PROSPECTIVE POPULATION AND LABOUR FORCE IN MYANMAR, 1981 - 2001

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JUNE, 1992

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YANGON

DEPARTMENT OF STATISTICS

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by

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This thesis is submitted to the Board of Examination in Statistics in partial fulfilment of the requirements for the degree of Master of Economics.

.....	.....	..... 13/9/93
Examiner	External Examiner	Examiner

.....
Chairman
Board of Examiners
1992

ACKNOWLEDGEMENT

I would like to express my indebtedness to U Ko Ko, Pro-Rector, Institute of Economics, for his advice, encouragement and his permission to work on this topic.

I wish to express my gratitude to Dr Thet Lwin, Associate Professor, Department of Statistics, for his guidance, comments and suggestions which I received in writing this thesis; and to Daw Maureen Po, Department of English, Institute of Economics, for editing the manuscript.

Finally, I would like to extend my thanks to U Nyan Myint and U Win Tun, Department of Statistics, for running computer programmes.

S U M M A R Y

Estimates on future size and selected characteristics of population and labour force are needed for drawing social and economic development plans. An attempt has been made to project the population and the size of labour force including that engaged in agriculture over the twenty years from 1981 to 2001. The 1981 base year population of 34.16 million was interpolated from the 1973 and 1983 population censuses.

The cohort component method of projecting population by age and sex is used to make forecasts. Three fertility patterns and three mortality patterns are assumed to get nine different projections. The total fertility rate (TFR) which is one of the fertility measures is used to indicate the level of fertility. The base year level of fertility was fixed at 5.05 on the basis of the fertility history of ever married women observed in the 1983 census. The base year level of fertility was further assumed to decline at the rate of 2 percent per year over the entire projection period reaching 3.37 in 2001. Next, Brass' relational Gompertz fertility model is used to generate age specific rates (ASFRs).

The expectation of life at birth e_0^0 was used to indicate the level of mortality. The value of e_0^0 for 1981 was

fixed at 53 years for both sexes, 55 years for females and 52 years for males. The gain in the lengths of life were fixed in advance using UN working model of mortality improvement. The three most likely courses of change in the size of population produced a plausible projection about 55 million in 2001. This figure is found to fall in between a low variant of about 50 million and a high variant of about 59 million for the said end of year of the projection period.

The projected population figures were further subject to assumed age and sex specific labour force participation rates (LFPRs) to get the future size and age-sex composition of the labour force. The volume of the labour force in 2001 would be somewhere between 20 million and 21 million.

As agriculture happens to be the predominant sector in the economy of Myanmar, efforts were also made to determine the share of labour force engaged in agricultural activities. In 2001 a workforce of about 14 million would be expected in agriculture. In other words the share of labour force (LF) in agriculture in 2001 would be around 67 percent.

C O N T E N T S

CHAPTER I

GENERAL BACKGROUND

1.1 Introduction

Population change is of great significance to students of economic growth. This change interacts with economic change. When economic growth is under way, the change in population may function as cause, as effect, and as equilibrating agent.

A change in sub-populations assumes three main forms:

Form (i) change in an area's population results because births exceed deaths, and this excess is not offset by net migration.

Form(ii) change in the redistribution of a population results when persons immigrating into an area exceed in number those emigrating from it, and their arrival does not generate offsetting changes in fertility.

Form(iii) change in the proportions which a population is distributed among social or demographic categories, may be effected or even dominated by migratory or reproductive selection.

The change especially in the composition of a population is a cause for concern for it can produce significant changes in fertility and/or mortality. From past fertility and mortality trends, it is possible with some degree of confidence to make population projections. These projections of the total population and the assessment of its future size and structure are crucial for formulating and for implementing development programmes. Projections may be made over shorter or longer periods of time. The shorter the time period the more realistic the assumptions used. Short-term projections give an order of magnitude subject only to a relatively small margin of error. The longer the time period, the less likely is the predictive accuracy, but the more valuable the projections become in helping to identify factors which may influence the future trend.

1.2 Geographic Background

The Union of Myanmar lies in South East Asia between Latitudes 9°32' N and 28°31' N and Longitudes 92°10' E and 101°11' E. Bounded by land on north-west, north and east and on the remaining sides by sea, it stretches for about 1280 miles from north to south and 578 miles from east to west, at the widest points of the boundary.

The near-neighbours of Myanmar are: Bangladesh, China, India, Laos and Thailand. The length of contiguous frontier is 3826 miles. The coastline extends from the mouth of Naaf River to Kawthaung and measures about 1,385 miles. The area of the country is 261,228 square miles. The geographic location, the topographic variation and the seasonal changes in the monsoon wind directions create 3 distinct seasons: the summer, the rainy and the winter.

The summer season, lasts for 3 months; from March to mid-May, the rainy season from mid-May to the end of October, end the winter season from November to the end of February.

The country is mountainous; a system of five rivers flow parallel to one another from the far north to the deep south into the gulf of Martaban. Owing to the damp hot climate, most of the country is covered with forests. The main rivers are the Ayeyarwaddy, the Thanlwin, the Sittaung and the Chindwin. The Ayeyarwaddy River forms a vast fertile delta in the southern part of Myanmar. The delta region, the river valleys, and the Taninthayi and the Rakhine coastal regions are very fertile areas for growing rice.

According to the 1983 census, 69 per cent of the total population residing in Myanmar are Bamar. A majority of the indigenous population belongs to the mongoloid stock. The migration of Bamar to the southern land followed by an earlier group of immigrants. The eight major indigenous groups are

Bamar, Chin, Kachin, Kayin, Kayah, Mon, Rakhine and Shan. It is claimed that the total number of races in Myanmar is 135. (Collected Paper No.32, 1991: 85-86)

Apart from these indigenous ethnic groups, many people of foreign races viz of Indian, Pakistan, Chinese, Nepalese, European origin also live in Myanmar.

The population of Myanmar in 1990/91 was estimated at 40.78 million, an increase of 0.75 million over the 1989/90 estimated population of 40.03 million. The rate of growth of population was 1.88 per cent. (Review of the Financial, Economic and Social Conditions of the Union of Myanmar, 1991/92: 23)

Out of the estimated total population of 40.78 million in 1990/91, the male population was 20.21 million or 49.56 per cent and the female population was 20.57 million or 50.44 per cent. The dependency ratio has declined from 82.00 in 1983 to 73.76 in 1990/91 resulting in an increase in the size of the working age population. (Review of the Financial, Economic and Social Conditions of the Union of Myanmar, 1991/92: 23)

1.3 The Economy

Myanmar is endowed with natural resources. Given the right economic policy orientation and conducive conditions for investment, the country has great potentials for accelerated growth.

Myanmar managed her economy by implementing five Four Year Plans (FYP) within the framework of the 20 year Long Term Plan (1974/75 to 1993/94). The objectives, guidelines and strategies were laid down by the Burma Socialist Programme Party. The Long Term Plan was terminated in 1988/89.

At first the performance of the economy was quite satisfactory. The average annual growth rate was about 6.5 per cent during the Third FYP (1978/79 to 1981/82) and about 5.0 per cent during the Fourth FYP period (1982/83 to 1985/86). The sustained growth was due to the spectacular average annual growth rate of about 8.5 per cent during the third FYP in agricultural sector. The economy, however, started to falter from 1985/86 achieving 2.9 per cent followed by negative growth rates for three consecutive years, i.e. -1.1 per cent in 1986/87, -4.0 per cent in 1987/88 and by, -11.4 per cent in 1988/89. (Review of the Financial, Economic and Social Conditions of the Union of Myanmar, 1990/91: 37)

The performance of the economy during the 3rd and 4th FYP periods was satisfactory; but it started to falter

from the first year of the fifth FYP achieving 2.5 per cent growth followed by negative growths for three consecutive years. The exceptionally poor performance, due to rigid control and inefficient economic management practices resulted in low levels of saving, investment, and production. It is in this context that steps to transform the economic system were taken in the latter part of FY 1988-89 from a centrally planned economy into a more liberalized market oriented one.

To speed up the process of development, far reaching reform measures are being taken by the government to restructure the economy. The short term objective obviously is that of restoring economic recovery with stability within the shortest possible time. The long term objective might then be the pursuit of those strategies that would put the economy firmly on a sound and sustained accelerated growth path.

The new market oriented economic policy adopted by the government in 1988 implies-

(i) A shift from non-competitive import substitution industries to competitive export oriented ones,

(ii) An increased contact with foreign economic partners,

(iii) An introduction of new technology accompanying foreign direct investment,

(iv) A mobilization of domestic private capital, privatization followed by a corresponding reductionin state monopoly and

(v) A decline in the role of state as the principal employer.

The government in its endeavour for laying down foundation for the market oriented economy carried out a number of reform measures. It liberalized and regulated the cultivation, marketing, milling, transportation and storage of crops. This measure-

(i) relaxed the rule for choice of crop cultivated and to trade them freely;

(ii) allowed the marketing of hardwood timber and other forest products with the exception of teak;

(iii) granted marine fishing rights to private entrepreneurs and foreign companies in exclusive economic zones;

(iv) abolished price control and subsidies giving the state economic enterprises more autonomy in management;

(v) enacted Foreign Investment Law and procedures to promote the inflow of capital and technology so as to generate employment opportunities, and to promote export;

(vi) regularized border trade;

(vii) instituted measures for promoting the role of the private sector;

(viii) amended Income Tax and Profit Tax Law to fully support economic development;

(ix) enacted commercial Tax Law by substituting the existing commodities and services Tax Law and other tax laws into a single and simplified tax law;

(x) permitted state economic enterprises and foreign mining and oil firms to enter into joint production contracts for exploration and production of crude oil, gas and tin mining both on-shore and off-shore;

(xi) deregulated trading activities by permitting cooperatives and the private sector to engage in both domestic as well as foreign trade;

(xii) allowed the registration of both local and foreign exporters, importers and commission agents to do business in Myanmar and to form joint ventures between state enterprises and private entrepreneurs as an initialstep towards privatization. (Sang Khup, 1990:1-4)

1.4 Key Growth Sector

Any planning process begins with a general overview of the nature, levels, structure and direction of past and present production. The output structure and employment by economic sector of Myanmar are given in Table(1.1).

Table(1.1)

GDP and Employment by Sector, 1975-76 - 1990-91
(at 1985-86 constant prices)

Year	1975-76	1980-81	1985-86	1990-91
I. GDP (millions of kyats)	32240	43829	55989	51539
1. Agriculture	14735	20814	26983	24978
2. Industry	3752	5392	7040	6421
3. Services	13753	17623	21967	20141
Share (per cent)				
1. Agriculture	45.70	47.49	48.20	48.46
2. Industry	11.64	12.30	12.57	12.46
3. Services	42.66	40.21	39.23	39.08
II. Employments (millions)	11.93	13.52	15.13	15.74
1. Agriculture	8.24	9.03	9.97	10.87
2. Industry	1.12	1.33	1.62	1.40
3. Services	2.58	3.15	3.55	3.47
Share (per cent)				
1. Agriculture	69.04	66.84	65.86	69.05
2. Industry	9.34	9.83	10.69	8.89
3. Services	21.62	23.33	23.45	22.06
III. Per capita GDP (kyats/month)	225.15	270.25	308.38	272.92
1. Agriculture	149.05	191.99	225.65	191.54
2. Industry	280.42	338.35	362.59	382.48
3. Services	444.22	465.77	516.09	483.55
Earnings Ratio non-agriculture/agriculture	2.65	2.23	2.07	2.37

Source: (1) Report to the Pyithu Hluttaw 1975/76, 1981/82, 1985/86 & 1986/87.

(2) Review of the Financial, Economic & Social Conditions of the Union of Myanmar, 1989/90 & 1991/92.

In FY 1990-91, the total employed population was estimated at 15.74 million. The size of the workforce employed in agriculture was about 10.87 million. Agriculture had provided employment to about 69 per cent of the total workforce. Next, the contribution to GDP by agriculture was about 49 per cent. For the last two decades, very little change had occurred either in the employment or in output of agriculture. Agriculture therefore, would continue to the dominant economic sector for Myanmar. As agriculture contributes to some 50 per cent of total production provides employment to nearly 70 per cent of the labour force, allocation of more resources i.e. increased agricultural inputs is expected to produce substantial increases in agricultural produce.

In FY 1990-91, the industry sector could contribute about 12.5 per cent to GDP, and could absorb about 8.89 per cent of the total employed population. Between FY 1975-76 and FY 1990-91, industry had gained a slight growth. As for average earnings, agriculture fell behind either industry or services. See Table(1.1). If conditions for rapid expansion of the industries and services could be created, plenty of low wage workers could be drawn into these sectors.

For Myanmar, increased agricultural output is essential not only to increase total output and to raise the level of living, it is also essential for earning foreign

exchange, and for providing raw materials and markets for industrial developments. Thus, efforts were also made to project the current agricultural labour force of Myanmar from 1981 to 2001.

CHAPTER II

DATA SOURCES AND LIMITATIONS

2.1 Introduction

Population statistics finds wide application. Public as well as private organizations use population related parameters for marketing, manpower planning, and administrative purposes. In many instances, the demand for population data does not rest on the past and current trends, but it extends their forecast into the future.

The forecast is dependent upon the quality of data used. It also depends on the methods chosen and the assumptions made. If the actual data are inadequate and unreliable, they have to be supplemented by new information collected from sample surveys. The survey data too may contain undesirable errors. Hence, it is always necessary to evaluate the quality of all available data before putting them into use.

2.2 Population Censuses

In Myanmar, population counts had been taken, as early as 500 BC, during the reign of king Thadodipa Mahadazayarza's reign of the Tagaung Dynasty (Nyunt, 1978: 8). The first modern population census was held in 1872, followed by another in 1881. At that time, Lower Myanmar was under the colonial administration and included Rakhine state, Bago, Ayeyarwady and, Taninthayi divisions. Since then, censuses were carried out every 10 years until 1941.

Before World war II, censuses were carried out by a combination of three methods in different parts of the country in the following manner: (Sundrum, 1957: 2)

(a) in the fully administered areas, a synchronous defacto method or enumeration of persons who were actually resident in those areas as of midnight on the census date;

(b) in the loosely administered and sparsely populated areas, the dejure method or the enumeration of all people normally resident in those areas; and

(c) for the remaining parts of the country, estimates were made by the administrative officers.

After gaining independence in 1948, an attempt was made to take a census in three stages. The first stage taken in 1953 covered 252 towns, and the second stage taken in 1954

covered 2143 village tracts. The third stage planned to be taken in 1955 was abandoned due to the then unsettled conditions of the country.

The 1953 first stage census covered almost 99 per cent of the total urban area (IMD, 1975: 11). A country wide census was conducted in April 1973. It was followed by a second one in 1983. These censuses unlike those taken in the prewar period, were organized not as a mere government departmental activity, but as a mass movement. The 1973 census covered about 85.1 per cent of total area and 97.1 per cent of the total population (IMD, 1976: 1-3). The latest census could cover 96.6 per cent of the total population (IMD; 1986, Part 1, 11). Both the 1973 and 1983 censuses adopted the dejure method.

A special feature of the 1983 census is that it used two different questionnaires to collect information on socioeconomic and demographic characteristics; a short form containing 7 questions on social characteristics for 80 per cent of the population, and a long form containing 11 questions on socioeconomic and fertility characteristics for the remaining 20 per cent on a sample basis. The long form also gathered information on school attendance, highest standard passed, literacy, occupation, industry, employment status, reason for not working, whether working during the

last twelve months, children ever born alive, children still living, and date of birth of the last child.

One year later, the 1983 census operation was followed by the Post Enumeration Check (PEC), which was conducted on a sample basis, in 1984. The PEC was intended to evaluate the completeness of the census coverage and the accuracy of its results. The PEC shows that the coverage of households and persons in the census were 99.6 per cent and 99.1 per cent respectively. (IMD, 1986: 6)

2.3 Vital Statistics

Events in an individual's life like birth, and death are known as vital events. This term covers adoption, marriage, annulment, legitimate separation, divorce and migration. Data on these events usually collected on a continuing basis are known as Vital Statistics.

The origins of vital registration lay in the need for official documents confirming the birth, marriage and death of each individual. The requirement remains but it has been supplemented by the increasing demand for quantitative information for various purposes.

A vital registration system for collecting information on births and deaths was first introduced into some parts of Lower Myanmar and then gradually extended to

other parts of the country. It was introduced into towns in Upper Myanmar in 1906 and into the villages in 1907 (Sundrum, 1957(a): 7). The system broke down completely during the war and was revived in the postwar period. A new system of vital registration was introduced in 1962; however the number of towns covered by this system varies from one year to the other.

The system for registering births and deaths is organized by units of government. In some countries, the registration is compulsory; in others, there is no national provision for compulsory registration. The following acts support registration activities in Myanmar-

(1) The Births, Deaths and Marriages Registration Act, 1886,

(2) The Municipal Act, 1898,

(3) The City of Rangoon Municipal Act, 1902,

(4) The Burma Towns Act, 1907,

(5) The Burma Village Act, 1907,

(6) The Births, Deaths and Marriages Registration Manual, 1912,

(7) The Births, Deaths and Marriages Registration Act, 1943,

(8) The Central Statistical Authority Act, 1952 (Myint, 1984: 44)

Before World war II, vital data were collected by Municipal Health Offices in urban areas and by village headmen in rural areas. The Department of public health took the

responsibility of publishing vital statistics (Sundrum, 1957(a): 7). At present the Directorate of Health Services and Central Statistical Organization (C.S.O) cooperate to collect, process and publish vital statistics. According to the Vital Statistics Report (C.S.O, 1990: 1), in 1986, the vital registration system covered 97.4 per cent of the total urban population and 33 per cent of the total rural population.

2.4 Surveys

Age-sex data derived from two consecutive censuses may be used to estimate the general level of mortality, especially postchildhood, during the intercensal period using intercensal survival techniques. But the censuses do not provide estimates of mortality on a current and continuous basis needed to measure short-term changes in population growth. Hence, alternative primary sources like ad hoc demographic sample surveys are required to supplement secondary sources.

CHAPTER III

METHODS OF POPULATION PROJECTION

3.1 Introduction

A number of methods are available for projecting human populations over time and for different regions within the same country. Calculations concerning possible future population trends are intended to provide the most probable estimates of future numbers. It is sometimes useful, for example, to calculate the growth of population that would result from the continuation, during a specified future period, of the current fertility or mortality rates; or from the admission of a stated number of immigrants; or to determine the rates of fertility, mortality and migration that would be required to achieve a population of a stated size within a given length of time. Such calculations, made without regard to the probability that the stipulated conditions of fertility, mortality, or migration will actually materialize, may be very helpful in evaluating the merits of various proposals relating to population policy.

With the advent of high speed personal computers, the cumbersome, laborious tasks of handling large figures are relieved by efficient, and flexible computer software. In this thesis, two demographic application software called PEOPLE and DAS were used.

3.2 Mathematical Methods

The simplest method of estimating the future size of a population is to take the number of individuals as determined at a more or less recent date in the past and to apply to it an assumed rate of increase, as a function of time. The rate may be derived from observations on the past growth of the population itself or by analogy with rates observed in other populations in similar circumstances. The calculations can be carried out directly with reference to the net rate of population growth, or the assumed birth rates, death rates and rates of immigration and emigration may be calculated separately and added to obtain the rate of growth for each future period.

The distinguishing feature of a "mathematical" projection lies in the fact that calculations are applied to the figure of total population only, rather than to population segments or relations between the population and its environment (UN, M III, 1956: 2).

The mathematical methods involve application of some mathematical formula directly to the total population from one or more censuses to derive projections of total population. The mathematical equations are useful for preparing projections and for measuring population change or for extrapolating time series. The number of mathematical forms that could be used to project population could be extended far beyond those cited here, but very few of these are actually employed. For projecting total population, polynomial forms, including linear extrapolation, have little application, especially over the long-term. Various exponential forms are widely used, however. These include the geometric curve, with annual (1a) or continuous compounding (1b), and the logistic curve (2a or 2b).

$$P_t = P_0 \ (1+r)^t \tag{1a}$$

or

$$P_t = P_0 \ e^{rt} \tag{1b}$$

$$P_t = \frac{1/a}{1 + \frac{b}{ae^{-rt}}} \tag{2a}$$

or

$$P_t = \frac{K}{1 + e^{a+bt}} \tag{2b}$$

where r is the growth rate, t is the number of years , a and b are constants, and e is the base of the natural system of logarithms. In Equation(2), the constant 1/a or K is the upper asymptote.

For making a population projection, one may apply Equation(1a) or (1b) either by using the latest intercensal rate of change, the average rate over a longer period, or an arbitrary rate, or by fitting a curve by the method of least squares to a series of census totals. Since growth rates are likely to change in the long term, these formula are recommended for use only in making short term projections.

Fitting a logistic curve is a more complicated procedure and requires a greater number of observations covering a longer period. At the same time, it is useful for projection over a greater period of years than the simple geometric procedures, particularly if the past series has reached the point of inflexion. Like all mathematical curves, the logistic is quite mechanistic; hence, it may be advisable not to apply it over too long a period. The logistic cannot be used to project a population that is decreasing.

Mathematical methods are now much less frequently employed to estimate the population of countries than formerly, even though they have by no means been abandoned. Component methods have been displacing the mathematical methods. (Shryock, 1976: 777)

3.3 Economic Methods

Population growth can seldom, if ever, be expected to be completely independent of changing economic circumstances. Within limits, mortality and fertility are responsive to economic conditions. The same is true of migration; immigrants are attracted to areas of economic opportunity, while emigrants depart from areas where opportunities are more restricted. Within limits, a government may be able, by means of economic incentives and deterrents, to relate migratory movements and even the natural growth of the population to an economic plan.

