occupation opted at the place of destination as well as pre-migration occupation.

The distribution of migrants according to their occupation both at the place of origin (before migration) and at the place of destination (after migration) are shown in Tables 3.1.7 and 3.1.8 respectively.

In Table 3.1.7 and Figure 7 it is shown that the pre-migration occupation of migrants are as follows; 41 per cent of the migrants were involved with studies, 12 per cent were house works, about 9 per cent were unemployed and dependent, land owner 6 , unagriculture labour 4, agriculture labour 2, service/job 3, business 1, labour but farmer 3 per cent and others were 10 per cent.

Table-3.1.7: Distribution of Migrants According to Pre(before) Migration Occupation

Pre-Migration Occupation	No. of Migrants	Percentage of Migrant
Land owner	42	5.43
Farmer but Labour	22	2.85
Agriculture Labour	18	2.33
Unagriculture Labour	33	4.27
House Work	91	11.77
Dependent	71	9.18
Service/job	23	2.98
Business	9	1.16
Students	320	41.40
Unemployed	70	9.06
Others	17	2.20
No Occupation	57	7.37
Total	773	100

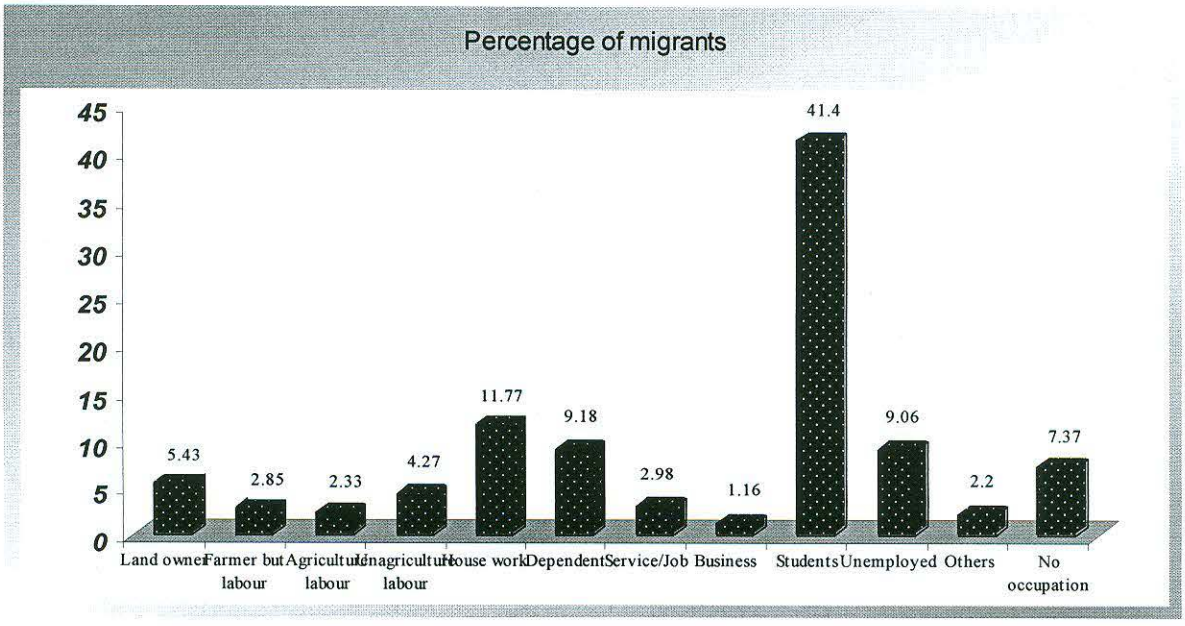
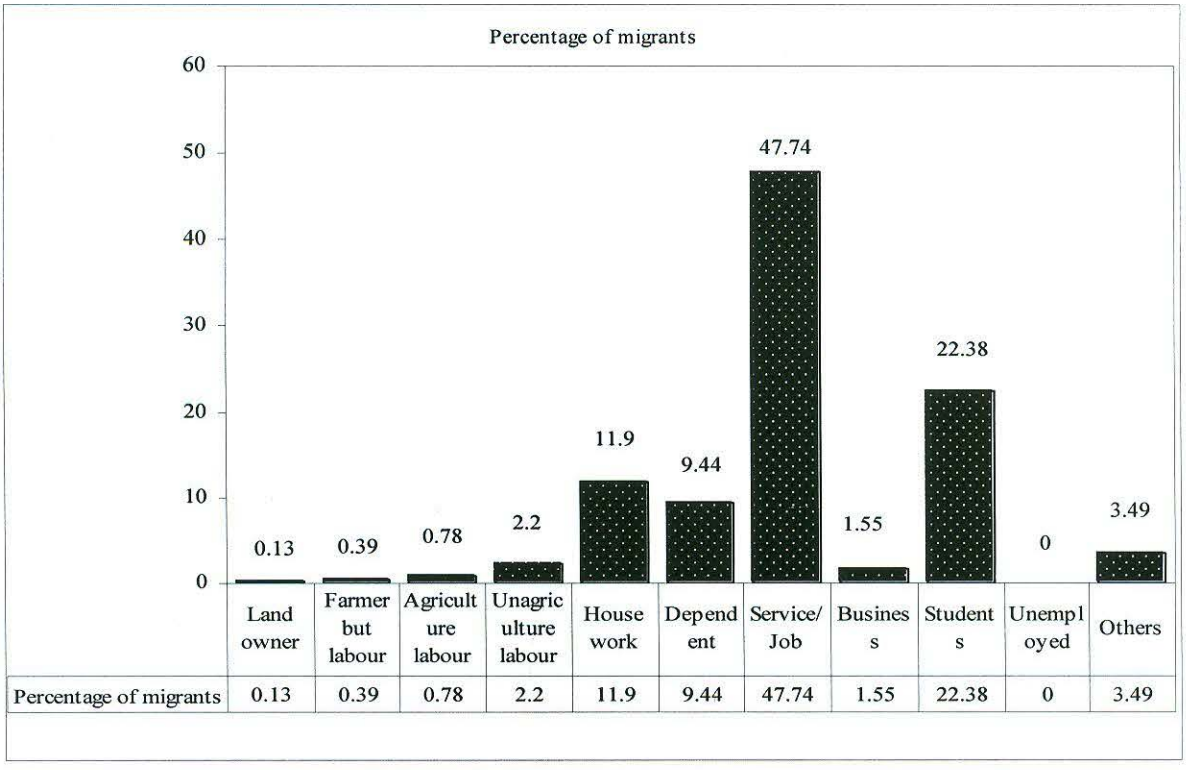


Figure-7: Distribution of Migrants According to Pre(before) Migration Occupation

In the context of occupation opted at the place of destination (i.e. after migration), it was found that about 48 per cent of migrants were employed in service/job, 22 per cent were students, 12 per cent were house worker(mainly women, who never get a job/service, but migrated), 9 per cent were dependent and rest of percentage of migrants are not remarkable(Shown in Table 3.1.8 & Figure 8).

Table-3.1.8: Distribution of Migrants According to Occupation at the Place of destination (Occupation after Migration)

Occupation	No. of Migrants	Percentage of Migrant
Land owner	1	.13
Farmer but Labour	3	.39
Agriculture Labour	6	.78
Unagriculture Labour	17	2.20
House Work	92	11.90
Dependent	73	9.44
Service/job	369	47.74
Business	12	1.55
Students	173	22.38
Unemployed	0	0.00
Others	27	3.49
Total	773	100



	Land owner	Farmer but labour	Agricult ure labour	Unagric ulture labour	House work	Depend ent	Service/ Job	Busines s	Student s	Unempl oyed	Others
Percentage of migrants	0.13	0.39	0.78	2.2	11.9	9.44	47.74	1.55	22.38	0	3.49

Figure-8: : Distribution of Migrants According to Occupation at the Place of destination (Occupation after Migration)

3.2.6: Factors active for Migration

The causes of migration are usually explained by using two broad categories, namely, push and pull factors. For example, people of a certain area may be pushed off by poverty to move towards a town and/or industrial base for employment. While a better employment or higher education facility may pull people to avail these opportunities. People's decision to migrate from one place to another may be influenced by many non-economic factors such as, maladjustment in the family or community. When maladjustment arises, economic disadvantage may appear as a strong influential or push factor in migration decision of an individual.

The findings however show that it is the economic opportunity that played dominant role in migration decision. More than 51 per cent of migrants were migrated with influencing of their family members, about 22 per cent were migrated for higher

studies, over 20 per cent of migrants due to poverty. Only about 6 per cent were migrated for job searching (Shown in Table 3.1.9 & figure 9).

Table-3.1.9: Distribution of Migrants According to Push Factors

Push Factor	No. of Migrants	Percentage of Migrants
Poverty	96	20.47
Job Scharching	27	5.76
Influencing by Family	242	51.60
Influencing By Villages	0	0
Natural Causes	0	0
Studies	104	22.17
Others	0	0
Total	469	100

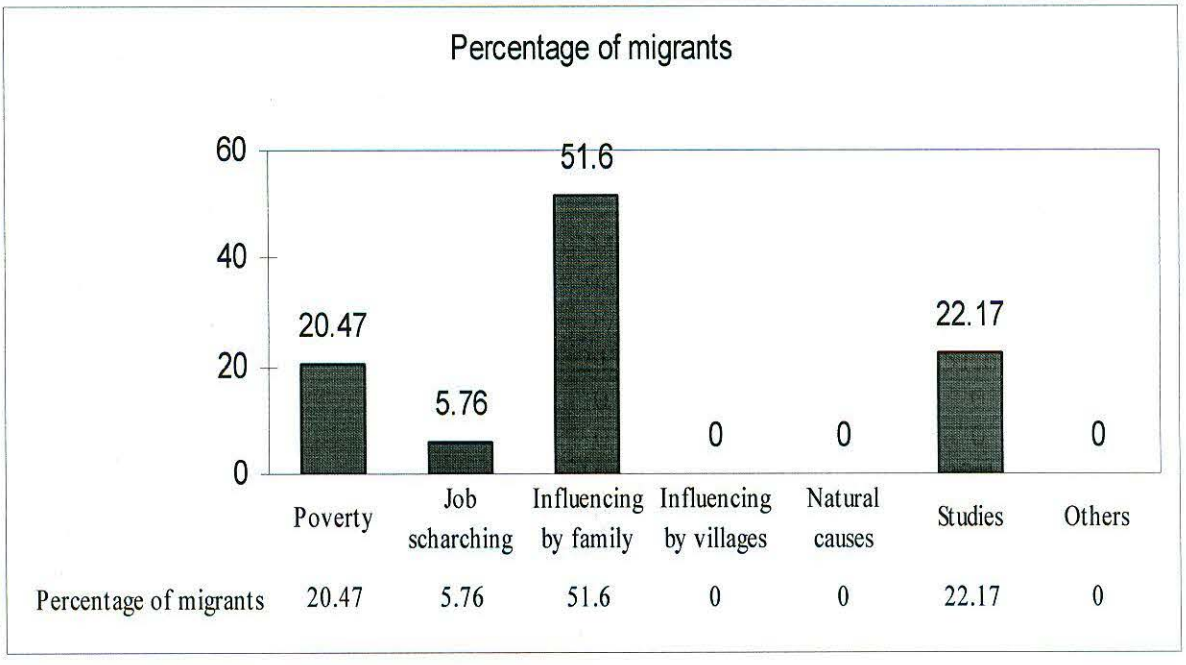


Figure- 9: Distribution of Migrants According to Push Factors

It is documented that migration decision of an individual is influenced not only by the push factors but also by the pull factors(Yadava,1988). It is remarkable that about 74 per cent migrated due to availability of job at a particular place of destination(Shown in Table 3.1.10 and Figure 10), about 21 per cent were found migrated to a particular destination place due to better opportunity, other pull factors are not available in study areas.

Table-3.1.10: Distribution of Migrants According to Pull Factors

Pull Factor	No. of Migrants	Percentage of Migrants
Better Opportunity	62	20.39
Liking the Place	4	1.32
Transfer	11	3.62
Relative	1	.33
Friends	0	0
Due to Jobs	224	73.68
Others	2	.66
Total	304	100

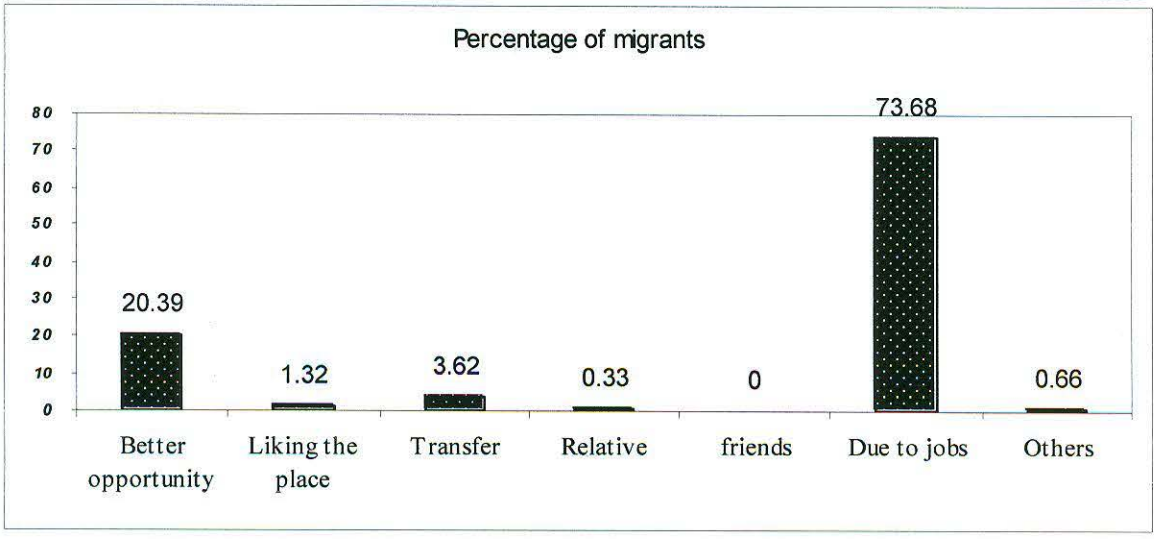


Figure-10: Distribution of Migrants According to Pull Factors

The distribution of push factors according to education and pre-migration occupation of migrants are shown in Table 3.1.11 and Table 3.1.12 respectively.

From Table 3.1.11 among illiterate migrants, maximum were found migrated due to influencing by family (81.42 per cent), followed by poverty (18.57 per cent). For the primary and secondary, the main push factor was found as influencing by family, followed by poverty. For SSC/HSC and graduate level migrants, the main push factor was found as studies (40.71 per cent and 55.56 percent) From the above findings, it is transparent that family influencing was the main push factor among all level of education and poverty and studies also effects the migration very well.

Table-.3.1.11: Percentage of Distribution of the Migrants of Push Factor by Educational Level

Push Factors	Educational Level					
	Illiterate	Primary	Secondary	SSC/HSC	Graduate and above	Total
Poverty	13.54 13 18.57	42.71 41 38.32	29.17 28 35.40	13.54 13 9.29	1.04 1 1.39	96
Job searching	-	14.81 4 3.74	22.22 6 7.50	44.44 12 8.57	18.52 5 6.94	27
Influencing by family	23.55 57 81.42	24.79 60 58.07	16.94 40 41.25	23.97 58 41.43	10.74 26 28.57	242
Studies		1.92 2 1.86	4.81 5 6.33	54.81 57 40.71	38.46 40 55.56	104
Total	70(14.73)	107(22.81)	80(17.06)	140(29.85)	72(15.5)	469 (100)

Figure in upper line of each cell represent the percentage of row total, lower line indicate the column total and figures within parenthesis indicate the percentage of total.

