An Analysis of the Recent Fertility Transition in Some Asian Countries

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By

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Preface

This study mainly focuses on the nature and causes of the fertility transition in Asian countries. From East to West Asia, each of 50 countries varies significantly in cultural, social, economic, political, and demographic situations. These situations can also explain the causes of the fertility decline.

Continuous decline in fertility will lead to the below-replacement level fertility. This will imply substantial changes in demand for social services and the supply of labour. Since fertility decline in several Asian countries has already reached to their replacement level, it is required to analyze the recent fertility transition in Asian countries. The continuation of fertility decline has called into question. Thus, the policy and services required to help and maintain the low level of fertility are urgently needed.

Some kinds of analyses have been introduced in this study to understand "How does the fertility decline?" and "What are the causes?" in Asian fertility decline. Although country level data has limitation obviously, this study aggregates the Asian countries as much as possible to represent each region.

Writing this thesis has required me to learn and read widely on the entire range of subjects embraced by demography, as well as excellent general education in the discipline, which I have missed. It goes without saying that all remaining errors that regarding the data and the interpretations are my sole responsibility.

Acknowledgements

First of all, I would like to express my heartfelt thanks to my Supervisor, Professor Dr. Hiroshi Ohbuchi, for his unstinted guidance, valuable suggestions, and encouragement during my study in Japan. I am greatly appreciated to Professor Dr. Takeshi Imagawa, Professor Dr. Tomoko Furugori, Dr. Minoru Okada (honorary Professor) for their keen interest and useful comments to improve my thesis.

I am also grateful to the members of the Study Group on Population Science in Japan who contributed in various ways to make up progress my research.

I wish to extend my special thanks to both the Japanese and Myanmar Governments for giving me an opportunity to study at Chuo University. I also appreciate the staff of graduate school's administrative office and International Students' Center of Chuo University, for their valuable assistance.

I wish to mention my sincere gratitude to Professor U Kan Zaw (Rector, Institute of Economics, Yangon), Dr. U Thet Lwin and Daw Khin San Myint (Former Head of the Department of Statistics), Professor Dr. Daw Than Toe (Head of the Department of Statistics), and all my teachers, who taught and encouraged me on my way.

I also wish to express my warm appreciation to my friends in Japan and my colleagues at the Yangon Institute of Economics, who offered valuable help and their friendship while I had been studying in Japan.

Finally, I wish to express my deep gratitude to my beloved parents, my brothers and sisters, for their warm-heartedness and constant encouragement. A special word of thanks is due to my husband, for his great understanding, sharing the stress and strains related to the writing of this thesis.

Introduction

Asian countries account for 3.68 billion, 60.7 per cent of the world's population in the millennium 2000 (United Nations 2000a). An average population growth rate during 1995-2000 was 1.38 per cent annually. Based on the level of per capita income or economic development, as well as for statistical convenience, today world can be classified into two general groups: more developed and less developed regions. In 1950, about 32.23 per cent of the world's population lived in the more developed regions while 67.77 per cent lived in the less developed regions. In the year 2000, this proportion fell into 19.62 per cent in the more developed regions and increased into 80.38 per cent in the less developed regions.

The combination of many factors such as the rapid growth of population, increasing unemployment, slow growth in income and the lack of high technology lead to the country into less developed condition. As a result, deteriorating in human living condition, unsustainable natural resources, environmental pollution caused by slum in urban area have been occurred.

Objectives

The main objective as well as theme of this study is to examine why and how the fertility decline has occurred in Asian countries. There are a number of countries with similar socio-economic levels and trends but with different fertility levels. A detailed analysis will be made an effort towards identifying the circumstances under which fertility does not change or changes slowly or changes rapidly.

At the macro level, fertility behaviours influence population growth, which has consequences on human resources, unemployment rates, savings and investment. In

turn, such consequences represent changes in the socio-economic variables that may affect fertility behaviour. At the micro level, the presence of children affects the income and opportunities of parents' labour supply, and thus feed back into the determination of fertility.

Thus, an analysis of fertility behaviour from both macro level and micro level will also be made in this research work. The analysis will be on the examination of the relationships between fertility and socio-economic development for Asian developed countries as well as developing countries. The purpose of this analysis is to assist in determining the impact of development on fertility and to provide the basis for policy implications.

Methodology

In less developed countries, the vital data is still very limited in demographic analysis. Demographic techniques, which are useful for evaluation and adjustment of demographic data will be used.

One of the methods, most frequently used to accomplish the objective is to fit the observed data into a multiple linear regression model. The model includes the greatest possible number of independent variables, and this set of variables will be measured in reducing or explaining the total variation in the dependent variables.

Both qualitative and quantitative approaches will be used in order to be able to make a comprehensive analysis of the subject under consideration. The primary focus is not only on Asian fertility transition, in particular on changes and differentials in fertility behavior but also on socio-economic factors, cultural changes and government policy affecting fertility.

Scope of the Present Study

In the parts of analysis, the study generally relies on country's data to assess the effects of recent fertility transition. This study also attempts to draw together quantitative information on the regions from East to West Asia. These include a broad range of discussion on population growth, social and economic development, the extent of country's demographic transition, and policy dialogue on fertility decline.

Some kinds of analysis such as the Hutterites indices, age patterns of fertility, fertility model construction, national policy on fertility decline have been introduced in this study.

Asian fertility transition has been started in Japan. Since mid-1970s, Japan has reached to the below replacement level fertility. Between 1960-1965 and 1990-1995, the largest fertility decline (52 per cent) occurred in Asia. Major cities of China, Cyprus, Hong Kong (Special Administrative Region of China), the Republic of Korea, Singapore, and Thailand had already completed their fertility transition and achieved to the below replacement level fertility since late 1970s to 1980s.

The research period is the second half of the 20th century. However, numbers of country and the length of period are different from each analysis.

General Scheme of the Research

The general scheme can be divided as follows:

(a) Explaining the demographic structural changes that take place before the transitional stage, during the transitional stage and continuing transitional stage.

(b) Discussion on the relating nature of social, economic and cultural factors.

(c) Examination of the marital fertility patterns with the comparison of natural fertility and controlled fertility.

(d) Description on age patterns of fertility and fertility transition process.

(e) Setting the likely associations between the fertility variables and socio-economic variables.

(f) Observation of the changes in family building patterns following the family planning programme and activities, as well as adoption of contraception.

(g) A case study on the nature and causes of fertility transition in Myanmar.

CHAPTER I

The State of Asian Population

Contents

CHAPTER I

The State of Asian Population

1.1 Regional Background

A total of 50 countries are grouped geographically into four major regions in Asia: Eastern Asia, South Central Asia, South Eastern Asia and Western Asia. For the worldwide comparison, the regions are classified into two general groups of more developed or less developed. More developed regions comprise Northern America, Japan, Europe and Australia/ New Zealand. Less developed regions include all regions of Africa, Asia (excluding Japan), Latin America and the Caribbean, Melanesia, Micronesia and Polynesia.

As of 1998 United Nations General Assembly, least developed regions include 48 countries, of which 33 are in Africa, 9 in Asia, 1 in Latin America and the Caribbean, and 5 in Oceania. They are included in the less developed regions. Currently defined least developed countries in Asia are:

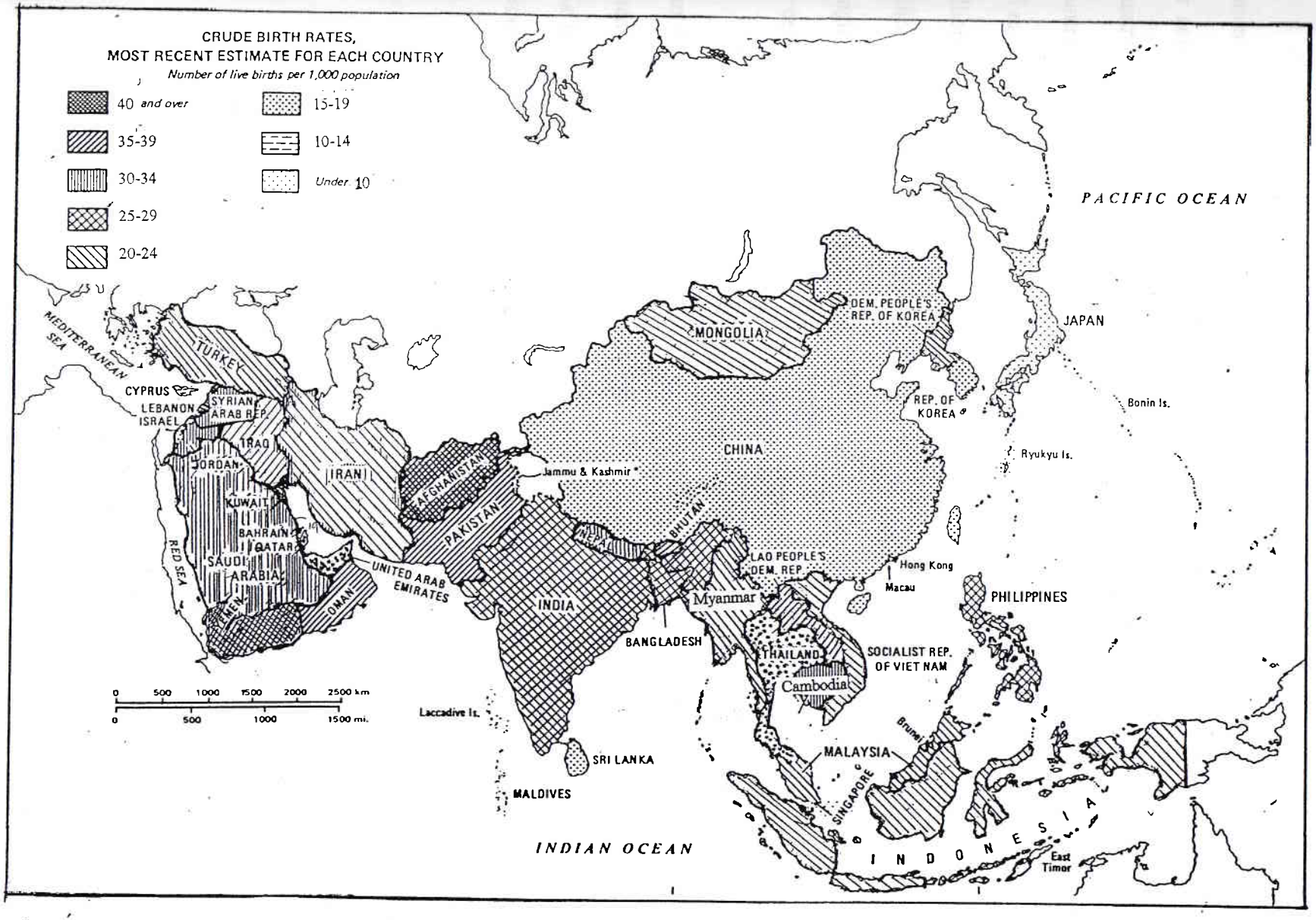
South-Central Asia	South-Eastern Asia	Western Asia
1 Afghanistan	1 Cambodia	1 Yemen
2 Bangladesh	2 Lao People Democratic Republic	
3 Bhutan	3 Myanmar	
4 Maldives		
5 Nepal		

Classification of Major Regions and Population in 2000

	Eastern Asia	Population (millions)		South-Central Asia	Population (millions)		South-Eastern Asia	Population (millions)		Western Asia	Population (millions)
1	China	1277.56	1	Afghanistan	22.72	1	Brunei	0.33	1	Armenia	3.52
2	China, Hong Kong SAR	6.93	2	Bangladesh	129.16	2	Cambodia	11.17	2	Azerbaijan	7.73
3	Democratic People's Republic of Korea	24.04	3	Bhutan	2.12	3	East Timor	0.89	3	Bahrain	0.62
4	Japan	126.71	4	India	1013.66	4	Indonesia	212.11	4	Cyprus	0.79
5	Macau	0.47	5	Iran	67.7	5	Lao People Democratic Republic	5.43	5	Gaza Strip	1.12
6	Mongolia	2.66	6	Kazakhstan	16.22	6	Malaysia	22.24	6	Georgia	4.97
7	Republic of Korea	46.84	7	Kyrgyzstan	4.7	7	Myanmar	45.61	7	Iraq	23.12
			8	Maldives	0.29	8	Philippines	75.97	8	Israel	6.22
			9	Nepal	23.93	9	Singapore	3.57	9	Jordan	6.67
			10	Pakistan	156.48	10	Thailand	61.4	10	Kuwait	1.97
			11	Sri Lanka	18.83	11	Viet Nam	79.83	11	Lebanon	3.28
			12	Tajikistan	6.19				12	Oman	2.54
			13	Turkmenistan	4.46				13	Qatar	0.6
			14	Uzbekistan	24.32				14	Saudi Arabia	21.61
									15	Syrian Arab Republic	16.13
									16	Turkey	66.59
									17	United Arab Emirates	2.44
									18	Yemen	18.11
		1485.21			**1490.78**			**518.55**			**188.03**