A number of methods have been developed which employ economic variables directly in the context of a ratio, component, or correlation method, or a combination of these methods. These methods take account of economic prospects quantitatively by basing the projections of population on projections of employment, per capita income, production, land use, or other economic variables. These methods are considered in two groups, those methods involving correlation with economic indicators and other methods using economic analysis.

In these methods involving correlation with economic indicators, regression analysis may be employed to project the total population directly or to project the net migration component only. For example, projections of net migration may

be derived from a regression equation relating net migration and per capita income by assuming that net migration for a certain country is more closely correlated with per capita income than is total population change, that labour tends to move toward areas of higher per capita income, and that the systematic influence of income on migration flows will continue in the future.

Methods of projecting population using economic analysis may involve an intensive study of the economic prospects for each area. One approach involves separate consideration of several main branches of the economy, proceeding from national to local employment in these branches, then to total employment in the area, and finally to total population. The local projections of employment in various branches of the economy may be made as a proportion of the corresponding national projections.

These exists another class of methods which employ a limited type of component procedure which depends on prior projections of employment or labour force. In the simpler application, the projections of employment or labour force, and then net migration, are made directly for the population of all[8] ages; in the more elaborate application, the projections of employment or labour force, and then net migration, are made by age groups. The method sequentially calculates employment or labour force, net migration of the

labour force, net migration of the total population, and finally, the total population, combining the net migration with the expected population allowing for births and deaths. This method includes a number of adjustments to take care of special situations. The method using the best judgement forecast of net migration was derived basically as follows:

1. The current population was projected by age and sex as a closed populated, that is, assuming zero net migration.

2. Projected age-sex-specific labour force participation rates were applied to these interim population "projections" to obtain the future labour force on the assumption of no further net migration.

3. An independent forecast of future employment by age was developed on the basis of a detailed analysis by industry classes.

4. To the forecast in step(3) an allowance for unemployment was added, to obtain an independent forecast of the future labour force.

5. The difference between the forecasts in step(4) and the projections in step(2) was taken to represent net in-migration or net out-migration of workers, depending on which was larger.

6. The net migration of the household population not in the labour force (including children and retired persons)

was estimated by ratio inflations of the results in step(5), and special allowances were made for the net migration of such groups as the armed forces, college students, and inmates of institutions. (Shryock, 1976: 802-803)

A projection by "economic " methods is most obviously appropriate for an area subject to easy, unrestricted in-migration and out-migration, where an important new industry is being established which will dominate the economy of that area. The assumed future capacity of this industry to absorb labour is then the primary determinant of population growth. To this amount of labour, a certain multiple must be added to represent dependents, as well as the additional workers in subsidiary industries (trade, service, etc.) who will be required in the expanding community. The "economic" method can likewise be applied to an industrial area of free inward and outward movement where industrial employment opportunities are expected to change greatly. Under certain conditions, anticipated housing development may be regarded as a primary factor of expected population change.

Expected changes in income, education or social status may also be listed among the factors influencing future population growth (UN, 57: 2).

3.4 Component Method

Almost all modern techniques of population forecasting is based on the "COMPONENT METHOD" developed by P.K. WHELPTON and M.S. THOMPSON. The projections are made usually on an age-sex specific basis. The three components which determine the probable future growth of a population are, viz, ... FERTILITY, MORTALITY and MIGRATION.

Future mortality may be assumed either to be constant or to conform to some assumed trends. Fertility can be defined in several different ways and its probable future trend can be estimated under a variety of assumptions. The effects of immigration and emigration can also be calculated, on the assumption of a certain volume of future migration, divided according to sex and age, with the use of appropriate survival ratios and assumptions as regards the fertility of the migrants.

The component method is superior to "mathematical" methods in that it involves a separate analysis of the changes affecting each component of the population. (UN, 57: 3)

3.4.1 Projection Technique

The essence of this procedure is to calculate the expected number of persons, age by age for each sex, at points in time subsequent to a census. The set of birth and death

rates used may be those of some past period held fixed, or an extrapolation from the past, or simply intuitive. The calculations are made in terms of "projection cycles or periods". The length or span of each cycle is either one year or five year. The force of mortality which is expressed as the proportion of persons surviving from one age-group to a later age group is applied to the base population along with the chosen or assumed schedule of fertility to get an estimate of the population as of the date that marks the end of the cycle. The population at the end of the cycle, obtained from these operations, then becomes the base population for a second projection cycle. The projection cycle is repeated farther into the future until the desired target date is reached. It is evident that the validity or the utility of a particular forecast is dependent on the accuracy of the levels and trends of fertility and mortality assumed.

3.4.2 Computational Steps

The population that was alive at the mid-point of any projection cycle will be subject to mortality until it arrives at the mid-point of the next projection cycle. The appropriate adjustment for this mortality is to "age" or "survive" each age group for one projection cycle. This procedure gives the estimated number of persons who will

survive from the mid-point of cycle to the next. The number of births that are expected to occur during a given projection cycle is estimated by applying the chosen schedule of fertility to all the women of child-bearing ages expected to be alive at the mid-point of the projection cycle under consideration. Although births are anticipated to occur continuously throughout the projection cycle, only those infants who will survive up to the mid-point of this cycle shall have to be included in the projected population.

P.K Whelpton and W.S. Thompson of the Scrips Foundation for Research in Population Problems formulated a method of projecting population around 1928. This method came to be known as the Cohort Survival or Component Method of Population Projection. This method is essentially straight-forward. Keyfitz attributes its invention in a simple form to Cannon(1895). As a demographic tool it was mainly developed by Welpton(1928). The relations between the population elements at successive time points are neatly expressed in matrix notation which is a substantial aid for largescale computer calculations (Carrier, 1969). If the population is closed, i.e. migration is eliminated, and the probabilities of birth, deaths and movements between elements remain constant over time, elegant asymptotic results can be derived. Leslie(1945) takes the major credit for the development although he had fore-runners.(Lwin, 1985: 55-61)

3.4.3 The Component Method of Population Projection

A brief description of the Component Method of Projecting population by age and sex is given below:-

The component method of population projection is usually understood to consist in the separate projection of numbers by sex in each group of the population . It is convenient to project the population by time-intervals equal to the age-interval into which it has been divided . Thus, if the population is subdivided by five-year groups of age, the projection can most easily be made over five-year intervals of time. At the end of a five-year period, all surviving members of one age group will have moved into the next sub-sequent age group.

The conventional method of projecting populations may be regarded as the calculation of the expected values of the number of persons alive at the future dates, the number now alive and age-specific mortality given. The crux of the projection procedure lies in securing survival probabilities via the life table. A few essential functions pertinent to this method of projection may be described briefly as follows:

If ${}_5P_x^{(t)}$ stands for the actual female population between x and x+5 years of age time t, then the female population five years older than the initial population five years later can be expressed as

$$ {}_5P_{x+5}^{(t+5)} = {}_5P_x^{(t)} \frac{{}_5L_{x+5}^{(t)}}{{}_5L_x^{(t)}} \quad , \; x = 0,5,10,\ldots\ldots,w-5. $$

w = chosen for the upper limit

where $L_x^{(t)}$ denotes the stationary age distribution at time t. This yields a projection of the female population already alive at the base period, an allowance has to be made for those babies born during the projection period.

If ${}_5f_x^{(t)}$ stands for the fertility schedule at time t, α for the proportion of females at birth, then

(i) the projected female population will be

$$ {}_5P_{x+5}^{(t+5)} = {}_5P_x^{(t)} \frac{{}_5L_{x+5}^{(t)}}{{}_5L_x^{(t)}} \quad , \; x = 0,5,10,\ldots\ldots,w-5 \text{ and} $$

(ii) the total number of female births expected during the 5 year projection period can be written as

$$ B = \alpha \sum_{x=15}^{45} \left[{}_5P_x^{(t)} + {}_5P_x^{(t+5)} \right] {}_5f_x^{(t)} $$

Among these births, the number of female children expected to form the youngest age group i.e.

l_0 = total number of births at time t.

$$ {}_5P_0^{(t+5)} = \frac{{}_5L_0^{(t)}}{l_0} B $$

$$
{}_5P_0^{(t+5)} = \frac{{}_5L_0^{(t)}}{l_0} \left[{}_5P_{10}^{(t)} \frac{{}_5L_{15}^{(t)}}{{}_5L_{10}^{(t)}} {}_5f_{15}^{(t)} \right.
$$

$$
+ {}_5P_{15}^{(t)} \left\{ {}_5f_{15}^{(t)} + \frac{{}_5L_{20}^{(t)}}{{}_5L_{15}^{(t)}} {}_5f_{20}^{(t)} \right\}
$$

$$
+ {}_5P_{20}^{(t)} \left\{ {}_5f_{20}^{(t)} + \frac{{}_5L_{25}^{(t)}}{{}_5L_{20}^{(t)}} {}_5f_{25}^{(t)} \right\}
$$

$$
+ \cdots\cdots\cdots\cdots\cdots\cdots\cdots\cdots
$$

$$
\left. + {}_5P_{40}^{(t)} \left\{ {}_5f_{40}^{(t)} + \frac{{}_5L_{45}^{(t)}}{{}_5L_{40}^{(t)}} {}_5f_{45}^{(t)} \right\} \right]
$$

The above condition of birth and death which produced the populations at time t and t+5 can also be represented by the following set of linear, first order, homogeneous difference equations with constant coefficients as:

$$
{}_5P_0^{(t+5)} = \alpha \frac{{}_5L_0^{(t)}}{l_0} \left[{}_5P_{10}^{(t)} \frac{{}_5L_{15}^{(t)}}{{}_5L_{10}^{(t)}} {}_5f_{15}^{(t)} \right.
$$

$$
+ {}_5P_{15}^{(t)} \left\{ {}_5f_{15}^{(t)} + \frac{{}_5L_{20}^{(t)}}{{}_5L_{15}^{(t)}} {}_5f_{20}^{(t)} \right\}
$$

$$
\left. + \cdots\cdots\cdots\cdots\cdots\cdots\cdots\cdots \right]
$$

$$ {}_5P_5^{(t+5)} = {}_5P_0^{(t)} \frac{{}_5L_5^{(t)}}{{}_5L_0^{(t)}} $$

$$ {}_5P_{10}^{(t+5)} = {}_5P_5^{(t)} \frac{{}_5L_{10}^{(t)}}{{}_5L_5^{(t)}} $$

.....

$$ {}_5P_{80}^{(t+5)} = {}_5P_{75}^{(t)} \frac{{}_5L_{80}^{(t)}}{{}_5L_{75}^{(t)}} $$

The entire set of equations can be written in matrix form as: If the time interval of projection is used in units of five, then

$$ \vec{P}^{(t+5)} = M \; \vec{P}^{(t)} $$

can be modified by treating the matrix M and column vector P as scalars as follows:

$$ \vec{P}^{(t)} = M^{(t)} \; \vec{P}^{(0)} $$

This recurrent relation in matrix form is useful

(i) in projecting populations with the aid of computers, and

(ii) in analyzing the matrix to study the effects of the pattern of fertility and mortality.

CHAPTER IV

COMPONENT OF POPULATION GROWTH

4.1 Introduction

Economic growth is concerned with the levels and trends of per capita income. One may attempt to relate the size of a population with the objective of maximizing the level of income per capita. A country is said to be "under populated" or "over populated" if an increase or a decrease of population would contribute to a rise in per capita income. Any "over" or "under" population must of course occur relative to one or more other economic variables, e.g, the supply of natural resources, the stock of capital, the state of technology or the size of the labour force.

A growth in population may not be in conformity with economic growth; neither mortality nor fertility may respond positively to economic change. Even if they did, a reduction in births or in deaths needs a considerable time lag. Mortality and fertility are the two main components of population growth, if one is willing to ignore the influence

of economic change over that of population, provided that the population under study is closed to migration.

4.2 Mortality Levels and Trend

A system of collecting information on births and deaths was first introduced into some parts of lower Myanmar in the late nineteenth century and gradually extended to the other parts of the country. By 1931, about 82.5 per cent of the population was covered by the registration system (UN, 1959: 47). At present, vital statistics is collected under the authority of the Department of Health, and compiled and published jointly by the Central Statistics Organization (CSO). In 1986, the system covered 8.66 million urban population in 245 towns, and 9.5 million rural population in 78 Townships, in other words the extent of coverage being 97 per cent in urban areas, and 33 per cent in rural areas. (CSO, 1986: 1)

The registration system was operative almost exclusively in urban areas; the extent of coverage was about 85 per cent in 1973 and 87 per cent in 1983. The population under vital registration varied widely between 7 per cent and 23 per cent among the states; and between 9 per cent and 68 per cent among the divisions. Today less than a quarter of the total population live in urban areas, and vital statistics is

lacking for the remaining three quarters living in rural areas. Since differences exist in the socioeconomic conditions between urban and rural areas, more efforts should be devoted towards developing efficient systems capable of keeping records of birth and death.

A series of vital rates are available for Myanmar; but these rates can neither represent the whole country nor the entire urban population for the number of towns covered keep changing from one calendar year to another. A few selected vital indices are given in Table(4.1). A line graph drawn with a series of crude death rates (CDR) expected to represent urban areas covering over three quarters of the present century is given in Figure(4.1).

Table(4.1)

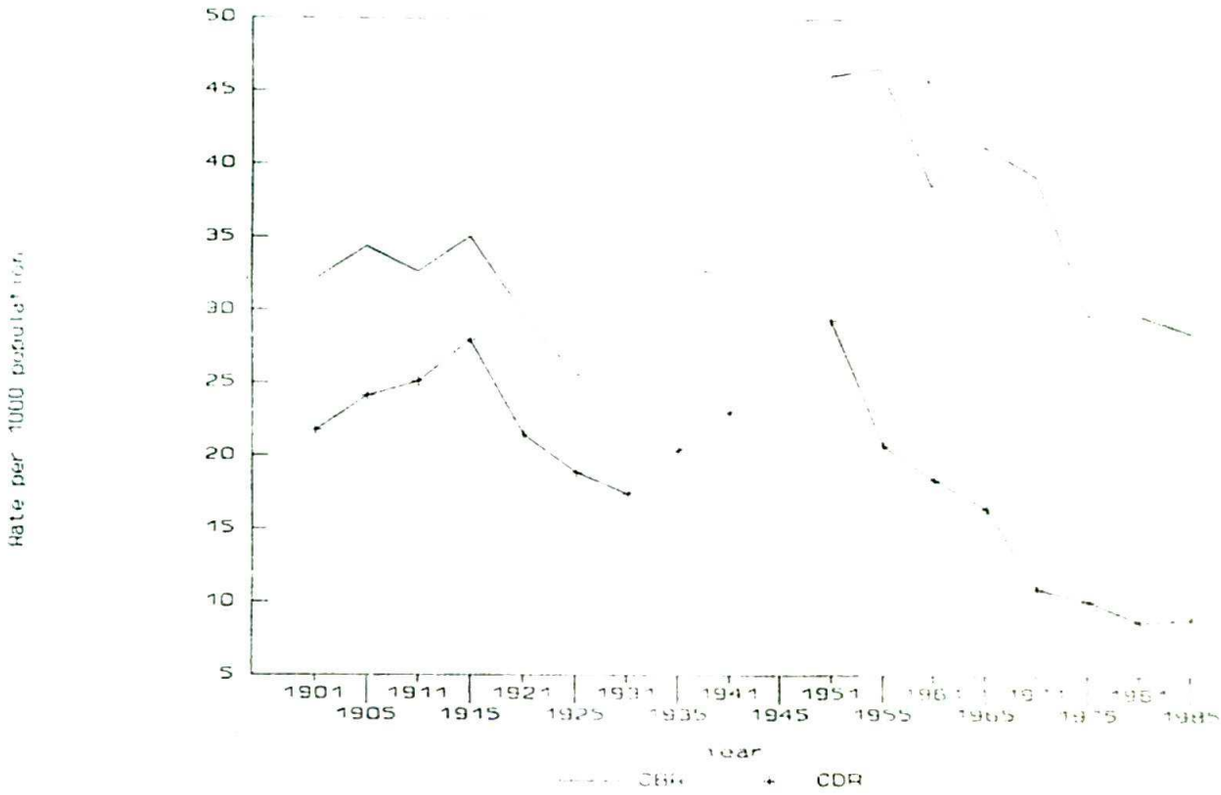
Selected Vital Indices

Year	Union Population (million)	Urban						
		CBR	CDR	IMR	MMR	LFDR	PMR	NMR
1901	10.49	32.07	21.74					
1905	11.28	34.34	24.09					
1911	12.12	32.64	25.09					
1915	12.56	35.05	27.99					
1921	13.21	29.85	21.45	278.8				
1925	13.72	25.50	18.84	286.2				
1931	14.67	26.53	17.36	277.5				
1935	15.45	33.03	20.42	255.8				
1941	16.82	32.40	23.00	272.7				
1945	17.36							
1951	18.07	46.10	29.30	252.8	6.5			
1955	19.56	46.60	20.70	175.9	5.1	40.2		
1961	22.60	38.50	18.40	129.9	3.8	36.1		
1965	24.16	41.30	16.40	155.0	3.1	24.0	54.3	44.7
1971	26.93	39.20	10.90	57.7	1.9	16.7	33.6	28.5
1975	30.44	29.70	10.10	51.9	1.4	12.0	27.4	24.5
1981	33.88	29.70	8.70	47.3	1.3	10.8	27.1	25.8
1985	37.54	28.50	8.90	44.7	0.9	10.9	25.7	24.8

Source: (1) United Nations, 1991, "The Sex and Age Distribution of Population": 274.

(2) Win, Khin Nu, 1991, "An Analysis on Urban Mortality in Myanmar, 1973-1983": 52.

Figure(4.1): Trends in Birth and Death Rates, 1901-1985



The crude birth rate (CBR) remained on the average around 31.3 per thousand for the first half of the present century. If declines perceptibly from 46.10 in 1951. It can be noted from Table(4.1) that only at and after 1975, the CBR stated to be lower than the average level before 1941.

The crude death rate (CDR) too remained on the average around 24.72 per thousand during the first quarter of the twentieth century. It started to decline from 1955 and later slowly reaching the lowest level of about 9 per thousand in the 1980s. These levels are quite comparable with the average levels of the ESCAP region in 1985; CBR being 26.4,

and CDR 9.5, Beginning from the second half of the twentieth century, both birth rates and death rates dropped but the latter falling faster than the former giving rise to a sustained growth in population. The fall in the level of mortality is also reflected by the rates of infant mortality. In 1951, the infant mortality rate (IMR) was 253 per thousand live births; it fell to 130 in 1961, and then to 58 in 1971. The pace of decline became slow in the late 1970s. During the 1980s, it had been found to fluctuate around 45. See Table(4.1)

An easily understood and widely used summary measure of mortality is the expectation of life at birth. It is taken to represent the level of mortality.

In Myanmar, figures on life expectancies at birth are given in few official publications like "Annual vital Statistics Reports", the "Review of the Financial, Economic and Social Conditions of Myanmar", occasional ad hoc reports etc. As usual these estimates differ from one source to another.

Table(4.2) shows the levels of mortality of Myanmar for the last 80 years. A sex differential exists in the lengths of life at birth; females seemed to live about 3 years longer than the males.

Table(4.2)

Different Estimates of Life Expectancy at Birth (e_0), Myanmar (Union)

Sources	Year	Life Expectancy at Birth Males	Life Expectancy at Birth Females	Both Sexes
1. Thet Lwin	1911	28.11	27.90	28.01
	1921	27.64	30.58	29.00
	1931	32.54	34.49	33.46
	1941	38.60	37.86	38.24
2. Tin Tin Nyunt	1953-54	35.60	38.20	36.82
	1953-58	37.30	38.30	37.78
	1958-63	39.70	40.80	40.22
	1963-68	42.10	43.30	42.68
	1968-73	44.50	45.80	45.12
	1973	45.60	49.00	47.20
3. Tin Tin Myint	1973	48.60	51.50	49.97
4. Win Tint	1983	53.05	56.33	54.60
5. Nyan Myint	1969	48.50	51.48	50.00
	1972	49.00	52.00	50.60
	1975	50.82	53.93	52.40
	1977	51.94	55.12	53.50
	1981	54.03	57.37	55.70
6. Cho Cho Wai	1973-83	50.95	55.17	52.92

Source: 1. Lwin, 1974: 14-22
2. Nyunt, 1978: 88
3. Myint, 1980: 7
4. Tint, 1988: 42
5. Myint, 1988: 76
6. Wai, 1991: 68

4.3 Fertility Level and Trend

The vital Statistics in Myanmar is collected compiled and published jointly by the Central Statistical Organization and the Department of Health. The crude birth rate (CBR) though based on limited coverage does reflect the changing levels of fertility, it fluctuated around 40 per thousand in 1971. The CBR declined gradually, reaching the lowest value of 26.9 in 1980, and then remained almost unchanged about 29. (Myint, 1988: 35, 69)

Table(4.3)
Selected Fertility Indices, Union

Census Year	CBR	CWR	SMAM	TFR
1931	na	559	16.3	na
1953-54	na	569	na	na
1973	39.4	647	21.3	5.65*
1983	34.7**	538	22.4	4.73**
1983	35.0		22.4	4.59*

Source: * Myint, Nyan (1988: 45, 46)
* Estimated by means of Palmore's method
** (IMD, 1986: 1-37)

Like CBR, the figures on either CWR or TFR also reflect the apparent fall in fertility. The singulate mean age at marriage (SMAM) has kept rising , it rose from 16.3 in 1931

to 22.4 in 1983. Since increases in SMAM have brought about fertility declines in developing countries, the increase observed in SMAM in Myanmar might have produced a similar decline in fertility. Over the 1973-83 decade, the drop in TFR, as estimated by U Nyan Myint through Palmore's method was about 19 per cent; it fell from 5.65 in 1973 to 4.59 in 1983.