From Table 3.1.12, for land owner, farmer but labourer, agriculture labourer, unagriculture labourer, business and unemployed migrants, it was found that majority were migrated for poverty (71.43, 92.31, 94.11,100, 66.67 and 81.81 per cent respectively) For house work (90.91 per cent) and dependent (95.65 per cent) were migrated for influencing by family and about hundred per cent due to job scarching who were engaged in any job/service. It may be due to their dissatisfaction with the job at the place of origin and also for low salary. It is observed that those who were engaged in business, the maximum were migrated for poverty (66.67 per cent). It is interesting to note that those who were engaged in studies at the place of origin, about 62.65 per cent migrated for studies and 22.89 per cent for influencing by family. However, migrants among those who were related other activities at the place of origin, about 79.17 per cent were migrated due to influencing by family and about 19.44 per cent migrated by

poverty. Thus this study reveals that those who were engaged in agricultural labourer, unagriculture lebourer, business and unemployed at the place of origin, they were mostly migrated due to poverty; and those who were engaged in job/service, were mostly migrated for job searching.

Table-3.1.12: Percentage of Distribution of the Migrants of Push Factor by Pre-Migration Occupation

Push Factors	Pre-migration Occupation											
	land owner	Farmer but labour	Agriculture Labour	Unagriciture Labour	House work	Dependent	Service /job	Business	Studies	Unemployed	Others	Total
Poverty	5.21 5 71.43	12.5 12 92.31	16.67 16 94.11	19.79 19 100	8.33 8 9.09	3.13 3 4.35	-	4.17 4 66.67	6.25 6 3.31	9.38 9 81.81	14.58 14 19.44	96
Job scharching	7.41 2 18.57	3.7 1 7.69	-	-	-	-	3.70 1 100	7.41 2 33.33	66.67 18 10.84	7.41 2 18.18	3.70 1 1.39	27
Influencing by family	-	-	41.00 1 5.89	-	33.06 80 90.91	27.27 66 95.65	-	-	15.70 38 22.89	-	23.55 57* 79.17	242
Studies	-	-	-	-	-	-	-	-	100 104 62.65	-	-	104
Total	7 (1.49)	13 (2.77)	17 (3.62)	19 (4.05)	88 (18.76)	69 (14.71)	1 (21)	6 (1.28)	166 (33.39)	11 (2.35)	72 (15.35)	469 (100)

Figure in upper line of each cell represent the percentage of row total, lower line indicate the percentages of column total and figures within parentheses indicate the percentages of total.
* indicate the percentages of no occupation.

3.2.7: Place of Migration

The quality and quantity of opportunities available at a particular place of destination play a major role in attracting migrants towards it In the developing countries like Bangladesh migrants of a particular origin follow some established routes because resources (opportunities) are disproportionately distributed to a few cities.

In Table 3.1.13 and Figure 11 present the percentage of migrants and the migration rate for different mauzas/villages under study. About 45 per cent migrated from kanupur mauza of Akkelpur upazilla, 13 and 10 per cent from Bamangaon mauza and Dudhail mauza respectively of Kalai upazilla, about 8 and 9 per cent migrated from Kuargaon and Koytahar mauza respectively of Joypurhat sadar upazila and lowest percentage (.5 per cent) from Jitapur mauza of Joypurhat sadar upazilla. The migration rates from different mauzas/villages have also been computed to get an overview of the migration intension. The rates are computed on the basis of the total number of migrants from different mauzas/villages at the time of survey. The overall migration rate was found to be about 4.87 per cent. The out migration rate was found highest (12.3 per cent) for Kanupur mauza of Akkelpur upazilla, followed by Hantanabaz mauza (8.69 per cent) of Khetlal upazilla, Bamangaon mauza(7.78 per cent) and Dudhuil mauza (4.45 per cent) of Kalai upazilla, Vadrakali mauza (4.46 per cent) of Akkelpur upazilla. The migration rate was lowest for Jitapur(1.29 per cent), Kuargaon(1.78 per cent) of Joypurhat sadar. A wide variation in migration rate from villages/mauzas has been observed which may be due to variation in transport facilities, commutation facilities and also differences in the socio-economic status of the mauzas under study.

Table-3..1.13: Distribution of Migrants and Migration Rate According to Difference Mauzas/Villages.

Mauza/Village	Population	No. of Migtants	Percentage of Migrants	Rate of Migration
Jitapur	309	4	.52	1.29
Kuargram	3480	62	8.02	1.78
Kaytahar	3487	72	9.31	2.06
Kapasticry	366	15	1.94	4.10
Hantanabaz	426	37	4.79	8.69
Baruil	1475	38	4.92	2.58
Dhudhail	1708	76	9.83	4.45
Bamangaon	1246	97	12.55	7.78
Kanupur	2805	345	44.63	12.30
Vadrakali	556	27	3.49	4.46
Total	15858	773	100	4.87

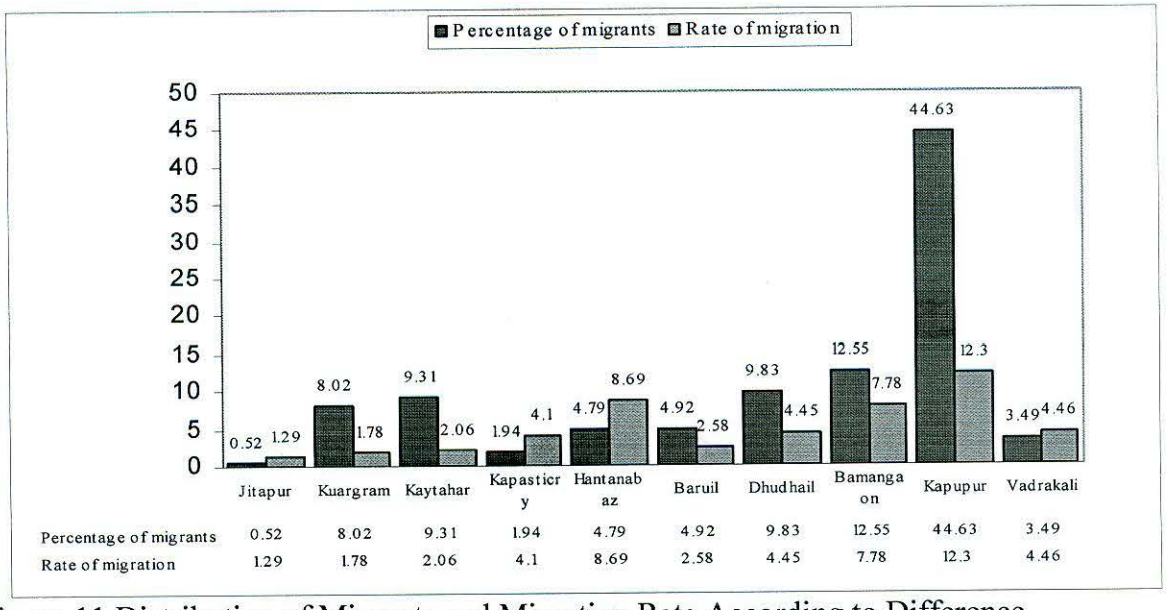
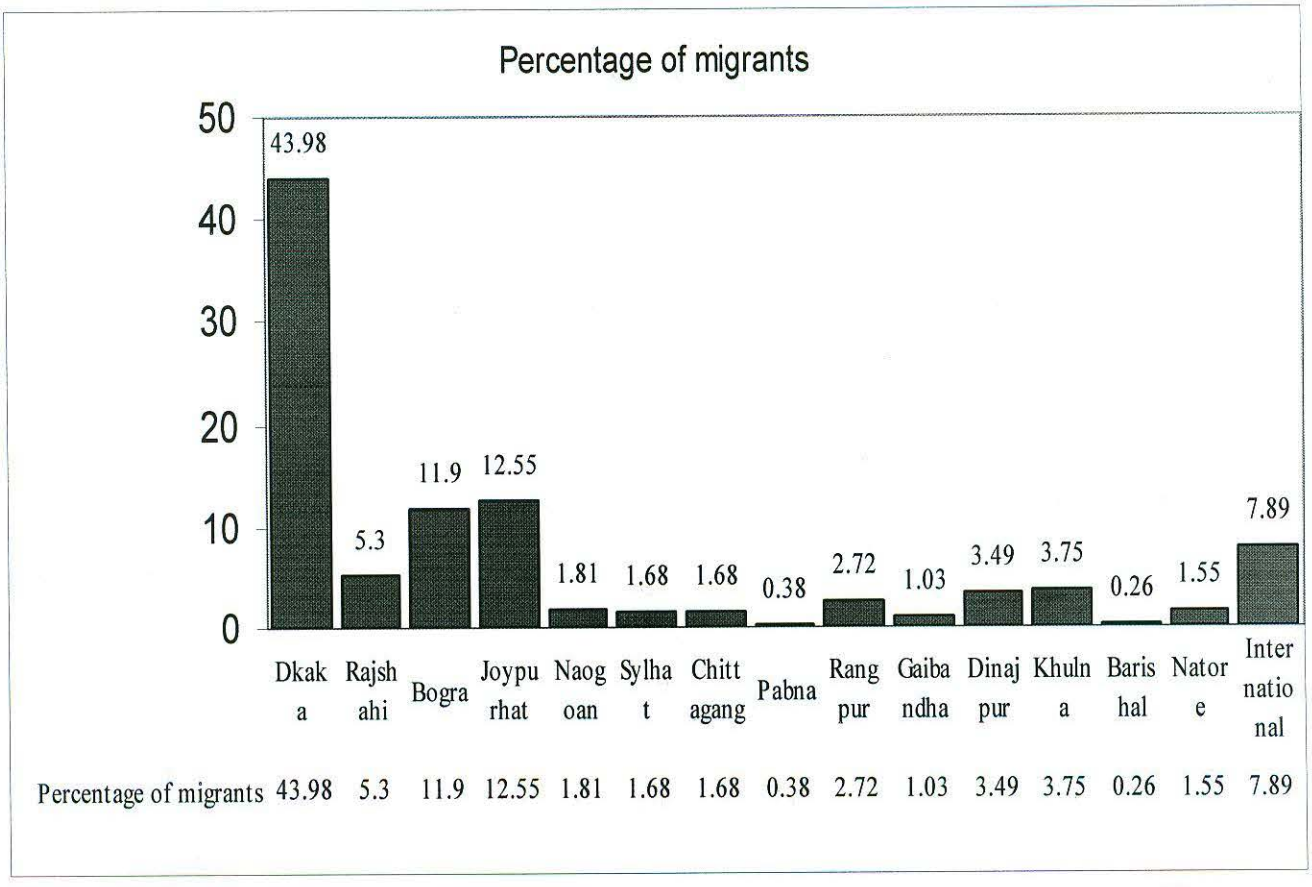


Figure-11 Distribution of Migrants and Migration Rate According to Difference Mauzas/Villages.

In Figure 12 and Table 3.1.14 shows the distribution of migrants at various destination places according to place of origin. The destination places are grouped taking into accounts the geographical location and distance. The findings indicate that about 8 per cent migrants were migrated to foreign countries, and remainder migrated mainly to some big cities of the country. Majority of the international emigrants migrated to Saudi Arabia, Malayasia, kuwait (i.e. Midile East). About 44 per cent of migrants migrated to Dhaka city, 13 per cent to urban areas of Joypurhat district, about 12 per cent migrated to our near district, Bogra (mainly Bogra town), Rajshahi district(mainly town) were more than 5 per cent, Dinajpur district were 4 per cent , about 4 per cent to Khulna district town. A negligible proportion was found migrated to Rangpur district (2.72 per cent), Naogaon district (1.81 per cent) , both Sylhat and Chittagang division (1.68 per cent) and Natore district (1.55 per cent).



	Dkaka	Rajshahi	Bogra	Joypurhat	Naogoan	Sylhat	Chittagang	Pabna	Rangpur	Gaibandha	Dinajpur	Khulna	Barishal	Natore	International
Percentage of migrants	43.98	5.3	11.9	12.55	1.81	1.68	1.68	0.38	2.72	1.03	3.49	3.75	0.26	1.55	7.89

Figure-12: Distribution of Migrants According to Destination Places from Different Mauzas/Villages

Table-3.1.14: Distribution of Migrants According to Destination Places from Different Mauzas/Villages

Mauza	1	2	3	4	5	6	7	8	9	10	11	12	13	14	**15**	**16**	**17**	**18**	**19**	**20**	Total
Jitapur	3			1																	4(.52)
Kuargram	29	3	4	17	2	3						1			**3**						62(8.02)
Kaytahar	20	3	4	29	4		1	3	4					3		**1**					72(9.31)
Kapasticry			12	2											**1**					**1**	16(1.94)
Hantanabaz	8	2	9	9					8												37(4.79)
Baruil	7		3	1		1			2						**3**	**12**	**4**	**5**			38(4.92)
Dhudhail	52		8	3	1	5			2	3		1		1							76(9.83)
Bamangaon	34	2	24	13			1		1	1		5		2	**2**	**5**	**4**	**4**	**1**		97(12.55)
Kanupur	174	29	27	15	7	4	10		4	4	27	22	1	14	**6**	7					345(44.63)
Vadrakali	13	2	1	7			1						1			**1**			**1**		27(3.4)
Total	340(43.98)	41(5.30)	92(11.9)	97(12.55)	14 (1.81)	13 (1.68)	13 (1.68)	3 (.38)	21 (2.72)	8 (1.03)	27 (3.49)	29 (3.75)	2 (.26)	12 (1.55)	**15 (1.94)**	**26 (3.36)**	**8 (1.03)**	**9 (1.16)**	**2 (.26)**	**1(.13)**	773(100)

1-Dhaka, 2-Rajshahi, 3-Bogra, 4-Joypurhat, 5-Naogaon, 6-Sylhat, 7-Chittagang, 8-Pabna, 9-Rangpur, 10-Gaibandha, 11-dinajpur, 12-Khulna, 13-Barishal, 14-Natore, **15-Saudi Arabia, 16-Malaysia, 17-Kuwait, 18-Middile East, 19-Singapore, 20-Africa.**

7.89

* Bold Numbers are International Migrants.

It is observed that migrants from a particular origin tend to migrate in cluster/group to some specific destination. For example, it was found that out of 38 migrants, 63 per cent migrated to foreign countries and only 37 per cent were other destination place from Baruil mauza. Again, from Kanupur mauza, found that out of 345 total migrants, about 28 per cent migrated to Dhaka city, 4 per cent migrated to foreign countries and rest of them migrated to other destination places.

3.3: Determinants of Migration at the Household Level

It is important to note that the characteristics of migrants are not sufficient to explain the selectivity of migration because the decision of a person to migrate is largely dependent on his family background. The individual characteristics can only give some idea about type of people involved in the process of migration. Thus, it is important to study the characteristics of migrant households to get an idea about the selectivity of migration process. This will provide a better understanding as to why some families participate in migration process while others not.

It is difficult to identify the differentiating factors between migrant and non-migrant households. For example, the socio-economic position of a migrant household may change significantly after receiving remittances from the migrant member(s). It is therefore not justified to compare the present position of migrant households with their non-migrant counterpart. However, some household characteristics such as education of the household, main occupation of the household, agricultural land owned by the household, family size, and number of adult male member(s) in the household have been taken to have a comparative study between migrant and non-migrant households. It is expected that these variables influence migration decision at the household level.