Source: United Nations, World Population Prospects, 1998 Revision, Vol.3

Map of Asia


CRUDE BIRTH RATES,
MOST RECENT ESTIMATE FOR EACH COUNTRY
Number of live births per 1,000 population
40 and over
35-39
30-34
25-29
20-24
15-19
10-14
Under 10
PACIFIC OCEAN
MEDITERRANEAN SEA
TURKEY
CYPRUS
LEBANON
ISRAEL
SYRIAN ARAB REP.
IRAQ
JORDAN
KUWAIT
BAHRAIN
QATAR
SAUDI ARABIA
YEMEN
OMAN
RED SEA
IRAN
AFGHANISTAN
PAKISTAN
UNITED ARAB EMIRATES
MONGOLIA
DEM. PEOPLE'S REP. OF KOREA
REP. OF KOREA
JAPAN
Bonin Is.
Ryukyu Is.
CHINA
Jammu & Kashmir *
NEPAL
BHUTAN
INDIA
BANGLADESH
Myanmar
LAO PEOPLE'S DEM. REP.
Hong Kong
Macau
PHILIPPINES
THAILAND
Cambodia
SOCIALIST REP. OF VIET NAM
Laccadive Is.
SRI LANKA
MALDIVES
MALAYSIA
Brunei
SINGAPORE
INDONESIA
East Timor
INDIAN OCEAN
0 500 1000 1500 2000 2500 km
0 500 1000 1500 mi.

1.2 Demographic Trends in Period

Population Trends

According to the 1998 Revision of the Population Estimates by the United Nations, 2 out of 5 people in the world currently live in either China or India. About 60 per cent of the world population increase contributed by 10 countries, of which 6 countries are from Asia. Net annual population growth during 1995-2000 in these countries are ranged from 2 per cent (1.5 millions) in the Philippines to 20.6 per cent (16 millions) in India. In the year 2000, other 10 countries have a population over 100 million in the world, of which 6 countries are from Asia. They are China (1278 millions), India (1014 million), Indonesia (212 millions), Pakistan (156 millions), Bangladesh (129 millions), and Japan (127 millions). These 6 countries account for 79 per cent of the Asian population and 48 per cent of the world's population.

In Asia four major regions, the share of population in Eastern Asia decreased from 48 per cent in 1950 to 40 percent in 2000. The share of South Central Asia increased from 35 per cent in 1950 to 41 per cent in 2000. The share of South Eastern Asia increased from 13 per cent in 1950 to 14 per cent in 2000. And, the share of Western Asia increased from 4 per cent in 1950 to 5 per cent in 2000.

Table 1.1 Total Population and Growth Rate by Region

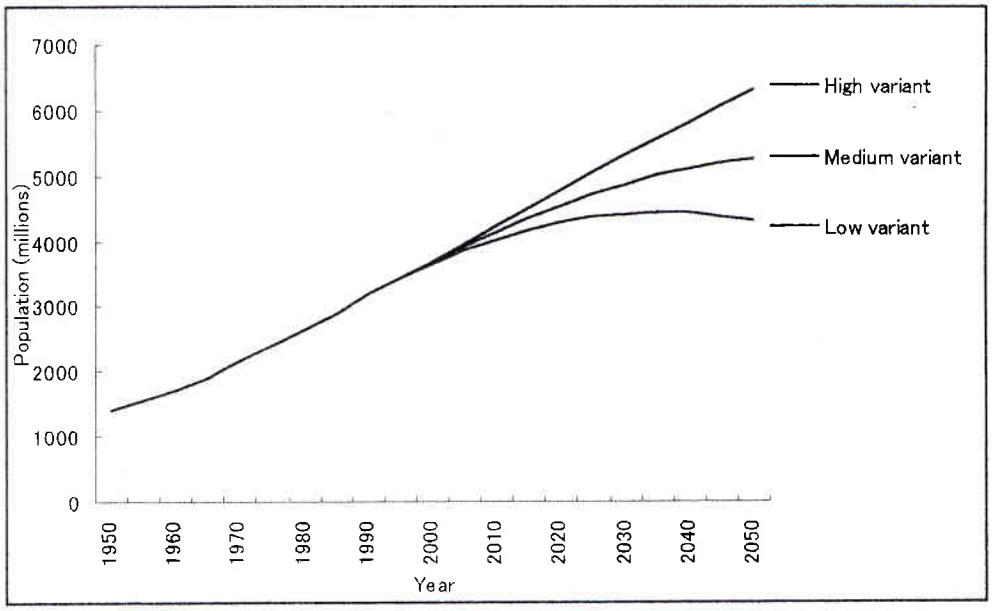
(Medium Variant Projection) (millions)

Major area and region	1970	1975	1980	1985	1990	1995	2000	Growth rate 1995-2000
World	3696.2	4074.7	4440.4	4837.4	5266.4	5666.4	6055.1	1.33
More developed regions	1007.7	1048.4	1082.9	1114.2	1148.0	1171.8	1188.0	0.27
Less developed regions	2688.5	3026.3	3357.5	3723.1	4118.5	4494.6	4867.1	1.59
Least developed regions	308.1	348.4	396.6	447.6	505.9	572.6	644.7	2.37
Asia	2147.0	2405.6	2641.4	2901.2	3180.6	3436.3	3682.6	1.38
Eastern Asia	986.6	1097.0	1178.4	1258.4	1350.5	1422.3	1485.2	0.87
South Central Asia	787.5	885.8	989.8	1110.6	1238.8	1365.2	1490.8	1.76
South Eastern Asia	286.7	324.0	360.2	400.8	441.0	480.5	518.5	1.53
Western Asia	86.1	98.8	112.9	131.4	150.3	168.3	188.0	2.21

Source: United Nations, World Population Prospects, 1998 Revision, Vol.1

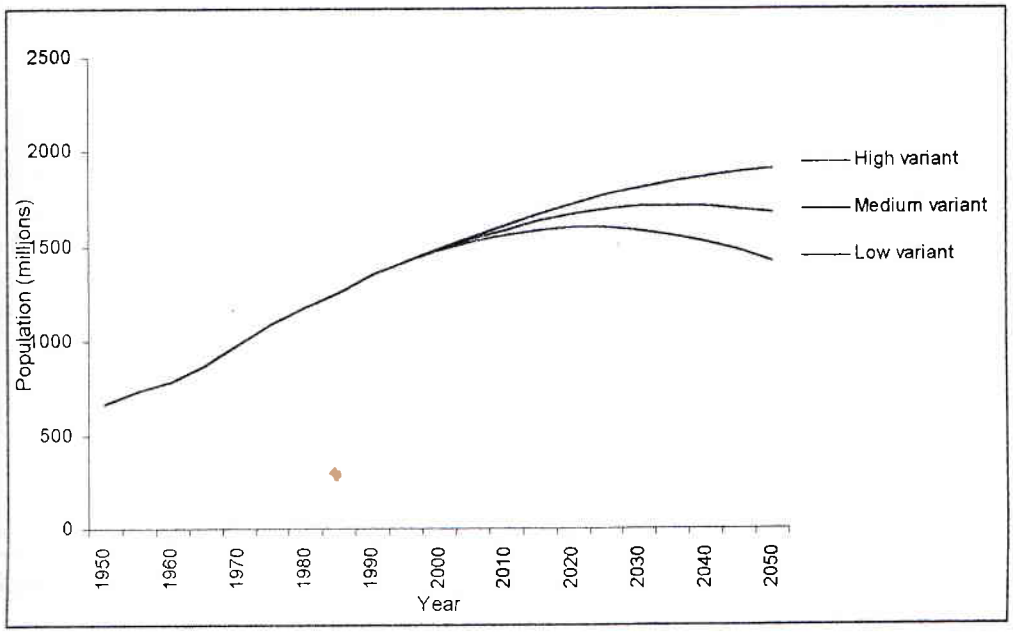
Figures 1.1 to 1.5 show the population estimate and projection for 2000 to 2050 of Asia and major four regions. In the 1980s and 1990s, fertility of all countries (except Mongolia) in East Asia has decreased to the below replacement level. Consequently, the population projection in 2050 (medium variant) assumes that fertility in these countries will not return to replacement level within the projection period. By the end of the projection period, the population of the South Central Asia, South East Asia, and West Asia will still be increasing. Despite the fact that total fertility rate for these three regions are expected to be 2.10, 2.08 and 2.09 per women respectively in 2045-2050, that is barely sufficient level to ensure population replacement if maintained over long-run.

Figure 1.1 Total Population in Asia: Past Estimate and Projection



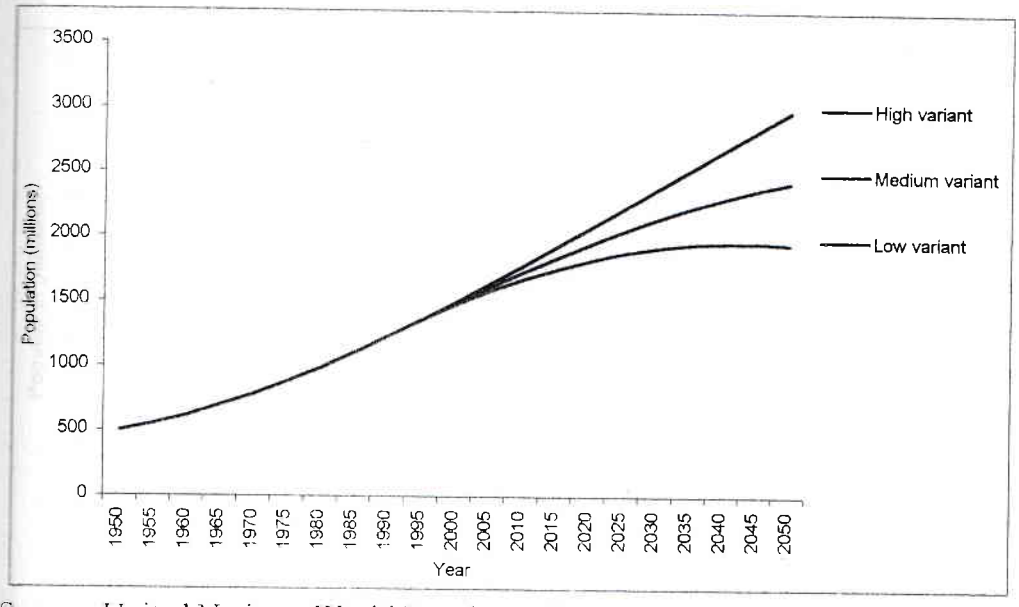
Source: United Nations, World Population Prospects, 1998 Revision, Vol.1

Figure 1.2 Total Population in Eastern Asia: Past Estimate and Projection



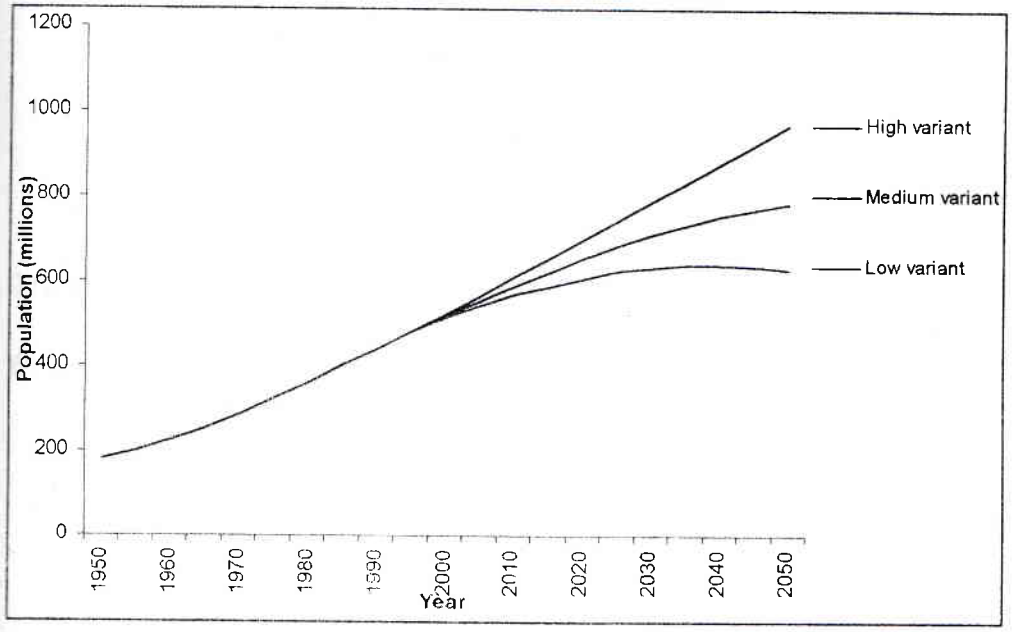
Source: United Nations, World Population Prospects, 1998 Revision, Vol.1