4.4 Fixing Mortality and Fertility Locals

For the purpose of projecting population into the future, 3 kinds of data need to be prepared for the base year. They are -

(1) population by age and sex

(2) level of mortality (e_0^0), and

(3) level of fertility (TFR).

The calendar year 1981 is chosen as the base year and 2001 as the end year of projection. The span of a projection cycle is set at 5 years, and the period of projection is set at 20 years. The projection period is therefore made up of 4 projection cycles.

In fixing the level of mortality, the values of e from Table(4.2) are taken into consideration. To get the base year mortality levels of 51.56 years for males and 54.86 for females, the method of linear interpolation was used, e values by sex estimated by Daw Tin Tin Nyunt for 1973 was

taken as initial values, and those by U Win Tint as terminal values.

Next, the future levels of mortality are fixed in advance by means of the UN working model of mortality improvement. In this model a gain of 2.5 years in life expectancy over every 5 years is assumed for both sexes before e_0^0 reaches 55 years. After this level, the gain in the length of life will get gradually reduced (UN, 1977: 11). The levels fixed at the start of each successive projection cycle are given in Table(4.4).

Table(4.4)
Assumed Levels of Mortality

Time reference (year)	Males	Females	Both Sexes combined
t = 1981	51.56	54.86	53.12
t+5 = 1986	54.06	57.36	55.62
t+10 = 1991	56.36	59.76	57.97
t+15 = 1996	58.61	62.06	60.24
t+20 = 2001	60.66	64.26	62.36

Source: (UN, 1977: 11)

The TFR is considered as the decisive measure of fertility. All available TFR estimates are given in Table(4.5).

Table(4.5)

Total Fertility Rate by different Sources, Myanmar (UNION)

Source	Years	TFR	Method Applied
1. UN	1960-65	5.90	
	1970-75	5.40	
	1980-85	4.61	
	2000-05	3.07	
2. Tin Tin Myint	1973	6.26	
3. Nyan Myint	1973	5.65	Palmore's method
		5.13	Rele method
	1983	4.59	Palmore's method
		4.20	Rele method
		5.24	Brass method
		5.26	Trussell method
		5.27	Arri-1 method
		5.66	Arri-2 method
4. Win Tint	1983	5.20	Brass I method
		4.87	Brass method
		5.49	Trussell method
		5.14	Arriaga method
5. IMPD	1983	4.73	
6. Estimated	1981	4.80	Palmore's method
		4.39	Rele method
		5.47	Arri-1 method
		5.05	Interpolated

Source: 1. UN, World Population Prospects 1990: 496-497
2. Nyunt, 1978: 107-113
3. Myint, 1989: 45,39
4. Tint, 1989: 50
5. IMD, 1986: 1-37

The level of fertility for the beginning of the first cycle of projection is fixed at 5.05. Besides fixing the most plausible level of fertility, it is also necessary to fix a realistic age pattern of fertility. The 1983 broad peak type is adopted as the most suitable age pattern of fertility.

The 1983 ASFR s for Myanmar are given in Table(4.6). The age pattern of fertility is illustrated in Figure(4.2).

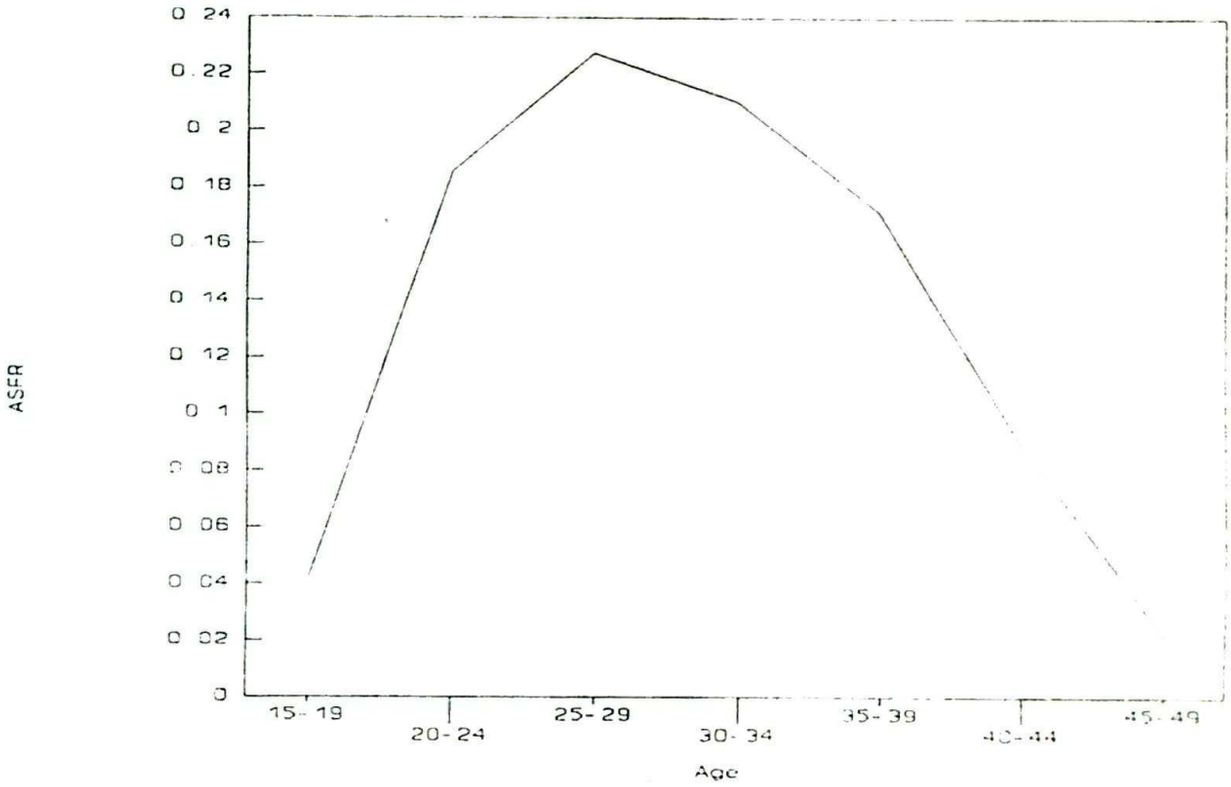
Table(4.6)

Age Specific Fertility Rates and Total Fertility Rate for Union, 1983

Age Group	ASFR(Union)
15-19	0.0425
20-24	0.1855
25-29	0.2274
30-34	0.2102
35-39	0.1712
40-44	0.0878
45-49	0.0208
T F R	4.73
C B R	34.7

Source: (IMD; 1986: 1-35)

Figure(4.2): Age Pattern of Fertility, Myanmar(Union), 1983



CHAPTER V

POPULATION PROJECTIONS

5.1 Introduction

The growth of future population is believed to be brought about by continued gradual reductions in mortality accompanied by relatively moderate changes in the level of fertility. Three different fertility assumptions, and three different mortality assumptions are made to get the population forecasts.

In fixing mortality levels for each projecting cycle, the UN Working Model for Projection Mortality Levels for Developing Countries has been followed. Regarding fertility levels, a TFR value of 5.05 for the base year 1981 is fixed on the basis of the fertility history of ever married women as observed in the 1983 census returns. The end year of projection happens to be the year 2001 for the period of projection has been fixed, in advance, as 20 years. Estimates of CWR for 1973 and 1983 were 647 and 554 respectively. The CWR over the 1973-83 decade fell at the rate of about 2 per

cent per year. Assuming fertility level would fall at least 2 per cent per year over the next 20 years, TFR in 2001 would be about 3.37. In between these two values, the following 4 different patterns of fertility change were considered-

(1) Linear change

(2) Fast initial decrease/increase

(3) Slow initial decrease/increase

(4) Exponential change

Brass' relational gompertz fertility model is used to generate ASFRs for the mid-point of each 5 year cycle of projection. This model may be given as-

$$F_{(x)} = TFR \cdot \exp(-\exp(A + B\, n(F_{S(x)})))$$

where $n(F_{S(x)})=\ln(-\ln(F_{S(x)}/TFR))$ and $F_{(x)}$ is the cumulative fertility up to age x, TFR is the total fertility rate, and the subscripts denotes a standard.

The 1983 fertility pattern is found to be comparatively close to that of Brass general standard. See Table(5.1), Table(5.2) and Figure(5.1). As the PEOPLE 2.0 software gives the "Brass general standard pattern", the standard pattern is adopted while making population forecasts simply for the sake of convenience.

Table(5.1)

Brass' General Standard Set of ASFRs

Age Group	ASFRs
15-19	0.02717
20-24	0.04830
25-29	0.04626
30-34	0.03751
35-39	0.02680
40-44	0.01234
45-49	0.00162

Table(5.2)

Pattern of ASFRs for the Union

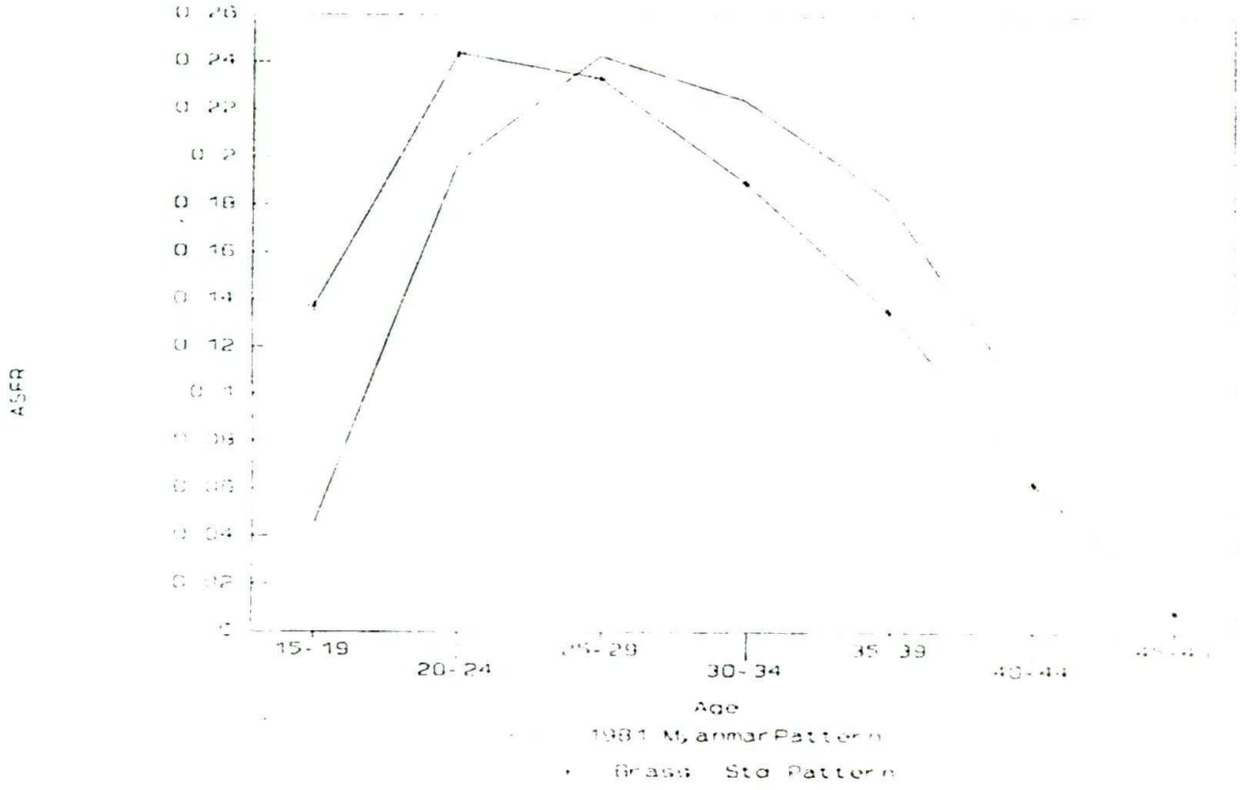
Age Group	1983	1981	Brass' general std set
15-19	0.0425	0.0454	0.1372
20-24	0.1855	0.1982	0.2439
25-29	0.2274	0.2429	0.2336
30-34	0.2102	0.2246	0.1894
35-39	0.1712	0.1829	0.1354
40-44	0.0878	0.0938	0.0623
45-49	0.0208	0.0222	0.0082
TFR	4.73[a]	5.05[b]	5.05[c]

Source: (a) IMD, 1986b, Part 1: 35

(b) Estimated

(c) Estimated

Figure(5.1): Age Pattern of Fertility



5.2 Projection Procedure

The base year population by age and sex is derived from the 1973 and 1983 population censuses. Prior to interpolation, these two populations were adjusted for uncovered areas, and then smoothed for irregularities caused particularly by age misstatements.(See Appendix Table(1))

The extent of under enumeration for the 0-4 age group was about 3 per cent.(IMD,1987 a:4). The smoothing of the age-sex data was done by using the Hill-Zlotnik Durch method.(UN,1983:241-4). This method is capable of producing reasonable age-specific sex-ratios and retaining the original

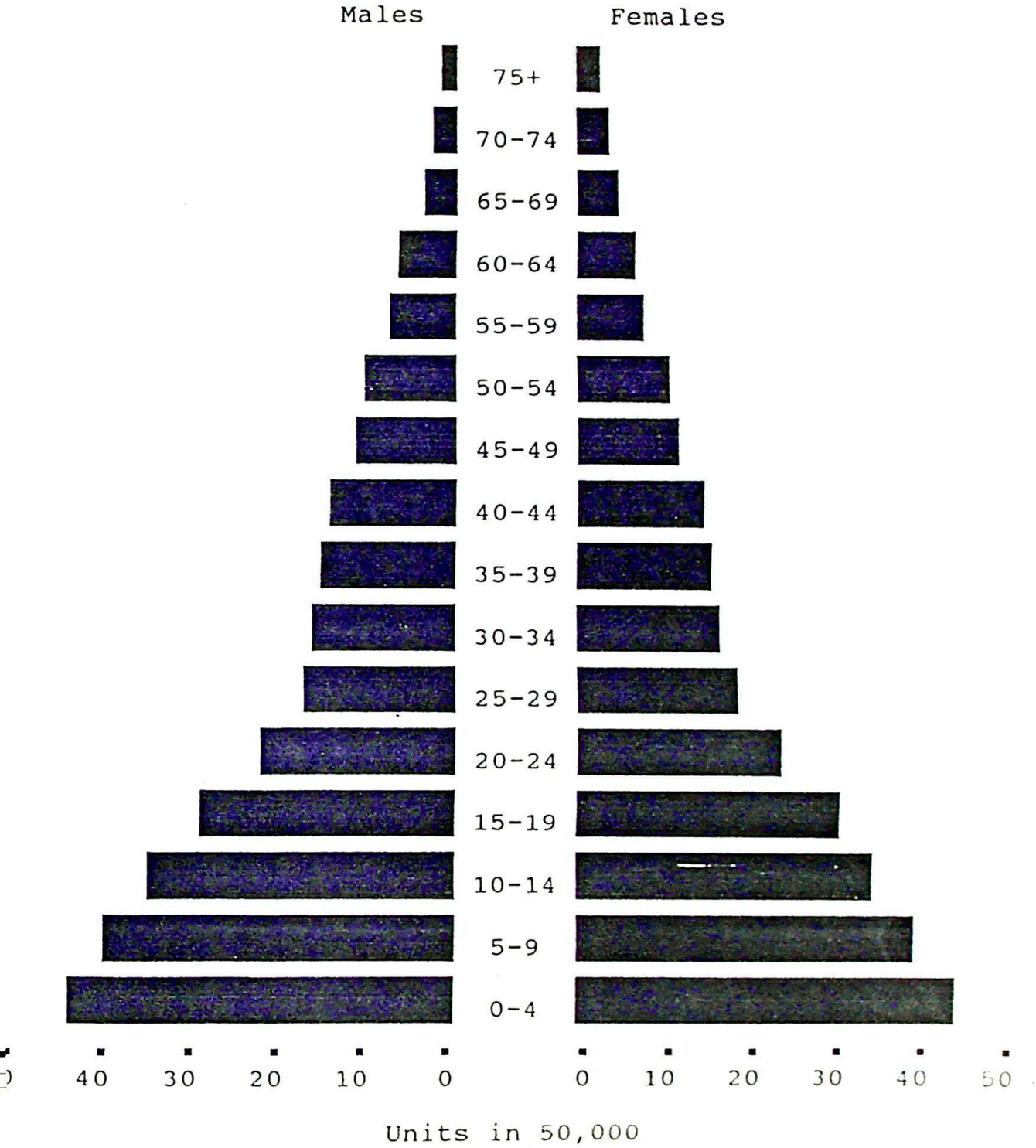
pattern of age-sex structure. The reported and smoothed age and sex distributions were given in Appendix 1. The population pyramids for both the reported and smoothed distributions are presented in Figure(5.2) to Figure(5.5).

The age and sex composition of populations can differ markedly from one country to another. However, they all tend to fall into three profiles of age-sex composition.

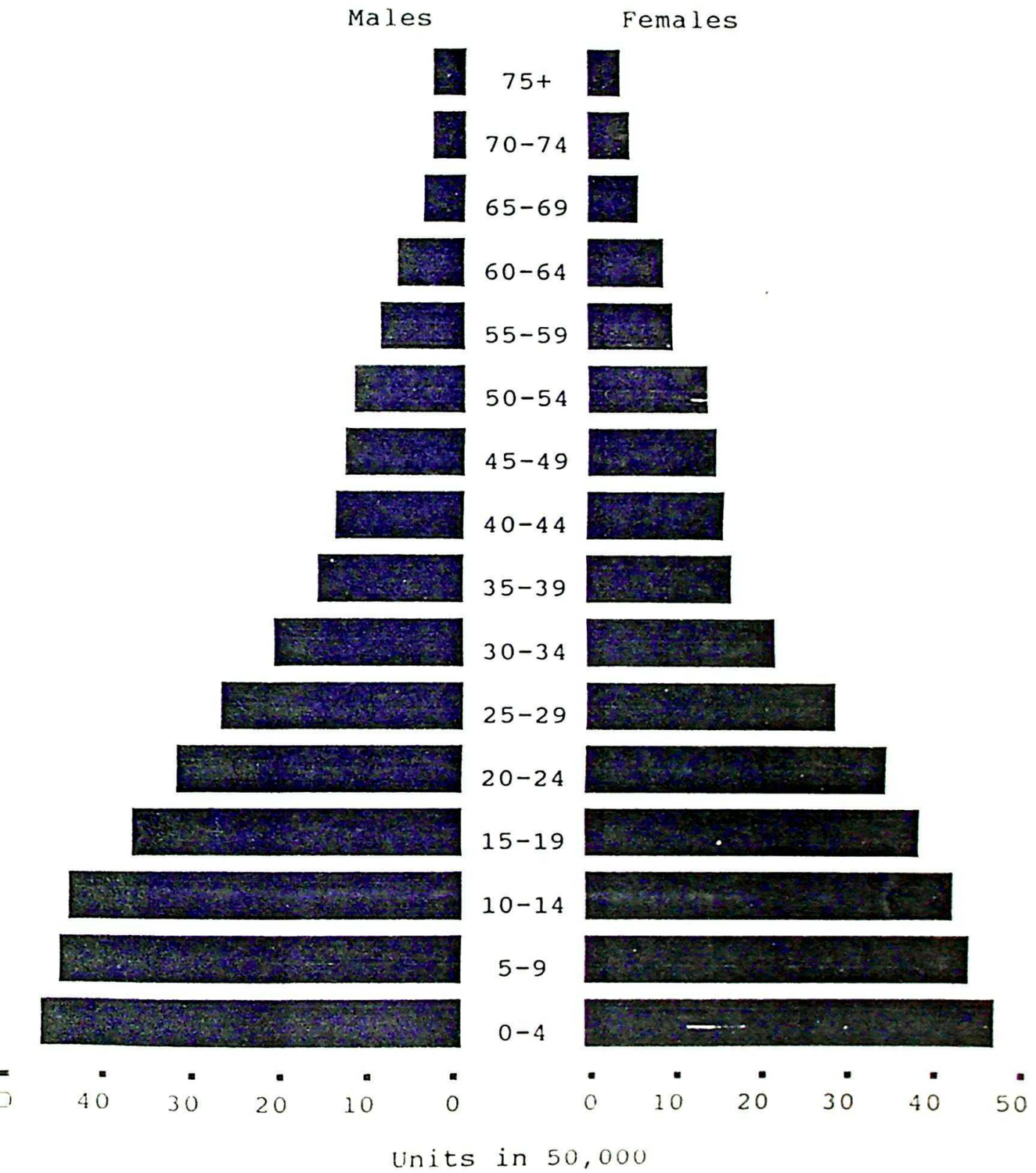
1. Expansive : Larger numbers of people in the younger ages.
2. Constructive: Smaller numbers of people in the younger ages.
3. Stationary : Roughly equal numbers of people in all age ranges, tapering off gradually at the older ages.