The measurement of landholding of a household, family size, and number of adult male member(s) is straightforward. The educational status of a household is determined by taking the highest educational level obtained by the member (male aged 15 years and above) of the household. The occupation of a household is determined by considering the

main source of income of the household. The information related to main occupation of male members along with their income and agricultural land owned were considered to determine the household occupation. The percentage distribution of migrant and non-migrant households according to certain socio-economic characteristics is shown in Table 3.2.

Table 3.2: Characteristics of Migrant and Non-migrant House Holds

Characteristics	Percentage of		
	Migrant HHs	Non- Migrant HHs	Total HHs
Education of House hold			
Illiterate	11.91	19.02	10.38
Primary	26.44	35.23	27.56
Secondary	23.02	23.96	21.65
SSC/HSC	28.15	15.86	26.69
Graduate	10.47	5.91	13.56
Occupation of Household			
Agriculture (owner)	29.14	44.18	34.34
Agriculture(Labourer)	4.63	15.83	18.51
Non-agriculture Labourer	6.84	3.75	5.77
Service	39.29	17.08	31.60
Business	5.74	12.92	8.22
Others	6.18	3.75	5.05
Agricultural Land owned by HH			
00-05	26.05	24.17	25.39
06-50	17.44	20.42	18.47
51-100	24.28	26.67	25.10
101-200	15.89	16.67	16.16
201 and above	15.89	12.08	14.57
Adult Male member of HH			
0-1	83.89	94.58	87.59
2-3	15.67	5.00	11.97
4 and above	.44	.41	.43
Family size			
2-4	68.43	71.67	69.55
5-8	29.14	26.67	28.28
9 and above	2.43	1.67	2.16

The logistic regression model is considered an appropriate tool to analyze such data since the dependent variable, type of household, is dichotomized (non-migrant or migrant). Table 3.3 shows the estimated regression coefficients along with the standard errors, relative risks and the number of cases for the categories of variables studied. The findings indicate that the variables 'education', 'occupation' and 'family size' included in the analysis have had significant effect on rural out-migration except the variables 'agricultural land owned' and 'adult male member'.

An increased risk of out-migration from a rural household has been observed with the increased level of education. The risk of migration was 1.85, 5.00, 10.83 and 10.69 times higher for the households with educational level primary, secondary, SSC/HSC (secondary school certificate/higher secondary certificate) and graduate respectively as compared to households with no education. In other words, the propensity of out-migration was remarkably higher for the households whose member(s) attained at least primary education, which may be, as mentioned earlier, due to the fact that educated people generally like a white collar job and such jobs are not usually available (if available, not sufficient) in rural areas.

It was found that households with occupation non-agricultural labourer, service business and others have greater chance of migration as compared to households with occupation 'agriculture (owner)'. The risk of migration has been found 14.22, 32.00, 5.83 and 16.40 times higher for households belonging to occupation as non-agricultural labourer, service business and others respectively as compared to agriculture (owner). The risk of out-migration was found significantly higher for the households with occupation of household. This may be because of a little scope of getting an occupation other than agricultural sector in rural areas.

Table 3.3: Relative Risk of Migration at Household Level Using Logistic Regression Analysis

variables	N	β	SE(β)	Relative Risk
Education of House hold				
Illiterate	72			1.000
Primary	191	.613	1.364	1.845
Secondary	150	1.610	1.324	5.004
SSC/HSC	185	2.382	1.336	10.825*
Graduate	94	2.370	1.355	10.694*
Occupation of Household				
Agriculture (owner)	238			1.000
Agriculture(Labourer)	59	2.723	.716	15.219*
Non-agriculture Labourer	40	2.680	1.076	14.591*
Service	219	3.466	.378	32.003*
Business	57	1.762	.470	5.825*
Others	35	2.797	1.157	16.400*
Agricultural Land owned by HH				
00-05	176			1.000
06-50	128	1.054	1.217	2.870
51-100	174	.347	1.203	1.409
101-200	112	.337	1.223	1.401
201 and above	101	.659	1.224	1.932
Adult Male member of HH				
0-1	542			1.000
2-3	101	-.305	.614	.737
4 and above	50	-.103	.813	.902
Family size				
2-4	482			1.000
5-8	196	.742	.331	2.101*
9 and above	15	1.010	1.098	2.745
Constant		-4.739	1.889	

* Significant at 5 per cent level

Landholding of a household plays an important role in determining rural out-migration in an agrarian economy where the people are mostly dependent on land for their livelihood. Several studies have showed that out-migration from rural areas is closely associated with unequal distribution of resources, particularly land (Sovani, 1961; Samsuddin, 1981). However, studies conducted in developing countries on the relationship between landholding and propensity to move, have shown dissimilar results. For example, Hill (1972) found that poorer and landless have a greater propensity of migration than richer and big land owners. On the other hand, Sekhar (1993) found that out-migration is higher for the small and medium land owning families and lower for either landless or big land owners. The findings of this study do not support strongly any of the above proposition.. The risk of out-migration was 2.87, 1.41, 1.40, 1.93 times higher among the households with agricultural land 6-50, 51-100, 101-200 and 201+ decimal respectively as compared to landless households. A higher risk of out-migration from the households with medium or big size of agricultural land may be due to the fact that persons from such households were found mainly migrated for better opportunity (schooling, job, business etc.). A lower risk of out-migration from the households with agricultural land 06-50 decimal may be because the persons from such households usually worked as share cropper or agricultural labourer, and earnings from such land, to some extent, cover the cost of livelihood for their survival. Further, persons from the landless households were found mainly migrated for their survival, because a work/job may not be available in all the seasons in the rural areas and they may not be capable to fulfil their minimum cost of livelihood during a lean season.

Several studies argued that migration is positively related with family size (Connell *et al.*, 1976; Sekhar, 1993; Upton, 1967). In other words, people migrate mostly from large households because it is easy to spare some members to go outside for work. This study also showed a similar result (Table 3.2). The risk of out-migration was found

2.10 and 2.74 times higher among the household with the family size. However, the multivariate analysis revealed that family size has significant effect on out-migration by family size 5-8.

The number of adult male members in a household may describe the outcome of an event (out-migration) well than the family size. The logistic regression analysis indicates that number of adult male member(s) in a household has had a insignificant effect on rural out-migration. A substantially increased risk of out-migration from a household was noted with the increased number of adult men in the household. As compared to single adult male member, the risk of rural out-migration was about .737 times higher for the households with 2-3 adult male members and .902 times higher if the adult males were more than three. A higher risk of out-migration from the households with more than one adult male member may be due to the fact that it is easier to spare some persons to migrate outside and remaining members can look after the household's work.

Thus, the findings indicate that the risk of out-migration was higher for the households attaining at least primary level of education, having occupation other than agriculture, agricultural land more than 6-50 decimal,

3.4: Conclusions

A study of migration differentials at individual level indicated that persons involved in the process of rural out-migration were adult and more educated. Most of them were engaged in studies or unemployed or dependent or house worker before migration. About 60 per cent of migrants have migrated for temporary and about 13 per cent of migrants were permanent migrants. The migration rate was found significantly higher for educated people, and also for the people belonging to the ages 15-29.

Poverty, studies and family influence were the main push factors for out-migration, while due to job, better opportunity were the main pull factors behind migration. Education of the migrant and their occupation at the place of origin significantly related with the push factors of the migrants. Poverty was found to be the main push factor for primary and moderately educated migrants and studies was the main push factor among the migrants having graduate level education or more. Also poverty has been the main push factor for the migrants who were engaged in agricultural labourer, unagriculture labourer and the unemployed.

It is found that about half of migrants were migrated in Dhaka division (mainly Dhaka city), about 8 per cent to foreign countries (mainly Saudi Arab, Malaysia) and followed by Joypurhat urban, Bogra urban, Dinajpur urban area.

Multivariate logistic regression analysis suggested that education of the household, occupation of the household and number of adult male member - all determined significantly the risk of rural out-migration. The risk of out-migration was more than double for the households whose member attained at least primary level education. As compared to the illiterate households, the risk of out-migration was about ten times higher for the households whose member attained secondary /higher secondary or graduate level of education. The risk of out-migration was significantly higher for the households having occupation other than agriculture, and it was 32 times higher for the households with occupation service. The risk of out-migration was higher for the households with agricultural land more than 6- 50 decimal and it increased sharply with the increased number of adult male member(s).

Chapter 4

Trends and Volume of Migration

4.1 Introduction

This chapter throws some light on the trend and volume of out-migration by using some migration models. Ravenstein's Laws (1885, 1889) on population movement is the milestone in the area of migration, particularly to study the trend and volume of migration. Zipf's (1946) gravity model and Stouffer's opportunity (1940) and intervening opportunity (1960) models have received much attention after the pioneer work of Ravenstein. However, the gravity type model overestimates migration at short distances and underestimates for long distances, whereas operational definition of opportunity and intervening opportunity has no definite norm. Lee (1966) formulated some generalised hypotheses with regard to volume of migration, establishment of stream and counter-stream and the characteristics of migrants after a thorough review of Ravenstein's Laws. One of his important hypotheses related to volume of out-migration is the volume of migration that varies with the diversity of people, that is, a population homogeneous in nature with respect to various socio-economic and other characteristics experience lesser rate of migration than that of great diversity. Needless to mention that the diversity is present in almost all the society and the degree of diversity varies due to differences in the socio-economic status, cultural and political patterns of the society. The degree of discrimination also varies from place to place and it may be higher in developing regions compared to developed ones.

Recently, a number of models have been developed to study the volume and direction of migration, particularly from a single origin to multiple destinations (Singh and Yadava, 1974; 1979; Sivamurthy and Kadi, 1984; Yadava *et al.*, 1989 *etc.*). In fact migration models for explaining the volume and direction help to understand about the number of migrants going to different places from a single area or to a single place from different places. Most of the studies as mentioned above used opportunity factor as prior migrants. Nevertheless, migration models employing opportunity factors other than 'prior

migrants' may help to understand the volume and direction comfortably. Keeping this view in mind, urban density, urban population and urban area are considered as opportunity factors in addition to 'prior migrants'.

In Bangladesh, adequate work has not been done on volume of rural out-migration. This may perhaps be due to the lack of data as well as the lack of interest among the social researchers. The census data of Bangladesh has the limitation that there are only one or sometimes two questions relating to migration which is not sufficient to understand the factors active for migration. This study attempts to examine the Lee's theory. Some models for single origin and multiple destinations have also been proposed based on Zipf's gravity law.

The specific objectives of this chapter are:

(i) to test Lee's theory related to volume of out-migration using the household and village level data and thus to investigate factors influencing out-migration, and

(ii) to examine the suitability of some migration models for single origin and multiple destinations by considering different opportunity factors at the place of destination.

4.2 Population Diversity: Testing the Lee Theory

Lee's general theory on volume of out-migration is tested here by using village level data. Effects of factors such as education, occupation and sociol status have been studied using both mathematical and empirical procedures. Lieberson's formula has been used to compute the index of diversity. Both simple and multiple regression techniques have been applied to examine Lee's law considering population diversities in the above mentioned three factors.

4.2.1 The Variables and Setup Hypotheses

The inclusion of an explanatory variable depends on its importance and availability of its measurement. The measurement procedures and categories of the study variables are discussed in Appendix. We present here a short description of the variables used in this study and the hypotheses regarding them.

It is a well established fact that population movement is closely associated with the economic conditions of the migrants at the place of origin. The economically better-off households of a village tend to send their children for better schooling which are mostly located in urban areas (Yadava and Singh, 1988). On the other hand, the majority of the people in the economically depressed households of villages tend to move to urban areas in search of employment. Thus it is observed that the rate of migration is higher for both the economically well-off and economically depressed people, but people from middle income group tend to have lower migration rate. Singh (1986) observed that per capita income (also family income) was directly correlated with standard of living, and areas with high levels of living tend to be areas of in-migration while areas with low levels of living tend to be areas of out-migration. In the developing countries it is obvious that the standard of living is comparatively lower in the rural areas as compared to urban areas. Therefore, we assume that the diversity of socio status is inversely related with the volume of out-migration.

The rural-urban migration rate is usually found higher among educated persons than illiterates. This may be due to the fact that jobs for the educated persons are not available in rural areas and obviously the educated persons are not interested in agricultural jobs available in the rural areas (Yadava, 1988). Thus, if the level of education of a locality is high, there would be a high rate of migration.

Several studies (Kumari, 1980; Yadava and Singh, 1988) have shown a positive relationship between occupational heterogeneity and internal migration. The occupational diversity also indicates the diversity of economic activity and predicts the potential of the occupational opportunities in the community. Although agriculture is the dominant source of employment in the study area, other sources such as non-crop husbandry (dairy, poultry, fishing), small scale cottage, household based industries and service have also been observed. Given this context, we assume that occupational diversity is positively related with the volume of migration.

On the basis of the above discussion, we assume the following hypotheses to study the relationship between migration and population heterogeneity.

(1) there is an inverse relationship between out-migration and diversity of social status.

(2) the diversity of education and occupation are positively related with out-migration.

4.2.2: Migration And Diversity Indices

4.2.2.1 Migration Index

The volume of migration has been computed as the ratio of the number of migrants to total population, i.e. migration index Y (say) is defined as

$$Y_i = \frac{M_i}{P_i} \times 100$$

where Y_i is the migration score or index for the i^{th} mauza/village (i = 1, 2, 3,..., 10); M_i is the number of adult male migrants from the i^{th} village and P_i is the total population of i^{th} village. It is mentioned that the volume of migration is measured with respect to the place of origin. The migration scores for all 10 villages are given in column 2 of Table 4.1. It is observed that the migration index varies from 1.29 to 12.30, yielding 4.87 per cent as the average migration rate for the villages under study.

4.2.2.2 Diversity Index

Diversity or heterogeneity in the population is computed by using Lieberson's (1969) diversity index as follows:

If C_i (i=1,2,3, ..., n) denotes the proportion of individuals in the i^{th} sub-class such that $\sum C_i=1$, then Lieberson's index of diversity D (say) is defined as

$D = 1 - \sum_{i=1}^{n} C_i^2$, where $\sum C_i^2$ gives up persons/individuals of the same characteristics if successive selections are made. Theoretically, the diversity index varies from 0 to 1. It is

zero in case of perfect homogeneity and 1 if every individual of the community possesses a different characteristic.

Table 4.1: Population Diversity and Volume of Migration in Different Mauza/Villages

Mauza/ Village	Migration Rate (Y_i)	Socio status (x_1)	Education (x_2)	Occupation (x_3)
1	1.29	.38	.63	.63
2	1.78	.68	.71	.24
3	2.06	.67	.77	.71
4	4.10	.40	.53	.24
5	8.69	.63	.74	.70
6	2.58	.67	.68	.57
7	4.45	.56	.77	.76
8	7.78	.59	.75	.82
9	12.30	.69	.76	.84
10	4.86	.50	.68	.78

The diversity indices for the study variables *viz.* social status, education and occupation are shown in Table 4.1. The variation of diversity was found almost identical for the variables and the diversity varies from 0.38 to 0.69, 0.63 to 0.77 and 0.24 to 0.84 for social status, education and occupation respectively. This indicates that the villages/mauzas under study show almost similar heterogeneity according to these three variables.