Figure 1.3 Total Population in South Central Asia: Past Estimate and Projection



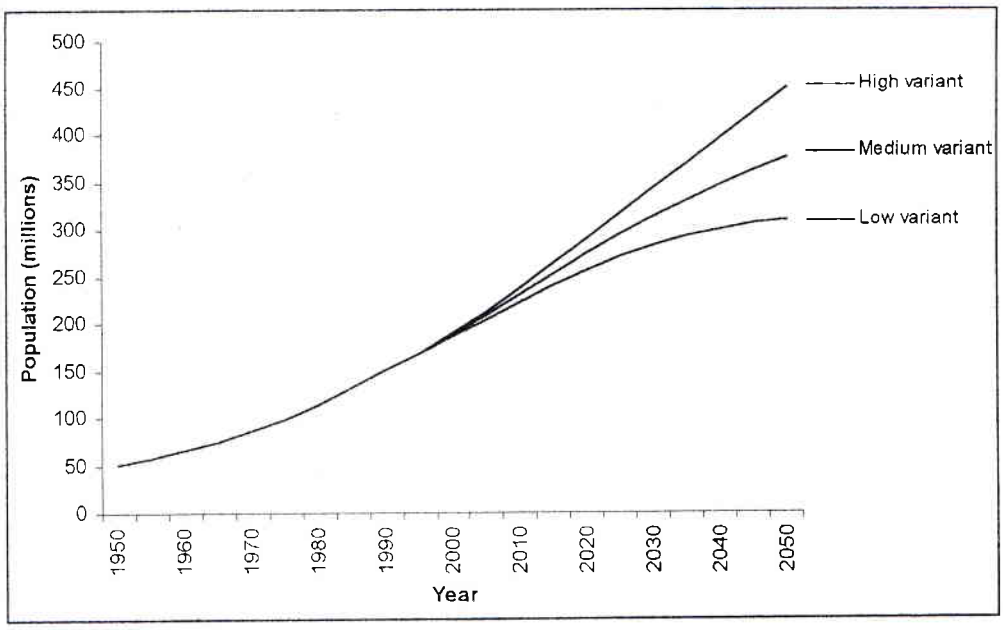
Source: United Nations, World Population Prospects, 1998 Revision, Vol.1

Figure 1.4 Total Population in South Eastern Asia: Past Estimate and Projection



Source: United Nations, World Population Prospects, 1998 Revision, Vol.1

Figure 1.5 Total Population in Western Asia: Past Estimate and Projection



Source: United Nations, World Population Prospects, 1998 Revision, Vol.1

All of the Figures 1.1 to 1.5 are illustrated by using the above source of data.

Fertility Trends

The following Table 1.2 shows the countries that reached the replacement fertility level in 1990-1995, and a target period to reach the replacement level was set within the projection period from 1995-2000 to 2045-2050.

Table 1. 2 Period to Reach Replacement Level (Medium Variant Projection)

Period	Eastern Asia	South-eastern Asia	South-central Asia	Western Asia
1990-1995		Thailand		Armenia
1995-2000	Dem. Peop. Rep. of Korea		Sri-Lanka	Cyprus Georgia
2000-2005			Kazakhstan	
2005-2010	Mongolia	Indonesia Viet Nam Myanmar	Turkey	Bahrain Lebanon Turkey
2010-2015		Brunei Malaysia	Kyrgyzstan India Iran	Israel Kuwait
2015-2020		Philippines	Uzbekistan Turkmenistan Bangladesh Tajikistan	United Arab Emirates
2020-2025		East Timor		Qatar Syrian Arab Republic
2025-2030		Cambodia	Maldives Nepal Pakistan	
2030-2035				Iraq Jordan Saudi Arabia
2035-2040		Lao, PDR	Afghanistan	
2040-2045			Bhutan	Oman Yemen
2045-2050				Gaza Strip

Source: United Nations, World Population Prospects, 1998 Revision, Vol.1

Note: China, Hong Kong (SAR), Japan, Macau, and Republic of Korea (Eastern Asia); Singapore (South Eastern Asia) have already reached replacement level before 1990-1995.

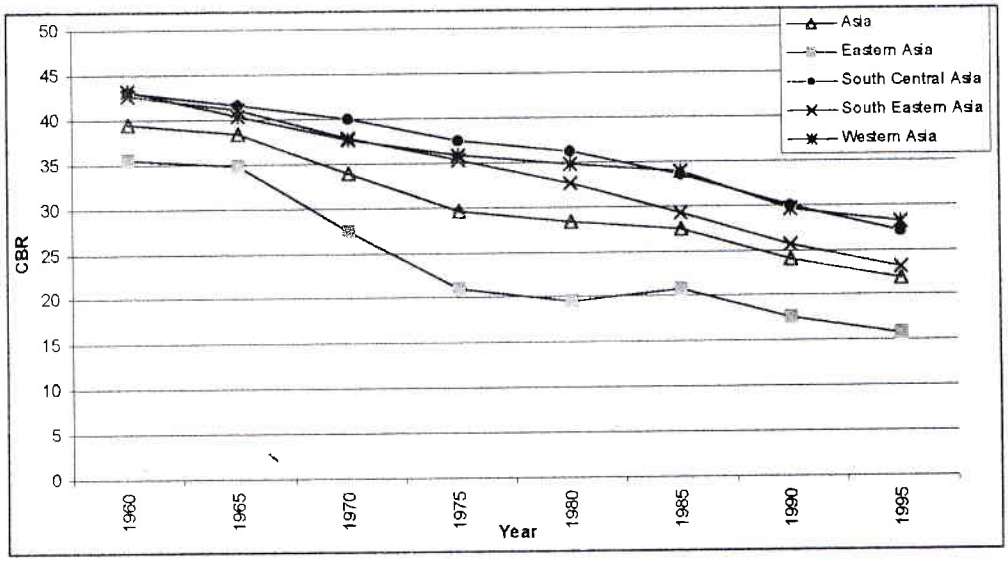
Since 1980s, no regions of Asia have exceeded the fertility above 5 children per women. The trends of CBR (Crude Birth Rate) and TFR (Total Fertility Rate) from 1960-1965 to 1995-2000 and their rates of decrease during 1960-2000 are presented in Tables 1.3 to 1.4 and Figures 1.6 to 1.7.

Table 1.3 Trends of Crude Birth Rate by Region

Major area and region	1960 -1965	1965 -1970	1970 -1975	1975 -1980	1980 -1985	1985 -1990	1990 -1995	1995 -2000	Rate of Decrease 1960-2000
World	35.2	33.8	30.9	28.3	27.4	26.6	23.9	22.1	-37
More developed regions	19.6	17.3	16.1	14.9	14.5	13.9	12.3	11.2	-43
Less developed regions	41.8	40.3	36.3	32.8	31.4	30.2	27.1	24.9	-40
Least developed regions	47.8	47.8	47.8	47.0	46.2	43.1	39.7	38.5	-19
Asia	39.5	38.3	33.9	29.6	28.4	27.5	24.1	21.9	-45
Eastern Asia	35.5	34.7	27.4	21.0	19.6	20.7	17.5	15.7	-56
South Central Asia	43.0	41.5	40.0	37.4	36.2	33.6	30.0	27.0	-37
South Eastern Asia	42.6	41.1	37.8	35.3	32.7	29.2	25.7	23.1	-46
Western Asia	43.2	40.3	37.7	35.8	34.8	33.8	29.6	28.2	-35

Source: United Nations, World Population Prospects, 1998 Revision, Vol.1

Figure 1.6 Trends of CBR by Region



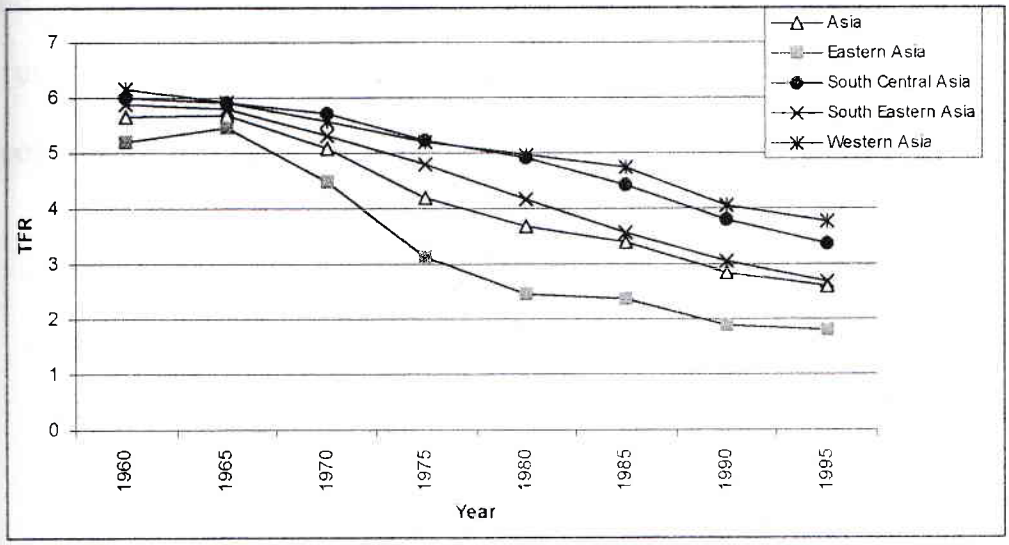
Source: United Nations, World Population Prospects, 1998 Revision, Vol.1

Table 1.4 Trends of Total Fertility Rate by Region

Major area and region	1960 -1965	1965 -1970	1970 -1975	1975 -1980	1980 -1985	1985 -1990	1990 -1995	1995 -2000	Rate of decrease 1960-2000
World	4.95	4.9	4.48	3.92	3.58	3.34	2.93	2.71	-45
More developed regions	2.67	2.36	2.11	1.91	1.84	1.83	1.7	1.57	-41
Less developed regions	6.01	6	5.43	4.65	4.15	3.79	3.27	3	-50
Least developed regions	6.59	6.67	6.71	6.6	6.5	6.03	5.37	5.05	-23
Asia	5.67	5.69	5.09	4.21	3.7	3.39	2.85	2.6	-54
Eastern Asia	5.19	5.46	4.49	3.1	2.47	2.36	1.88	1.8	-65
South Central Asia	6.01	5.91	5.72	5.24	4.92	4.44	3.79	3.36	-44
South Eastern Asia	5.9	5.81	5.31	4.81	4.18	3.58	3.1	2.69	-54
Western Asia	6.18	5.91	5.57	5.19	4.96	4.73	4.05	3.77	-39

Source: United Nations, World Population Prospects, 1998 Revision, Vol.1

Figure 1.7 Trends of TFR by Region



Source: United Nations, World Population Prospects, 1998 Revision, Vol.1

Mortality Trends

One of the major achievements in the twentieth century has been the reduction of mortality in most of the world[1]. Although most of the countries have been in low mortality level, the reduction of mortality will not necessarily lead to lower level in long term estimate. According to the 1998 Revision, the annual death rate for the world population is expected to rise from 8.9 deaths per 1000 population in 1995-2000 to 10.1 deaths per 1000 population in 2045-2050 (medium variant projection). This is because an older population will experience a larger number of deaths than a younger population. In particular, death rate in Hong Kong (SAR) was 4.8 in 1980-85 and it had increased into 5.8 per 1000 population in 1995-2000 (Refer to Chapter 2, Section 3).