As seen in Figure(5.6), the shape of the 1981 base year population may be considered as expansive.

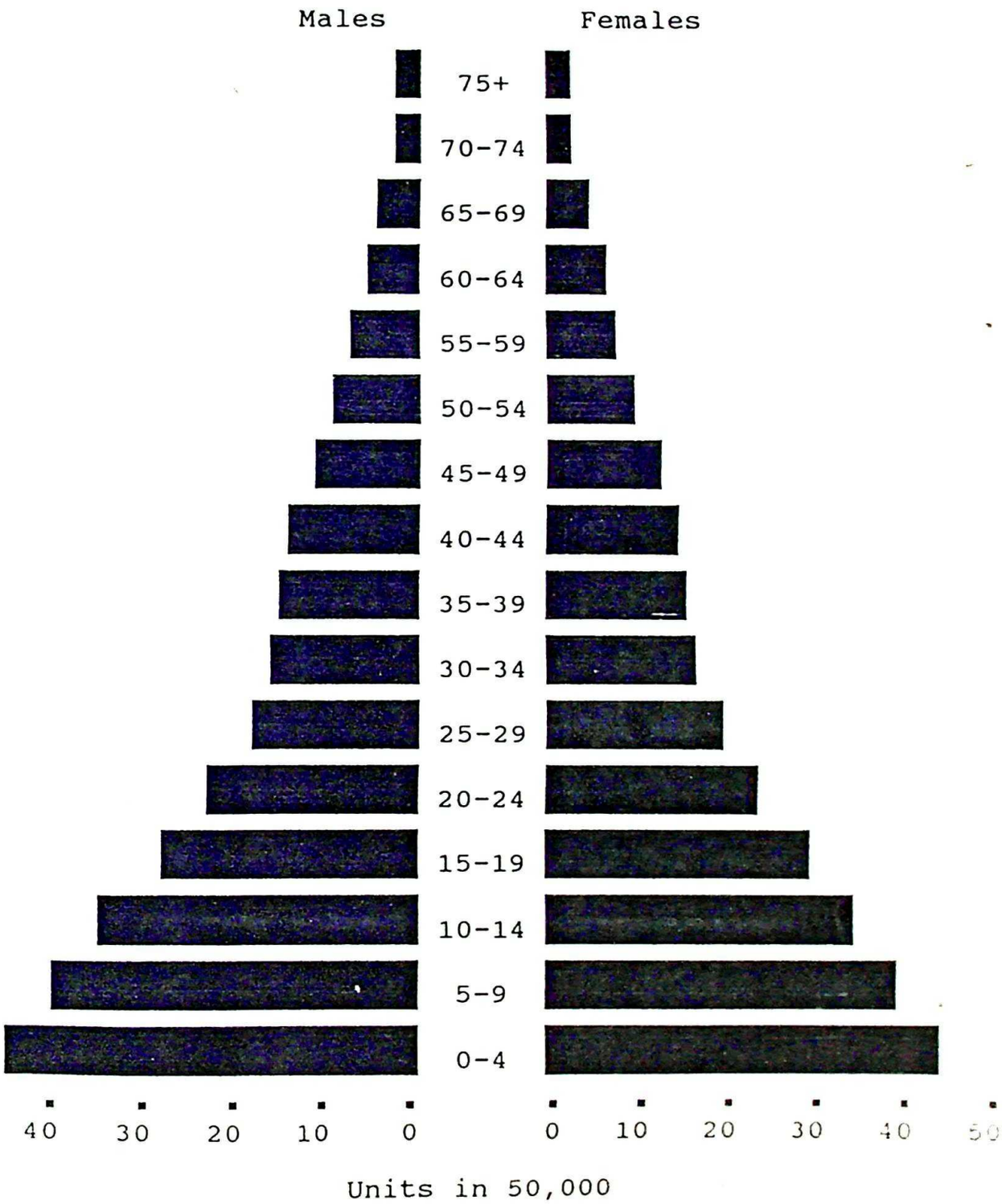
Figure(5.2): Age-Pyramid for Reported Population of Myanmar, 1973



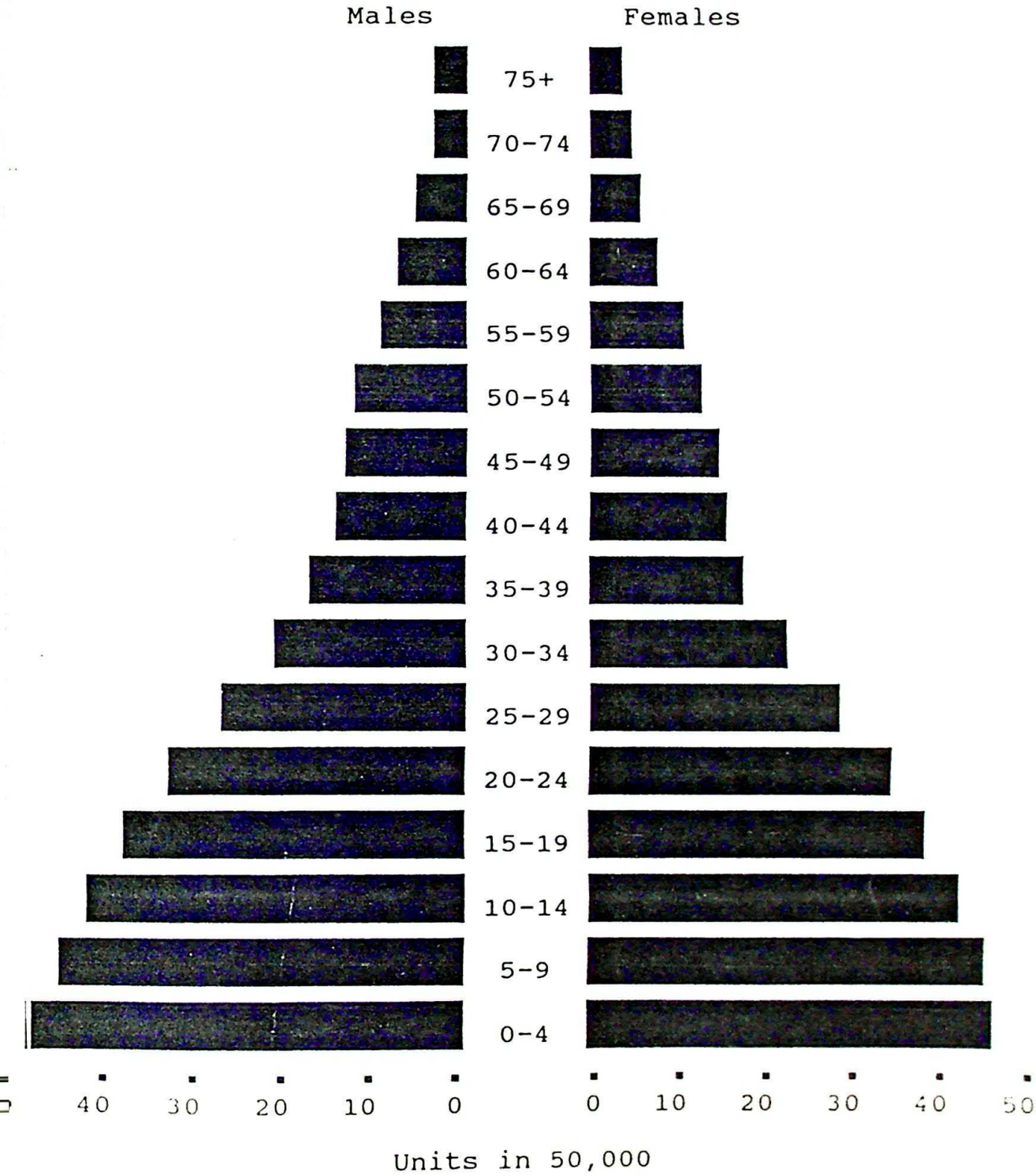
Figure(5.3): Age-Pyramid for Reported Population of Myanmar, 1983



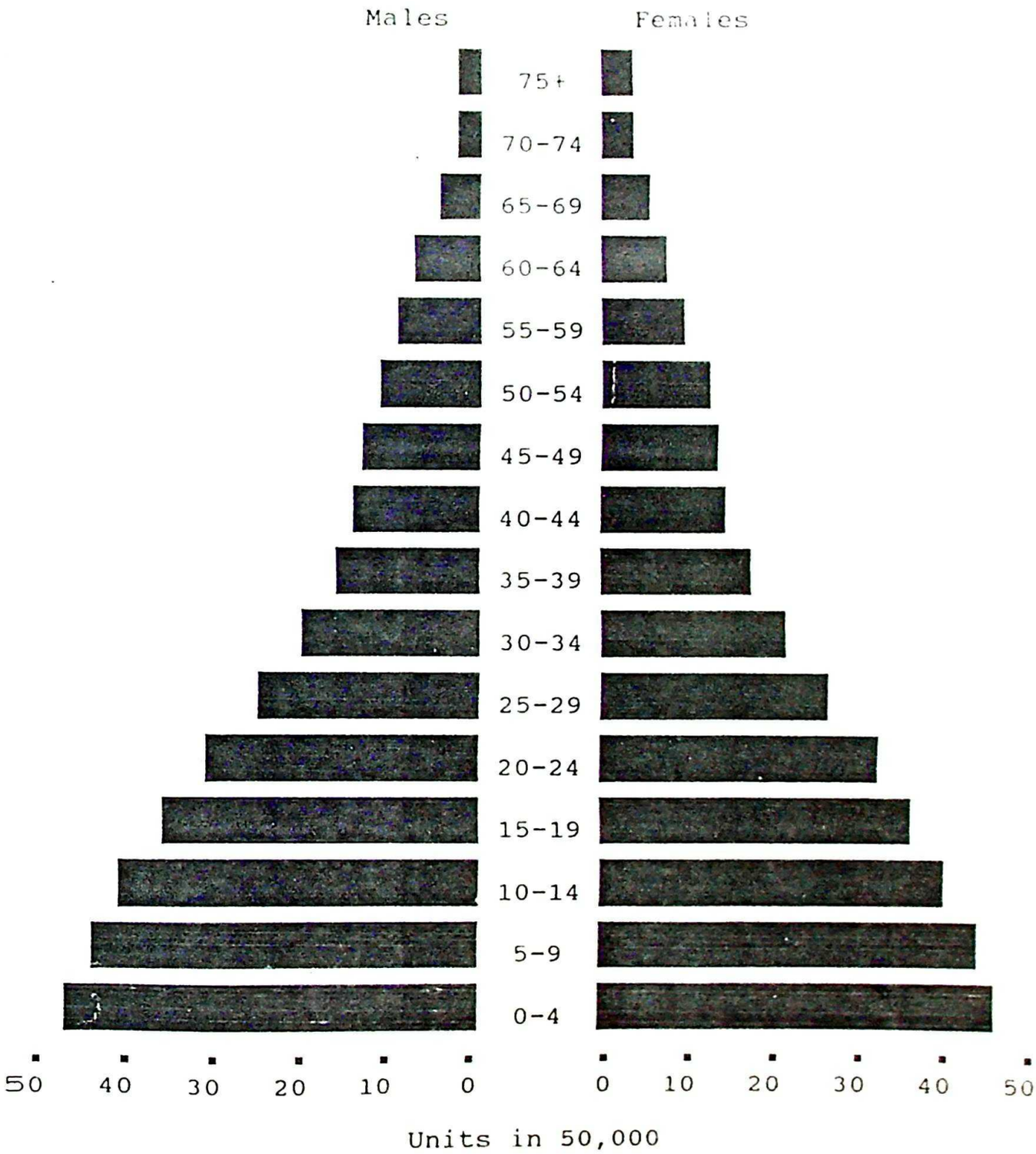
igure(5.4): Age-Pyramid for Smoothed Population of Myanmar, 1973



'igure(5.5): Age-Pyramid for Smoothed Population of Myanmar, 1983



Figure(5.6): Age-Pyramid for Interpolatd Population of Myanmar, 198



The actual computation was done on a Personal Computer PC using the demographic software package called "PEOPLE" version 2.0. The software provides population projections by using the demographic cohort component method. In the computation process, separate projections are made for males and females in five year age groups over a projection period of 20 years involving four projection cycles. The number of persons of a given sex within a specific five year age group five years after the base year is obtained by multiplying the base year population by age-sex-specific five year survivorship ratios.

Algebraically:

$$P_{x+5}^{t+5} = P_x^t \, S_x^{t+2.5} \qquad (1)$$

where P_x is the number of persons of a given sex at mid-year t in five year age group x, and S represents the sex specific five year survivorship ratio of a given sex.

In order to obtain the population aged 0-4 at time t+5, the projected number of births occurring during the five year period is calculated by applying assumed sets of age-specific fertility rates to women in each five year age group between 15 and 49. The formula is:

$$TB^{t+5} = \sum_{i=1}^{7} [\ 0.5\ (FP_i^t + FP_i^{t+5})\ f_i^{t+2.5} * 5\ ] \qquad (2)$$

where TB is the total projected number of births to women aged 15-49 in the five year period from mid-year t to t+5; FP_i is

the number of women at mid-year t in the five year age group i (starting from women aged 15-19) and $f_i^{t+2.5}$ is the age-specific fertility rate at the mid-point of the five year period.

The total number of births in each five year period is then split into males and females by applying sex proportions at birth.

$$FB^{t,t+5} = TB^{t,t+5}.\ 1/(1+1.06) \qquad (3)$$

where FB represent female births. Male births are obtained as total births minus female births.

The population of a given sex at ages 0-4 at time t+5 is then obtained as the survivors of the projected births.

The formula used is:

$$P_{0-4}^{t+5} = (\ B^{t,t+5}.\ S^{t+2.5}\ ) \qquad (4)$$

5.3 Alternative Population Projections

Adequate information on prospective population changes is needed in formulating, implementing and evaluating socioeconomic development programmes. Hence, it is important to have a fair knowledge of projecting the current size of the population and its age structure into the future on the basis of assumed trends in mortality and fertility. (Migration is ignored for it has little or no influence on growth in all closed populations.)

Any change in the size and composition of population depends on a set of assumed levels of fertility and mortality. But these levels are in turn dependent upon the influence of changing economic, social and other conditions. A projection based on only one set of assumptions cannot be expected to reflect a whole range of changes that could occur either in fertility or in mortality. Any decision made on the results of a single projection might lead to erroneous conclusions.

5.3.1 Fertility and Mortality Assumptions

The 4 most common trends often observed in fertility and mortality are:

(i) declining mortality and constant fertility

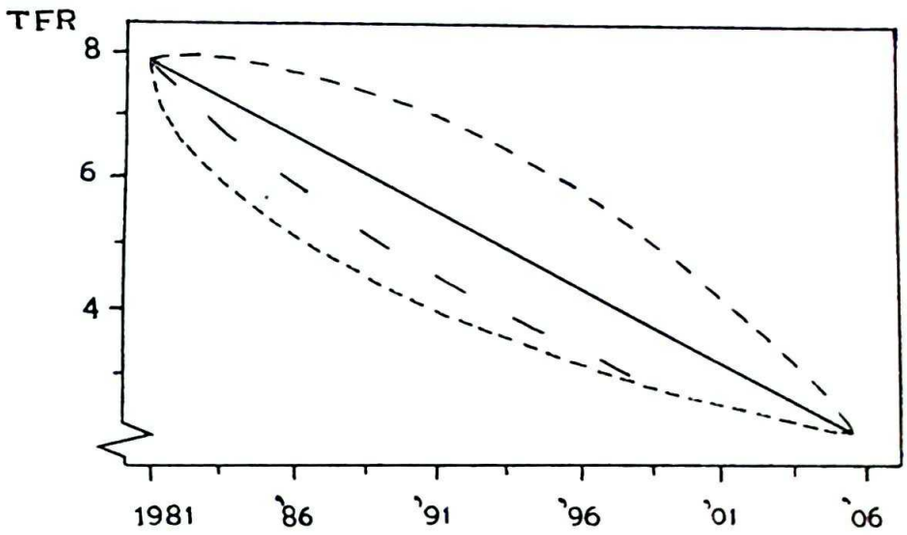
(ii) constant mortality and constant fertility

(iii) declining mortality and declining fertility

(iv) constant mortality and declining fertility

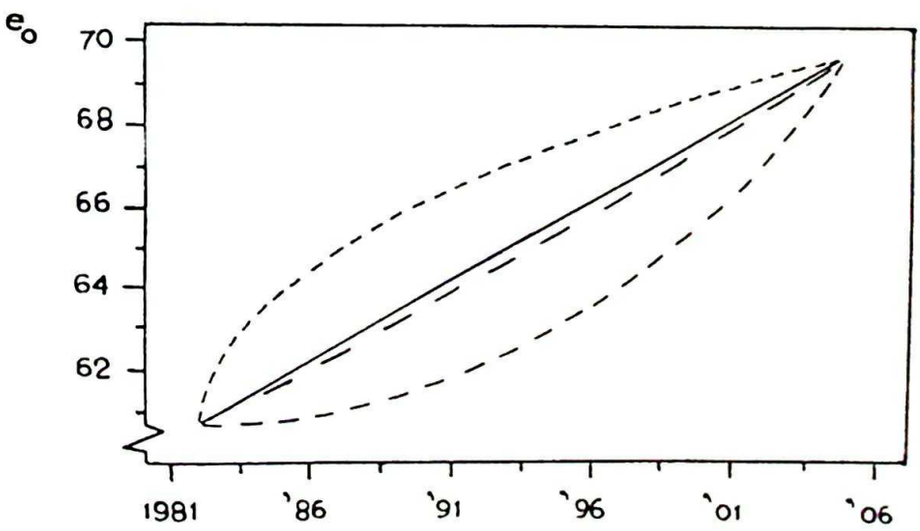
The patterns of changes in fertility and mortality are shown in Figures(5.7) and (5.8).

Figure(5.7): The Pattern of Changes in Fertility



Modes of fertility change over projection period
——— (1) Linear change
----- (2) Fast initial decrease/increase
- - - (3) Slow initial decrease/increase
— — (4) Exponential Change

Figure(5.8): The Pattern of Changes in Mortality



Modes of mortality change over projection period
——— (1) Linear change
----- (2) Fast initial decrease/increase
- - - (3) Slow initial decrease/increase
— — (4) Exponential Change

Among these, the most likely courses of change either in mortality or in fertility are chosen for projecting the 1981 base year population into the future. The most plausible change in future size of population is shown in Table(5.4) by 3 different variants: high, medium and low.

Table(5.4)

Plausible Changes in Future Population Size

(In million)

Year	Variant I	Variant II	Variant III
1981	34.3	34.3	34.3
1986	39.4	39.0	38.3
1991	44.5	43.4	41.6
1996	51.0	49.0	45.6
2001	58.6	55.3	50.1

Note:

I High Variant: Declining mortality and Constant fertility

II Medium Variant: Constant mortality and Costant fertility

III Low Variant: Declining mortality and Declining fertility

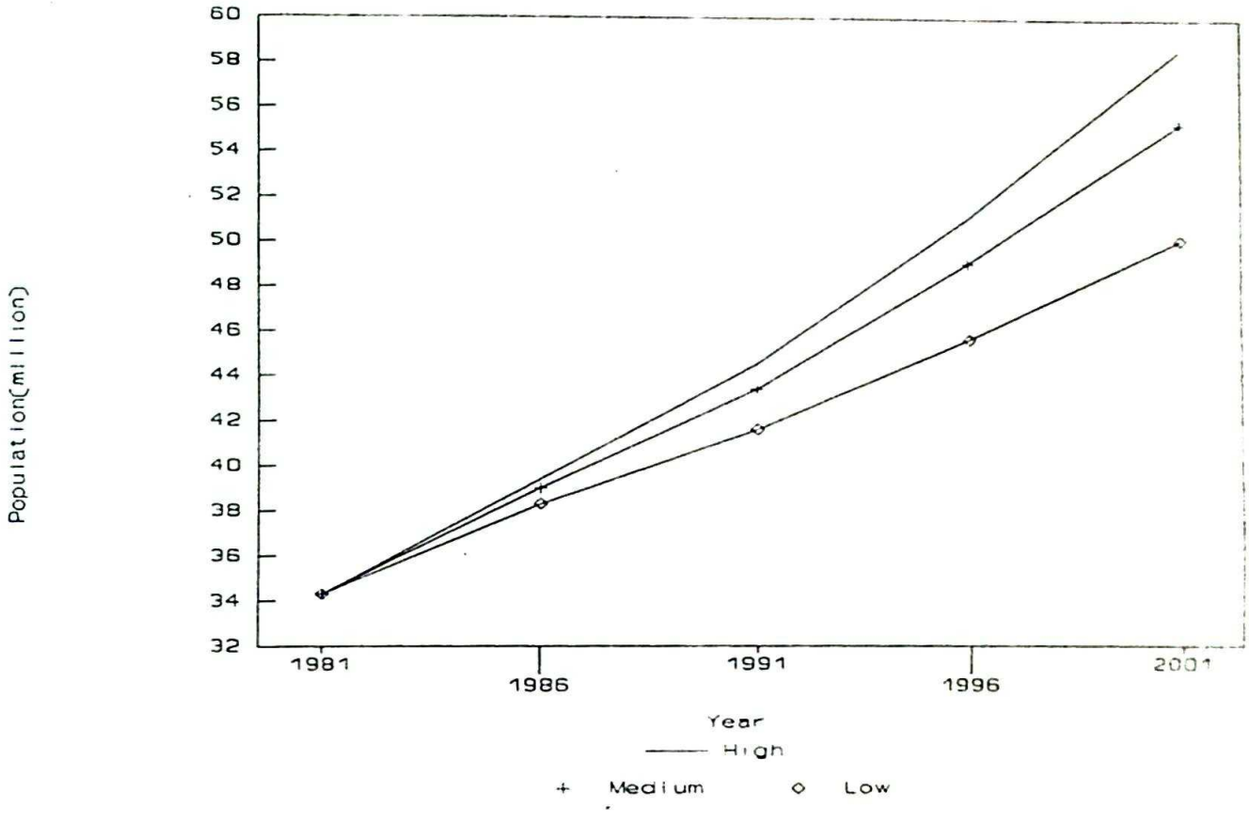
The three variants of the projections- high, medium and low are established by combining the assumed levels of fertility and mortality, and selecting those combinations that generally yield the maximum range for the projected size of population. The high variant is based on the assumptions of

constant fertility and declining mortality. The medium variant is based on the assumptions of constant mortality and fertility. The low variant is based on the assumptions of declining mortality and fertility.