4.2.3 Results and discussion

Table 4.2 shows the correlation matrix among the study variables. The volume of migration showed a positive relationship with diversity of social status(+.307),education

(+0.373) and occupation (+0.539). However, only the educational and occupational diversity have been found to be significantly related with volume of out-migration. The correlation between migration and diversity indices establishes the hypotheses as stated above.

Table 4.2: Correlation Matrix Showing Simple Correlation Coefficients Between Migration Index and Diversity Indices of Study Variables

	X_1	X_2	X_3	Y
X_1	1.00	.752*	.211	.307
X_2		1.00	.648*	.373
X_3			1.00	.539
Y				1.00

🖫 Significant at 5 per cent level

Table 4.3 shows the regression analysis of migration and diversity indices of study variables by truncating the diversity indices at some stages to test curvilinear of the data. The regression analysis showed positive relationship between migration and diversity of social status, education and occupation at all truncated points. The regression coefficient was found significant for occupational diversity in case of all the observations. The maximum percentage of variation in migration accounted for by occupation, followed by education and social status.

Table 4.3: Simple Regression Analysis for Migration Index and Diversity Indices of Four Study Variables on Above the Truncated Points

Diversity above truncated points	Sample size	Simple correlation	Regression equation	R^2 values
For Socio Status				
.67	4	.844	$Y=-299.333+448.727X_1$	.712
.59	6	-.216	$Y=22.203-24.944\ X_1$	.047
.56	8	.481	$Y=4.865+1.118\ X_1$	.000
.38	10	.307	$Y=-.477+9.470\ X_1$	.094
For Education				
.75	4	-.621	$Y=226.178-287.909X_2$	.386
.71	6	.202	$Y=-21.256+36.577\ X_2$	.041
.68	8	.359	$Y=-20.428+35.482\ X_2$	.129
.53	10	.373	$Y=-7.288+17.489\ X_2$	.139
For Occupation				
.76	4	.939*	$Y=-67.130+93.100X_3$	.882
.70	6	.570	$Y=-21.452+36.620\ X_3$	.325
.57	8	.708*	$Y=-15.558+28.997\ X_3$	.502
.24	10	.528	$Y=-.379+8.530\ X_3$	.279

* Significant at 5 per cent level

The combined effect of all the three study variables on migration has been studied through multiple regression analysis (Table 4.4). The coefficient of educational status was found negative and coefficients of other variables were found positive, which confirms the hypotheses stated earlier. All the three variables combined together accounted for 38 per cent of variation in migration.

Table 4.4: Multiple Regression Analysis of Migration and Diversity of Study Variables

Variable	B	SE (B)	Sig T
Social Status (X_1)	17.067	17.958	.379
Education Status (X_2)	-25.508	34.966	.493
Occupation (X_3)	12.682	8.239	.175
Constant	5.134	13.571	.718
R^2	.384		

4.3 Single Origin and Multiple Destinations Migration Models

Zipf (1946) established a gravity type mathematical model stating that the number of migrants from one place to another are directly proportional to the product of the populations of two included places and inversely proportional to the distance between them. Mathematically,

$$M_{ij} = \frac{p_i p_j}{D_{ij}}$$

where M_{ij} denotes the number of migrants from place i to j, p_i and p_j are the populations of the place i and j respectively, and D_{ij} is the distance between i and j. However, several studies have shown that there is less effect of distance on migration flow (Levy and Wadycki, 1973; Tere Heid, 1963). Stouffer introduced the ideas of opportunities (1940) and intervening opportunities (1960) and argued that there is no necessary relationship between migration and distance, but according to him number of migrants to a given distance is directly proportional to the number of opportunities at that distance, and inversely proportional to the number of intervening opportunities. Mathematically,

$$\frac{\Delta Y}{\Delta S} = \frac{a}{\mathrm{x}} \frac{\Delta \mathrm{x}}{\Delta S}$$

where, ΔY is the number of persons moving from origin to a circular area of width ΔS; x is the cumulated number of opportunities between origin and distance S, Δx is the number of opportunities within the area of width ΔS and a is a constant.

However, there are some difficulties in applying Stouffer's theory because the operational definition of opportunities and intervening opportunities has no definite norm. Stouffer (1960) himself mentioned that the gravity type models provide greater understanding than the models proposed by him. Later, several attempts have been made to modify the distance or intervening opportunities (Johnston, 1971) and population or opportunity factors (Hangerstand, 1957).

The idea of 'prior migrants' (relatives or friends who have had migrated earlier) has been incorporated as opportunity factor in the early seventies. Several researchers have used 'prior migrants' as an independent variable to explain the current flow of migration (Greenwood, 1971; Levy and Wadycki, 1973; Singh and Yadava, 1974, 1979; Sivamurthy and Kadi, 1984). According to these studies, gravity type models along with the variable 'prior migration' were found to be more capable of predicting the volume and direction of current flow of migration particularly in developing countries.

Singh and Yadava (1974) developed a set of migration models for single origin and multiple destinations incorporating prior migrants and extended their own model in 1979. Migration models for the pattern of migration in a given period of time from a fixed place of origin to different destinations proposed by Singh and Yadava (1974) are as follows:

$$\left.\begin{array}{ll} (a) & M_{jt} = \alpha M_{jt-1} + \beta Y_j \\ (b) & M_{jt} = \alpha M_{jt-1} + \beta e^{-z_j} \\ (c) & M_{jt} = M^{\alpha}_{jt-1} \cdot Y_j^{\beta} \end{array}\right\} \quad \ldots\ldots\ldots\ldots \quad (4.1)$$

where M_{jt} and M_{jt-1} denote the number of migrants to j^{th} place of destination at times t and (t-1) respectively, and

$P_j = \frac{O_j}{\sum_{i=1}^{n} O_j}$; $d_j = \frac{D_j}{\sum_{i=1}^{n} D_j}$; $Y_j = \frac{P_j}{d_j}$; $Z_j = \frac{1}{Y_j}$; O_j denotes the number of opportunities at the j^{th} place of destination and d_j is the relative distance of the j^{th} place of destination from the given origin.

The models proposed by Singh and Yadava (1974) are simple in nature with less number of parameters to be estimated and explained much more variation in migration pattern. However, the separate effects of distance and opportunities could not be studied. To overcome this limitation, Sivamurthy and Kadi (1984) suggested a model of migration as follows:

$$M_{jt} = k \frac{O_{jt}^{\beta_{1t}} \; M_{jt-1}^{\beta_{3t}}}{O_{it}^{\beta_{2t}} \; I_{jt}^{\beta_{4t}}} \varepsilon_{ij} \qquad \text{.....} \qquad (4.2)$$

where O_{it} is the number of opportunities at the fixed place of i at time t

M_{jt-1} is the number of stayers at time t among the past migrants from fixed origin i to destination j at time t-1

$ß_i$'s are parameters

I_{jt} is the number of intervening factors between fixed origin i and destination j at time t

ε_{ij} is the random error and k is proportionality constant

Further, Sivamurthy and Kadi extended their model (4.2) under the assumptions that there is a constant proportion p of past migrants (MS_{jt-1}) still staying up to time t and a certain proportion of past migrants returned, remigrated or died during the period (t-1, t); i.e. (M_{jt-1}=pMS_{jt-1}) and their extended model is

$$M_{jt} = \theta_0 \frac{O_{jt}^{(\beta_{1t} + \beta_{3t}\theta_1 b_{1t-1})} \; e^{\theta_2 \beta_{3t}(-b_{1t-1} r_j + b_{2t-1} r_i - b_{4t-1} h_j)}}{O_{it}^{(\beta_{2t} + \beta_{3t}\theta_1 b_{2t-1})} \; I_{jt}^{(\beta_{4t} + \beta_{3t}\theta_1 b_{4t-1})}} \qquad \text{.....(4.3)}$$

where $\theta_0 = e^{\beta_0 + \beta_{3t} \log p + \beta_{3t} b_0}$; b_0, b_1, b_2, b_3, b_4 are constants;

$\theta_1 = \frac{1-\lambda^m}{1-\lambda}$; $\theta_2 = \frac{1+\lambda^m(m\lambda - m - 1)}{(1-\lambda)^2}$, where $0 < \lambda < 1$; and r_i, r_j and h_j are the exponential growth rates in opportunities at origin (O_i) and destination (O_j) and intervening opportunities (I_j) respectively; and assumed that migration to the place of destination (O_j) began from past (t-m) periods.

However, the proportion of migrants returning or remigrating or dying will depend upon the number of past migrants during the time under consideration (Yadava *et al.*, 1989). Taking this fact into consideration model (4.3) was further extended as

$$M_{jt} = \theta_0' \frac{O_{jt}^{(\beta_1 + \beta_3 \theta_1' \beta_1)} \; e^{\theta_2' \beta_3 (-\beta_1 r_j + \beta_2 r_i - \beta_4 h_j + r_i)}}{O_{it}^{(\beta_2 + \beta_3 \theta_1' \beta_2)} \; I_{jt}^{(\beta_4 + \beta_3 \theta_1' \beta_4)}} \quad \text{..... (4.4)}$$

where $\theta_0' = e^{\beta_0 + \beta_3 \theta_1' \log k + \beta_3 \theta_1' \log \alpha}$; $\theta_1' = \frac{1-\beta_3^m}{1-\beta_3}$;

$\theta_2' = \frac{1+\beta_3^m(m\beta_3 - m - 1)}{(1-\beta_3)^2}$, and α is the proportionality constant.

Models (4.2), (4.3) and (4.4) contain a large number of parameters to be estimated from the observed data. However, it is difficult to fit these models with the limited number of destination places. To avoid these limitations, Sivamurthy and Kadi (1984) fitted the following form of model for the data of Singh and Yadava (1974).

$$M_{jt} = \beta_0 \frac{M_{jt-1}^{\beta_1}}{e^{\beta_2 D_j}} \varepsilon_{ij} \quad \text{.....} \quad (4.5)$$

where D_j is the geographical distance of the j^{th} place of destination. As mentioned earlier the contribution of distance was found to be insignificant. Singh (1986) fitted the following model to the same set of data of Singh and Yadava (1974) as

$$M_{jt} = \beta_0 \frac{M_{jt-1}^{\beta_1}}{e^{\beta_2 d_j}} \varepsilon_{ij} \quad \text{..... ....} \quad (4.6)$$

where $d_j = D_j / \sum_1^n D_j$ is the relative distance.

Keeping the idea in mind that neither model (4.5) nor model (4.6) provides a direct test of distance in Zipf's gravity form, Yadava *et al.* (1989) tested the following form of the model:

$$M_{jt} = \beta_0 \frac{M_{jt-1}^{\beta_1}}{D_j^{\beta_2}} \varepsilon_j \quad \text{.....} \quad (4.7)$$

4.3.1 Applications

As mentioned earlier, all the study villages/mauza's of Joypurhat district of Bangladesh are considered as single area for the application of the single origin and multiple destinations migration models. The persons who migrated during 2000-2007 are considered as 'current migrants' and those who migrated before 2000 are considered as 'prior migrants'. The destination places have been categorised on the basis of available facilities at the places as well as geographical locations. Among the cities of Bangladesh, the destination Dhaka (capital) is the most attractive because better opportunities for employment and studies are in existence in this city. Apart from Dhaka, the other destination places are considered as divisional headquarters (an administrative area) except Joypurhat and nearest Bogra. The destination place Joypurhat is the district head quarter and Bogra is the nearest urban area from the origin (study area) .

Table 4.5 shows the number of migrants along with some indicators of opportunity factors available at destination places. The opportunity factors considered here are prior migrants, urban density, urban population and urban area of the destination places. For the application of the models,

Table 4.5: Variables and their Values According to Destination Places

	Destination Places							
Variables	Dhaka	Rajshahi	Chittagong / Khulna	Sylhet/ Barishal	Joypurhat	Bogra	Dinajpur	Rangpur
Current Migrants*	254	27	11	8	69	64	8	17
Prior Migrants*	62	8	15	5	20	17	13	3
Total Migrants	316	35	26	13	89	81	21	20
Distance (Km.)	296	80	554	632	10	57	127	93
Urban Population**	7794070	843625	4665931	828165	121305	389069	370864	457234
Urban Area (Sq. Km.)**	820.73	376.96	1573.85	272.98	61.88	74.74	103.54	127.92

* Current migrants indicate the number of migrants during2000-2007 and those who migrated before 2000 were considered as prior migrants

** Figures have been taken from BBS (Census- 2001).

the destination places (Cittagoan & Khulna), and (Barishal & Sylhet) are treated as one since only a small number of migrants found migrated to those places from the study area. This is due to the fact that these four divisions are located to Southern and Eastern part of the country and the study area is the Northern part of Bangladesh.

Models (4.5) to (4.7) have been applied to the data set given in Table 4.5. These models may provide better understanding when variable 'prior migrants' is replaced by other opportunity factors like urban population, urban density, urban area *etc.* Indeed, the use of prior migrants as an opportunity factor has the limitation that the models explain the migration with the help of migration itself. Therefore, the 'prior migrants' is replaced by the 'urban population' of a particular place of destination which is considered as an indicator of employment opportunities and hence the above models take form as:

$$M_{jT} = \beta_0 \frac{U_{jt}^{\beta_1}}{e^{\beta_2 D_j}} \varepsilon_{ij} \qquad \text{.....} \qquad (4.8)$$

$$M_{jT} = \beta_0 \frac{U_{jt}^{\beta_1}}{e^{\beta_2 d_j}} \varepsilon_{ij} \qquad \text{.....} \qquad (4.9)$$

$$M_{jT} = \beta_0 \frac{U_{jt}^{\beta_1}}{D_j^{\beta_2}} \varepsilon_j \qquad \text{.....} \qquad (4.10)$$

where U_{jt} = number of urban population at the j^{th} place by destination at time t, and M_{jT} = total number of migrants from place i to j (i.e. $M_{jT} = M_{jt} + M_{jt-1}$).

Models (4.8) to (4.10) have also been tested by taking urban density as well as urban area instead of urban population as an opportunity factor. Several authors (Claeson, 1968; Levy and Wadycki, 1973) have used logarithm of the distance instead of distance between the two places of migration. Models (4.8) to (4.10) have also been tested here by taking logarithm of distance instead of distance. Moreover, models proposed by Singh and Yadava

(1974) have also been tested for the observed set of data collected from rural areas of Bangladesh.

Explanatory power of these models along with estimated values of the parameters are given in Table 4.6. The coefficient of determination for the model proposed by Sivamurthy and Kadi (1984) was found to be 0.657, 0.489, 0.470 and 0.274 if opportunity factors were prior migrants, urban density, urban population and urban area respectively. The model proposed by Yadava *et al.* (1989), the coefficient of determination were prior migrant(.630) urban density (0.691), urban population (0.717) and urban area (0.286) as opportunity factors. Further, the coefficients were found to be insignificant for all the opportunity factors except 'urban population ' for the model of Yadava *et al.* (1989). It is to be noted that the explanatory power of both the models [Sivamurthy and Kadi (1984) and Yadava *et al.* (1989)] were found lower when fitted with logarithm of distance instead of using direct distance. All the coefficients for both models were found insignificant indicating that these models become insignificant if distance is replaced by logarithm of distance.

It is interesting to note that the models proposed by Singh (1986) exhibited same variation as explained by the model of Sivamurthy and Kadi (1984). This indicates that relative distance and actual distance provided same variation in the migration process. This is due to the fact that while considering relative distance instead of distance, only the values of the distance has been shifted by using some scale (here total distance). Since regression coefficient is changed due to scale, so only the estimated value of β_2 may change. The results of Table 4.6 also supported this logic. The models of Sivamurthy and Kadi (1984) and Singh (1986) provided same result except the coefficient β_2 (coefficient related to distance / relative distance) and its standard error. Therefore, it is not exaggerated to state that there is no justification for using relative distance instead of distance.