Mortality trends for Asian four regions from 1960-1965 to 1995-2000 and their rates of decrease during 1960-2000 are displayed in Table 1.5 and Figure 1.8. Since 1990s, mortality of all regions in Asia has decreased into less than 10 deaths per 1000 population.

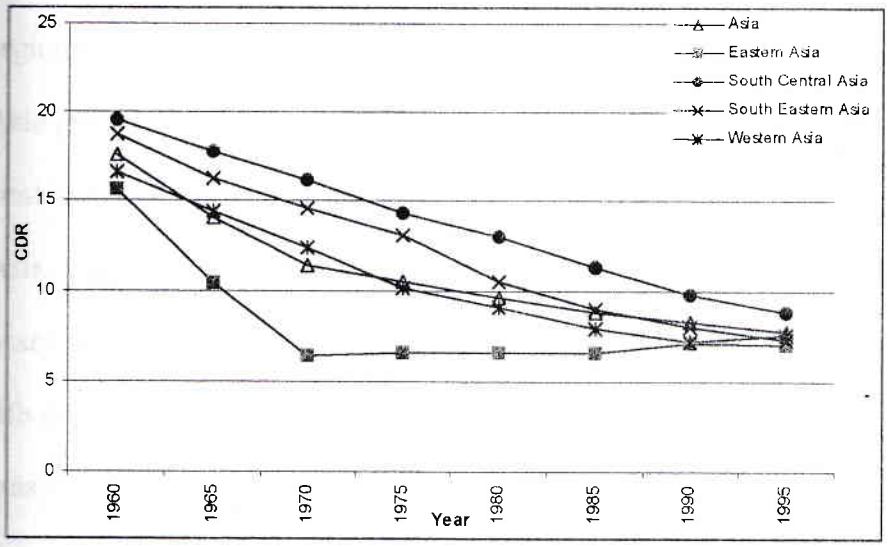
[1] By 1950, the discovery and wide-spread use of antibiotics as well as the growing use of vaccines had significantly reduced mortality. In addition, a combination of medical advances to combat or prevent infectious disease and concerted campaigns either to control the vectors responsible for the spreading disease or to improve hygiene had already contributed to reducing mortality in the less developed countries (United Nations 2000 a).

Table 1.5 Trends of Crude Death Rates by Region

Major area and region	1960 -1965	1965 -1970	1970 -1975	1975 -1980	1980 -1985	1985 -1990	1990 -1995	1995 -2000	Rate of decrease 1960-2000
World	15.6	13.4	11.6	11.0	10.3	9.6	9.3	8.9	-43.0
More developed regions	9.4	9.4	9.4	9.5	9.6	9.6	10.1	10.1	7.0
Less developed regions	18.2	15.0	12.4	11.5	10.5	9.6	9.1	8.6	-53.0
Least developed regions	24.0	22.3	21.0	19.8	18.2	16.3	15.6	14.5	-40.0
Asia	17.6	14.1	11.4	10.5	9.6	8.8	8.3	7.7	-56.0
Eastern Asia	15.7	10.4	6.4	6.6	6.6	6.6	7.1	7.0	-55.0
South Central Asia	19.6	17.8	16.2	14.3	13.0	11.3	9.8	8.8	-55.0
South Eastern Asia	18.8	16.3	14.6	13.1	10.5	9.0	8.0	7.3	-61.0
Western Asia	16.6	14.4	12.4	10.1	9.1	7.9	7.2	7.6	-54.0

Source: United Nations, World Population Prospects, 1998 Revision, Vol.1

Figure 1.8 Trends of CDR by Region



Source: United Nations, World Population Prospects, 1998 Revision, Vol.1

In order to compare the increase in life expectancy recorded by given region between 1970-1975 and 1995-2000 as well as the index of mortality decline was calculated in Table 1.6. The index of mortality is a comparative basis for increasing life expectancy of different regions. The index of mortality decline is calculated as:

$$\{e_0(2) - e_0(1) * 100\} / \{e_0(M) - e_0(1)\}$$

where e_0 (1) the life expectancy at initial period

e_0 (2) the life expectancy at second period

e_0 (M) the maximum life expectancy in the second period

This index represents the percentage of the actual achieved life expectancy that compares with the maximum level. The higher the index, the closer a region or country came to achieve the maximum potential reduction of mortality. The advantage of this index is that it controls the wide variation level of life expectancy among regions.

In Table 1.6, the index of mortality decline is calculated between 1970-1975 (initial period) and 1995-2000 (second period). Life expectancy experienced by the more developed regions in 1995-2000 is considered possible for maximum level. These are 74.9 years for both sexes, 71.1 years for males, and 78.7 years for females.

The values of the index of mortality decline in Table 1.6 display for major regions of the world and four main regions in Asia. Among the Asian regions, Eastern Asia gained largely, amount to 64 per cent of the potential increase in both sexes, 71 per cent in males, and 61 per cent in females. The most modest increase was South Central Asia, where life expectancy increased less than 50 per cent of its potential rise for both sexes and females. By 1995-2000, life expectancy of female was higher than the male life expectancy in all regions. But the difference between male and female expectancy was relatively low in South Central Asia. Nevertheless, it was the only region where female life expectancy was lower than male till 1975-1980.

In general, all regions in Asia had achieved higher life expectancy in males, females and both sexes than the world and less developed regions of the world.

Table 1.6 Trends in Expectation of Life at Birth and Mortality Decline Index

Major area and region	1970 -1975	1975 -1980	1980 -1985	1985 -1990	1990 -1995	1995 -2000	Mortality decline Index
World							
Both Sexes	58.0	59.7	61.3	63.1	64.1	65.4	44
Males	56.5	58.0	59.4	61.1	62.1	63.2	46
Females	59.4	61.5	63.3	65.1	66.3	67.6	42
More developed regions							
Both Sexes	71.2	72.1	73.0	74.1	74.1	74.9	100
Males	67.6	68.4	69.3	70.4	70.3	71.1	100
Females	74.7	75.8	76.7	77.6	77.8	78.7	100
Less developed regions							
Both Sexes	54.7	56.8	58.6	60.5	61.9	63.3	43
Males	53.9	55.8	57.3	59.2	60.4	61.8	46
Females	55.5	57.8	59.9	62.0	63.5	65.0	41
Least developed regions							
Both Sexes	43.7	45.3	47.3	49.2	49.1	50.5	22
Males	42.9	44.4	46.4	48.2	48.2	49.6	24
Females	44.5	46.2	48.3	50.2	50.1	51.5	20
Asia							
Both Sexes	56.3	58.5	60.4	62.5	64.5	66.3	54
Males	55.9	57.7	59.5	61.4	63.2	64.8	59
Females	56.8	59.3	61.5	63.7	65.9	67.9	51
Eastern Asia							
Both Sexes	64.2	66.4	67.7	68.2	69.6	71.0	64
Males	63.1	65.2	66.3	66.7	67.6	68.8	71
Females	65.2	67.6	69.0	69.8	71.8	73.4	61
South Central Asia							
Both Sexes	50.2	52.7	54.9	57.7	60.2	62.3	49
Males	50.8	52.9	54.7	57.4	59.8	61.8	54
Females	49.6	52.6	55.1	58.1	60.6	62.9	46
South Eastern Asia							
Both Sexes	51.9	54.78	58.0	61.4	63.7	65.7	60
Males	50.3	53.20	56.2	59.5	61.8	63.7	64
Females	53.5	56.30	59.9	63.3	65.5	67.8	57
Western Asia							
Both Sexes	57.9	60.50	62.9	65.3	66.2	68.0	59
Males	56.1	58.7	60.9	63.4	64.3	65.9	65
Females	59.9	62.5	64.8	67.2	68.2	70.2	55

Source: United Nations, World Population Prospects, 1998 Revision, Vol.1

Note: Mortality decline index is computed from the above source.

1.3 Population Ageing in Asia

The ageing of a population is primarily a result of decline in the total fertility rate[2]. Population ageing can be measured by various indices. According to the United Nations report in 1956, the population is arbitrarily defined as "aged" when the percentage of old people aged 65 and over exceeds 7 per cent. Shryock and Siegel (1976) stated that the proportion of aged person 65 years and over exceeds 10 per cent or more may be defined as aged. Similarly, in the view of Kono (1998), this figure of 7 per cent seems too small, and it is more appropriate to assume as 10 per cent.

The simplest measure of age composition is given by the percentage of change at each age group. Table 1.7 shows the percentage of changes by three broad age groups, such as children under 15, working age group 15-64, and aged persons 65 and over. The analysis of age data related to the measurement of changes over time is important, since it is applicable not only to the comparison of the same population at different dates.

The Proportion of Aged Persons has been regarded as an indicator of population ageing or population still growing younger. On this basis, population with 10 per cent or more in 65 years old and over may be said to be old and those with less than 5 per cent may be said to be young (Shryock and Siegel 1976).

In Table 1.7, population in the more developed regions of the world has attained more than 10 per cent of aged persons since 1975. The proportions of aged persons in South Central Asia, South East Asia, and West Asia have been less than 5 per cent during the period under review. Thus, the population in more developed regions is ageing, and the population in Asia regions (except East Asia) is still growing younger.

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[2] The apparent of this demographic transition is well documented and the process remains the same in both developed and developing countries (United Nations 1999a).

Table 1.7 Age Composition for Major Area and Region

(%)

Major area and region	1970	1975	1980	1985	1990	1995	2000
World							
Aged 0-14	37.4	36.9	35.2	33.5	32.4	31.2	29.7
Aged 15-64	57.1	57.4	58.9	60.6	61.4	62.2	63.4
Aged 65+	5.5	5.7	5.9	5.9	6.2	6.6	6.9
More developed regions							
Aged 0-14	26.0	24.2	22.4	21.4	20.6	19.6	18.2
Aged 15-64	64.1	65.1	66.0	67.0	66.9	66.8	67.4
Aged 65+	9.9	10.7	11.6	11.6	12.5	13.6	14.4
Less developed regions							
Aged 0-14	41.8	41.3	39.3	37.1	35.6	34.3	32.5
Aged 15-64	54.4	54.8	56.6	58.7	60.0	61.0	62.4
Aged 65+	3.8	3.9	4.1	4.2	4.4	4.7	5.1
Least developed regions							
Aged 0-14	44.3	44.9	44.9	45.0	44.5	43.4	42.1
Aged 15-64	52.7	52.0	52.0	52.0	52.4	53.5	54.8
Aged 65+	3.0	3.1	3.1	3.0	3.1	3.1	3.1
Asia							
Aged 0-14	40.3	39.9	37.7	34.9	33.2	31.8	29.9
Aged 15-64	55.7	55.9	57.9	60.5	61.9	62.8	64.2
Aged 65+	4.0	4.2	4.4	4.6	4.9	5.4	5.9
Eastern Asia							
Aged 0-14	38.2	37.9	34.3	29.4	26.7	25.4	23.9
Aged 15-64	57.3	57.4	60.6	65.0	67.2	67.8	68.4
Aged 65+	4.5	4.7	5.1	5.6	6.1	6.8	7.7
South Central Asia							
Aged 0-14	41.7	41.1	40.0	39.2	38.4	37.0	34.8
Aged 15-64	54.7	55.1	56.1	56.9	57.5	58.7	60.6
Aged 65+	3.6	3.8	3.9	3.9	4.1	4.3	4.6
South Eastern Asia							
Aged 0-14	43.4	42.6	40.9	38.9	36.4	34.0	31.4
Aged 15-64	53.3	54.1	55.5	57.4	59.6	61.7	63.9
Aged 65+	3.3	3.3	3.6	3.7	4.0	4.3	4.7
Western Asia							
Aged 0-14	42.2	41.7	40.8	39.4	38.3	36.7	35.0
Aged 15-64	53.5	54.0	54.9	56.6	57.8	58.9	60.2
Aged 65+	4.3	4.3	4.3	4.0	3.9	4.4	4.8

Source: United Nations, World Population Prospects, 1998 Revision, Vol.1.

Again, some round limits for the proportion of children under 15 could suggest a population as young or old. The proportion less than 30 per cent characterizes as old and proportion of over 40 per cent characterizes as young (Shryock and Siegel 1976). The comparative analysis on the proportion of children under 15 also shows that population in more developed regions is ageing, and the population in Asian regions (except East Asia) is still growing younger.

Another index that widely used is the ***Aged-Child Ratio***. It is the ratio of the number of elderly persons to the number of children. It can measure the number and changes at both ends of age distribution simultaneously. Population with the value of aged-child ratio less than 15 per cent may be described as young, population with the value of aged-child ratio greater than 30 per cent may be described as old, and the value within these ranges is defined as intermediate age (Shryock and Siegel 1976).