The most plausible change in future size of population is shown in Table(5.4) and Figure(5.9) by 3 different variants. It was seen that, the high variant produced a larger size of population by holding base year level of fertility constant. In other words, Myanmar population is subject to the highest possible level of fertility throughout the projection period.

The decline fertility may be due to many reasons; of these reasons, knowledge and use of fertility control among women especially the younger generation. The smallest size of population in 2001 provided by the low variant is particularly due to low fertility.

Figure(5.9): Population Projections, 1981-2001



The comparison with the other population projections is shown in Table(5.5).

Table(5.5)

A Few Selected Population Projections

Source	Assumptions				Population Forecasts (Million)			
	Fertility(TFR)		Mortality(e_0)					
	Begin of Projection Period	End of Projection Period	Begin of Projection Period	End of Projection Period	1986	1991	1996	2001
(a)Myint	4.22 (1983)	3.10 (2003)	55.18 (1983)	68.09 (2003)	37.3	41.8	46.4	51.3
(b)Tint	5.14 (1983)	2.20 (2003)	54.60 (1983)	67.29 (2003)	38.6	43.7	48.9	53.8
(c)Than	5.05 (1981)	3.37 (2001)	53.60 (1981)	62.40 (2001)	39.0	43.5	49.0	55.0
(d)MPF	N a	N a	53.78 (1973-83)	63.61 (2003-2013)	37.8	41.5		

Source: (a) Myint, Nyan 1990: Table 1(c)
(b) Tint, Win 1990: 48-49
(c) Review of the Financial, Economic and Social Conditions 1993:1993/94 :25
(d) IMD, 1987: 6-21

Note:
(a) and (b) are interpolated
(d) CBR was used instead of TFR for measuring the level of fertility.

The forecast is dependent upon (i) the levels and (ii) the courses of change in both fertility and mortality. As expected, different assumptions led to different sizes of population. Nevertheless, the projected figures are found to be quite close to one another.

CHAPTER VI

PROSPECTIVE LABOUR FORCE

6.1 Introduction

A country needs some facts about the size and composition of its working population. Economic programs contain, at least implicitly, some allocations of manpower in various pursuits, and these plans require an inventory of the country's manpower resources. The term "manpower" refers to the number of actual or potential workers in a population. It is measured in units of persons, not units of work. Often manpower is used as synonym to labour force.

Growth in the labour force can result from greater participation of the population already existing or from an increase in the population of working age due to natural population growth or migration.

Figure(A) presents a simple flow diagram of the scheme by which a country's labour supply is determined. The essential factors determining a country's labour supply are:

(a) the size of the population, which is a function of the rate of natural increase and the rate of migration;

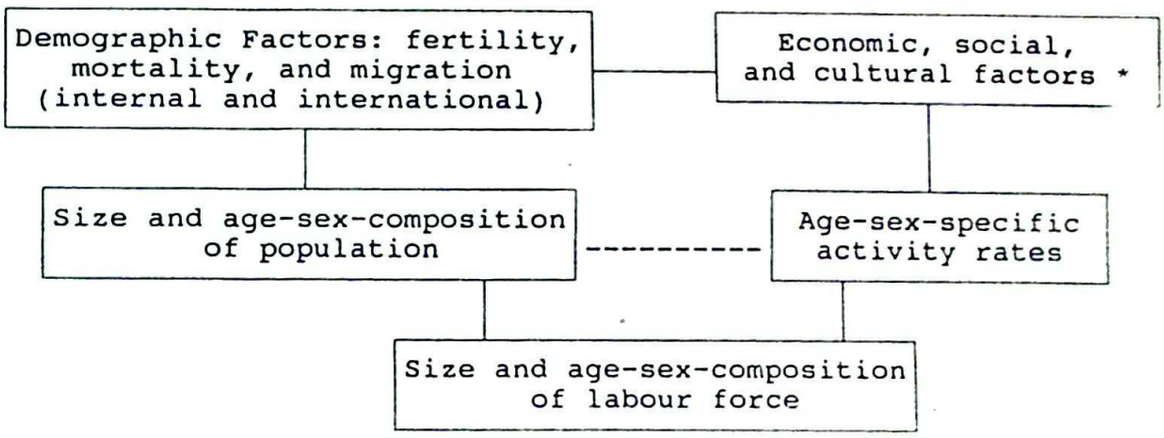
(b) the age-sex structure of the population, which is determined by the interplay of demographic forces of fertility, mortality and migration, autonomous factors and

(c) age-sex specific labour force participation rates, which are influenced by economic, social, cultural and demographic factors-induced factors.

In the following sub-sections the major groups of variables which determine a nation's labour supply are discussed.

Figure(A)

Flow Diagram of Basic Determinants of Labour Force Size



——— strong relationship
----- weak relationship

* Economic factors: Per Capita GNP, average earning level for workers, employment opportunities and their geographical distribution, industrial structure, occupational structure, organization of production, and so forth.

Social factors: Educational opportunities, educational attainment, urbanization, marital laws and characteristics, and so forth.

Cultural and other factors: Traditional attitudes toward participation of different groups, particularly women, in economic activity, religious influences on attitudes to work, and so forth.(UN, 1986: 28-29)

In theory, labour supply projections can be made for any period of time from one to twenty years; usually few short term projections are made. The labour supply projections are, in fact, the product of two separate projections, (i) a projection of total population by sex and age, and (ii) a projection of the activity rates for each group considered.

The size of the labour force depends largely on the number of persons in the population who are of working age. Projections of total population by sex and by age therefore provide the basis for estimates of labour supply: anticipated changes in the size and composition of the total population have a direct influence on labour force projections, particularly long-term projections.

Moreover, changes in the activity rates of the economically active population are brought about by a whole range of economic and social factors, such as the number and type of jobs created for young people by economic development, school enrollment trends, the size of the old-age persons, and, for women in general, age at marriage, number of children, and educational level.

To ascertain the degree to which all these factors influence the activity rates of the population is very difficult; it is generally assumed that activity rates evolve gradually under the pressure of the various factors and that long-term trends can be discerned(UN, 1971: 7).

Methods of projecting labour supply depend upon the level of development, the quality of the statistics available, and the importance of occupations as one of the factors determining trends in the economically active population. There are four principal methods in common use; each of them is based on one of the following assumptions:-

(a) The trend in the activity rates of the economically active population for future years will be an extrapolation of the past trend;

(b) Current activity rates will be maintained in future year;

(c) Activity rates in future years will be the same as those of other relatively more advanced countries;

(d) Activity rates will depend on projected changes in such factors as the economy's manpower needs, school enrollment, the growth of the urban population, the development of the pension system, and nuptiality and fertility rates.

6.2 Characteristics of the Labour Force

"Labour Force" is synonymous with economically active population. The economically active population is generally defined as that part of the population which supplies and which is willing to supply that labour force for the production of economic goods and services. It thus includes those who, during the reference period which is two weeks prior to the time of enumeration, are working and looking for work. The economically inactive persons are those who are neither working nor looking for work during the reference period such as those engaged in domestic duties in

their own houses, students, the old or very young-aged, the disabled and persons voluntarily engaged in charitable and religious services. In Myanmar, the population censuses and ad hoc labour force sample surveys constitute the major source of information on the economic activity of the population.

The volume of labour force or economically active population is normally presented as a percentage of the total population. The overall extent of participation of the population in economic activity is measured in terms of Activity Rates. There are two kinds of activity rates: the crude and the refined. The crude activity rate is the ratio of the economically active population to the total population expressed in percentage.

The crude activity rate indicates the relative number of persons who are economically active in the whole population. It is strongly affected by variations in age composition especially small children who are not exposed to economic activities. The refined activity rate reflects the labour force participation in relation to that part of the population which is exposed to economic activities. It is measured by the ratio of the economically active population 10 years and above to the total population of the same age expressed in percentage. The Activity Rates by age and sex are given in Table(6.1)a for 1973 and 1983.

Table(6.1)a

Population Aged 10 and Labour Force in 1973 and 1983

Age	Population	1973 L.F	Activity rates	Population	1983 L.F	Activity rates
Both Sexes	19620713	9367054	47.74	25233933	12199979	48.35
Males	9585481	6262912	65.34	12455444	7804687	62.66
Females	10035232	3104142	30.93	12778489	4395292	34.40
Males	9585481	6262912	65.34	12455444	7804687	62.66
10-14	1720431	251212	14.60	2178956	223269	10.25
15-19	1402047	726606	51.82	1844414	891261	48.32
20-24	1077672	830206	77.04	1610144	1207118	74.97
25-29	853303	735564	86.20	1363835	1134462	83.18
30-24	798435	701544	87.86	1067173	912986	85.55
35-39	780796	683871	87.59	835177	713669	85.45
40-44	719561	625679	86.95	716619	608359	84.89
45-49	570658	491676	86.16	695833	582780	83.75
50-54	507735	428435	84.38	634222	519293	81.88
55-59	377934	304207	80.49	489815	391454	79.92
60-64	314243	230649	73.40	398942	282310	70.76
65+	462666	253263	54.74	620314	337726	54.44
Females	10035232	3104142	30.93	12778489	4395292	34.40
10-14	1716876	235144	13.70	2089714	239642	11.47
15-19	1485217	478947	32.25	1891021	676704	35.79
20-24	1169531	407416	34.84	1676180	671786	40.08
25-29	909338	319712	35.16	1399710	568714	40.63
30-24	847731	304035	35.86	1085792	444129	40.90
35-39	798848	290849	36.41	833454	347026	41.64
40-44	738105	282760	38.31	762901	322139	42.23
45-49	577885	225064	38.95	717926	303981	42.34
50-54	524507	203539	38.81	664930	279954	42.10
55-59	392577	141157	35.96	505585	206243	40.79
60-64	336141	106061	31.55	431392	158102	36.65
65+	538476	109458	20.33	719884	176872	24.57

Source: IMD(1976: 142-149, 1986: 2: 79-82)

6.3 Projected Rates of Participation

Essentially the methods of projecting activity rates may be classified into two types:

Type I Future Activity Rates are projected by extrapolating the past trends observed, either in the country under study or in countries whose economic development is similar.

Type II Future Activity Rates at a given date are correlated with certain measures which typify the anticipated rate of economic development of specific regions of a country or of countries at different levels of development.

In this thesis, Type I is used to extrapolate activity rates by age group and by sex.

Future economic activity rates may be computed by linear extrapolation of observed trends. This method is the simplest and the most frequently employed, but it is unsatisfactory to a number of reasons, the most important of which is that it can yield impossible result. For instance, in the case of age groups whose activity rates are very high, the method may yield percentages above the maximum of 100. These drawbacks are not overcome by resort to geometric projection if the trend being projected is a rising one. A better method is to weight the changes in the activity rate with a coefficient that will have the effect of ruling out negative percentages or percentages above 100.

This correction coefficient is obtained by dividing the product of the rates of activity and inactivity at the beginning and end of the past period. The extrapolation formula is as follows:

$$a^x_{t1} = a^x_t \frac{100 \pm \Delta^x_{t,t1}}{100}$$

In this equation, a^x represents the activity rate of persons of age x; $\Delta^x_{t,t1}$ the recorded percentage increase or decrease in the activity rate of persons of age x in the base period, which is deemed also to apply to the projection period; t the beginning of the projection period or the end of the base period; t1 the end of the projection period.It should be noted that the projection period and the base period are here assumed to be of the same duration. If this is not the case, the mean rate of change for a period of the same duration must be computed. When the adjusted coefficient is applied, the percentage increase- or decrease- may be computed in two ways, using one of the following equations;

$$\Delta^x_{t,t1} = \left(\frac{a^x_t}{a^x_{t0}} \right) \left(\frac{a^x_t * u^x_t}{a^x_t * u^x_{t0}} \right) \qquad \text{(a)}$$

$$\Delta^x_{t,t1} = 1 + \left(\frac{a^x_t}{a^x_{t0}} - 1 \right) \left(\frac{a^x_t * u^x_t}{a^x_t * u^x_{t0}} \right) \qquad \text{(b)}$$

in which u^x represents the inactivity rate of persons of age x and t^0 the beginning of the base period. In (a) the ratio of the total increase- or decrease- is multiplied by the adjusted coefficient, whereas in (b) only the increase itself- or the decrease- is thus modified.(UN, 1971: 10)

The three variants of the projected labour force by sex are given in Table(6.1)b.

Table(6.1)b
Projected Labour Force (1986-2001)

(In million)

Year	High Variant			Medium Variant			Low Variant		
	M	F	Total	M	F	Total	M	F	Total
1986	8.74	5.12	13.86	8.69	5.10	13.79	8.69	5.10	13.79
1991	9.72	6.12	15.84	9.58	6.04	15.62	9.60	6.05	15.65
1996	10.79	7.31	18.10	10.51	7.12	17.63	10.57	7.15	17.72
2001	12.11	8.89	21.00	11.62	8.52	20.14	11.66	8.49	20.15

The volumes of all the three variants for the year 2001 seemed to fall around 20 million. More or less the same volume projected for 2001, despite differences in the assumed levels of fertility, might cause suspicion in the reliability of these estimates. In fact, any change in fertility during the 15 year projection period could only exert its influence on the young and not those belonging to the working age.

The labour force sizes and differences between the three variants for each quinquennial period are illustrated in Figure(6.1). The projected activity rates by age and by sex

are given in Table(6.2)a and Table(6.2)b, and the projected labour force by age and by sex are given in Appendix Table(3).

As expected, the projected female labour force participation rates (FLFPR) would tend to increase in future. See Table(6.2)b. There are two reasons for this. First, sex differences in longevity and a decline in child bearing tend to increase the number of female entrants into the labour force, and second an increase in the number of educated women who might go out to work as well as keep house for the family.

Figure(6.1): Projected Labour Force (1986-2001)

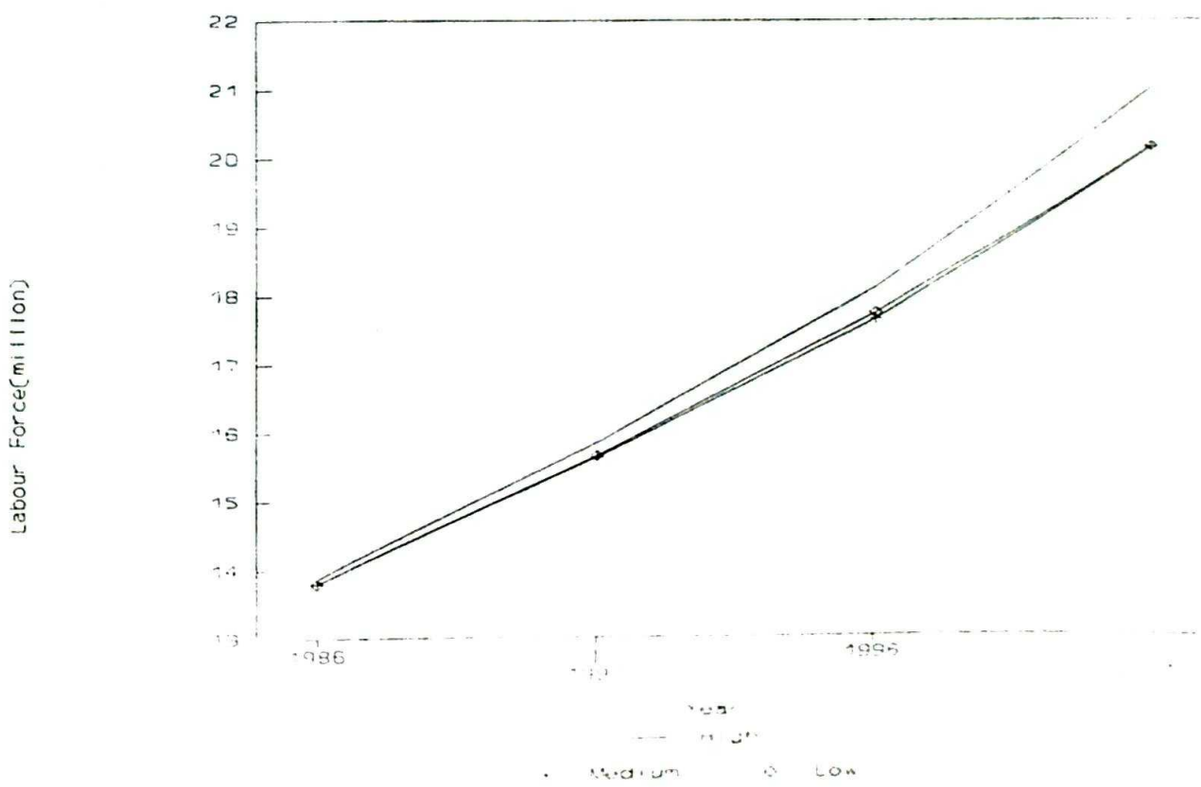


Table (6.2 a)

Projected Male Labour Force Participation Rates, Type I (eqn B)

Age Group	LFPR 1973 a1	LFPR 1983 a2	a2/a1	a2*u2 / a1*u1	a2/a1 -1	(5)*(6)	Delta	LFPR 1993 a3	LFPR 2003 a4	LFPR 1981	LFPR 1986	LFPR 1991	LFPR 1996	LFPR 2001
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
10-14	14.60	10.25	0.7017	0.7375	0.2983	0.2200	0.7800	7.9926	6.2344	11.00	9.51	8.40	7.42	6.55
15-19	51.82	48.32	0.9324	1.0002	0.0676	0.0676	0.9324	45.0557	42.0101	49.00	47.32	45.69	44.12	42.60
20-24	77.04	74.97	0.9732	1.0608	0.0268	0.0285	0.9715	72.8354	70.7619	75.38	74.32	73.26	72.21	71.17
25-29	86.20	83.18	0.9650	1.1762	0.0350	0.0412	0.9588	79.7539	76.4673	83.78	82.14	80.43	78.75	77.11
30-34	87.86	85.55	0.9737	1.1593	0.0263	0.0305	0.9695	82.9410	80.4098	86.01	84.76	83.46	82.17	80.91
35-39	87.59	85.45	0.9756	1.1434	0.0244	0.0279	0.9721	83.0693	80.7538	85.87	84.73	83.54	82.37	81.21
40-44	86.95	84.89	0.9763	1.1305	0.0237	0.0268	0.9732	82.6195	80.4069	85.30	84.20	83.07	81.95	80.84
45-49	86.16	83.75	0.9721	1.1411	0.0279	0.0319	0.9681	81.0834	78.4990	84.23	82.94	81.61	80.30	79.01
50-54	84.38	81.88	0.9703	1.1258	0.0297	0.0334	0.9666	79.1445	76.5016	82.37	81.05	79.68	78.34	77.02
55-59	80.49	79.92	0.9929	1.0221	0.0071	0.0073	0.9927	79.3369	78.7593	80.03	79.74	79.45	79.16	78.87
60-64	73.40	70.76	0.9641	1.0596	0.0359	0.0380	0.9620	68.0743	65.4862	71.28	69.95	68.60	67.29	66.00
65+	54.74	54.44	0.9946	1.0011	0.0054	0.0054	0.9946	54.1501	53.8574	54.50	54.36	54.21	54.06	53.92

Table (6.2 b)

Projected Female Labour Force Participation Rates, Type I (eqn B)

Age Group	LFPR 1973 a1	LFPR 1983 a2	a2/a1	a2*u2 / a1*u1	a2/a1-1	(5)*(6)	Delta	LFPR 1993 a3	LFPR 2003 a4	LFPR 1981	LFPR 1986	LFPR 1991	LFPR 1996	LFPR 2001
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
10-14	13.70	11.47	0.8371	0.8587	0.1629	0.1399	0.8601	9.8635	8.4838	11.88	10.96	10.17	9.43	8.74
15-19	32.25	35.79	1.1096	1.0517	0.1096	0.1153	1.1153	39.9106	44.5117	35.05	36.98	39.05	41.24	43.55
20-24	34.84	40.08	1.1504	1.0579	0.1504	0.1591	1.1591	46.4532	53.8419	38.97	41.89	45.10	48.56	52.28
25-29	35.16	40.63	1.1556	1.0581	0.1556	0.1646	1.1646	47.3202	55.1109	39.47	42.53	45.90	49.53	53.46
30-34	35.86	40.90	1.1406	1.0510	0.1406	0.1478	1.1478	46.9499	53.8899	39.84	42.63	45.67	48.93	52.42
35-39	36.41	41.64	1.1436	1.0496	0.1436	0.1507	1.1507	47.9108	55.1299	40.53	43.43	46.58	49.97	53.60
40-44	38.31	42.23	1.1022	1.0322	0.1022	0.1055	1.1055	46.6804	51.6053	41.41	43.52	45.75	48.11	50.58
45-49	38.95	42.34	1.0871	1.0267	0.0871	0.0894	1.0894	46.1268	50.2504	41.64	43.44	45.34	47.33	49.40
50-54	38.81	42.10	1.0848	1.0265	0.0848	0.0871	1.0871	45.7695	49.7555	41.42	43.17	45.01	46.93	48.93
55-59	35.96	40.79	1.1344	1.0488	0.1344	0.1410	1.1410	46.5429	53.1033	39.78	42.44	45.33	48.42	51.72
60-64	31.55	36.65	1.1616	1.0751	0.1616	0.1738	1.1738	43.0175	50.4922	35.57	38.45	41.66	45.14	48.90
65+	20.33	24.57	1.2085	1.1442	0.2085	0.2386	1.2386	30.4321	37.6935	23.66	26.20	29.16	32.45	36.11

6.4 Projected Population Economically Active in Agriculture

Myanmar is predominantly an agricultural economy. Agricultural production constitutes approximately 50 per cent of the country's exports and over 62 per cent of the active labour force are engaged in agricultural work.