Explanatory power along with the estimated value of the parameters of the models proposed by Singh and Yadava (1974) is shown in the bottom of Table 4.6.

Table 4.6: Estimated Coefficients and Explanatory Powers of the Models*

Models	Dependent (Y) and Independent Variables (X)				
	Current Migrants$^{(Y)}$ Prior migrants$^{(X)}$ and Distance$^{(X)}$	Total Migrants$^{(Y)}$ Urban Density$^{(X)}$ and Distance$^{(X)}$	Total Migrants$^{(Y)}$ Urban Population$^{(X)}$ and Distance$^{(X)}$	Total Migrants$^{(Y)}$ Urban Area$^{(X)}$ and Distance$^{(X)}$	Total Migrants$^{(Y)}$ Urban Population$^{(X)}$ and log of Distance$^{(X)}$
Sivamurthy and Kadi (1984)	β_1=0.949 (0.350) β_2=0.0007 (0.001) β_0=3.80 (.432) R^2=0.657 F=4.781🖫	β_1=1.317(.681) β_2=0.00074 (0.001) β_0=.0013 (2.412) R^2=0.489 F=2.389	β_1=0.586 (0.317) β_2=0.00152 (0.001) β_0=0.0329 (1.770) R^2=0.470 F=2.215	β_1=0.509 (0.473) β_2=0.00136(0.001) β_0=5.530 (0.988) R^2=0.274 F=.944	β_1=0..936🖫 (0..283) β_2=0.847🖫 (0.251) β_0=.0069 (1.322) R^2=0.717 F=6.327🖫
Yadava *et al* (1989)	β_1=0.941🖫 (0..364) β_2=0.239 (0.217) β_0=8.203 (.640) R^2=0.630 F=4.263	β_1=-1.793🖫 (.576) β_2=0.444 (0.185) β_0=.00014 (1.926) R^2=0.691 F=5.603	β_1=0.936🖫 (0.283) β_2=.847🖫 (0.251) β_0=.0068 (1.322) R^2=0.717 F=.523🖫	β_1=0.579 (0.500) β_2=.530 (0..377) β_0=22.438 (.825) R^2=0. F=1.002	β_1=0.803🖫 (0.308) β_2=2.546🖫 (2.4815) β_0=.004 (1.641) R^2=0.616 F=4.003
Singh (1986)	β_1=0.951🖫 (0.350) β_2=1.408 (1.087) β_0=3.80 (.433) R^2=0.656 F=4.776	β_1=1.308 (.685) β_2=1.358 (1.143) β_0=.0014 (2.427) R^2=0.482 F=2.325	β_1=0.573 (0.318) β_2=2.766 (1.473) β_0=.038 (1.708) R^2=0.457 F=2.102	β_1=0.498 (0.473) β_2=2.481 (0.1.859) β_0=5.84 (.987) R^2=0.267 F=.908	β_1=0.930🖫 (0.301) β_2=1.074🖫 (.345) β_0=.00008 (2.100) R^2=0.655 F=5.438
Singh and Yadava (1974)	(a) β_1=4.230🖫 (0.498); β_2=1.060 (2.497); β_0=-21.147 (12.454); R^2=0.943; F=41.292🖫 (b) β_1=3.977🖫 (0..526); β_2=29.502 (27.485); β_0=--25.865 (12.378); R^2=0.952; F=49.508🖫 (c) β_1=0.529 (0.375); β_2=0.404 (0.201); β_0=0.878 (.425); R^2=0.746; F=7.332🖫				

🖫 $p<0.05$;

* Figures in parenthesis indicate standard errors of the estimates

The coefficient of determination were obtained as 0.943, 0.952 and 0.746 for models 4.1(a), 4.1(b) and 4.1(c) respectively. Though the explanatory power of the models were found reasonably high, all the coefficients were found insignificant.

The findings discussed above indicated that the model proposed by Sivamurthy and Kadi (1984) provides the better fit while considering the opportunity factors 'urban population' and 'urban area'. Whereas, model proposed by Yadava *et al.* (1989) showed reasonably better pattern of migration with the opportunity factor 'prior migrants'. However, it is advantageous to study the volume and direction of migration by using factors other than 'prior migrants' due to its limitations as mentioned earlier. This study suggests that urban population and urban area may be taken as opportunity factors to describe the volume and direction of migration at least in Bangladesh situation.

4.4 Conclusions

The volume of migration showed a positive relationship with the diversity of education, occupation and social status. The regression coefficient of occupational diversity has been found to be significantly related with the volume of out-migration. The maximum percentage of variation in migration was accounted for by occupation, followed by education and socio-economic status. The higher value of R^2 indicates that the Lee theory may be, by and large, acceptable for the society like Bangladesh.

Migration models for single area to multiple destinations proposed by a number of authors have been applied to the Bangladesh data by considering different opportunity factors. The study indicated that the model proposed by Sivamurthy and Kadi (1984) along with the opportunity factors 'urban population' and 'urban area' are more capable to describe the volume of out-migration in Bangladesh.

Chapter 5

Some Probability Models for the Number of Migrants

5.1 Introduction

In the previous chapter some differentials and determinants of migration have been discussed in details. Recently, demographers and other social scientists have given their due attention on the formulation of models and their applications due to its usefulness and applicability in social sciences. This chapter is concerned with some mathematical modelling to study the distribution of households according to number of migrants from the rural areas.

In many developing countries like Bangladesh, two types of households are usually observed according to the occurrence of migration. First, the households from where male members aged 15 years and above migrate singly leaving their wives and children at home, and second where male members migrate with their wives, children and other dependent relatives. It is to be mentioned here that persons migrating from both types of households maintain close tie with remaining (non-migrant) members of the households left behind at the place of origin through regular visit and sending remittances. However, first category maintains closer tie than the second category of the households.

Several attempts have been made to study the pattern of rural out-migration through the use of probability models (Iwunor, 1995; Sharma, 1988; 1987; 1985; Singh and Yadava, 1981; Yadava, 1993; Yadava and Singh, 1983; Yadave *et. al.* 1991; 1994). In 1981, Singh and Yadava proposed negative binomial distribution to describe the trend of rural out-migration for male migrants aged 15 years and above. The idea of cluster was incorporated by Yadava and Singh (1983) and found that Thomas distribution is well suited to describe the number of migrants from a household. Yadava and Yadava (1988) extended the idea of cluster and assumed that the occurrence of migration in cluster varies from household to household and the number of migrants to a cluster follows truncated displaced geometric distribution. A probability distribution under such assumptions fitted well the distribution of male

migrants aged 15 years and above. However, the above mentioned models do not fit the distribution of total number of migrants including wife and children from a household.

A number of probability models have been worked out to describe the distribution of households according to total number of migrants under different assumptions. Sharma (1984) proposed a probability model under the assumptions that (i) the number of male migrants aged 15 years and above follows negative binomial distribution and (ii) the distribution of alive children to a couple be known. However, the distribution of children alive to a couple has not yet been derived theoretically, so the prior knowledge about these two distributions is difficult. Singh (1985) proposed a probability model for the total number of migrants under the assumption that there are two types of households - first, in which only male aged 15 years and above migrate, and second, in which the male migrates with their wives and children. On the same line, several authors have proposed models to describe the distribution of households according to the total number of migrants including wife and children (Kushwaha, 1992; Sharma, 1987; Singh, 1990; 1992; Yadava, 1993; Yadava and Yadava, 1988; Yadava *et. al.*, 1989; 1994).

However, most of the studies mentioned above have used moment technique or mean-zero frequency method (equating observed and theoretical zero'th cell frequencies and means) to estimate the parameters involved in the models. Under these techniques of estimation, it is observed that about 80 to 85 per cent variation in migration is equated through zero'th cell frequencies since all the non-migrant households are counted in this cell (see tables). So, only about 15 to 20 per cent variation are explained by the estimated parameters when mean-zero frequency method is applied. Further, moment estimates are usually consistent, but they are often less efficient. Considering these limitations into account, the maximum likelihood estimation technique is proposed in this study to estimate the parameters involved in the models. Needless to mention that the maximum likelihood method has the advantage that the standard error of the estimators can also be obtained and this method measures the total variation of the distribution. Further, the estimates obtained by this method have the optimum properties in terms of consistency and efficiency. Thus, the specific objectives of this chapter are: (i) to propose a model to describe the

distribution of male migrants aged 15 years and above, and (ii) to use maximum likelihood technique to estimate the parameters of the model proposed by Sharma (1985) for male migrants aged 15 years and above, and models proposed by Singh (1992) and Yadava (1993) for the total number of migrants.

This chapter is covered by two steps. First step, some probability models for male migrants aged 15 years and above has been proposed. Further, an estimation technique based on maximum likelihood method has been proposed to estimate the parameters of the model proposed by Sharma (1985). Second step, the probability model for total number of migrants have been discussed. This section consists of the estimation technique of the model proposed by Singh (1992) and Yadava (1993) for total number of migrants. The models have also been applied to several sets of data collected from rural areas of Joypurhat district as well as rural areas of Comilla district in Bangladesh.

5.2 Probability Models for Male Migrants Aged 15 Years and Above

5.2.1 Model A_1

A probability model for describing the variation in the number of rural male out-migrants aged 15 years and above from a households has been derived on the basis of following assumptions:

(i) At the survey point, the household is either exposed to the risk of migration or it is not exposed to the migration risk. Let α and $(1-\alpha)$ be the respective probabilities.

(ii) The probability of migrating one male from a household is greater than the probability of migrating two males, and probability of two males migrating is greater than that of three males from a household and so on. Thus, the pattern of migration from a household is a decreasing function and follows a logarithmic series distribution with parameter λ.

Let x represent the number of male rural out-migrants aged 15 years and above from a household, then under the assumptions (i) and (ii), the probability function of x is given by

$$\left.\begin{aligned} P(x=k) &= 1-\alpha, && \text{for } k=0 \\ &= \alpha\left[\frac{-\lambda^{k}}{k\log(1-\lambda)}\right] && \text{for } k=1,2,3,\ldots;\ 0<\lambda<1;\ 0<\alpha<1 \end{aligned}\right\} \quad \ldots\ldots\ldots (5.1)$$

The log-series distribution has a long positive tail and the shape of the tail is similar to that of geometric distribution for large values of k. However, the log-series distribution have the advantage that it has only one parameter instead of two parameters of Negative Binomial Distribution (Chatfield *et.al.*, 1966).

5.2.1.1 Estimation

Consider a sample consisting of n observations of the random variable x with probability function given by expression (5.1). Suppose that n_k (k = 0, 1,2, …, m) represents the number of observations of k'th cell and $\sum_{k=0}^{m} n_k = n$. The likelihood function for the given sample (x_1, x_2, …, x_n) can be expressed as :

$$L[\alpha,\lambda \mid (x_1, x_2,\ldots,x_n)] = (1-\alpha)^{n_0} \prod_{k=1}^{m}\left[\alpha\left(\frac{-\lambda^{k}}{k\log(1-\lambda)}\right)\right]^{n_k} \quad \ldots\ldots\ldots\ldots\ldots (5.2)$$

$$= \frac{(1-\alpha)^{n_0}(-\alpha)^{n-n_0}\lambda^{\sum_{k=1}^{m} n_k x_k}}{\left(\prod_{k=1}^{m} x_k^{n_k}\right)[\log(1-\lambda)]^{n-n_0}} \quad \ldots\ldots\ldots\ldots\ldots (5.3)$$

where x_k represents the value of k.

Taking logarithms of (5.3) and differentiating with respect to α and λ respectively and equating to zero gives the following equations:

$$\frac{\partial \log L}{\partial \alpha} = -\frac{n_o}{1-\alpha} + \frac{n-n_o}{\alpha} = 0 \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (5.4)$$

$$\frac{\partial \log L}{\partial \lambda} = \frac{\sum_{k=1}^{m} n_k x_k}{\lambda} + \frac{n-n_0}{(1-\lambda)\log(1-\lambda)} = 0 \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (5.5)$$

The equation (5.4) yields the estimator of α as

$$\hat{\alpha} = \frac{n-n_0}{n}$$

The estimating equation for λ is obtained by solving equation (5.5) as :

$$(1-\lambda)\log(1-\lambda)\sum_{k=1}^{m} n_k x_k + (n - n_0)\lambda = 0 \quad \ldots\ldots\ldots\ldots\ldots\ldots \quad \ldots.(5.6)$$

This equation can not be solved analytically, but it can be solved numerically and the numerical solution of (5.6) is the desired maximum likelihood estimate for λ.

The second partial derivatives of logL are as follows:

$$\frac{\partial^2 \log L}{\partial \alpha^2} = -\frac{n_0}{(1-\alpha)^2} - \frac{n-n_0}{\alpha^2} \quad \ldots\ldots\ldots\ldots\ldots\ldots \quad (5.7)$$

$$\frac{\partial^2 \log L}{\partial \lambda^2} = -\frac{\sum_{k=1}^{m} n_k x_k}{\lambda^2} + \frac{(n-n_0)[1+\log(1-\lambda)]}{[(1-\lambda)\log(1-\lambda)]^2} \quad \ldots\ldots\ldots\ldots\ldots\ldots \quad (5.8)$$

$$\frac{\partial^2 \log L}{\partial \alpha \partial \lambda} = 0 \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \quad (5.9)$$

Using the fact that $E(n_0) = n(1-\alpha)$, $E(n-n_0) = n\alpha$

$$E(x_k) = \frac{-\alpha\lambda}{(1-\lambda)\log(1-\lambda)} \text{ and } E\left(\sum_{k=1}^{m} n_k x_k\right) = -\frac{n\alpha\lambda}{(1-\lambda)\log(1-\lambda)}$$

The expected values of second partial derivatives are obtained as

$$-E\left(\frac{\partial^2 \log L}{\partial \alpha^2}\right) = -\frac{E(n_0)}{(1-\alpha)^2} - \frac{E(n-n_0)}{\alpha^2} = \frac{n}{\alpha(1-\alpha)} = \varphi_{11} \text{ (say)} \quad \ldots\ldots\ldots\ldots\ldots (5.10)$$

$$-E\left(\frac{\partial^2 \log L}{\partial \lambda^2}\right) = -\frac{E\left(\sum_{k=1}^{m} n_k x_k\right)}{\lambda^2} + \frac{[1+\log(1-\lambda)]E(n-n_0)}{[(1-\lambda)\log(1-\lambda)]^2}$$

$$= -n\alpha\left[\frac{1}{\lambda(1-\lambda)\log(1-\lambda)} + \frac{1+\log(1-\lambda)}{[(1-\lambda)\log(1-\lambda)]^2}\right] = \phi_{22} \text{ (say)} \ldots\ldots\ldots \quad (5.11)$$

The covarinace between α and λ is zero since $E\left(\frac{\partial^2 \log L}{\partial \alpha \partial \lambda}\right) = 0$ and hence the variance of α and λ can be obtained as

$$v(\hat{\alpha}) = \frac{1}{\phi_{11}} \quad \text{and} \quad v(\hat{\lambda}) = \frac{1}{\phi_{22}}$$

5.2.2 Model A_2

Sharma (1985) has proposed a probability model for the number of rural male out-migrants aged 15 years and above from a household under the following assumptions:

(i) At any point in time, let α be the probability migrating out from a household and $(1-\alpha)$ be the probability of not migrating from a household.