According to the values in Table 1.8, the aged-child ratios for more developed regions of the world have shown that countries in these regions have already appeared as definitely old. Many less developed countries have a small proportion of persons 65 years and over, and a large proportion of children under aged 15. The progress of the ageing population for least developed regions has been rather far.

In Asian regions, only the aged-child ratio for Eastern Asia exceeded the value greater than 30 per cent in 2000. The remaining three regions of Asia have the values less than 15 per cent during the studied period.

Table 1.8 Aged-Child Ratios for Major Area and Region

(%)

Major area and region	1970	1975	1980	1985	1990	1995	2000
World	14.7	15.4	16.8	17.6	19.1	21.2	23.2
More developed regions	38.1	44.2	51.8	54.2	60.7	69.4	79.1
Less developed regions	9.1	9.4	10.4	11.3	12.4	13.7	15.7
Least developed regions	6.8	6.9	6.9	6.7	7.0	7.1	7.4
Asia	9.9	10.5	11.7	13.2	14.8	17.0	19.7
Eastern Asia	11.8	12.4	14.9	19.0	22.8	26.8	32.2
South Central Asia	3.6	3.8	3.9	3.9	4.1	4.3	4.6
South Eastern Asia	7.6	7.7	8.8	9.5	11.0	12.6	15.0
Western Asia	10.2	10.3	10.5	10.2	10.2	12.0	13.7

Source: United Nations, World Population Prospects, 1998 Revision, Vol.1.

Note: Computed from the above source by using the formula

(Population of aged 65+) / (Population of aged under 15) * 100

The third index introduced in this study is the ***Age Dependency Ratio.*** It is the ratio of the combined child population and aged population to the population of intermediate age. Separate calculation of the ***Child-Dependency Ratio*** is the ratio of children under aged 15 to persons aged 15 to 64. The ***Old-Age Dependency Ratio*** is the ratio of persons aged 65 and over to persons aged 15 to 64. The values of age dependency ratios also reflect the great differences from country to country or region to region. The greater the value means the greater burden of dependency and the productive population must be increased. The differences in the age dependency ratios principally related to the differences in the proportion of children and hence to differences in fertility rates.

Table 1.9 Dependency Ratios by Major Area and Region

Major area and region	1970 -1975	1975 -1980	1980 -1985	1985 -1990	1990 -1995	1995 -2000
World						
Total	75.3	74.1	69.9	65.1	62.6	60.7
Age 0-14	65.7	64.3	59.8	55.3	52.6	50.2
Age 65+	9.6	9.8	10.1	9.8	10.0	10.5
More developed regions						
Total	56.0	53.8	51.8	49.4	49.5	49.6
Age 0-14	40.6	37.2	34.1	32.0	30.8	29.3
Age 65+	15.4	16.5	17.7	17.4	18.7	20.3
Less developed regions						
Total	83.8	82.6	76.7	70.4	66.7	63.9
Age 0-14	76.8	75.4	69.5	63.2	59.4	56.2
Age 65+	7.0	7.1	7.2	7.2	7.4	7.7
Least developed regions						
Total	89.8	92.3	92.3	92.5	90.9	86.7
Age 0-14	84.1	86.4	86.3	86.6	85.0	81.0
Age 65+	5.7	5.9	6.0	5.9	5.8	5.7
Asia						
Total	79.8	78.7	72.5	65.5	61.6	59.0
Age 0-14	72.5	71.3	64.9	57.8	53.6	50.5
Age 65+	7.3	7.4	7.6	7.7	8.0	8.5
Eastern Asia						
Total	74.8	74.3	65.1	54.1	49.0	47.6
Age 0-14	66.8	66.1	56.6	45.4	39.9	10.1
Age 65+	8.0	8.2	8.5	8.7	9.1	10.1
South Central Asia						
Total	82.9	81.4	78.3	75.9	73.7	70.4
Age 0-14	76.2	74.6	71.4	69	66.6	63.1
Age 65+	6.7	6.8	6.9	6.9	7.1	7.3
South Eastern Asia						
Total	87.5	85.00	80.1	74.1	67.8	62.1
Age 0-14	81.4	78.90	73.7	67.7	61.1	55.1
Age 65+	6.1	6.10	6.4	6.4	6.7	7.0
Western Asia						
Total	86.9	85.3	82.4	76.4	74.3	69.9
Age 0-14	78.8	77.3	74.5	69.4	67.5	62.4
Age 65+	8.1	8.0	7.9	7.0	6.9	7.5

Source: United Nations, World Population Prospects, 1998 Revision, Vol.1

CHAPTER II

The Asian Demographic Transition

Contents

CHAPTER II

The Asian Demographic Transition

2.1 Overview of the Levels and Trends of Fertility and Mortality

The Demographic Transition Theory is the theory that society progresses from a pre-modern regime of high fertility and high mortality to a post-modern regime of low fertility and low mortality (Kirk 1996).

According to the theory of demographic transition, a country has to pass through the following stages of population growth.

Stage (1) A relatively static population with high fertility and high mortality.

Stage (2) A rapid population growth based on a continuing high fertility and falling mortality.

Stage (3) A relatively static population based on a new balance between low fertility and low mortality.

A continuing demographic transition or second demographic transition is called when a country reaches to the following stages:

Stage (1) A relatively low population growth with below replacement level fertility and low mortality.

Stage (2) The decline rate of population with an excess of mortality over fertility.

The term ***fertility transition*** had been stated in the demographic literature since 1970s and a precise meaning was given as ***from natural fertility to family limitation*** in the articles of Knodel (1977, 1979) and Caldwell & Ruzicka (1978) (van de Walle 1992). Fertility transition can be viewed as one of the component of the demographic transition.

Natural increase (or decrease) is defined as the difference between fertility and mortality. Where net migration is zero, the rate of natural increase (or decrease) is identical to the growth (or decline) rate of population. Similarly the crude rate of natural increase is the algebraic difference between the CBR and CDR.

The following figures 2.1 to 2.4 show the countries' fertility and mortality trends by CBR and CDR.