The importance of agriculture in the economic development of the country has gained increasing recognition in recent years.Two major factors have contributed to this,namely population growth and the need to expand food production, and the success achieved in obtaining dramatic increases in crop yields through the use of new technology.

The goal of self sufficiency was to be pursued with reliance on Myanmar production for Myanmar requirements. If one wishes to move the economy away from the primary production stage towards the stage where industry is to play an important role, the country has to depend upon agriculture's traditional capacity to furnish a surplus for social accumulation.

The performance in the agricultural sector was poor between 1964 and 1974. Growth in Output (an average of 1.6 per cent over the previous decade reflecting only marginal gains in yields) lagged behind population growth (an average of 2 per cent per year. This performance over the decade had an extremely unfavorable impact on the economy as agricultural

crops account for 27 per cent of GDP. Low growth rates in agricultural output were due to several factors, the most important being: (a) insufficient investment;(b) lack of incentives offered to the farmers; (c) shortages of input supplies; and (d) limited development of supporting services. There are about 26 millions acres of fallow and culturable waste land for reclamation. Given the high growth potential of the agriculture sector, the government has adopted adequate measures to increase agriculture production.

6.4.1 Labour Force Participation by Economic Activity

The economic activities of employed population enumerated in the 1973 and 1983 censuses were given in Table(6.3).

Agriculture had provided employment to nearly 2/3 of the total employed population. The number employed in agricultural sector increased at the rate of about 2.78 per cent per year during the 1973-83 intercensal period. This rate was greater than the rate of population; growth 2 per cent.

A further breakdown of the 1983 census employed population is given in Table(6.4) by economic sector and by states and divisions.

With the exception of the Yangon Division, the proportion of Labour Force engaged in agricultural and related

activities in all states and divisions was found to fall between 58 per cent and 93.1 per cent. Since a high level of participation of the workforce has been observed in agriculture, it is thought that a projection of population economically active in agriculture might be interesting.

Table(6.3)

Employed Population by Economic Activity (industry-Major Groups), 1973 and 1983

Industry	1973 Persons	1973 Percent	1983 Persons	1983 Percent	Increase in 1973-83	Annual Growth Rate
All Industries	9199395	100.00	12000571	100.00	2801176	2.66
1. Agriculture, hunting, Forestry and Fishing	871783	63.83	7756106	64.63	1884323	2.78
2. Mining and quarrying	75596	0.82	69994	0.58	-5602	0.77
3. Manufacturing	957533	10.41	1105340	9.21	147807	1.44
4. Construction	144728	1.57	156802	1.31	12074	0.80
5. Electricity, Gas, Water and Stationary Services	16191	0.18	20917	0.17	4726	2.56
6. Wholesale & Retail Trade Restaurant and Hotels	1020523	11.09	1362253	11.35	341730	2.89
7. Transport, Storage and Communication	275563	3.00	[illegible]	2.88	69567	2.25
8. Services	522687	5.68	806383	6.72	283696	4.34
9. Unclassified	314791	3.42	[illegible]	3.15	62855	1.82

Source: IMD(1976: 216, 1986, 2: 119)

Appendix Table (2.4)

PROJECTED MID-YEAR POPULATION BY AGE AND SEX
(Variant-IV)

AGE	1991 MALES	1991 FEMALES	1991 PERSONS	1996 MALES	1996 FEMALES	1996 PERSONS
0-4	2697848	2609700	5307548	3088128	2983943	6072071
5-9	2858465	2776892	5635357	2634340	2554557	5188897
10-14	2327454	2263350	4590804	2835168	2756010	5591178
15-19	2228475	2193137	4421612	2304831	2243546	4548377
20-24	2041377	2025967	4067344	2196251	2166337	4362588
25-29	1781965	1820587	3602552	2005510	1995274	4000784
30-34	1521677	1578913	3100590	1747574	1788636	3536210
35-39	1254563	1299434	2553997	1486983	1546561	3033544
40-44	999036	1026179	2025215	1218181	1267650	2485831
45-49	797003	825331	1622334	960083	994849	1954933
50-54	673849	713379	1387229	753471	791501	1544972
55-59	592430	639958	1232388	621161	672445	1293607
60-64	492614	542503	1035117	525290	586266	1111556
65-69	364580	413099	777679	411692	473811	885504
70-74	237015	280514	517530	278240	333276	611516
75+	206836	269096	475932	244073	321814	565887
All ages	21075190	21278040	42353224	23310976	23476476	46787456
Median age	21	22	21.5	21.8	22.8	22.3
Percentage Age Distribution(%)						
Under 15	37	36	37	37	35	36
15-49	50	51	51	51	51	51
50-59	6	6	6	6	6	6
60+	6	7	7	6	7	7

Table(6.4)

Labour Force Participation Rates and Proportion of Labour Force in Agriculture, Industry and Services Sectors by States and Division, 1983

State/ Division	LFPR Male	Female	Total	Proportion of LF in Agri	Indu	Serv
Union	62.66	34.40	48.35	64.6	11.3	24.1
Rural	63.40	36.07	49.55	na	na	na
Urban	60.55	29.56	44.90	na	na	na
States						
Kachin	59.85	38.19	48.29	77.3	5.5	17.2
Kayah	72.42	52.01	61.94	75.1	11.6	13.3
Kayin	58.94	35.79	46.18	69.2	7.6	23.2
Chin	67.31	63.38	64.81	93.1	0.8	6.1
Mon	67.19	28.07	46.77	56.0	12.9	31.1
Rakining	43.89	11.73	26.64	55.1	10.4	34.5
Shan	65.20	48.92	56.67	80.2	5.3	14.5
Division						
Sagaing	63.32	38.71	49.94	73.5	10.5	16.0
Bago	63.17	32.22	46.81	67.1	10.5	22.4
Magway	66.73	37.92	51.29	72.1	10.1	17.8
Mandalay	63.97	35.60	48.60	58.3	16.5	25.2
Tanintharyi	63.57	32.08	46.82	60.8	14.2	25.0
Yangon	59.35	24.76	40.57	24.9	19.4	55.7
Ayeyarwady	65.19	36.42	50.17	72.4	8.8	18.8

Source: MERB(1989: Study II: 8)

6.4.2 Growth of the Agricultural Labour Force

The changes in the ratio of the number of those economically active in agriculture to the total economically active may be explained by changes in per capita GDP, the contributions to GDP and differentials between the growth rates. From past experience, it is believed that the absolute number, as opposed to the proportion, engaged in agriculture will continue to increase. A brief description of the method of determining the number of years to reach the Peak Agricultural Labour Force is reproduced below form.

More important in some respects than the rate of growth of the agricultural labour force alone are the relative growth rates of the agricultural and nonagricultural labour forces. The growth rate of the total labour force at any given time is the weighted average of the growth rates of its components. In simple algebraic terms if T, A and N denote the total, agricultural and nonagricultural labour force and T′, A′and N′ their rates of growth respectively, the relationship can be expressed as:

$$T' = \frac{A}{T} \cdot A' + \frac{N}{T} \cdot N' \qquad (1)$$

A crucial point in agricultural development is when the agricultural labour force ceases to increase and begins to

decrease. At this point the rate of growth of A is zero, that is to say A′=0. The above relationship(1) then becomes:

$$T' = \frac{N}{T} \cdot N' \quad \text{or} \quad \frac{N'}{T'} = \frac{T}{N} \qquad (2)$$

The rate of growth of the total labour force T and its constituents, A and N, are not likely to remain the same over long periods of time, though in the short-run the variations may be only minor. Nevertheless, it is useful as a first approximation to assume the rates of growth of the total labour force and of the nonagricultural labour force remain constant.

This would, for example, be the case if (a) the total labour force were increasing as a constant proportion of the total population which itself were increasing at a fixed rate and (b) employment in the agricultural sector were also increasing at a fixed rate.

On the assumption that T′ and N′ remain constant, a simple algebraic expression can be obtained from which can be determined the time (t) in years to reach the turning point of the growth of the agricultural labour force. The size of the total labour force T in the nth year can be expressed:

$$T_n = T_0 \ (1+T')^n \qquad (3)$$

where T_0 = the size in the base year.

A similar expression can be obtained for the nonagricultural labour force:

$$N_n = N_0 (1+N')^n \quad (4)$$

Table(6.5)

Estimated Agricultural Labour Force of Myanmar

(In million)

Year	Variant High	Medium	Low
1986	9.29(67.0%)	9.21(66.8%)	9.22(66.9%)
1991	10.68(67.3%)	10.45(66.9%)	10.49(67.0%)
1996	12.26(67.6%)	11.84(67.1%)	11.88(67.0%)
2001	14.40(68.5%)	13.53(67.1%)	13.53(67.1%)

The potential workforce engaged in agriculture is expected to grow at the rate of about 3.12 per cent per year. As expected, 2.56 which is the rate of growth of the labour force is greater than that of the population which is about 2 per cent over the 15 year period, 1986-2001. Thus absorptive capacity of land would have to be raised to accommodate the increase in rural labour supply. Ways and means should be found to give people in the rural areas an opportunity in commercial production for export and domestic markets. An expansion of employment opportunties in urban areas will also be needed to match the growth in urban population due to natural increase and due to the rising inflow of migrants from rural to urban areas in search of job opportunities.

CHAPTER VII

CONCLUSION

Population censuses still remain to be the major source of information on population and labour force in Myanmar. Uptodate information on population and its characteristics is sought after by public health officials, market research analysts, planners and decision makers, researchers, etc for drawing, implementing and monitoring various programmes. Expensive, labourious and time-consuming censuses are usually taken once in every ten years. In order to meet the needs for population data for those years in which censuses can not be conducted, population forecasts have to be made and this with the help of computers.

In this thesis, the population of Myanmar was projected into the future from 1981 to 2001 by means of the software called PEOPLE 2 which makes use of the cohort component method. This method calls for different assumptions of fertility and mortality, the two most important components of population change. In all, three fertility assumptions and three mortality assumptions were made giving 9 different

projections. For 1981, the base year of the projection period, TFR which is a fertility measure is fixed at 5.05 and assumed to fall at the rate of 2 per cent per year reaching 3.37 in 2001.

Next, the expectation of life at birth e_0 which indicates the level of mortality is fixed at 53 years for both sexes-52 years for males and 55 years for females. The expectation of life at birth e_0 in 2001 would be about 62 years for both sexes -61 years for males and 64 years for females which was assumed by UN working model of mortality improvement. Two distinct courses of population change were taken into consideration; fast initial decline and slow initial decline in both fertility and mortality. Among the 9 projections, 3 most plausible forecasts were chosen to represent 3 variants: low, medium and high. The low variant was generated on the assumption of declining fertility and mortality, the medium on constant fertility and constant mortality, and the high on declining mortality and constant fertility.

According to the projections the population of Myanmar by the year 2001 would be 58.6 million (high variant), 55.8 million (medium variant) and 50.1 million (low variant). The annual growth rate over the projection period, 1981-2001, would then be 2.7 (high variant), 2.4 (medium variant) and 1.9 (low variant). Our estimated population (medium variant) for

the year 2001 is found to be higher than the estimates 51.3 million (Myint, 1990:Tab c) and 53.8 million (Tint, 1990:App:B). This is due to the fact that for our estimates medium variant means constant fertility, whereas medium variant in their cases means declining fertility, mortality assumptions being the same. However, all these population projections indicate that the population of Myanmar would be over 50 million by the year 2001.

In addition to the population forecasts the volume of labour force by age and sex over the projection period of 20 years was estimated on the basis of assumed LFPRs which were the extrapolations from the 1973 and 1983 census activity rates. Subjecting the three different population projections to these extrapolated LFPRs, gave different projections of labour force by age and sex. All the three different projections gave the projected size of labour force to be about 20 million by 2001.

The labour force was projected by MERB to be about 18 million in 1998 and about 21 million in 2003.(MERB, 1989: 28-36) The linear interpolation of those figures give 19.8 million for 2001 which is close to our estimate of 20.1 million(medium and low variants)

Of the labour engaged in different sectors, the agricultural labour is the most important factor of production for Myanmar. Agricultural production in 1991 accounted for 27

per cent of GDP and 50 per cent of exports.For Myanmar, agricultural production is the basis of the economy and over 62 per cent of the workforce was found to have been engaged in agriculture. An effort was thus made to determine the probable share of the workforce in agriculture in the same 20 year period. It is estimated that by 2001, the volume of active workforce would be around 20 million. The share of the total labour force in agriculture would be about 67 per cent.

It is common to make population forecasts and to have number of alternative projections. However if the base-line data are inadequate, and if the assumptions on fertility and mortality are not realistic, then the projected figures might not be able to trace the likely course of the population. Whenever new information on population, fertility, mortality is made available, it is always advisable to make new sets of projections under varying assumptions on fertility and mortality using the most recent data.

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Appendix Table (1.1)

Adjustment, for Heaping, of the Male Age Distribution, Myanmar, 1973

Age a	Male population under age a	Age b	Adjusted population under age b Three	Eight	Average population under age b	Smoothed	Reported
		0	-	-	-	2296951	2256562
3	1322017	5	-	-	2296952	2030104	2034514
8	3526683	10	4314420	4339692	4327056	1775455	1814224
13	5414953	15	6089812	6115211	6102512	1470081	1485716
18	7022397	20	7576338	7568847	7572593	1186040	1169259
23	8334310	25	8760081	8757184	8758632	949718	910632
28	9366381	30	9681158	9735543	9708350	832774	839656
33	10170685	35	10520303	10561947	10541125	794011	818152
38	11011300	40	11347633	11322638	11335135	731568	752464
43	11803541	45	12080440	12052966	12066703	624916	597028
48	12449250	50	12699880	12683358	12691619	512620	532812
53	13021470	55	13212631	13195847	13204239	411210	398608
58	13455537	60	13620858	13610041	13615449	319066	333337
63	13820747	65	13936990	13932039	13934515	231797	221000
68	14082756	70	14168868	14163755	14166311	146600	158352
73	14269689	75		14312911	14312911	129685	120279
78	14370457						
83	14417443						
88	14434347						
93	14439963						
98	24819028						
Total	14442595					14442596	14442595

Appendix Table (1.2)

Adjustment, for Heaping, of the Female Age Distribution, Myanmar, 1973

Age a	Female population under age a	Age b	Adjusted population under age b Three	Eight	Average population under age b	Smoothed	Reported
		0	-	-	-	2247872	2233987
3	1313092	5	-	-	2247872	2009914	2010502
8	3483782	10	4239262	4276311	4257786	1771543	1770183
13	5340271	15	6022185	6036473	6029329	1497303	1532199
18	6953336	20	7541528	7511736	7526632	1224403	1207695
23	8323833	25	8761171	8740900	8751036	981289	938171
28	9376412	30	9707991	9756657	9732324	853184	874470
33	10210256	35	10566242	10604775	10585508	806582	823876
38	11063413	40	11405259	11378922	11392091	738105	761394
43	11865713	45	12144098	12116293	12130195	628915	596439
48	12515612	50	12766069	12752151	12759110	518620	541847
53	13089674	55	13283886	13271575	13277730	421741	406102
58	13536604	60	13702711	13696231	13699471	334709	348252
63	13911115	65	14035241	14033120	14034181	250927	238380
68	14193756	70	14288235	14281980	14285108	163597	178570
73	14401233	75		14448705	14448705	156951	143589
78	14515526						
83	14572661						
88	14594425						
93	14602076						
98	14604401						
Total	14605656					14605656	14605656

Appendix Table (1.3)

Adjustment, for Heaping, of the Male Age Distribution, Myanmar, 1983

Age a	Males population under age a	Age b	Adjusted population under age b Three	Eight	Average population under age b	Smoothed	Reported
		0	-	-	-	2448923	2415335
3	1409006	5	-	-	2448923	2324839	2291730
8	3830109	10	4782944	4764579	4773762	2168796	2253092
13	6104640	15	6941477	6943638	6942558	1934841	1907168
18	8137889	20	8870174	8884624	8877399	1681830	1664927
23	9909614	25	10547951	10570508	10559229	1404108	1410238
28	11452504	30	11960484	11966190	11963337	1113807	1103482
33	12680519	35	13079036	13075252	13077144	875515	863595
38	13637719	40	13929545	13975774	13952659	751161	741001
43	14372647	45	14685010	14722630	14703820	701420	719508
48	15121939	50	15412099	15398380	15405240	633943	655801
53	15805072	55	16043293	16035072	16039183	521407	506480
58	16369831	60	16562165	16559014	16560590	393884	412515
63	16818367	65	16958234	16950713	16954474	276301	262603
68	17132762	70	17231444	17230104	17230774	178538	199272
73	17349038	75		17409313	17409312	176978	179545
78	17479472						
83	17549488						
88	17575493						
93	17583166						
98	17585299						
Total	17586290					17586290	17586290

Appendix Table (1.4)

Adjustment, for Heaping, of the Female Age Distribution, Myanmar, 1983

Age a	Female population under age a	Age b	Adjusted population under age b Three	Eight	Average population under age b	Smoothed	Reported
		0	-	-	-	2368679	2381739
3	1393609	5	-	-	2368679	2282073	2248827
8	3760969	10	4657709	4643794	4650752	2143405	2162916
13	5973721	15	6816599	6771714	6794157	1967994	1957263
18	7975991	20	8783242	8741060	8762151	1738408	1734896
23	9853180	25	10506172	10494947	10500559	1447781	1448741
28	11420193	30	11952661	11944019	11948340	1134078	1123827
33	12690288	35	13096412	13068424	13082418	893634	862650
38	13638478	40	13963362	13988741	13976051	778930	789625
43	14416839	45	14740167	14769796	14754982	732983	743075
48	15190338	50	15497314	15478615	15487964	662541	688222
53	15908802	55	16157293	16143718	16150506	548396	523295
58	16495237	60	16701469	16696335	16698902	423097	446503
63	16973410	65	17126138	17117861	17122000	307338	291380
68	17317545	70	17431734	17426941	17429337	204870	231337
73	17567484	75		17634208	17634207	222474	222383
78	17718841						
83	17807567						
88	17841147						
93	17852051						
98	17855148						
Total	17856681					17856682	17856681

Appendix Table(1.5)

Smoothed Population of the 1973 and 1983, Myanmar(Union)

Age Group	1973 Males	1973 Females	1973 Total	1983 Males	1983 Females	1983 Total
0-4	2296951	2247872	4544823	2448922	2368679	4817601
5-9	2030104	2009914	4040018	2324839	2282073	4606912
10-14	1775455	1771543	3546998	2168796	2143405	4312201
15-19	1470081	1497303	2967385	1934841	1967994	3902836
20-24	1186040	1224403	2410443	1681830	1738408	3420239
25-29	949718	981289	1931007	1404108	1447781	2851889
30-34	832774	853184	1685958	1113807	1134078	2247884
35-39	794011	806582	1600593	875515	893634	1769149
40-44	731568	738105	1469673	751161	778930	1530091
45-49	624916	628915	1253831	701420	732983	1434403
50-54	512620	518620	1031240	633943	662541	1296484
55-59	411210	421741	832951	521407	548396	1069804
60-64	319066	334709	653774	393884	423097	816981
65-69	231797	250927	482724	276301	307338	583638
70-74	146600	163597	310197	178538	204870	383408
75+	129684	156951	286634	176977	222474	399451
Total	14442595	14605656	29048251	17586290	17856681	35442971

Appendix Table(1.6)

Interpolatd population of the 1981, Myanmar

Age Group	Males	Females	Total
0-4	2418528	2344518	4763045
5-9	2265892	2227641	4493533
10-14	2090128	2069033	4159160
15-19	1841889	1873856	3715746
20-24	1582672	1635607	3218279
25-29	1313230	1354482	2667712
30-34	1057600	1077899	2135499
35-39	859214	876223	1735438
40-44	747242	770765	1518007
45-49	686119	712169	1398288
50-54	609678	633757	1243435
55-59	499368	523065	1022433
60-64	378920	405420	784340
65-69	267400	296055	563455
70-74	172150	196615	368766
75+	167518	209369	376888
Total	16957549	17206477	34164026

Appendix Table (2.1)

PROJECTED MID-YEAR POPULATION BY AGE AND SEX
(Variant-I)