(ii) If p represents the probability of a single individual migrating from a household, the pattern of migration from each household follows the geometric distribution.

If x represents the number of migrants from a household, then x follows the inflated geometric distribution with probability density function as

$$\left.\begin{aligned} P(\mathrm{x}=0) &= 1-\alpha+\alpha\,\mathrm{p} \\ P(\mathrm{x}=\mathrm{k}) &= \alpha\, q^{k} p \quad \text{for k} = 1,\ 2,\ 3,\ \ldots. \end{aligned}\right\} \qquad \ldots\ldots\ldots\ldots \qquad (5.12)$$

where $p+q=1$.

As mentioned above, Sharma (1985) used method of moments to estimate the parameters α and p of model (5.12) and obtained the asymptotic expressions for variance and covariance of the estimators using multivariate central limit theorem. Iwunor (1995) proposed an alternative estimation technique based on likelihood function and obtained the variance and covariance of the estimators. Though he used the likelihood function using multinomial combination, but finally estimated the parameters by mean-zero frequency method. Here, an alternative estimation technique based on likelihood function is worked out (in the following sub-section) by using all the observations to estimate the parameters. The expressions for exact variance and covariance of the estimators have also been derived.

5.2.2.1 Estimation

Let $(X_1, X_2, \ldots, X_n)$ denote a random sample of size n from the above probability model. Further, let n_k (k=0, 1, 2, ..., m) denote the number of observations corresponding to the k^{th} cell. The likelihood function for estimating the parameters α and p can be expressed as:

$$L = (1-\alpha+\alpha p)^{n_0} \prod_{k=1}^{m} \left(\alpha p q^{k}\right)^{n_k}$$

$$= (1-\alpha+\alpha p)^{n_0}\,\alpha^{n-n_0}\,p^{n-n_0}\,q^{s} \qquad \text{..... (5.13)}$$

where, $n_0 + n_1 + n_2 + \ldots + n_m = n$ and $S = n_1 + 2n_2 + 3n_3 + \ldots + mn_m = \sum_{k=1}^{m} n_k x_k$,

x_k represents the value of k.

Taking logarithms of the likelihood function (5.13) and differentiating with respect to α and p respectively and equating to zero gives the following estimating equations:

$$\frac{\delta \log L}{\delta \alpha} = \frac{n_0(p-1)}{(1-\alpha+\alpha p)} + \frac{n-n_0}{\alpha} = 0 \qquad \text{..... (5.14)}$$

$$\frac{\delta \log L}{\delta p} = \frac{n-n_0}{p} - \frac{s}{1-p} + \frac{n_0\alpha}{(1-\alpha+\alpha p)} = 0 \qquad \text{..... (5.15)}$$

Solution of equation (5.14) provides the estimate of α as

$$\hat{\alpha} = \frac{n-n_0}{n(1-p)}$$

Substituting the value of α and after rearranging equation (5.15) yields the estimator of p as

$$\hat{p} = \frac{n-n_0}{\sum_{k=1}^{m} n_k x_k}$$

The second partial derivatives of *LogL* can be obtained as

$$\frac{\delta^2 \log L}{\delta \alpha^2} = \frac{-n_0(p-1)^2}{(1-\alpha+\alpha p)^2} - \frac{(n-n_0)}{\alpha^2} \qquad \text{..... (5.16)}$$

$$\frac{\delta^2 \log L}{\delta p^2} = -\frac{n-n_0}{p^2} - \frac{S}{(1-p)^2} - \frac{n_0\alpha^2}{(1-\alpha+\alpha p)^2} \qquad \text{..... (5.17)}$$

$$\frac{\delta^2 \log L}{\delta \alpha\, \partial p} = \frac{n_0}{(1-\alpha+\alpha p)^2} \qquad \text{..... (5.18)}$$

Using the fact $E(n_0) = nP(x=0) = n(1-\alpha+\alpha p)$ and $E(n-n_0) = n\alpha(1-p)$, the expected value of second partial derivatives of *LogL* can be obtained as

$$-E\left(\frac{\delta^2 \log L}{\delta \alpha^2}\right) = \frac{n(1-p)}{\alpha(1-\alpha+\alpha p)} = \phi_{11}(\text{say}) \qquad \text{..... (5.19)}$$

$$-\mathrm{E}\left(\frac{\delta^2 \log L}{\delta p^2}\right) = \frac{\mathrm{n}\alpha\mathrm{q}}{\mathrm{p}^2} + \frac{n\alpha}{pq} + \frac{n\alpha^2}{1-\alpha+\alpha p} = \phi_{22}(\text{say}) \quad \text{.....(5.20)}$$

$$-E\left(\frac{\delta^2 \log L}{\delta\alpha\, \partial \mathrm{p}}\right) = -\frac{n}{(1-\alpha+\alpha p)} = \phi_{12}(\text{say}) \quad \text{.....(5.21)}$$

Therefore, by inverting the information matrix, the expressions for variances and covariance of the estimators can be obtained as

$$\left.\begin{aligned} V(\hat{\theta}) &= \frac{\phi_{22}}{\phi_{11}\phi_{22} - \phi_{12}^{\,2}} \\ V(\hat{p}) &= \frac{\phi_{11}}{\phi_{11}\phi_{22} - \phi_{12}^{\,2}} \\ \text{and } \operatorname{cov}(\hat{\theta}, \hat{\mathrm{p}}) &= \frac{\phi_{12}}{\phi_{11}\phi_{22} - \phi_{12}^{\,2}} \end{aligned}\right\} \quad \text{.....(5.22)}$$

5.2.3 Applications

Table 5.1 shows the estimated values of the parameters, variances and covariance, observed and expected number of households according to the number of male migrants (aged 15 years and above) for household cohorts of Bangladesh. The corresponding results for Comilla district data are shown in Table 5.2. The findings obtained from Model A_2 are also compared by the results found under different estimation methods (present method, Iwonor's method and Sharma's method).

Table 5.1: Distribution of Observed and Expected Number of Households According to the Number of Male Migrants Aged 15 Years and Above in Joypurhat, Bangladesh

Number of migrants per household	Household Cohort					
	Including International Migrants			Excluding International Migrants		
	Observed	Expected (Model A_1)	Expected (Model A_2)	Observed	Expected (Model A_1)	Expected (Model A_2)
0	1535	1535.01	1535.05	1535	1535.048	1535.05
1	300	301.434	270.678	268	262.22	240.069
2	62	88.110	108.920	49	75.94	93.026
3	45	34.339	43.829	38	29.313	36.047
4	35	15.056	17.637	28	12.729	13.968
5	7	7.0414	7.097	6	5.896	5.413
6	4			3		
7	0	6.028	4.467	0	4.972	3.225
8	0			0		
Total	1988	1988	1988	1927	1927	1927
χ^2		38.15	40.56		31.36	38.65
d.f.		4	4		4	4
$\hat{\alpha}$		.2278	.5662		.2034	.5289
$\hat{\lambda}$		.5846			..5790	
$\hat{p}$			.5976			.6125
$v(\hat{\alpha})$		8.84×10^{-5}	1.17×10^{-3}		8.40×10^{-5}	1.11×10^{-3}
$v(\hat{\lambda})$		3.87×10^{-5}			4.57×10^{-5}	
$v(\hat{p})$			3.17×10^{-4}			3.02×10^{-4}
$Cov(\hat{\alpha}\ \hat{\lambda})$		.000000			.00000	
$Cov(\hat{\alpha}, \hat{p})$			4.46×10^{-4}			4.10×10^{-4}

Table 5.2: Distribution of Observed and Expected Number of Households According to the Number of Male Migrants Aged 15 Years and Above in Comilla, Bangladesh

Number of migrants per household	HOUSEHOLD COHORT					
	Including International Migrants			Excluding International Migrants		
	Observed	Expected (Model A_1)	Expected (Model A_2)	Observed	Expected (Model A_1)	Expected (Model A_2)
0	1941	1941.00	1941.33	1941	1941.00	1941.00
1	542	546.44	529.47	296	303.38	292.33
2	124	125.69	146.49	79	73.95	86.91
3	48	38.55	40.53	29	24.04	25.84
4	13	13.30	11.21	9		
5	4			3		10.93
6	1	8.02	4.29	0	14.63	
7	0			0		
8	0			0		
Total	2673	2673	2673	2357	2357	2357
χ^2		3.519	5.68		2.022	1.26
d.f.		3	3		2	2
$\hat{\alpha}$		0.2738	0.9898		0.1765	0.5937
$\hat{\lambda}$		0.4600			0.4875	
$\hat{p}$			0.7233			0.7027
$v(\hat{\alpha})$		7.44×10^{-5}	0.00350		6.17×10^{-5}	0.00211
$v(\hat{\lambda})$		0.00045			0.00076	
$v(\hat{p})$			0.00020			0.00035
$Cov(\hat{\alpha},\hat{\lambda})$		0.00000			0.00000	
$Cov(\hat{\alpha},\hat{p})$			-0.00071			-0.00070

The estimated value of risk parameter α under Model A_1 was found 0.2278 when 'international migrants' households were included and 0.2034 when 'international migrants' households were excluded. The corresponding values obtained from Model A_2 were found 0.5662 and 0.5249 when 'international migrants' were included and excluded respectively. The higher value of $\hat{\alpha}$ in former case by both the models indicated that households with international migrants have a greater chance of sending males out than households without international migrants. However, not much variation in the estimated value of λ was found in both the household cohorts. The estimated value of λ was found .46 and .48 for households the villages, while the estimated value of α was found as .27 and 0.18 corresponding households of the villages. It is observed that the estimated value of λ was nearly constant, while there is variation in $\hat{\alpha}$. The higher value of $\hat{\alpha}$ for 'Including International Migrants' of households indicated that such households have a greater chance of migration than from 'Excluding International Migrants' of households. Also a slightly higher estimated value of p was found in 'including international migrant' household cohort, which indicates that the probability of migration of an individual from a household was higher among the residents having international migrant in the households.

The values of χ^2 at 5 per cent level of significance for all the five household cohorts indicate the suitability of the proposed model (A_1) as a reasonable approximation to describe the distribution of rural out-migration at least at the micro-level.

The estimates of the parameters obtained by using maximum likelihood method (proposed method) were found almost identical with those obtained by using mean zero frequency method (Iwonor's method) and method of moments (Sharma's method) (Table 5.2). Here the value of $\hat{\alpha}$ showed a wide variation over the type of Includung International Migrants and Excluding International Migrants houselods, while $\hat{p}$ was nearly constant. Though the variances of the estimators and their covariance obtained by Sharma's method were found smallest, his method of estimation provides somewhat crude approximation, whereas the proposed method provides an exact estimates of variances and their covariance. Further, these were found smaller than Iwonor's method.

5.3 Probability Models for Total Number of Migrants

5.3.1 Model B

Yadava (1993) proposed a probability model to describe the distribution of households according to total number of migrants and used mean-zero frequency method to estimate the parameters. He applied the proposed model to the Varanasi data of India. As said earlier, the maximum likelihood estimation technique is proposed here to estimate the parameters and expression for variances and coveriances of the estimated parameters have been obtained.

In brief, Yadava's (1993) model is as follows:

i. At the survey point, let β be the proportion of households which poses at-least one migrants

ii. Out of β proportion of households, let ξ be the proportion of households which poses only one migrants at the survey point.

iii. Out of $(1-\xi)\beta$ proportion of households, let π be the proportion of households from which only males $\geq$ 15 years migrate and $(1-\pi)$ be the proportion of households which poses both types of migrants (males $\geq$ 15 years as well as males with their families).

iv. The number of migrants from a household follows a mixture of two displaced geometric distributions with π proportion of households from which only males aged 15 years migrates and $(1-\pi)$ be the proposition of households from which both type of migration occur.

v. Let p_1 and p_2 be the probability of migration of a person form π and $(1-\pi)$ proportions of households respectively.

Based on above assumptions, the probability distribution for the total number of migrants, x , is given by

$$p(x=k) = 1-\beta \quad \text{if } k = 0$$

$$= \xi\beta \quad \text{if } k=1$$

$$= (1-\xi)\beta \{\pi p_1 q_1^{k-2} + (1-\pi) p_2 q_2^{k-2}\} \text{ if } k=2, 3, \ldots\ldots\ldots\ldots \quad (5.23)$$

Model (5.23) involves five parameters (β, ξ, π, p_1, p_2) which is difficult to estimate from the observed data. If it is assume that $p_1=p_2=p$(say), i.e. probability of migration from both types of household is same, the model becomes as:

$$\begin{aligned} p(x=k) &= 1-\beta \qquad \text{for } k = 0 \\ &= \xi\beta \qquad \text{for } k=1 \\ &= (1-\xi)\beta\, pq^{k-2} \text{ for } k=2, 3, \ldots\ldots\ldots\ldots \end{aligned} \qquad (5.24)$$

5.3.1.1 Estimation

The model (5.24) involves three parameters ξ, β and p to be estimated from the observed distribution of total number of migrants from households. Let x_1, x_2, …,x_n denote a random sample of size n from the population (5.24). Further, suppose that n_k (k=0,1,2, ..., m) be the number of observations corresponding to the value of k and $\sum_{k=0}^{m} n_k = n$. The likelihood function for the given sample can be expressed as

$$= (1-\beta)^{n_0}\, \xi^{n_1}\, \beta^{n-n_0}\, (1-\xi)^{n-n_0-n_1}\, p^{n-n_0-n_1}\, q^{\sum_{k=3}^{m}(k-2)n_k} \qquad \ldots\ldots\ldots\ldots(5.25)$$

Taking logarithms of (5.25) and differentiating with respect to β, ξ and p respectively and equating to zero, we get

$$\frac{\delta \log L}{\delta \beta} = -\frac{n_0}{1-\beta} + \frac{n-n_0}{\beta} = 0 \qquad \ldots\ldots\ldots\ldots \qquad (5.26)$$

$$\frac{\delta \log L}{\delta \xi} = \frac{n_1}{\xi} - \frac{n-n_0-n_1}{1-\xi} = 0 \qquad \ldots\ldots\ldots\ldots \qquad (5.27)$$

$$\frac{\delta \log L}{\delta p} = \frac{n-n_0-n_1}{p} - \frac{\sum_{k=3}^{m}(k-2)n_k}{1-p} = 0 \qquad \ldots\ldots\ldots\ldots \qquad (5.28)$$

Solving equations (5.26), (5.27) and (5.28) the estimators of β, ξ and p can easily be obtained as

$$\hat{\beta} = \frac{n-n_0}{n}, \quad \hat{\xi} = \frac{n_1}{n-n_0} \quad \text{and} \quad \hat{p} = \frac{n-n_0-n_1}{(n-n_0-n_1) + \sum_{k=3}^{m}(k-2)n_k}$$

The second partial derivations of logL can be obtained as:

$$\frac{\delta^2 \log L}{\delta\beta^2} = -\frac{n_0}{(1-\beta)^2} - \frac{n-n_0}{\beta^2} \quad \ldots\ldots\ldots\ldots\ldots\ldots \quad (5.29)$$

$$\frac{\delta^2 \log L}{\delta\xi^2} = -\frac{n_1}{\xi^2} - \frac{(n-n_0-n_1)}{(1-\xi)^2} \quad \ldots\ldots\ldots\ldots\ldots\ldots \quad (5.30)$$

$$\frac{\delta^2 \log L}{\delta p^2} = -\frac{(n-n_0-n_1)}{p^2} - \frac{\sum_{k=3}^{m}(k-2)n_k}{(1-p)^2} \quad \ldots\ldots\ldots\ldots\ldots\ldots \quad (5.31)$$

$$\frac{\delta^2 \log L}{\delta\beta\delta\xi} = \frac{\delta^2 \log L}{\delta\beta\delta p} = \frac{\delta^2 \log L}{\delta\xi\delta p} = 0 \quad \ldots\ldots\ldots\ldots\ldots\ldots \quad (5.32)$$

Here, $E(n_0) = n(1-\beta)$, $E(n_1) = n\xi\beta$, $E(n_k) = n(1-\xi)\beta pq^{k-2}$ for k=2,3...,m.