Figure 2.1 Fertility and Mortality Trends for Eastern Asia

Figure 2.1.1 China

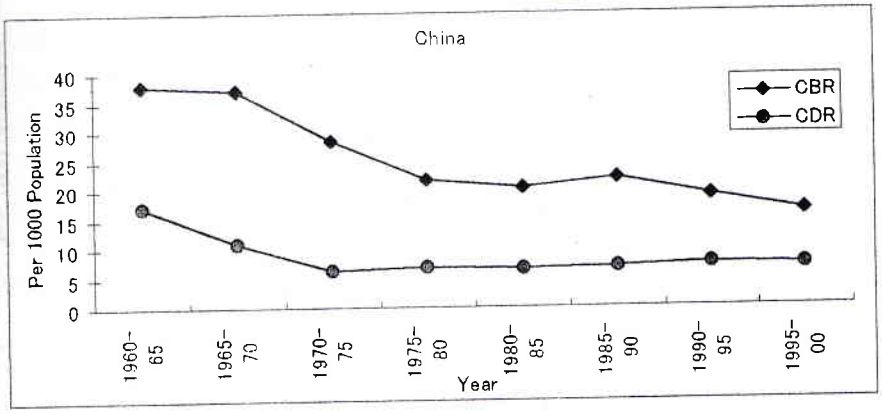


Figure 2.1.2 Hong Kong, SAR

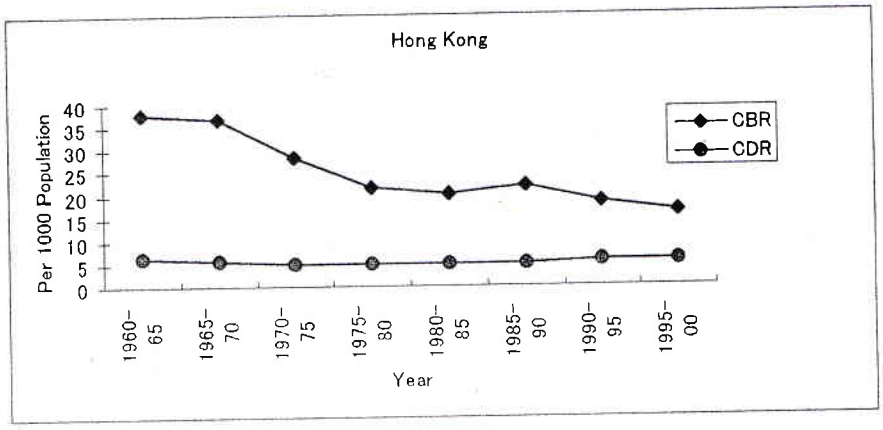


Figure 2.1.3 Japan

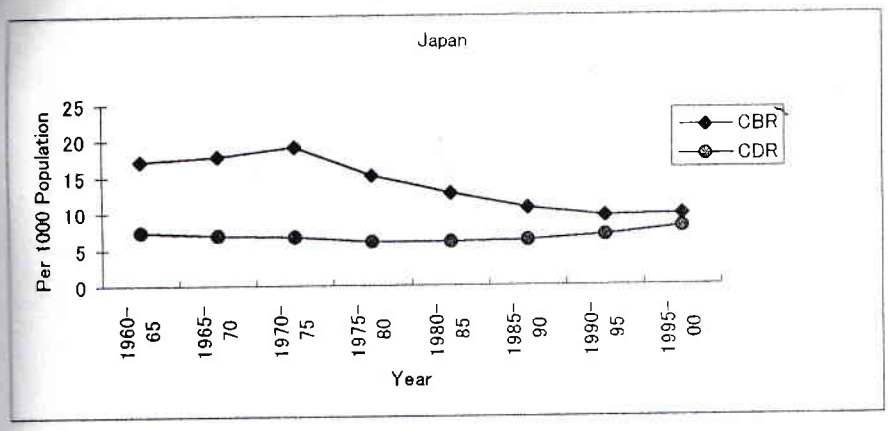


Figure 2.1.4 Republic of Korea

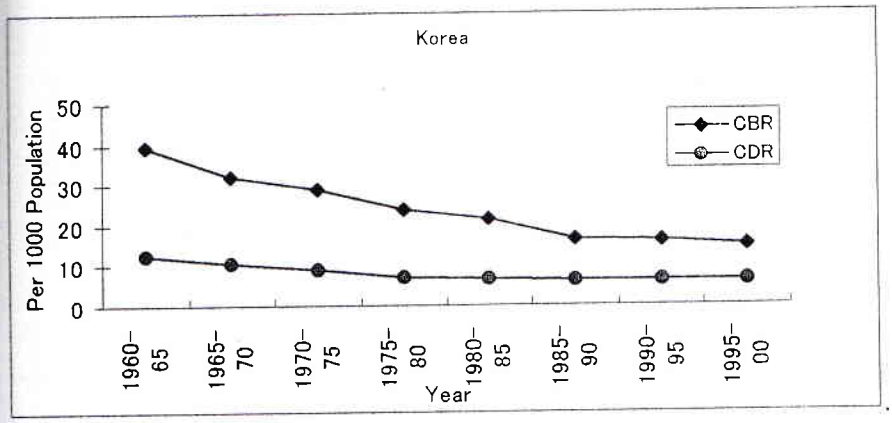


Figure 2.2 Fertility and Mortality Trends for South Central Asia

Figure 2.2.1 Bangladesh

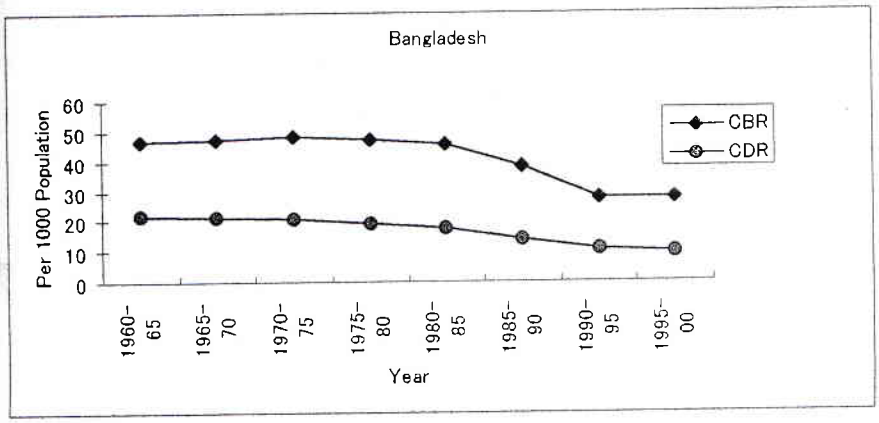


Figure 2.2.2 India

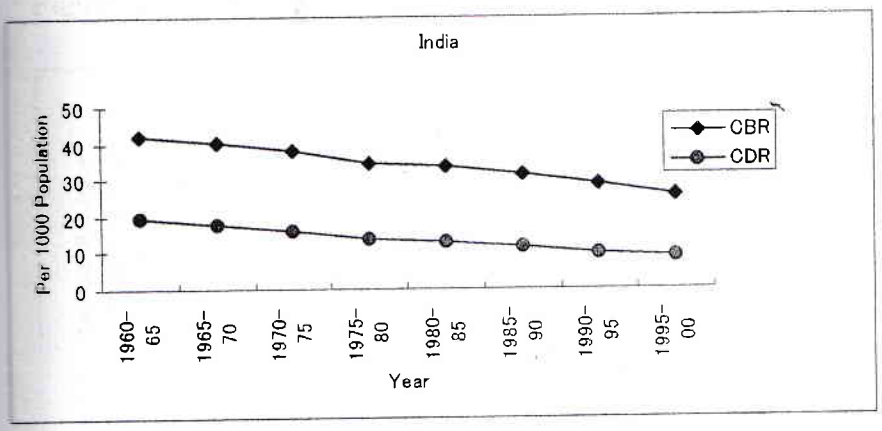


Figure 2.2.3 Iran

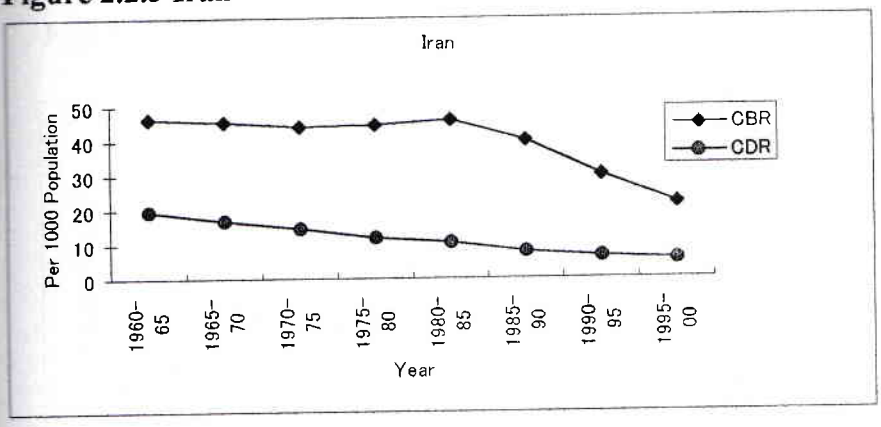


Figure 2.2.4 Nepal

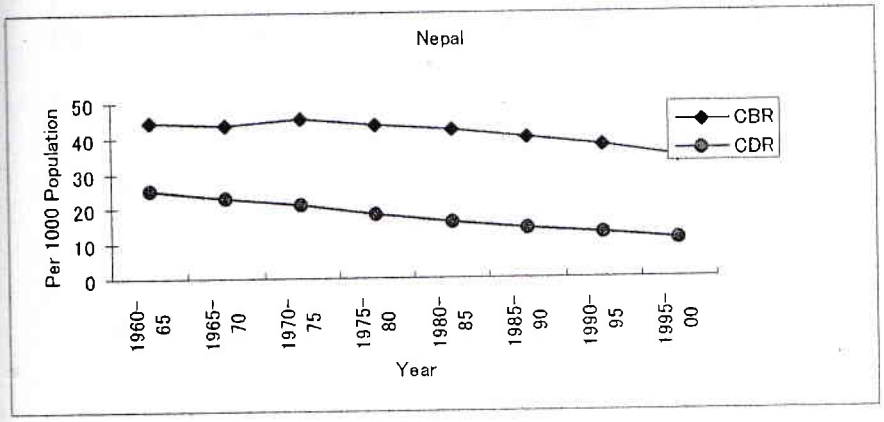


Figure 2.2.5 Pakistan

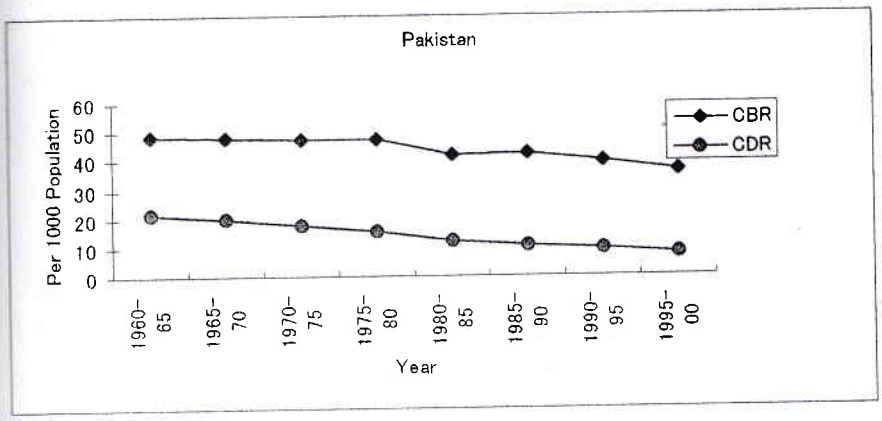


Figure 2.2.6 Sri Lanka

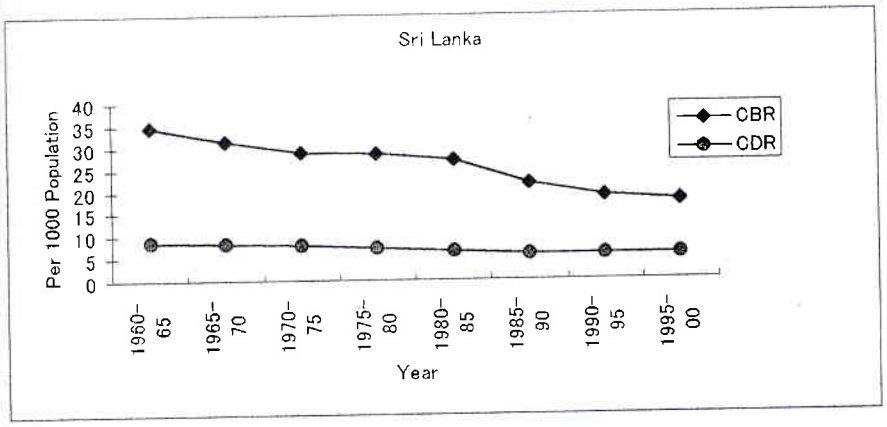


Figure 2.3 Fertility and Mortality Trends for South Eastern Asia

Figure 2.3.1 Brunei

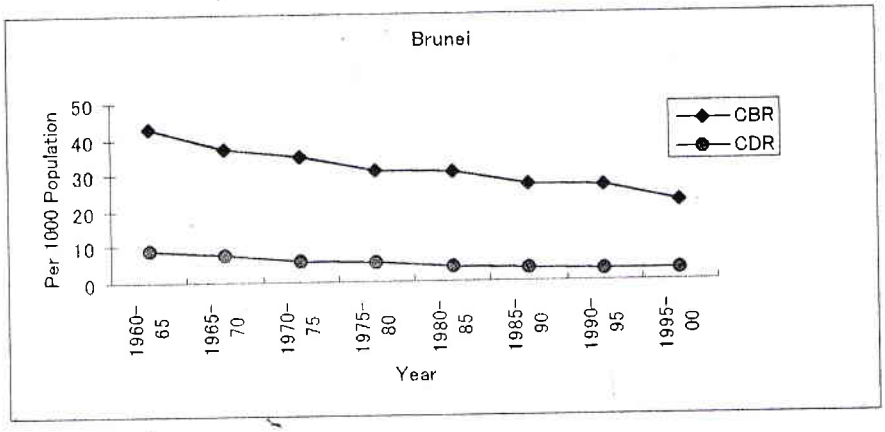


Figure 2.3.2 Indonesia

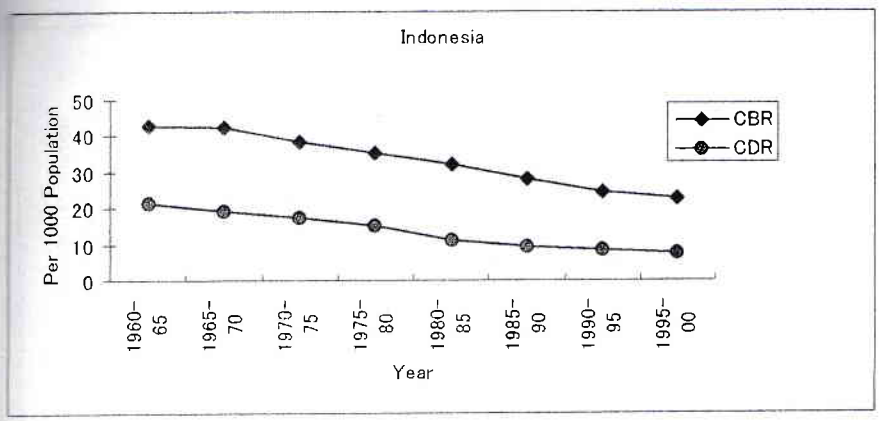


Figure 2.3.3 Malaysia

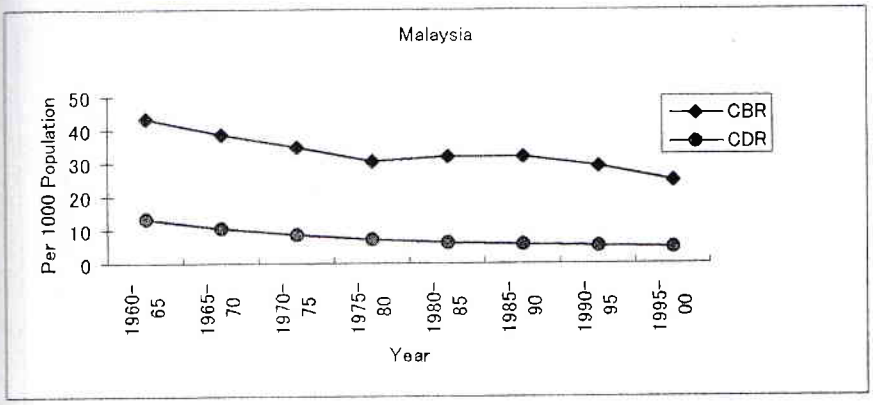


Figure 2.3.4 Myanmar

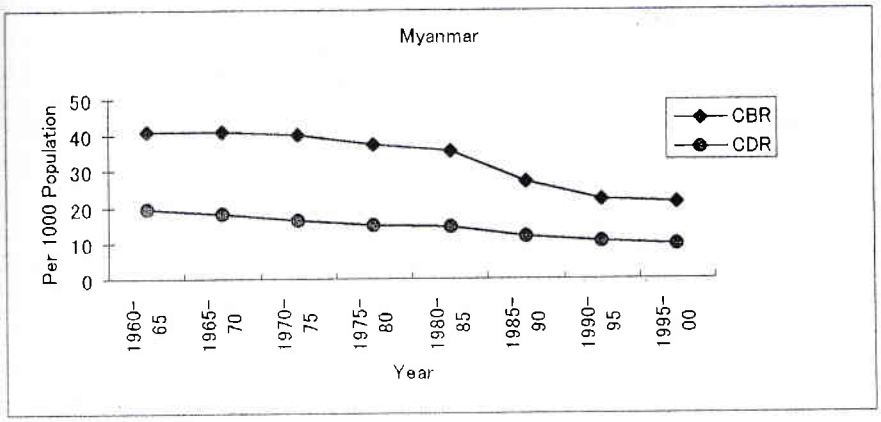


Figure 2.3.5 Philippines

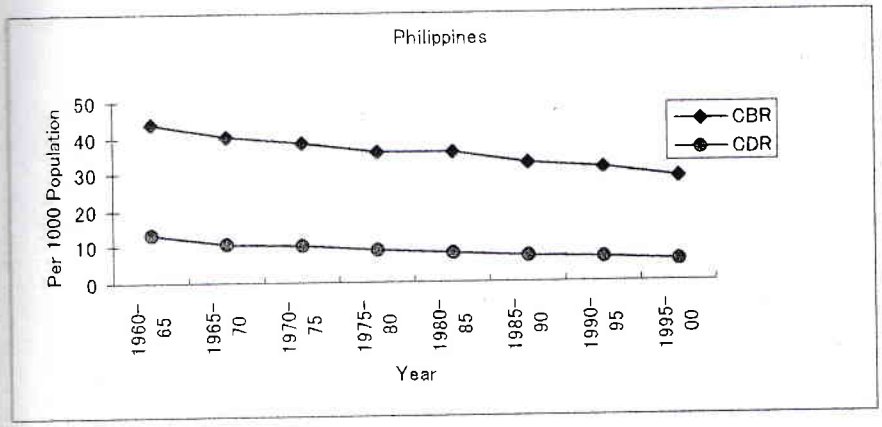


Figure 2.3.6 Singapore

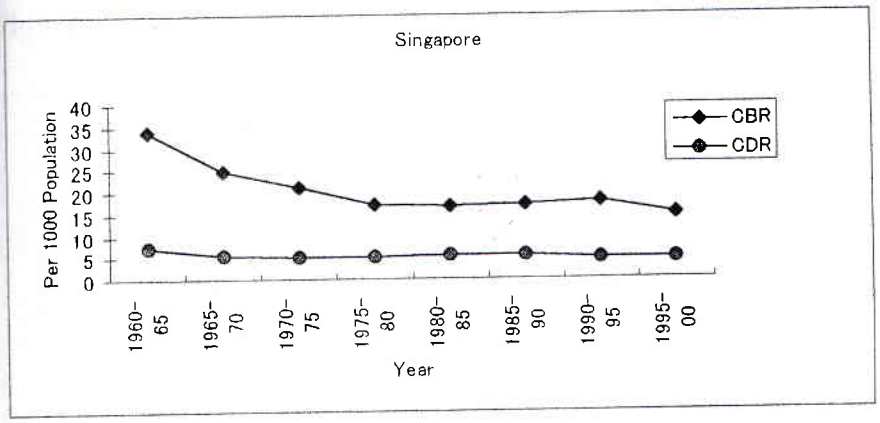


Figure 2.3.7 Thailand

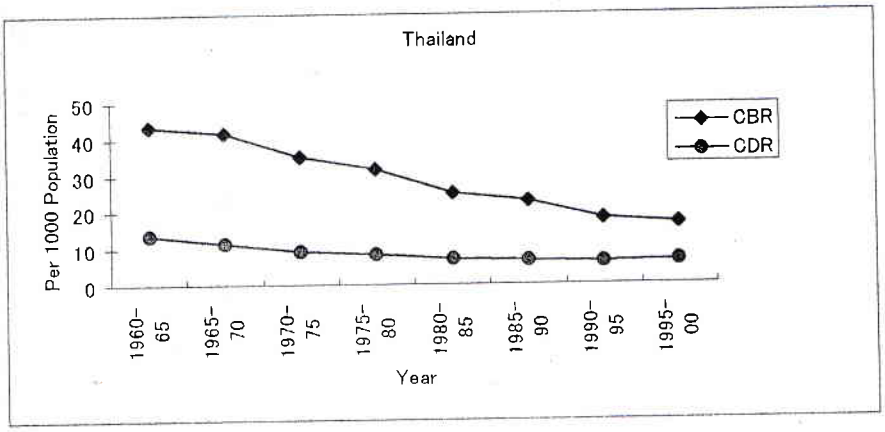


Figure 2.3.8 Viet Nam

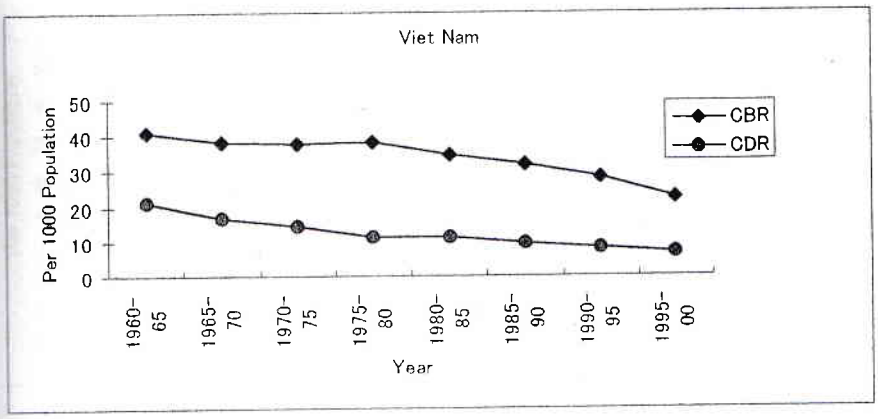


Figure 2.4 Fertility and Mortality Trends for Western Asia

Figure 2.4.1 Cyprus

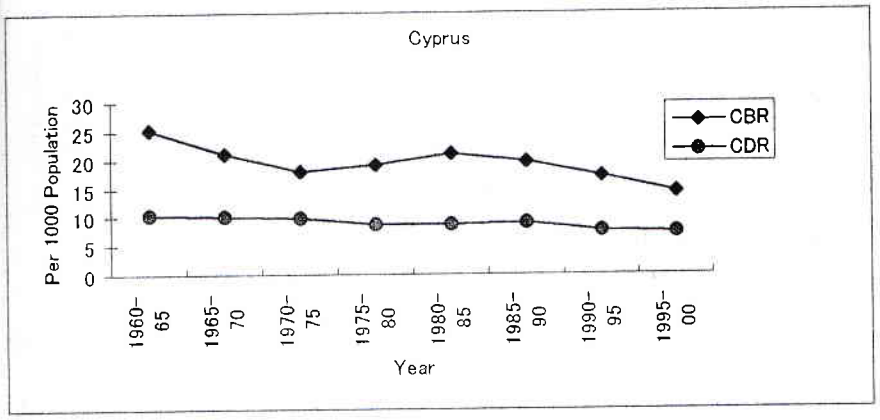


Figure 2.4.2 Israel

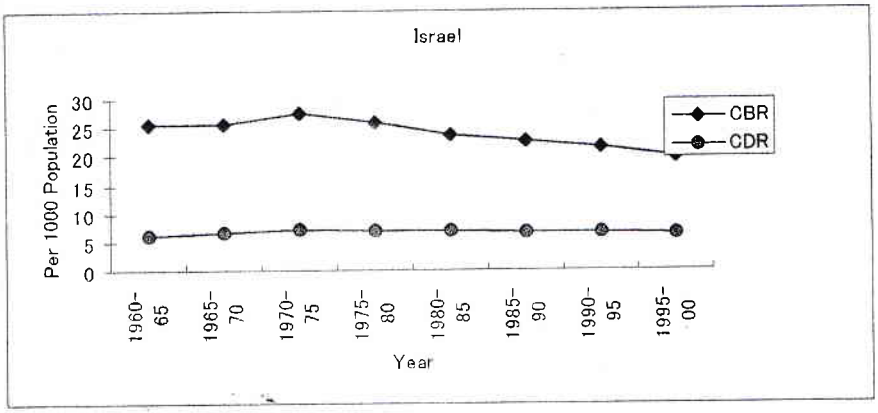


Figure 2.4.3 Turkey

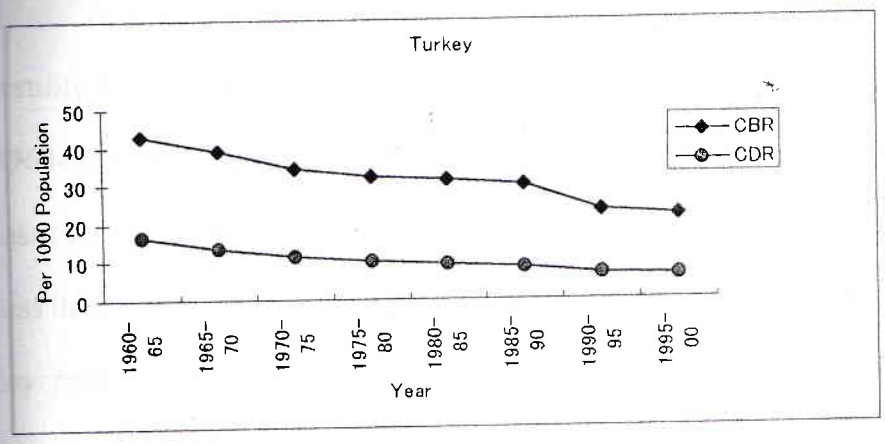


Figure 2.4.4 Kuwait

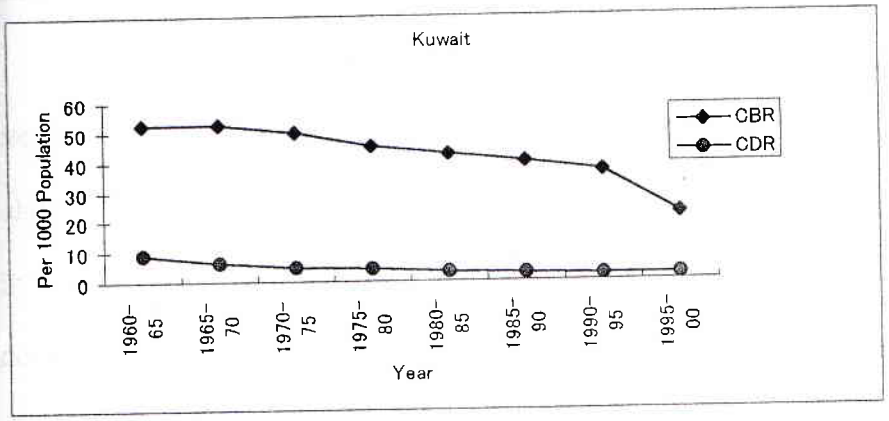