AGE	1981 MALES	1981 FEMALES	1981 PERSONS	1986 MALES	1986 FEMALES	1986 PERSONS
0-4	2430739	2356355	4787094	3331042	3227685	6558727
5-9	2277332	2238888	4516220	2349042	2283214	4632256
10-14	2100681	2079479	4180160	2252828	2215380	4468208
15-19	1851189	1883317	3734506	2074528	2054505	4129033
20-24	1590663	1643865	3234528	1817386	1852318	3669704
25-29	1319860	1361321	2681181	1555080	1610741	3165821
30-34	1062940	1083341	2146281	1287154	1329875	2617029
35-39	863552	880647	1744199	1031987	1054633	2086620
40-44	751015	774657	1525672	832188	853576	1685764
45-49	689583	715765	1405348	715582	746088	1461670
50-54	612756	636957	1249713	645595	681401	1326996
55-59	501889	525706	1027595	558570	595033	1153603
60-64	380833	407467	788300	439158	475958	915116
65-69	268750	297550	566300	313098	350450	663548
70-74	173019	197608	370627	201041	235463	436504
75+	168364	210426	378790	180500	230072	410572
All ages	17043164	17293348	34336512	19584778	19796394	39381172
Median age	19.6	20.3	19.9	19.5	20.3	19.9
Percentage Age Distribution(%)						
Under 15	40	39	39	41	39	40
15-49	48	48	48	48	48	48
50-59	7	7	7	6	6	6
60+	6	6	6	6	7	6

Appendix Table (2.1)

PROJECTED MID-YEAR POPULATION BY AGE AND SEX
(Variant-I)

AGE	1991 MALES	1991 FEMALES	1991 PERSONS	1996 MALES	1996 FEMALES	1996 PERSONS
0-4	3388062	3277363	6665425	4190165	4048800	8238965
5-9	3239472	3147025	6386497	3308307	3208112	6516419
10-14	2327454	2263350	4590804	3213070	3123360	6336430
15-19	2228475	2193137	4421612	2304831	2243546	4548377
20-24	2041377	2025967	4067344	2196251	2166337	4362588
25-29	1781965	1820587	3602552	2005510	1995274	4000784
30-34	1521677	1578913	3100590	1747574	1788636	3536210
35-39	1254563	1299434	2553997	1486983	1546561	3033544
40-44	999036	1026179	2025215	1218181	1267650	2485831
45-49	797003	825331	1622334	960083	994849	1954933
50-54	673849	713379	1387229	753471	791501	1544972
55-59	592430	639958	1232388	621161	672445	1293607
60-64	492614	542503	1035117	525290	586266	1111556
65-69	364580	413099	777679	411692	473811	885504
70-74	237015	280514	517530	278240	333276	611516
75+	206836	269096	475932	244073	321814	565887
All ages	22146410	22315836	44462240	25464884	25562236	51027120
Median age	19.8	20.7	20.2	19.4	20.4	19.9
Percentage Age Distribution(%)						
Under 15	40	39	40	42	41	41
15-49	48	48	48	47	47	47
50-59	6	6	6	5	6	6
60+	6	7	6	6	7	6

Appendix Table (2.1)

PROJECTED MID-YEAR POPULATION BY AGE AND SEX
(Variant-I)

AGE	MALES	2001 FEMALES	PERSONS
0-4	4778826	4613851	9392677
5-9	4103890	3974990	8078880
10-14	3283991	3186907	6470898
15-19	3184570	3099122	6283692
20-24	2274223	2219001	4493224
25-29	2160936	2136832	4297768
30-34	1970193	1963629	3933822
35-39	1711172	1755332	3466504
40-44	1447265	1511779	2959044
45-49	1173851	1231534	2405385
50-54	910476	956349	1866825
55-59	697066	748277	1445343
60-64	553150	618408	1171558
65-69	441370	514630	956000
70-74	316279	384716	700994
75+	289695	386779	676474
All ages	29296950	29302134	58599088
Median age	18.9	19.6	19.3
Percentage Age Distribution(%)			
Under 15	42	40	41
15-49	48	47	48
50-59	5	6	6
60+	5	6	6

Appendix Table (2.2)

PROJECTED MID-YEAR POPULATION BY AGE AND SEX
(Variant-II)

AGE	1981 MALES	1981 FEMALES	1981 PERSONS	1986 MALES	1986 FEMALES	1986 PERSONS
0-4	2430739	2356355	4787094	3247282	3156322	6403604
5-9	2277332	2238888	4516220	2328648	2262501	4591149
10-14	2100681	2079479	4180160	2247841	2209715	4457556
15-19	1851189	1883317	3734506	2069822	2048786	4118608
20-24	1590663	1643865	3234528	1811574	1845575	3657149
25-29	1319860	1361321	2681181	1548765	1603804	3152569
30-34	1062940	1083341	2146281	1281162	1323572	2604734
35-39	863552	880647	1744199	1026417	1049259	2075676
40-44	751015	774657	1525672	826998	849102	1676100
45-49	689583	715765	1405348	710618	742183	1452801
50-54	612756	636957	1249713	640581	677472	1318053
55-59	501889	525706	1027595	553656	590867	1144523
60-64	380833	407467	788300	434626	471637	906263
65-69	268750	297550	566300	309122	346318	655441
70-74	173019	197608	370627	197940	232003	429943
75+	168364	210426	378790	176620	225372	401991
All ages	17043164	17293348	34336512	19411672	19634488	39046160
Median age	19.6	20.3	19.9	19.5	20.4	19.9
Percentage Age Distribution(%)						
Under 15	40	39	39	40	39	40
15-49	48	48	48	48	48	48
50-59	7	7	7	6	6	6
60+	6	6	6	6	6	6

Appendix Table (2.2)

PROJECTED MID-YEAR POPULATION BY AGE AND SEX
(Variant-II)

AGE	1991 MALES	1991 FEMALES	1991 PERSONS	1996 MALES	1996 FEMALES	1996 PERSONS
0-4	3260705	3165376	6426081	4041206	3914793	7955999
5-9	3121092	3041085	6162177	3154048	3069940	6223988
10-14	2300425	2235170	4535595	3088227	3009975	6098202
15-19	2216708	2179376	4396084	2272337	2208974	4481311
20-24	2027970	2010474	4038444	2176963	2144332	4321295
25-29	1766556	1803515	3570071	1983456	1970847	3954303
30-34	1505988	1562105	3068093	1723629	1762737	3486366
35-39	1239665	1284381	2524046	1462962	1521522	2984484
40-44	985279	1013668	1998947	1195421	1245605	2441026
45-49	784548	815096	1599644	939493	976842	1916334
50-54	662040	703983	1366023	735122	776444	1511565
55-59	580700	630089	1210789	604079	658154	1262232
60-64	481304	531887	1013190	508693	571037	1079730
65-69	354459	402623	757082	396253	458061	854313
70-74	228988	271510	500499	265610	319135	584745
75+	197143	257004	454147	228749	302344	531093
All ages	21713570	21907342	43620912	24776246	24910742	49686984
Median age	19.9	20.8	20.4	19.6	20.6	20.1
Percentage Age Distribution(%)						
Under 15	40	39	39	42	40	41
15-49	48	49	49	47	47	47
50-59	6	6	6	5	6	6
60+	6	7	6	6	7	6

Appendix Table (2.2)

PROJECTED MID-YEAR POPULATION BY AGE AND SEX
(Variant-II)

AGE	MALES	2001 FEMALES	PERSONS
0-4	4669246	4512399	9181645
5-9	3943813	3829959	7773772
10-14	3127901	3046363	6174264
15-19	3057746	2983096	6040842
20-24	2239001	2181472	4420473
25-29	2138126	2111266	4249392
30-34	1944561	1935648	3880209
35-39	1683727	1726037	3409764
40-44	1419936	1483757	2903693
45-49	1148262	1207129	2355391
50-54	887689	936410	1824099
55-59	677209	731519	1408727
60-64	535214	602527	1137741
65-69	424733	498299	923032
70-74	302067	369147	671214
75+	271785	363800	635585
All ages	28471018	28518826	56989844
Median age	19.1	19.8	19.4
Percentage Age Distribution(%)			
Under 15	41	40	41
15-49	48	48	48
50-59	5	6	6
60+	5	6	6

Appendix Table (2.3)

PROJECTED MID-YEAR POPULATION BY AGE AND SEX
(Variant-III)

AGE	1981 MALES	1981 FEMALES	1981 PERSONS	1986 MALES	1986 FEMALES	1986 PERSONS
0-4	2430739	2356355	4787094	3243166	3152786	6395952
5-9	2277332	2238888	4516220	2327627	2261465	4589092
10-14	2100681	2079479	4180160	2247590	2209424	4457014
15-19	1851189	1883317	3734506	2069591	2048495	4118086
20-24	1590663	1643865	3234528	1811296	1845236	3656532
25-29	1319860	1361321	2681181	1548463	1603459	3151922
30-34	1062940	1083341	2146281	1280858	1323259	2604117
35-39	863552	880647	1744199	1026141	1048999	2075140
40-44	751015	774657	1525672	826747	848891	1675638
45-49	689583	715765	1405348	710385	741998	1452383
50-54	612756	636957	1249713	640347	677293	1317640
55-59	501889	525706	1027595	553429	590676	1144105
60-64	380833	407467	788300	434415	471437	905852
65-69	268750	297550	566300	308939	346131	655070
70-74	173019	197608	370627	197797	231845	429642
75+	168364	210426	378790	176444	225163	401606
All ages	17043164	17293348	34336512	19403236	19626556	39029792
Median age	19.6	20.3	19.9	19.5	20.4	19.9
Percentage Age Distribution(%)						
Under 15	40	39	39	40	39	40
15-49	48	48	48	48	48	48
50-59	7	7	7	6	6	6
60+	6	6	6	6	6	6

Appendix Table (2.3)

PROJECTED MID-YEAR POPULATION BY AGE AND SEX
(Variant-III)

AGE	1991 MALES	1991 FEMALES	1991 PERSONS	1996 MALES	1996 FEMALES	1996 PERSONS
0-4	3224157	3134307	6358464	3915871	3806745	7722616
5-9	3105591	3025824	6131415	3087388	3008089	6095477
10-14	2297228	2231704	4528932	3065032	2986004	6051036
15-19	2214326	2176504	4390830	2263229	2198452	4461681
20-24	2024991	2007074	4032065	2166607	2132495	4299102
25-29	1763242	1799881	3563123	1971268	1957740	3929008
30-34	1502706	1558626	3061332	1711138	1749556	3460694
35-39	1236515	1281311	2517826	1450682	1509218	2959900
40-44	982407	1011172	1993579	1183815	1235107	2418922
45-49	782020	813102	1595122	929259	968541	1897800
50-54	659664	702115	1361779	726184	769398	1495582
55-59	578348	628081	1206429	595795	651099	1246894
60-64	479026	529700	1008726	500595	563244	1063839
65-69	352406	400472	752878	388595	449965	838560
70-74	227376	269698	497075	259367	312040	571407
75+	195213	254623	449836	221317	292985	514302
All ages	21625216	21824194	43449412	24436144	24590676	49026816
Median age	19.9	20.9	20.4	19.7	20.7	20.2
Percentage Age Distribution(%)						
Under 15	40	38	39	41	40	41
15-49	49	49	49	48	48	48
50-59	6	6	6	5	6	6
60+	6	7	6	6	7	6

PROJECTED MID-YEAR POPULATION BY AGE AND SEX
(Variant-III)

AGE	MALES	2001 FEMALES	PERSONS
0-4	4392933	4270512	8663445
5-9	3749760	3653447	7403207
10-14	3047067	2968502	6015569
15-19	3019669	2941513	5961182
20-24	2214457	2153999	4368456
25-29	2109127	2080078	4189205
30-34	1913017	1903002	3816019
35-39	1651899	1694095	3345994
40-44	1388854	1454795	2843649
45-49	1119770	1183035	2302805
50-54	862910	916482	1779392
55-59	655875	713493	1369368
60-64	515696	583886	1099583
65-69	406093	478459	884552
70-74	286002	350603	636606
75+	251904	338273	590177
All ages	27585032	27684176	55269204
Median age	19.3	20	19.7
Percentage Age Distribution(%)			
Under 15	41	39	40
15-49	49	48	49
50-59	6	6	6
60+	5	6	6

Appendix Table (2.4)

PROJECTED MID-YEAR POPULATION BY AGE AND SEX
(Variant-IV)

AGE	1981 MALES	1981 FEMALES	1981 PERSONS	1986 MALES	1986 FEMALES	1986 PERSONS
0-4	2430739	2356355	4787094	2939265	2848065	5787330
5-9	2277332	2238888	4516220	2349042	2283214	4632256
10-14	2100681	2079479	4180160	2252828	2215380	4468208
15-19	1851189	1883317	3734506	2074528	2054505	4129033
20-24	1590663	1643865	3234528	1817386	1852318	3669704
25-29	1319860	1361321	2681181	1555080	1610741	3165821
30-34	1062940	1083341	2146281	1287154	1329875	2617029
35-39	863552	880647	1744199	1031987	1054633	2086620
40-44	751015	774657	1525672	832188	853576	1685764
45-49	689583	715765	1405348	715582	746088	1461670
50-54	612756	636957	1249713	645595	681401	1326996
55-59	501889	525706	1027595	558570	595033	1153603
60-64	380833	407467	788300	439158	475958	915116
65-69	268750	297550	566300	313098	350450	663548
70-74	173019	197608	370627	201041	235463	436504
75+	168364	210426	378790	180500	230072	410572
All ages	17043164	17293348	34336512	19193002	19416774	38609772
Median age	19.6	20.3	19.9	20	20.8	20.4
Percentage Age Distribution(%)						
Under 15	40	39	39	39	38	39
15-49	48	48	48	49	49	49
50-59	7	7	7	6	7	6
60+	6	6	6	6	7	6

Appendix Table (2.4)

PROJECTED MID-YEAR POPULATION BY AGE AND SEX
(Variant-IV)

AGE	MALES	2001 FEMALES	PERSONS
0-4	3290980	3177368	6468348
5-9	3024544	2929546	5954090
10-14	2614978	2537672	5152650
15-19	2810020	2734623	5544643
20-24	2274223	2219001	4493224
25-29	2160936	2136832	4297768
30-34	1970193	1963629	3933822
35-39	1711172	1755332	3466504
40-44	1447265	1511779	2959044
45-49	1173851	1231534	2405385
50-54	910476	956349	1866825
55-59	697066	748277	1445343
60-64	553150	618408	1171558
65-69	441370	514630	956000
70-74	316279	384716	700994
75+	289695	386779	676474
All ages	25686196	25806474	51492668
Median age	22.4	23.4	22.9
Percentage Age Distribution(%)			
Under 15	35	33	34
15-49	53	53	53
50-59	6	7	6
60+	6	7	7

Appendix Table (2.5)

PROJECTED MID-YEAR POPULATION BY AGE AND SEX
(Variant-V)

AGE	1981 MALES	1981 FEMALES	1981 PERSONS	1986 MALES	1986 FEMALES	1986 PERSONS
0-4	2430739	2356355	4787094	3313734	3210914	6524648
5-9	2277332	2238888	4516220	2349042	2283214	4632256
10-14	2100681	2079479	4180160	2252828	2215380	4468208
15-19	1851189	1883317	3734506	2074528	2054505	4129033
20-24	1590663	1643865	3234528	1817386	1852318	3669704
25-29	1319860	1361321	2681181	1555080	1610741	3165821
30-34	1062940	1083341	2146281	1287154	1329875	2617029
35-39	863552	880647	1744199	1031987	1054633	2086620
40-44	751015	774657	1525672	832188	853576	1685764
45-49	689583	715765	1405348	715582	746088	1461670
50-54	612756	636957	1249713	645595	681401	1326996
55-59	501889	525706	1027595	558570	595033	1153603
60-64	380833	407467	788300	439158	475958	915116
65-69	268750	297550	566300	313098	350450	663548
70-74	173019	197608	370627	201041	235463	436504
75+	168364	210426	378790	180500	230072	410572
All ages	17043164	17293348	34336512	19567470	19779622	39347092
Median age	19.6	20.3	19.9	19.5	20.3	19.9
Percentage Age Distribution(%)						
Under 15	40	39	39	40	39	40
15-49	48	48	48	48	48	48
50-59	7	7	7	6	6	6
60+	6	6	6	6	7	6

Appendix Table (2.5)

PROJECTED MID-YEAR POPULATION BY AGE AND SEX
(Variant-V)

AGE	1991 MALES	1991 FEMALES	1991 PERSONS	1996 MALES	1996 FEMALES	1996 PERSONS
0-4	3229562	3124042	6353604	3645638	3522643	7168281
5-9	3222639	3130674	6353313	3153538	3058031	6211569
10-14	2327454	2263350	4590804	3196375	3107131	6303506
15-19	2228475	2193137	4421612	2304831	2243546	4548377
20-24	2041377	2025967	4067344	2196251	2166337	4362588
25-29	1781965	1820587	3602552	2005510	1995274	4000784
30-34	1521677	1578913	3100590	1747574	1788636	3536210
35-39	1254563	1299434	2553997	1486983	1546561	3033544
40-44	999036	1026179	2025215	1218181	1267650	2485831
45-49	797003	825331	1622334	960083	994849	1954933
50-54	673849	713379	1387229	753471	791501	1544972
55-59	592430	639958	1232388	621161	672445	1293607
60-64	492614	542503	1035117	525290	586266	1111556
65-69	364580	413099	777679	411692	473811	885504
70-74	237015	280514	517530	278240	333276	611516
75+	206836	269096	475932	244073	321814	565887
All ages	21971078	22146164	44117236	24748892	24869772	49618664
Median age	19.9	20.9	20.4	20.2	21.2	20.7
Percentage Age Distribution(%)						
Under 15	40	38	39	40	39	40
15-49	48	49	48	48	48	48
50-59	6	6	6	6	6	6
60+	6	7	6	6	7	6

Appendix Table (2.5)

PROJECTED MID-YEAR POPULATION BY AGE AND SEX
(Variant-V)

AGE	1991 MALES	1991 FEMALES	1991 PERSONS	1996 MALES	1996 FEMALES	1996 PERSONS
0-4	3229562	3124042	6353604	3645638	3522643	7168281
5-9	3222639	3130674	6353313	3153538	3058031	6211569
10-14	2327454	2263350	4590804	3196375	3107131	6303506
15-19	2228475	2193137	4421612	2304831	2243546	4548377
20-24	2041377	2025967	4067344	2196251	2166337	4362588
25-29	1781965	1820587	3602552	2005510	1995274	4000784
30-34	1521677	1578913	3100590	1747574	1788636	3536210
35-39	1254563	1299434	2553997	1486983	1546561	3033544
40-44	999036	1026179	2025215	1218181	1267650	2485831
45-49	797003	825331	1622334	960083	994849	1954933
50-54	673849	713379	1387229	753471	791501	1544972
55-59	592430	639958	1232388	621161	672445	1293607
60-64	492614	542503	1035117	525290	586266	1111556
65-69	364580	413099	777679	411692	473811	885504
70-74	237015	280514	517530	278240	333276	611516
75+	206836	269096	475932	244073	321814	565887
All ages	21971078	22146164	44117236	24748892	24869772	49618664
Median age	19.9	20.9	20.4	20.2	21.2	20.7
Percentage Age Distribution(%)						
Under 15	40	38	39	40	39	40
15-49	48	49	48	48	48	48
50-59	6	6	6	6	6	6
60+	6	7	6	6	7	6

Appendix Table (2.5)

PROJECTED MID-YEAR POPULATION BY AGE AND SEX
(Variant-V)

AGE	MALES	2001 FEMALES	PERSONS
0-4	3561585	3438631	7000216
5-9	3570574	3458426	7029000
10-14	3130360	3037817	6168177
15-19	3168023	3083020	6251043
20-24	2274223	2219001	4493224
25-29	2160936	2136832	4297768
30-34	1970193	1963629	3933822
35-39	1711172	1755332	3466504
40-44	1447265	1511779	2959044
45-49	1173851	1231534	2405385
50-54	910476	956349	1866825
55-59	697066	748277	1445343
60-64	553150	618408	1171558
65-69	441370	514630	956000
70-74	316279	384716	700994
75+	289695	386779	676474
All ages	27376216	27445158	54821372
Median age	20.6	21.6	21.1
Percentage Age Distribution(%)			
Under 15	37	36	37
15-49	51	51	51
50-59	6	6	6
60+	6	7	6

Appendix Table (2.6)

PROJECTED MID-YEAR POPULATION BY AGE AND SEX
(Variant-VI)

AGE	1981 MALES	1981 FEMALES	1981 PERSONS	1986 MALES	1986 FEMALES	1986 PERSONS
0-4	2430739	2356355	4787094	2865357	2785095	5650452
5-9	2277332	2238888	4516220	2328648	2262501	4591149
10-14	2100681	2079479	4180160	2247841	2209715	4457556
15-19	1851189	1883317	3734506	2069822	2048786	4118608
20-24	1590663	1643865	3234528	1811574	1845575	3657149
25-29	1319860	1361321	2681181	1548765	1603804	3152569
30-34	1062940	1083341	2146281	1281162	1323572	2604734
35-39	863552	880647	1744199	1026417	1049259	2075676
40-44	751015	774657	1525672	826998	849102	1676100
45-49	689583	715765	1405348	710618	742183	1452801
50-54	612756	636957	1249713	640581	677472	1318053
55-59	501889	525706	1027595	553656	590867	1144523
60-64	380833	407467	788300	434626	471637	906263
65-69	268750	297550	566300	309122	346318	655441
70-74	173019	197608	370627	197940	232003	429943
75+	168364	210426	378790	176620	225372	401991
All ages	17043164	17293348	34336512	19029748	19263260	38293008
Median age	19.6	20.3	19.9	20	20.9	20.4
Percentage Age Distribution(%)						
Under 15	40	39	39	39	38	38
15-49	48	48	48	49	49	49
50-59	7	7	7	6	7	6
60+	6	6	6	6	7	6