Again $E(n-n_0) = np$, $E(n-n_0-n_1) = n\beta(1-\xi)$

$$E[\sum_{k=3}^{m}(k-2)n_k] = E[n_3 + 2n_4 + 3n_5 + \ldots + (m-2)n_m]$$

$$= n(1-\xi)\beta pq[1 + 2q + 3q^2 + \ldots + (m-2)q^m]$$

$$= n(1-\xi)\beta q[\frac{1-q^{m-2}}{p} - (m-2)q^{m-2}] \text{ for small m} \quad \ldots\ldots (5.33)$$

$$= \frac{n(1-\theta)\beta q}{p} \quad \text{for large m} \quad \ldots\ldots (5.34)$$

Using the above facts, the expected values of the second partial derivatives can be obtained as:

$$-E(\frac{\delta^2 \log L}{\delta\beta^2}) = \frac{E(n_0)}{(1-\beta)^2} - \frac{E(n-n_0)}{\beta^2} = \frac{n}{\beta(1-\beta)} = \phi_{11}(say) \quad \ldots\ldots (5.35)$$

$$-E(\frac{\delta^2 \log L}{\delta\xi^2}) = \frac{E(n_1)}{\xi^2} + \frac{E(n-n_0-n_1)}{(1-\xi)^2} = \frac{n\beta}{\xi(1-\xi)} = \phi_{22}(say) \quad \ldots\ldots (5.36)$$

$$-E(\frac{\delta^2 \log L}{\delta p^2}) = \frac{E(n-n_0-n_1)}{p^2} + \frac{E[\sum_{k=3}^{m}(k-2)n_k]}{(1-p)^2}$$

$$= \frac{n\beta(1-\xi)q + n(1-\xi)\beta p[1-q^{m-2} - (m-2)pq^{m-2}]}{p^2 q}$$

$$= \phi_{33}(a)(say), \quad \text{for small m} \quad \ldots\ldots (5.37)$$

and $-E(\frac{\delta^2 \log L}{\delta p^2}) = \frac{n\beta(1-\xi)}{p^2 q} = \phi_{33}(b)(say)$, for large m ..... (5.38)

The covariances between the estimators becomes zero since

$E(\frac{\delta^2 \log L}{\delta\beta\delta\xi}) = E(\frac{\delta^2 \log L}{\delta\xi\delta p}) = E(\frac{\delta^2 \log L}{\delta\beta\delta p}) = 0$ and hence the variances of the estimators can be obtained as:

$$\left.\begin{aligned} V(\hat{\beta}) &= \frac{1}{\phi_{11}}, \quad V(\hat{\xi}) = \frac{1}{\phi_{22}}, \text{ and} \\ V(\hat{p}) &= \frac{1}{\phi_{33}(a)} \quad \text{when m is small} \\ &= \frac{1}{\phi_{33}(b)} \quad \text{when m is large.} \end{aligned}\right\} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \quad (5.39)$$

5.3.1.2 Applications

The probability distribution discussed above for describing the total number of migrants from a household are fitted to the data collected from rural areas of Joypurhat district of Bangladesh as well as the data used by Singh (1992) and Yadava (1993). The observed and expected number of households (along with the variances and covariances between the estimators) according to the total number of migrants in the two household cohorts of Bangladesh are presented in Table 5.3. The corresponding results for the rural areas of Comilla district of Bangladesh in Table 5.4.

Table 5.3: Distribution of Observed and Expected Number of Households According to the Total Number of Migrants in Joypurhat, Bangladesh

Number of migrants per household	Household Cohort			
	Including International Migrants		Excluding International MIgrants	
	Observed	Expected (Model B)	Observed	Expected (Model B)
0	1535	1535.138	1535	1534.990
1	300	299.910	268	268.000
2	64	83.206	51	68.651
3	56	45.150	49	37.847
4	42	24.504	35	20.866
5	10	13.298	9	11.504
6	6	21.217	5	6.342
7	2		2	
8	2	6.041	2	5.424
Total	2017	2017	1956	1956
χ^2		21.242		18.599
d.f.		4		4
$\hat{\beta}$		.2389		.2152
$\hat{\xi}$		.6224		.6366
$\hat{p}$		.4573		.4486
$v(\hat{\beta})$		9.0163×10^{-5}		8.6355×10^{-5}
$v(\hat{\xi})$		4.8770×10^{-4}		5.4950×10^{-4}
$v(\hat{p})$		6.5229×10^{-4}		7.6076×10^{-4}
covariances		.00000		.00000
Average no of migrants per households		.4361		.3695

Table 5.4: Distribution of Observed and Expected Number of Households According to the Total Number of Migrants in Comilla, Bangladesh

Number of migrants per household	**Household Cohort**			
	Including International Migrants		Excluding International Migrants	
	Observed	Expected (Model B_1)	Observed	Expected (Model B_1)
0	1941	1941.00	1941	1941.00
1	544	544.00	292	292.00
2	117	108.32	67	56.17
3	50	52.57	37	33.95
4	18	25.65	17	20.52
5	8	12.48	6	12.40
6	6		7	7.50
7	6	11.83	3	
8	6		5	11.46
Total	2696	2696	2357	2357
χ^2		7.94		7.35
d.f.		3		5
$\hat{\beta}$		0.280045		0.182873
$\hat{\xi}$		0.72053		0.672811
$\hat{p}$		0.51338		0.39554
$v(\hat{\beta})$		7.48×10^{-5}		6.29×10^{-5}
$v(\hat{\xi})$		0.000269		0.000507
$v(\hat{p})$		0.000625		0.000712
covariances		0.0000		0.0000
Average no of migrants per households		0.4325		0.3339

Table 5.3 shows that the proportion of households having only one migrant ($\hat{\xi}$) is higher for households including international migrants. This again indicates that persons from households having international migrants tend to move singly compared to other type of households. This may be due to higher cost on travel and higher cost of living at the place of destination along with families. Moreover, most of the international migrants moves for a certain period and after completion of the tenure they have to return back to the country. The higher value of $\hat{\beta}$ among households including international migrants indicated a higher rate of migration than others.

The average number of migrants per household under Model B is given by

$$\hat{\xi}\hat{\beta} + (1-\hat{\xi})\hat{\beta}(1+\frac{1}{\hat{p}})$$

The average number of migrants was found higher (0.4361) for households including international migrants as compared to households excluding international migrants (0.3695). The chi-square values were found significant which confirms that model B fits the data sets reasonably well. It is interesting that the estimated values of the parameters using maximum likelihood method were found same as obtained by using mean zero frequency method (Table 5.4). However, the variances and covariances of the estimators are computed as it was not possible under mean-zero frequency method.

5.4 Conclusions

The study indicates that the proposed model (A_1) is a reasonable approximation to describe the distribution of households for the male migrants aged 15 years and above at least at the micro-level. This study also provides the estimates of the parameters of model A_2 by using maximum likelihood technique. The exact variances and covariance of the estimators for both the models (A_1 and A_2) have also been computed. The obtained results of model A_2 by using different estimation techniques have also been compared.

The higher value of risk parameter $\hat{\alpha}$ for 'international migrants household' cohort by both the models A_1 and A_2 indicated that households with international migrants have a greater chance of sending males out than households without international migrants.

Further, a higher value of $\hat{\alpha}$ for 'international migrants household' indicated that such households have a greater chance of migration than from of households without international migrants if commuters are not taken into account.

The maximum likelihood method has been used to estimate the parameters of the model B and the variances and covariances of the estimates have also been computed. The findings indicate that the model B is also fit the distribution of households according to the total number of migrants for the rural areas of Bangladesh.

The proportion of households having only one migrant ($\hat{\xi}$) was found higher for households including international migrants which indicates that persons from households having international migrants tend to move singly compared to other type of households. The higher values of $\hat{\beta}$ (by model B) among households including international migrants indicated a higher risk of migration from such households than others. Further, the average number of migrants was found higher among households including international migrants as compared to households excluding international migrants by both the models.

Chapter 6

Summary and Conclusion

6.1 Summary of the study

Migration is an important indicator to assess the population of country. This study focuses some important features of internal migrants based on our collected data. In this study, an attempt has been made to examine the differential and determinants of migration with some selected demographic and socioeconomic related variables.

In this study we discussed into four aspects of migration: selectivity of migrants, nature of migration, factors active for migration and destination of migrants. The selectivity of migrants limits to age, marital status, education and occupation of the migrants.

The rate of migration was found significantly higher for the people who belonged to the age groups 20-24 and 25-29 years (about 11.55 per cent and 8.95 per cent) respectively and only the lowest percentage (2.32 per cent) of age group 0-14 years. The age distribution of migrants clearly shows that majority of them were very young at the time of their first migration. The marital status of the migrants reveals that unmarried (52 per cent) migrants are higher than the married (48 per cent) migrants.

In my study the education attainment shows that more than 38 per cent of migrants are passed secondary and higher-secondary examination (passed SSC/HSC), whereas about 20 per cent of migrants are graduate and above. we showed that the highest percentage of migrants are educated migrants.

The study also reveals that two types of occupation of migrants (pre-migration occupation and after migration occupation). Here we found that the pre-migration occupation of migrants about 41 per cent of the migrants were involved with studies and

after migration about 48 per cent of migrants were employed in service/job. From this study we found that the nature of migrants about 60 per cent of the migrants moved for temporary migrants and about 13 per cent were permanent migrants.

The causes of migration are usually explained by using two broad categories, namely, push and pull factors. In this study we showed that the puss factors more than 51 per cent of migrants were migrated with influencing of their family members, about 22 per cent were migrated for higher studies and over 20 per cent of migrants due to poverty. It is remarkable that pull factor about 74 per cent of migrated due to availability of job at a particular place of destination.

In the study area we found that about 8 per cent of migrants were migrated to foreign countries, maximum percentage of migrants were migrated to Dhaka city(44%) and others destination places are not remarkable. About 45 per cent migrated from kanupur mauza of Akkelpur upazilla and the lowest percentage (.5 per cent) from Jitapur mauza of Joypurhat sadar upazilla.

It is difficult to identify the differentiating factors between migrant and non-migrant households. For example, the socio-economic position of a migrant household may change significantly after receiving remittances from the migrant member(s). We found that the variables 'education', 'occupation' and 'family size' included in the analysis have had significant effect on rural out-migration except the variables 'agricultural land owned' and 'adult male member'. The risk of out-migration from a rural household has been observed with the increased level of education. The risk of migration was 1.85, 5.00, 10.83 and 10.69 times higher for the households with educational level primary, secondary, SSC/HSC (secondary school certificate/higher secondary certificate) and graduate respectively as compared to households with no education.The propensity of out-migration was remarkably higher for the households whose member(s) attained at least primary education.

We found that households with occupation non-agricultural labourer, service, business and others have greater chance of migration as compared to households with occupation 'agriculture (owner)'. The risk of migration has been found 14.22, 32.00, 5.83 and 16.40 times higher for households belonging to occupation as non-agricultural labourer.

The risk of out-migration was 2.87, 1.41, 1.40, 1.93 times higher among the households with agricultural land 6-50, 51-100, 101-200 and 201+ decimal respectively as compared to landless households. A higher risk of out-migration from the households with medium or big size of agricultural land may be due to the fact that persons from such households were found mainly migrated for better opportunity (schooling, job, business etc.). A lower risk of out-migration from the households with agricultural land 06-50 decimal.

This study also showed a similar result that the risk of out-migration was found 2.10 and 2.74 times higher among the household with the family size. However, the multivariate analysis revealed that family size has significant effect on out-migration by family size 5-8.

We observed that the migration index varies from 1.29 to 12.30, yielding 4.87 per cent as the average migration rate for the villages under study. The diversity indices for the study variables *viz.* social status, education and occupation . The variation of diversity was found almost identical for the variables and the diversity varies from 0.38 to 0.69, 0.63 to 0.77 and 0.24 to 0.84 for social status, education and occupation respectively. This indicates that the villages/mauzas under study show almost similar heterogeneity according to these three variables.

In this study we also found that the persons who migrated during 2000-2007 are considered as 'current migrants' and those who migrated before 2000 are considered as 'prior migrants'. Among the cities of Bangladesh, the destination Dhaka (capital) is the most attractive because better opportunities for employment and studies are in existence

in this city. We shows that the coefficient of determination for the model proposed by Sivamurthy and Kadi (1984) was found to be 0.657, 0.489, 0.470 and 0.274 if opportunity factors were prior migrants, urban density, urban population and urban area respectively. All the coefficients for both models were found insignificant indicating that these models become insignificant if distance is replaced by logarithm of distance.

From this study we shows that the estimated values of the parameters, variances and covariance, observed and expected number of households according to the number of male migrants (aged 15 years and above) for household cohorts of Bangladesh. The estimated value of risk parameter α under Model A_1 was found 0.2278 when 'international migrants' households were included and 0.2034 when 'international migrants' households were excluded. The corresponding values obtained from Model A_2 were found 0.5662 and 0.5249 when 'international migrants' were included and excluded respectively. The estimated value of λ was found .46 and .48 for households the villages, while the estimated value of α was found as .27 and 0.18 corresponding households of the villages. It is observed that the estimated value of λ was nearly constant, while there is variation in $\hat{\alpha}$. The higher value of $\hat{\alpha}$ for 'Including International Migrants' of households indicated that such households have a greater chance of migration than from 'Excluding International.

6.2 Concluding Remarks

From different studies it was clear that persons involved in rural out migration were adult and comparatively educated. The migrant individuals were students, Jobless or dependant or house worker before shifting from their place of origin. 60 percent people migrated temporarily and 10 percent permanently. Educated people and people of 15-29 age group were more prone to migration. Poverty, education, family influence and social changes were main push factors, on the other hand job, earning and better opportunities were the main pull factors for migration. Level of education and occupation were related to push factor. Poverty was supposed to be the main push factor not only for primary and

moderately educated but also for agricultural , non-agricultural labourers and the unemployed.

This study also showed that fifty per cent of migrants migrated to Dhaka city and eight per cent to foreign countries as well as to adjacent districts. Multivariate logistic regression analysis proved that education, occupation and number of adult male members were the risk factors for rural out migration. Migration tendency was generally higher for the house holds having at least primary level education. There was a ten times higher risk of out migration among people having secondary/higher secondary or graduation level of education than the illiterate. The risk of out migration is higher for house holds with non-agricultural occupation or services. It was 32 times higher for the house holds with services. Migration was also higher for the house holds with 6-50 decimals land and with adult male members.

Diversity of education, occupation, social status were related to the volume of migration. The regression co-efficient of occupation diversity was also related to the volume of out migration occupation, education and social status influenced the percentage of migration. The higher value of R^2 indicates that the Lee theory can be acceptable in the social contest of Bangladesh. Migration models for single area to multiple destination with ample opportunity factors, proposed by Sivamurthy and Kadi(1984) can show the volume of out migration in Bangladesh.