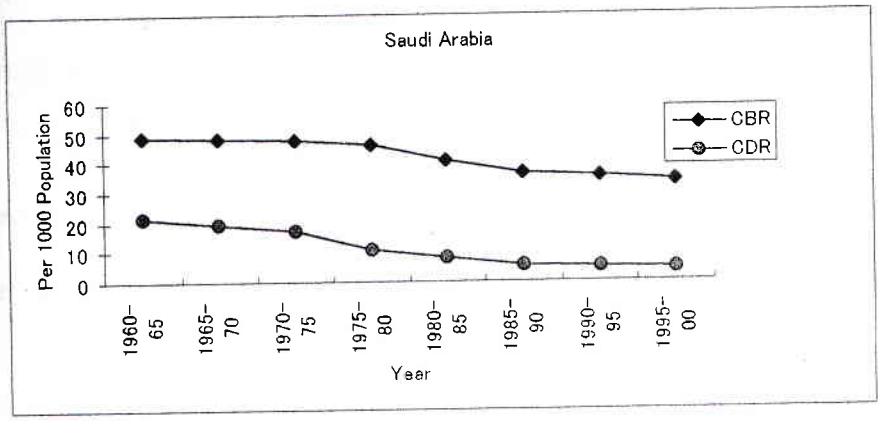


Figure 2.4.5 Saudi Arabia



The sources of data for these figures are from the United Nations, World Population Prospects, 1998 Revision, Vol.1.

2.2 The Characteristic of Fertility Decline

A comparison of fertility in selected Asian countries is shown in terms of total fertility rates in Table 2.1. It indicates the most recent fertility estimates over the period 1960-2000. Among the Eastern Asia countries in this study, fertility had declined into less than 5 since the mid-1960s (except China), and all countries reached to the level of less than 3 in the early 1980s. Republic of Korea and China have experienced relatively low fertility (below replacement level) since late 1980s and early 1990s.

In South-Central Asia, fertility levels had been as high as greater than 5 until early 1990s (except India and Sri Lanka). Fertility in Sri Lanka had declined into less than 3 since late 1980s, and India attained to the level of less than 4 in early 1990s.

In South-Eastern Asia Countries, Brunei, Indonesia, Myanmar and Viet Nam have shown similar fertility pattern. Almost all countries in South East Asia, except Malaysia, Philippines and Viet Nam have reached their fertility to the level of less than 4 in late 1980s. Since early 1970s, official family planning programs were adopted in Indonesia and Thailand. Fertility decline in the Philippines and Malaysia are the slowest among these selected countries. Fertility decline in Thailand is extremely rapid. Thailand represents the most advanced pattern, characterized by below replacement level of fertility rate. In 1976, Singapore was announced that the replacement level of fertility had been achieved.