Appendix Table (2.6)

PROJECTED MID-YEAR POPULATION BY AGE AND SEX
(Variant-VI)

AGE	1991 MALES	1991 FEMALES	1991 PERSONS	1996 MALES	1996 FEMALES	1996 PERSONS
0-4	2596436	2520527	5116963	2978346	2885180	5863526
5-9	2754009	2683412	5437421	2511507	2444533	4956040
10-14	2300425	2235170	4535595	2725009	2655960	5380969
15-19	2216708	2179376	4396084	2272337	2208974	4481311
20-24	2027970	2010474	4038444	2176963	2144332	4321295
25-29	1766556	1803515	3570071	1983456	1970847	3954303
30-34	1505988	1562105	3068093	1723629	1762737	3486366
35-39	1239665	1284381	2524046	1462962	1521522	2984484
40-44	985279	1013668	1998947	1195421	1245605	2441026
45-49	784548	815096	1599644	939493	976842	1916334
50-54	662040	703983	1366023	735122	776444	1511565
55-59	580700	630089	1210789	604079	658154	1262232
60-64	481304	531887	1013190	508693	571037	1079730
65-69	354459	402623	757082	396253	458061	854313
70-74	228988	271510	500499	265610	319135	584745
75+	197143	257004	454147	228749	302344	531093
All ages	20682218	20904820	41587040	22707628	22901706	45609332
Median age	21.2	22.1	21.6	22	22.9	22.5
Percentage Age Distribution(%)						
Under 15	37	36	36	36	35	36
15-49	51	51	51	52	52	52
50-59	6	6	6	6	6	6
60+	6	7	7	6	7	7

Appendix Table (2.6)

PROJECTED MID-YEAR POPULATION BY AGE AND SEX
(Variant-VI)

AGE	MALES	2001 FEMALES	PERSONS
0-4	3215533	3107518	6323051
5-9	2906568	2822659	5729227
10-14	2490686	2425759	4916445
15-19	2698113	2632243	5330356
20-24	2239001	2181472	4420473
25-29	2138126	2111266	4249392
30-34	1944561	1935648	3880209
35-39	1683727	1726037	3409764
40-44	1419936	1483757	2903693
45-49	1148262	1207129	2355391
50-54	887689	936410	1824099
55-59	677209	731519	1408727
60-64	535214	602527	1137741
65-69	424733	498299	923032
70-74	302067	369147	671214
75+	271785	363800	635585
All ages	24983210	25135188	50118404
Median age	22.6	23.6	23.1
Percentage Age Distribution(%)			
Under 15	34	33	34
15-49	53	53	53
50-59	6	7	6
60+	6	7	7

Appendix Table (2.7)

PROJECTED MID-YEAR POPULATION BY AGE AND SEX
(Variant-VII)

AGE	1981 MALES	1981 FEMALES	1981 PERSONS	1986 MALES	1986 FEMALES	1986 PERSONS
0-4	2430739	2356355	4787094	3230409	3139922	6370331
5-9	2277332	2238888	4516220	2328648	2262501	4591149
10-14	2100681	2079479	4180160	2247841	2209715	4457556
15-19	1851189	1883317	3734506	2069822	2048786	4118608
20-24	1590663	1643865	3234528	1811574	1845575	3657149
25-29	1319860	1361321	2681181	1548765	1603804	3152569
30-34	1062940	1083341	2146281	1281162	1323572	2604734
35-39	863552	880647	1744199	1026417	1049259	2075676
40-44	751015	774657	1525672	826998	849102	1676100
45-49	689583	715765	1405348	710618	742183	1452801
50-54	612756	636957	1249713	640581	677472	1318053
55-59	501889	525706	1027595	553656	590867	1144523
60-64	380833	407467	788300	434626	471637	906263
65-69	268750	297550	566300	309122	346318	655441
70-74	173019	197608	370627	197940	232003	429943
75+	168364	210426	378790	176620	225372	401991
All ages	17043164	17293348	34336512	19394800	19618088	39012884
Median age	19.6	20.3	19.9	19.6	20.4	20
Percentage Age Distribution(%)						
Under 15	40	39	39	40	39	40
15-49	48	48	48	48	48	48
50-59	7	7	7	6	6	6
60+	6	6	6	6	7	6

Appendix Table (2.7)

PROJECTED MID-YEAR POPULATION BY AGE AND SEX
(Variant-VII)

AGE	1991 MALES	1991 FEMALES	1991 PERSONS	1996 MALES	1996 FEMALES	1996 PERSONS
0-4	3108164	3017294	6125458	3516036	3406051	6922087
5-9	3104875	3025283	6130158	3006496	2926322	5932818
10-14	2300425	2235170	4535595	3072181	2994335	6066516
15-19	2216708	2179376	4396084	2272337	2208974	4481311
20-24	2027970	2010474	4038444	2176963	2144332	4321295
25-29	1766556	1803515	3570071	1983456	1970847	3954303
30-34	1505988	1562105	3068093	1723629	1762737	3486366
35-39	1239665	1284381	2524046	1462962	1521522	2984484
40-44	985279	1013668	1998947	1195421	1245605	2441026
45-49	784548	815096	1599644	939493	976842	1916334
50-54	662040	703983	1366023	735122	776444	1511565
55-59	580700	630089	1210789	604079	658154	1262232
60-64	481304	531887	1013190	508693	571037	1079730
65-69	354459	402623	757082	396253	458061	854313
70-74	228988	271510	500499	265610	319135	584745
75+	197143	257004	454147	228749	302344	531093
All ages	21544812	21743458	43288272	24087478	24242742	48330216
Median age	20.1	21	20.6	20.4	21.4	20.9
Percentage Age Distribution(%)						
Under 15	40	38	39	40	38	39
15-49	49	49	49	49	49	49
50-59	6	5	6	6	6	6
60+	6	7	6	6	7	6

Appendix Table (2.7)

PROJECTED MID-YEAR POPULATION BY AGE AND SEX
(Variant-VII)

AGE	MALES	2001 FEMALES	PERSONS
0-4	3479918	3363022	6842940
5-9	3431299	3332242	6763541
10-14	2981572	2903848	5885420
15-19	3041858	2967595	6009453
20-24	2239001	2181472	4420473
25-29	2138126	2111266	4249392
30-34	1944561	1935648	3880209
35-39	1683727	1726037	3409764
40-44	1419936	1483757	2903693
45-49	1148262	1207129	2355391
50-54	887689	936410	1824099
55-59	677209	731519	1408727
60-64	535214	602527	1137741
65-69	424733	498299	923032
70-74	302067	369147	671214
75+	271785	363800	635585
All ages	26606958	26713716	53320676
Median age	20.8	21.8	21.3
Percentage Age Distribution(%)			
Under 15	37	36	37
15-49	51	51	51
50-59	6	6	6
60+	6	7	6

Appendix Table (2.8)

PROJECTED MID-YEAR POPULATION BY AGE AND SEX
(Variant-VIII)

AGE	1981 MALES	1981 FEMALES	1981 PERSONS	1986 MALES	1986 FEMALES	1986 PERSONS
0-4	2430739	2356355	4787094	2861725	2781975	5643700
5-9	2277332	2238888	4516220	2327627	2261465	4589092
10-14	2100681	2079479	4180160	2247590	2209424	4457014
15-19	1851189	1883317	3734506	2069591	2048495	4118086
20-24	1590663	1643865	3234528	1811296	1845236	3656532
25-29	1319860	1361321	2681181	1548463	1603459	3151922
30-34	1062940	1083341	2146281	1280858	1323259	2604117
35-39	863552	880647	1744199	1026141	1048999	2075140
40-44	751015	774657	1525672	826747	848891	1675638
45-49	689583	715765	1405348	710385	741998	1452383
50-54	612756	636957	1249713	640347	677293	1317640
55-59	501889	525706	1027595	553429	590676	1144105
60-64	380833	407467	788300	434415	471437	905852
65-69	268750	297550	566300	308939	346131	655070
70-74	173019	197608	370627	197797	231845	429642
75+	168364	210426	378790	176444	225163	401606
All ages	17043164	17293348	34336512	19021794	19255744	38277540
Median age	19.6	20.3	19.9	20	20.9	20.5
Percentage Age Distribution(%)						
Under 15	40	39	39	39	38	38
15-49	48	48	48	49	49	49
50-59	7	7	7	6	7	6
60+	6	6	6	6	7	6

Appendix Table (2.8)

PROJECTED MID-YEAR POPULATION BY AGE AND SEX
(Variant-VIII)

AGE	1991 MALES	1991 FEMALES	1991 PERSONS	1996 MALES	1996 FEMALES	1996 PERSONS
0-4	2567333	2495788	5063121	2885976	2805550	5691526
5-9	2740330	2669945	5410275	2458427	2395282	4853709
10-14	2297228	2231704	4528932	2704541	2634809	5339350
15-19	2214326	2176504	4390830	2263229	2198452	4461681
20-24	2024991	2007074	4032065	2166607	2132495	4299102
25-29	1763242	1799881	3563123	1971268	1957740	3929008
30-34	1502706	1558626	3061332	1711138	1749556	3460694
35-39	1236515	1281311	2517826	1450682	1509218	2959900
40-44	982407	1011172	1993579	1183815	1235107	2418922
45-49	782020	813102	1595122	929259	968541	1897800
50-54	659664	702115	1361779	726184	769398	1495582
55-59	578348	628081	1206429	595795	651099	1246894
60-64	479026	529700	1008726	500595	563244	1063839
65-69	352406	400472	752878	388595	449965	838560
70-74	227376	269698	497075	259367	312040	571407
75+	195213	254623	449836	221317	292985	514302
All ages	20603132	20829798	41432928	22416798	22625480	45042276
Median age	21.2	22.1	21.6	22.1	23	22.5
Percentage Age Distribution(%)						
Under 15	37	36	36	36	35	35
15-49	51	51	51	52	52	52
50-59	6	6	6	6	6	6
60+	6	7	7	6	7	7

Appendix Table (2.8)

PROJECTED MID-YEAR POPULATION BY AGE AND SEX
(Variant-VIII)

AGE	MALES	2001 FEMALES	PERSONS
0-4	3025248	2940941	5966189
5-9	2763552	2692571	5456123
10-14	2426320	2363760	4790080
15-19	2664514	2595550	5260064
20-24	2214457	2153999	4368456
25-29	2109127	2080078	4189205
30-34	1913017	1903002	3816019
35-39	1651899	1694095	3345994
40-44	1388854	1454795	2843649
45-49	1119770	1183035	2302805
50-54	862910	916482	1779392
55-59	655875	713493	1369368
60-64	515696	583886	1099583
65-69	406093	478459	884552
70-74	286002	350603	636606
75+	251904	338273	590177
All ages	24255238	24443024	48698260
Median age	22.8	23.8	23.3
Percentage Age Distribution(%)			
Under 15	34	33	33
15-49	54	53	54
50-59	6	7	6
60+	6	7	7

Appendix Table (2.9)

PROJECTED MID-YEAR POPULATION BY AGE AND SEX
(Variant-IX)

AGE	1981 MALES	1981 FEMALES	1981 PERSONS	1986 MALES	1986 FEMALES	1986 PERSONS
0-4	2430739	2356355	4787094	3226314	3136404	6362718
5-9	2277332	2238888	4516220	2327627	2261465	4589092
10-14	2100681	2079479	4180160	2247590	2209424	4457014
15-19	1851189	1883317	3734506	2069591	2048495	4118086
20-24	1590663	1643865	3234528	1811296	1845236	3656532
25-29	1319860	1361321	2681181	1548463	1603459	3151922
30-34	1062940	1083341	2146281	1280858	1323259	2604117
35-39	863552	880647	1744199	1026141	1048999	2075140
40-44	751015	774657	1525672	826747	848891	1675638
45-49	689583	715765	1405348	710385	741998	1452383
50-54	612756	636957	1249713	640347	677293	1317640
55-59	501889	525706	1027595	553429	590676	1144105
60-64	380833	407467	788300	434415	471437	905852
65-69	268750	297550	566300	308939	346131	655070
70-74	173019	197608	370627	197797	231845	429642
75+	168364	210426	378790	176444	225163	401606
All ages	17043164	17293348	34336512	19386384	19610172	38996556
Median age	19.6	20.3	19.9	19.6	20.4	20
Percentage Age Distribution(%)						
Under 15	40	39	39	40	39	40
15-49	48	48	48	48	48	48
50-59	7	7	7	6	6	6
60+	6	6	6	6	6	6

Appendix Table (2.9)

PROJECTED MID-YEAR POPULATION BY AGE AND SEX
(Variant-IX)

AGE	1991 MALES	1991 FEMALES	1991 PERSONS	1996 MALES	1996 FEMALES	1996 PERSONS
0-4	3073325	2987678	6061003	3406989	3312045	6719034
5-9	3089454	3010101	6099555	2942954	2867364	5810318
10-14	2297228	2231704	4528932	3049106	2970488	6019594
15-19	2214326	2176504	4390830	2263229	2198452	4461681
20-24	2024991	2007074	4032065	2166607	2132495	4299102
25-29	1763242	1799881	3563123	1971268	1957740	3929008
30-34	1502706	1558626	3061332	1711138	1749556	3460694
35-39	1236515	1281311	2517826	1450682	1509218	2959900
40-44	982407	1011172	1993579	1183815	1235107	2418922
45-49	782020	813102	1595122	929259	968541	1897800
50-54	659664	702115	1361779	726184	769398	1495582
55-59	578348	628081	1206429	595795	651099	1246894
60-64	479026	529700	1008726	500595	563244	1063839
65-69	352406	400472	752878	388595	449965	838560
70-74	227376	269698	497075	259367	312040	571407
75+	195213	254623	449836	221317	292985	514302
All ages	21458248	21661842	43120092	23766904	23939736	47706636
Median age	20.1	21.1	20.6	20.5	21.5	21
Percentage Age Distribution(%)						
Under 15	39	38	39	40	38	39
15-49	49	49	49	49	49	49
50-59	6	6	6	6	6	6
60+	6	7	6	6	7	6

Appendix Table (2.9)

PROJECTED MID-YEAR POPULATION BY AGE AND SEX
(Variant-IX)

AGE	MALES	2001 FEMALES	PERSONS
0-4	3273986	3182748	6456734
5-9	3262465	3178669	6441134
10-14	2904519	2829630	5734149
15-19	3003979	2926228	5930207
20-24	2214457	2153999	4368456
25-29	2109127	2080078	4189205
30-34	1913017	1903002	3816019
35-39	1651899	1694095	3345994
40-44	1388854	1454795	2843649
45-49	1119770	1183035	2302805
50-54	862910	916482	1779392
55-59	655875	713493	1369368
60-64	515696	583886	1099583
65-69	406093	478459	884552
70-74	286002	350603	636606
75+	251904	338273	590177
All ages	25820552	25967478	51788028
Median age	21.1	22	21.5
Percentage Age Distribution(%)			
Under 15	37	35	36
15-49	52	52	52
50-59	6	6	6
60+	6	7	6

Appendix Table (3.1)

Labour Force Projection (High Variant)

Age	1981			1986			1991			1996			2001		
	M	F	Both Sexes	M	F	Both Sexes	M	F	Both Sexes	M	F	Both Sexes	M	F	Both Sexes
10-14	231049	247104	478153	214260	242824	457084	195501	230077	425578	238365	294457	532822	215168	278643	493811
15-19	907142	660072	1567214	981628	759671	1741299	1018209	856400	1874610	1016881	925207	1942088	1356700	1349695	2706395
20-24	1199019	640634	1839653	1350732	775992	2126725	1495457	913748	2409206	1585847	1051896	2637743	1618606	1159997	2778602
25-29	1105742	537347	1643089	1277315	685076	1962391	1433199	835642	2268840	1579407	988341	2567747	1666376	1142273	2808649
30-34	914230	431616	1345845	1090992	566937	1657930	1269941	721138	1991079	1436040	875222	2311263	1594079	1029419	2623497
35-39	741567	356969	1098536	874398	458002	1332401	1048066	605337	1653403	1224795	772835	1997630	1389672	940927	2330599
40-44	640623	320798	961421	700739	371437	1072176	829892	469511	1299403	998292	609821	1608112	1170035	764665	1934700
45-49	580827	298047	878874	593525	324125	917650	650437	374235	1024672	770939	470832	1241772	927450	608344	1535794
50-54	504747	263844	768592	523246	294166	817413	536949	321102	858052	590286	371456	961741	701276	467955	1169231
55-59	401677	209110	610787	445425	252526	697951	470703	290102	760805	491731	325605	817336	549807	387017	936825
60-64	271472	144925	416397	307176	183024	490200	337953	226012	563965	353454	264614	618068	365056	302401	667457
65+	332543	166914	499457	377577	213776	591353	438241	280698	718939	504943	366326	871269	564684	464475	1029159
Total	7830639	4277381	12108020	8737014	5127558	13864571	9724549	6124004	15848552	10790979	7316613	18107592	12118909	8895811	21014720

Appendix Table (3.2)

Labour Force Projection (Medium Variant)

Age	1981			1986			1991			1996			2001		
	M	F	Both Sexes	M	F	Both Sexes	M	F	Both Sexes	M	F	Both Sexes	M	F	Both Sexes
10-14	231049	247104	478153	213762	242171	455933	192962	226860	419822	227382	281508	508890	199645	259547	459192
15-19	907142	660072	1567214	979292	757448	1736740	1011745	849905	1861650	998527	906611	1905138	1286448	1281055	2567503
20-24	1199019	640634	1839653	1346206	773025	2119232	1483453	905227	2388681	1564442	1035464	2599906	1576069	1126017	2702086
25-29	1105742	537347	1643089	1271880	681979	1953859	1418140	826138	2244278	1552440	969749	2522189	1626424	1111935	2738359
30-34	914230	431616	1345845	1085656	564117	1649773	1254109	711873	1965981	1406100	856100	2262199	1547818	997636	2545453
35-39	741567	356969	1098536	869445	455556	1325001	1032989	596895	1629884	1194895	754175	1949069	1341536	908101	2249637
40-44	640623	320798	961421	696157	369398	1065556	816078	462645	1278723	970129	594165	1564294	1122813	735842	1858655
45-49	580827	298047	878874	589214	322348	911562	638209	368690	1006899	746188	458382	1204570	884721	584386	1469107
50-54	504747	263844	768592	518993	292393	811386	525646	316032	841678	568908	361082	929991	664639	448448	1113087
55-59	401677	209110	610787	441325	250677	692002	459515	284718	744233	471650	315269	786919	517318	369027	886345
60-64	271472	144925	416397	303858	181285	485144	328631	220678	549309	336837	254223	591060	340338	285520	625858
65+	332543	166914	499457	371349	210411	581759	420116	269643	689758	469951	342342	812293	508965	421575	930540
Total	7830639	4277381	12108020	8687137	5100809	13787946	9581592	6039304	15620896	10507448	7129069	17636518	11616733	8529088	20145821

Appendix Table (3.3)

Labour Force Projection (Low Variant)

Age	1981			1986			1991			1996			2001		
	M	F	Both Sexes	M	F	Both Sexes	M	F	Both Sexes	M	F	Both Sexes	M	F	Both Sexes
10-14	231049	247104	478153	213785	242203	455988	193230	227213	420443	202157	250393	452550	163191	212093	375284
15-19	907142	660072	1567214	979401	757556	1736957	1012833	851027	1863860	1002545	910950	1913495	1149458	1146365	2295823
20-24	1199019	640634	1839653	1346413	773167	2119580	1485636	906761	2392396	1571920	1041211	2613131	1593537	1140378	2733916
25-29	1105742	537347	1643089	1272128	682126	1954254	1420805	827806	2248611	1562038	976241	2538280	1648786	1128607	2777393
30-34	914230	431616	1345845	1085914	564250	1650164	1256848	713462	1970309	1416364	862549	2278913	1573340	1014750	2588090
35-39	741567	356969	1098536	869679	455669	1325347	1035620	598325	1633945	1205010	760323	1965333	1367384	925224	2292607
40-44	640623	320798	961421	696369	369490	1065859	818464	463787	1282251	979640	599216	1578855	1147941	750491	1898432
45-49	580827	298047	878874	589407	322429	911836	640273	369594	1009866	754406	462310	1216716	907232	596288	1503521
50-54	504747	263844	768592	519183	292470	811653	527540	316873	844412	575911	364389	940300	683725	458199	1141923
55-59	401677	209110	610787	441506	250758	692264	461383	285629	747012	478208	318685	796893	534145	378350	912495
60-64	271472	144925	416397	304006	181362	485368	330194	221589	551783	342286	257741	600027	353219	294636	647855
65+	332543	166914	499457	371622	210556	582177	423149	271493	694641	481484	350308	831792	538395	444656	983051
Total	7830639	4277381	12108020	8689412	5102036	13791448	9605974	6053556	15659531	10571968	7154317	17726285	11660353	8490036	20150389