Proposed model (A_1) is a reasonable approximation to describe the distribution of households for the male migrants age 15 and above at least at the micro level. In model (A_2) maximum likelihood technique was used variances and co-variances of the estimators in A_1 and A_2 have been calculated and results of model A_2 also been compared. Model A_1 and A_2 also supported risk parameter α for international migrants household and showed that households having international migration than households without international migrants.

Likelihood method was used in Model B which is suitable for the number of migrants from the rural areas of Bangladesh. The higher values of β (by model B) among households with international migrants showed higher risk than other types of households. That is the number of migrants is clearly higher for households having international migrants than other households with no international migrants.

6.3 Some Policy Recommendations

On the basis of the present findings, Researchers, Planners, Policy-Makers and others might be benefited in general, and in particular, it helps for proper micro level planning in the developing countries; like Bangladesh. This study gives an input for implementing and extending the rural development programmes along with an overview of the people involved in rural out-migration process and their fundamental/ root causes of migration both at individual and household level. Also this study suggests to design proper urban planning after getting an idea about the migration intentions and the extent of migration. In adition to this, the volume, direction and factors active for out-migration in rural areas are interesting finding for effective and equitable rural and urban planning /policies in the developing countries like Bangladesh. Much of the research conducted in the field of population so far has been made by technical demographers. This study is successful to portray the dynamics of interrelationships that exist and consequently policy implication. A team of demographers can better handle most of these issues raised here. In this context, the active participation in all stages of research by the consumers of government would help in putting the research finding into practice more readily. Therefore, effective policies and recommendations are needed to identify the factors influencing on migration. The policy implications and recommendation of my findings are as follows:

1. This study may help the planners and social scientists for implementing and extending the rural development programmes, as it gives an overview of the people involved in rural out-migration process and also identify the root causes of migration both

at individual and household level. Further proper urban planning can be designed since this study also provides some idea about the migration intentions and the extent of migration.

2. For the development of a more effective and equitable rural and urban policies in the developing countries like Bangladesh, the policy planners and social researchers may get an idea from this study about the volume, direction and factors active for out-migration in rural areas.

3. The policy in Bangladesh related to migration suggests that the government should promote economic activities in rural areas and adopt a balanced development strategy to encourage settlements and other function in small and intermediate cities.

4. In rural area, percolation of service provisions, infrastructural development and relocating industries to rural areas.

5. Policies should be taken to enhance male and female education both in rural and urban areas and consequently urbanization will be reduced in Bangladesh.

6. To improve communications and transportation conditions which will dispel internal migration rate and other problem of urbanization.

7. The process of migration in Bangladesh and the concomitant urbanization evolve from the circumstances characterized by extreme poverty and entitlement contraction among particularly the marginalised and the landless poor. The migration of the poor engendered the 'ruralization' of the urban centres by directly transmitting rural poverty and backwardness to the town.

8. The information collected from field survey conducted for purpose of the present study reveals that the process of migration in Bangladesh is strongly influenced by both the push and pull factors of which the principal push factor is the situation of insufficient job prospects in the villages, while the perception of the higher probability of getting employment and earning higher income in cities are the predominant pull factor. The pull factors that induce migration to urban locations are largely the direct or indirect results of the government policy.

9. To improve different types of labour insentive programme in rural areas will decrease internal migration rate.

10. The government should take steps to expand vocational training workshop such as livestock, fisheries, poultry farm and crop preservation etc, for rural poor and helpless people and that will reduce to urbanization and other problems of urban.

11. The government should dispel negative perception of rural people and they will be included by using science and technological method in agricultural sectors, which will reduced urban congestion.

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APPENDIX

Concept of Migration

According to concise Oxford Dictionary, "Migrate means to move from one place, country or town to another. Thus migration is the movement from one place to another within the country or outside it."

United Nations Multilingual Demographic Dictionary defines migration as " a form of geographical mobility or spatial mobility between one geographical unit and another, generally, involving a change in residence from the place of origin or place of departure to the place of destination or place of arrival."

Thus, "a migrant is a person who has changed his residence from one geographically well defined area to another area with the intension of permanently or semi-permanently settling at the new place."

Internal Migration: The mobility or the movement of people within national boundaries. It is very difficult to measure.

International Migration: The mobility or the movement of people within a different state, country or continent.

Out-Migration: it refers to movement out of a particular area within a country, that is internal migration.

Place of origin: The place from which a move is made is the place of origin.

Place of Destination: The place of destination refers to the place at which a move terminates.

Migration Stream: The phrase migration stream refers to the total number of moves made during a given migration interval which have a common area of destination. In practice, it refers to a boby of migrants having a common area of origin and a common area of destination. Stream of migration which are classified as (I) rural to urban migration, (II) rural to rural migration, (III) urban to rural migration and (IV) urban to urban migration.

. Measurement and Categories of Some Variables

Social Status of Households

In the present study, the social status of a household has been computed by taking into consideration the following five factors.

1) agricultural land owned
2) home type
3) tube well platform
4) types of toilet used
5) valuable goods owned

Appropriate scores are given to the above factors and the total score is taken to represent the social status of a household.

Social status group	Score
1. Low	9-12
2. Middle	13-15
3. High	16-18
4. Very High	19-20

Education of the Household

The educational status of a household has been determined by taking the highest education level obtained by the educated member (male aged 15 years and above) of the household. On the basis of the education the households are classified into following categories.

1. Illiterate
2. Primary
3. Secondary
4. SSC/HSC
5. Graduate and above

Occupation of Households

The occupation of a household has been determined by considering the main source of income of a household. The information of the main occupation of the male members along with income, agricultural land own and age of the members are considered to determine the household occupation. On the basis of the above information the households are classified into following five categories.

1. Agriculture (own land)
2. Agriculture (Labour)
3. Non-agricultural Labour
4. Service
5. Business

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Upazilla [ ] Union [ ] Mauza [ ] Type of Household [ ]
Household No.

First Part:

a) Respondent Name [ ]

b) Relation with Head of Household [ ]

c) member of Household: Below 14; [ ] 14-49 [ ] 50+ [ ] Total [ ]

d) Detailed Information of a Household Membesr:

serial No.	Name	Age	Gender	Marital Status	Age at Marrige	Relation with Head HH	Education	Ocupation	Monthly Income
1									
2									
3									
4									
5									
6									
7									
8									
9									
10									
11									
12									
13									
14									
15									

Code: **Gender:** Male-1, Feminine-2, **Marital Status:** Married-1, Unmarried-2, Other-3,
Relation: Husband-wife-1, Perents-2, Children-3, Brother-sister-4,Nephiw-niece-5, Other-6,
Education: Not going to School-0, Number for each and every class (Viz: class one-1, class two-2, class three-3,.....)
Occupation: Owner fermer-1, Share Croper-2, Agriculture Labour-3, Unagriculture Labour-4, House work-5, Depandent-6, Service-7, Besiness-8, Student-9, Unimployment-10, Other-11

2nd Parts Household Facility:

a) Household Assets

(i) Land description:

Type of land	Land Under one household(Decimal)												
	Paternal ownership	Purchased land		প্রদান (Owning but not cultivating)					Received (Not owning but cultivating)				
		At Present	Before Migration	Lease / hire based	Share	Agreement	Tenure	Amount of money	Lease / hire based	Share	Agreement	Tenure	Amount of money
Home													
Agriculture Land													
Pond/Tank													
Fallow land													

(ii) Pond Description:

Type of Pond	Area	Ownership	Type of Holding	Type of management	Income from fish rearing

Type of Pond/Tank: Ditch-1, Cenal-2, Pond-3Dighi-4, Other¨-5Personal ownership-1, Lease-2, Institutional-3, Unclaimed-4;

Type of holding: Alone-1, Undivided-2;

Type of management: Alone-1, Undivided-2

(iii) Type of House:

After Migration				Before Migration				Electricity Status (Yes-1, No-2)	
Living room		Others House		Living room		Others House		At Present	Before Migration
Type	Number	Type	Number	Type	Number	Type	Number		

Type of living house: Fence-1, Thached-2, Fence and Tin-3, Earth and Tin-4, Earth and Straw-5, Semi-Pacca-6, One stror pacca -7, Multi storied pucca-8, Other-9;

Others Room: Drawing room-1, Separate kitchen room-2, cows room-3, Poultry fold-4, Other¨-5

b) Water Fecilities:

Source of Water		Have Tube well (Yes-1, No-2)		Where stand the tube well ? (Insidee-1, Outside-2)	Type of Platform		Quality of Water	Causes of not good	Use directly or apply any process.
At Present	Before Migration	At Present	Before Migration		At Present	Before Migration			

Source of Water: Pond-1, Cenal-2, Deep tubewell-3, Tubewell-4, Well-5

Type of platform of Tube well: Concrete with Cement-1, Only Brick covered-2, No platform around it-3;

Quality of water: Good-1, Miduum-2, Not good-3;

Causes if not good: Excessive Iron-1, Salinity-2, Bad taste-3, Bad smell-4, Polluted-5, Excessive Arsenic-5, Other causes-6;

Use directly or apply any process: Directly-1, Percolated -2, Adding Fitkary -3, Adding Bleashing powder-4, Purifying Tablate-5, Boiled water-6, Adding Filtering-7Other-8

c) Information about Health and Sanitation of a Household:

Own Latrine in HH (Yes-1, No-2)		Type of Latrine		Washing hand coming from latrine	Source of health related information and counselling	Knowledage about make oar saline (Yes-1, No-2)	If known from what source
At Present	Before Migration	At Present	Before Migration				

Type of Latrine: Safety Latrine-1, Slab and concreate-2, Pil without ring-3, Hanging-4, Open space-5;

Washing hands coming from latrine: Only water -1Shoap and water -2, Soil and water -3, Other¨ -4;

Source of health related information and counselling: Doctor-1, Health worker-2 Kabiraj-3, Member of family-4, Member of NGOs¨-5, Newspaper/Redio/TV-6, Other¨-7;

What source you know how to make the oar saline: Doctor-1, Health worker-2 , Member of family-3, Member of NGOs¨-4, Newspaper/Redio/TV-5, Other¨-6

d) Information about Communication:

i) Internal communication condition in the village:

Distance from Village	K. M	Nature of Movement (On foot-1, Ricsha-2, Boat-3, Van-4, Bus-5, Other-6)
From Union Parished		
From Local Upa-Zilla		
From Bus-stand		
From Raikway station		
From Local Hat/Bazar		
From Union Health Complex		
From Local Doctor Chamber		
From local High School		
From Local Collage		

ii) Village communication system

Road and water transport system	Yes-1, No-2
Any river in the village	
Any herring road bond road in/around the village	
Any metal led road in/around the village	

e) Information about production and income of a HH:

i) Income from agricultural crops:

Sl. No.	**Name of crop**	**Land amount (Decimal)**	**Production cost (Taka)**	**Total crops**	**income (Taka)**
1	a) Rice-Aus				
	b) Rice-Aman				
	c) Rice-Irri				
2	Patato				
3	Weat				
4	Jute				
5	Suger-cane				
6	Maize				
7	Mastard seed				
8	Water Milion				
9	Bean				
10	Patal				
11	Gourd				
12	Chilli				
13	Banana				
14	Brinjal				
15	Pawpaw				
16	Cauliflower				
17	Cabbage				
18	Radish				
19	Cucumber				
20	Arum				
21	Vegetable				
22	Dal				
23	Other				

ii) Income from Poultry and Livestock:

Sl. No.	Income Item	Number	Maintenance cost (Taka)	Income(taka)
1	Cow			
2	Buffalo			
3	Goat			
4	Hen			
5	Duck			
6	Selling Milk			
7	Selling Egg			

iii) Non-farm Income of HH (Yearly)

Sl. No.	Source of Income	Total Taka
1	Service	
2	Business	
3	Unagriculture Labour	
4	Agriculture Labour	
5	Ricsa Pullaer	
6	Track driver	
7	Contacting	
8	House rent	
9	Shop rent	
10	Ricsha rent	
11	Lending money on interest	
12	Others	

f) Monthly Expenditure of a HH:

i) Food Consumption:

Sl. No.	Food	Total Consumption (Monthly)	Total Expenditure (Taka)
1	Rice (per mound)		
2	Dal(Kg)		
3	Fish (kg)		
4	MEat (kg)		
5	Egg (Number)		
6	Milk (liter)		
7	Oil(liter)		
8	Spices		
9	Fire wood)		
10	Fuel (others)		
11	Keroshin (liter)		
12	Others		

ii)Cloth

Sl. No.	Type of Cloth	Number	Total Expenditure (Taka)
1	Shari		
2	Lange		
3	Pant		
4	Saloar Kamij		
5	Shirt		
6	Children wear		
7	Cloth of Maid servant		
8	Bed sheet		
9	Others		

iii) **Others Expenditure:**

Sl. No.	Other Family Expenditure	Total Expenditure
1	Education cost	
2	Treatment cost	
3	Traveling cost	
4	Cost in religion function	
5	Family occasion	
6	Case/Litigation cost	
7	Donation/Gift	
8	Smoking	
9	Salary of the Staff	
10	Fatra/Zakat	
11	If others (written)	

g) Loan condition of a Household:

Source of Loan	Time of receiving Loan	Taka	Name of Bank/NGOs	Type of Loan	Type of repayment

Source of Loan: Bank-1, NGOs-2, Traders-3, Relative-3, Others¨-4;

Type of Loan: Agriculture-1Beseness-2, Educationv-3, Furniture-4, Constraction-5, Animal Husbandary-6, Fish rearing-8, Poultry rearing-9, Rearing Goat-10, Others¨-11

Type of repayment: Monthly-1, Half yearly-2, Yearly-3, Others-4

h) Present HH Assets:

Name of Goods			Number of Goods	Present Value
	At Present (put Tick mark)	Before Migration (put Tick mark)		
Radio				
TV				
Cycle				
Motor Cycle				
Sewing Machine				
Frieze				
VCD/DVD				
Power tiller				
Rickshaw/Van				
Boat				
Engine Boat				
Mobile				
Computer				

3rd Parts: Migration Description:

a) Migrants Particulars:

S No.	Date of Migration	Age at Migration	Type of Migration	Place of Migration	Distance from vuillage (KM)	Migrants Occupation		Causes of Migration		How times of visiting in the last two years	Sending money for the family in the last two years (Yes-1, No-2)
						Before	After	Puss Factor	Pull Factor		

(N.B: Serial number of accounts of the members)

Occupation: Owner fermer-1, Share Croper-2, Agriculture Labour-3, Unagriculture Labour-4, House work-5, Depandent-6, Service-7, Besiness-8, Student-9, Unimployment-10, Other-11

Migration Type: Temporary-1, Permenent-2, Education-3, Dependent-4, Others-5
Puss Factor: Poverty-1, Search for Service-2, Influencing by Family-3, Influencing by Villagers-4, Natural Causes-5, Education-6, Others-7.
Pull Factors: Better Oportunity-1, Like the Place-2, Trancefer-3, Relatives-4, Friends-5, For Service-6, Others-7.

b) Question regerding the opinion of the HH head:

i) Any change in HH after migration:

	yes/no
Economic status	
Social status	
Educational status	
Living status	

ii) Tell about your economic condition:

Financial condition	put tick mark
Ultra poor	
Poor	
Lower middle class	
Middle class	
Rich	