In Western Asia, fertility in Saudi Arabia has been a very high level, greater than 5 through the studied period. Fertility in Turkey and Kuwait were down to less than 4 in late 1980s. Cyprus has reached to the replacement level fertility in late 1990s.

Table 2.2 provides the indicators of the fertility transition for the most recent period 1970-2000. Per cent changes in fertility levels are analyzed into two parts, as of before and after mid-1980s. Moreover, the maximum and minimum levels over the period 1970-1999 and the reference years when the maximum level was last observed

and when the minimum was attained. The difference between the reference years provides a measure of the length of the period over which fertility has declined.

Table 2.1 Fertility Trends in Selected Asian Countries

Countries	1970-1975	1975-1980	1980-1985	1985-1990	1990-1995	1995-2000	% Changes 1970-1985	% Changes 1985-2000
Eastern Asia								
China	4.86	3.32	2.55	2.46	1.92	1.80	-48	-27
Hong Kong, SAR	2.89	2.32	1.80	1.31	1.32	1.32	-38	1
Japan	2.07	1.81	1.76	1.66	1.49	1.43	-15	-14
Korea, Rep. of	4.28	2.92	2.50	1.80	1.70	1.65	-42	-8
South-Central Asia								
Bangladesh	7.02	6.66	6.44	5.17	3.40	3.11	-8	-40
India	5.43	4.83	4.47	4.07	3.56	3.13	-18	-23
Iran	6.54	6.50	6.80	5.70	4.10	2.80	4	-51
Nepal	6.30	6.20	6.10	5.80	4.90	4.45	-3	-23
Pakistan	7.00	7.00	6.50	6.00	5.51	5.03	-7	-16
Sri Lanka	4.00	3.83	3.25	2.55	2.20	2.10	-19	-18
South-Eastern Asia								
Brunei	5.40	4.40	3.80	3.37	3.09	2.80	-30	-17
Indonesia	5.10	4.68	4.06	3.31	2.90	2.58	-20	-22
Malaysia	5.15	4.16	4.24	4.00	3.62	3.18	-18	-21
Myanmar	5.75	5.30	4.60	3.60	2.70	2.40	-20	-33
Philippines	5.50	4.96	4.74	4.30	4.00	3.62	-14	-16
Singapore	2.62	1.87	1.69	1.71	1.75	1.68	-35	-2
Thailand	4.99	4.25	2.96	2.57	1.94	1.74	-41	-32
Viet Nam	5.85	5.59	4.69	4.22	3.30	2.60	-20	-38
Western Asia								
Cyprus	2.49	2.29	2.45	2.43	2.32	2.03	-2	-16
Israel	3.77	3.41	3.13	3.05	2.92	2.68	-17	-12
Turkey	5.04	4.51	4.10	3.77	2.70	2.50	-19	-34
Kuwait	6.90	5.89	4.87	3.94	3.20	2.89	-29	-27
Saudi Arabia	7.30	7.28	7.28	6.80	6.37	5.80	0	-15

Source: United Nations, World Population Prospects: The 1996 Revision, Vol.1.

Note: Percentage of changes are computed from the above source.

Table 2.2 Measurements on the Fertility Transition During 1970-1999

Countries & TFR level (1999)	Maximum Level 1970-1999	Minimum Level 1970-1999	Reference Year of Max. level	Reference Year of Min. level	Number of years between Max. & Min.	Different level between Max. & Min.
(TFR < 2)						
China	5.8	1.9	1970	1995	25	3.9
Hong Kong, SAR	3.3	1.0	1970	1999	29	2.3
Japan	2.2	1.4	1971	1996	25	0.8
Korea, Rep. of	4.3	1.6	1970	1998	28	2.7
Singapore	3.1	1.5	1970	1998	28	1.6
Thailand	5.4	1.7	1970	1997	27	3.7
(2 ⩽ TFR < 3)						
Iran	6.7	2.7	1970	1998	28	4.0
Sri Lanka	4.3	2.1	1970	1998	28	2.2
Indonesia	5.5	2.6	1970	1996	26	2.9
Israel	3.8	2.4	1972	1995	23	1.4
Turkey	5.3	2.4	1970	1998	28	2.9
Kuwait	7.1	2.7	1970	1999	29	4.4
(3 ⩽ TFR < 4)						
Bangladesh	7.0	3.1	1972	1998	26	3.9
India	5.8	3.1	1970	1996	26	2.7
Malaysia	5.5	3.0	1970	1999	29	2.5
Philippines	6.4	3.5	1970	1999	29	2.9
(TFR ⩾ 4)						
Nepal	6.5	4.3	1978	1999	21	2.2
Pakistan	7.0	4.8	1982	1999	17	2.2
Saudi Arabia	7.3	5.5	1983	1999	16	1.8

Sources: (1) World Bank, World Table, 1991, 1993, 1995

(2) World Bank, World Development Indicators, various issues

Note: Computed from the above sources.

2.3 The Characteristic of Mortality Decline

Three indicators of mortality, namely Crude Death Rate (CDR), Infant Mortality Rates (IMR), and Expectation of Life at Birth (e_0) for both sexes combined are shown in Table 2.3. In general, the overall declines of mortality have been achieved rapidly during the studied period.

In Eastern Asia, CDR and IMR in Hong Kong and Japan are particularly low. The present CDR in China has been the same with the level of Japan in preceding 5 years period and the present IMR in the Republic of Korea has been the same with the level of Hong Kong in 1980-1985 period. Expectation of life at birth in Japan is the highest and all others are around 80 years and 70 years.

In South Central Asia, Sri Lanka and Iran have relatively low levels of CDR and IMR, and around 70 years in e_0. The remaining countries in this study have similar levels and trends in CDR, IMR and e_0.

In South Eastern Asia, CDR and IMR in Singapore, Malaysia and Brunei are very low and e_0 are over 70 years. The high rate of infant mortality is still maintained in Myanmar and the expectation of life at birth has been the lowest among the countries with the same region.

In Western Asia, all countries have the same level of CDR and a relatively high e_0 of nearly 70 years and over 70 years in present situation. But Turkey has remained a moderately high infant mortality rate.

Table 2.3 Some Indicators of Mortality in Selected Asian Countries

Table 2.3.1 Eastern Asia

Countries		1960-1965	1965-1970	1970-1975	1975-1980	1980-1985	1985-1990	1990-1995	1995-2000
China									
	CDR	17.1	10.9	6.3	6.7	6.6	6.7	7.2	6.9
	IMR	121.0	81.0	61.0	52.0	52.0	50.0	46.0	41.0
	e_0	49.5	59.6	63.2	65.3	66.6	67.1	68.4	69.8
Hong Kong SAR									
	CDR	6.2	5.5	5.0	5.0	4.8	4.9	5.7	5.8
	IMR	33.0	23.0	17.0	13.0	10.0	7.0	6.0	6.0
	e_0	67.7	70.0	72	73.6	75.5	76.2	77.4	78.5
Japan									
	CDR	7.3	6.9	6.6	6.1	6.1	6.3	6.9	5.4
	IMR	25.0	16.0	12.0	9.0	7.0	5.0	4.0	4.0
	e_0	69.0	71.1	73.3	75.5	76.9	78.3	79.5	80.0
Korea, Rep. of									
	CDR	12.5	10.4	8.9	7.1	6.5	6.1	6.3	6.2
	IMR	70.0	58.0	38.0	30.0	23.0	14.0	11.0	10.0
	e_0	55.2	57.6	62.6	64.8	65.9	69.6	70.9	72.4

Source: United Nations, World Population Prospects: The 1998 Revision, Vol.1.

Table 2.3.2 South-Central Asia

Countries		1960-1965	1965-1970	1970-1975	1975-1980	1980-1985	1985-1990	1990-1995	1995-2000
Bangladesh									
	CDR	22.0	21.0	20.8	18.9	17.5	13.9	10.8	9.6
	IMR	150.0	140.0	140.0	137.0	128.0	110.0	91.0	79.0
	e_0	40.6	43.3	44.9	46.6	49.7	52.8	55.6	58.1
India									
	CDR	19.4	17.5	15.8	13.9	12.8	11.3	9.9	8.9
	IMR	157.0	145.0	132.0	129.0	106.0	93.0	78.0	72.0
	e_0	45.5	48.0	50.3	52.9	54.9	57.6	60.3	62.2
Iran									
	CDR	19.6	17.0	14.5	11.8	10.5	7.9	6.4	5.5
	IMR	163.0	145.0	122.0	100.0	78.0	53.0	43.0	35.0
	e_0	50.8	53.2	55.9	58.6	61.1	64.7	67.2	69.2
Nepal									
	CDR	25.0	22.8	21.1	18.4	16.2	14.1	12.8	10.9
	IMR	189.0	175.0	160.0	142.0	125.0	109.0	96.0	83.0
	e_0	39.1	41.0	43.0	46.2	49.1	52.0	54.6	57.3
Pakistan									
	CDR	21.6	19.8	17.7	15.4	12.0	10.6	9.1	7.8
	IMR	155.0	145.0	140.0	130.0	115.0	100.0	84.0	74.0
	e_0	45.0	47.8	50.6	53.4	56.1	58.9	61.4	64.0
Sri Lanka									
	CDR	8.5	8.3	8.1	7.1	6.4	5.9	5.8	5.7
	IMR	80.0	71.0	56.0	41.0	30.0	24.0	21.0	18.0
	e_0	63.5	64.2	65.0	66.8	68.4	70.4	71.7	73.1

Source: Same as Table 2.3.1.

Table 2.3.3 South-Eastern Asia

Countries		1960-1965	1965-1970	1970-1975	1975-1980	1980-1985	1985-1990	1990-1995	1995-2000
Brunei									
	CDR	9.0	7.5	5.9	5.4	4.1	3.6	3.2	3.1
	IMR	62.0	61.0	54.0	23.0	14.0	10.0	11.0	10.0
	e_0	63.0	64.9	68.3	69.7	71.6	73.2	74.5	75.5
Indonesia									
	CDR	21.5	19.3	17.3	15.1	11.2	9.4	8.4	7.5
	IMR	133.0	124.0	114.0	105.0	90.0	75.0	59.0	48.0
	e_0	42.5	46.0	49.3	52.8	56.2	60.2	62.6	65.1
Malaysia									
	CDR	13.3	10.4	8.8	7.2	6.0	5.6	5.1	4.8
	IMR	63.0	50.0	42.0	34.0	28.0	17.0	15.0	11.0
	e_0	55.7	59.4	63.0	65.3	68.0	69.5	70.7	72.0
Myanmar									
	CDR	19.5	17.8	16.1	14.9	14.2	11.9	10.3	9.3
	IMR	150.0	136.0	122.0	114.0	106.0	101.0	89.0	79.0
	e_0	45.0	47.4	49.8	51.2	52.2	55.1	57.6	60.1
Philippines									
	CDR	13.1	10.7	10.2	9.0	8.1	7.2	6.5	5.8
	IMR	76.0	72.0	71.0	62.0	60.0	53.0	40.0	35.0
	e_0	54.5	56.2	57.8	59.9	61.9	64.0	66.3	68.3
Singapore									
	CDR	7.1	5.6	5.2	5.1	5.4	5.4	4.9	4.9
	IMR	30.0	24.0	19.0	13.0	8.0	7.0	6.0	5.0
	e_0	65.8	67.9	69.5	70.8	71.8	73.6	75.6	77.1
Thailand									
	CDR	13.4	11.4	9.3	8.3	7.0	6.4	6.1	6.7
	IMR	95.0	84.0	65.0	56.0	44.0	39.0	31.0	29.0
	e_0	53.9	56.7	59.6	61.2	64.9	67.2	68.8	68.8
Viet Nam									
	CDR	21.2	16.7	14.3	11.4	11.1	9.5	7.9	6.8
	IMR	130.0	118.0	106.0	82.0	63.0	47.0	45.0	38.0
	e_0	45.4	47.9	50.3	55.8	58.8	62.6	65.1	67.4

Source: Same as Table 2.3.1

Table 2.3.4 Western Asia

Countries		1960-1965	1965-1970	1970-1975	1975-1980	1980-1985	1985-1990	1990-1995	1995-2000
Cyprus									
	CDR	10.5	10.0	9.7	8.7	8.6	8.9	7.7	7.3
	IMR	29.0	29.0	29.0	20.0	16.0	11.0	9.0	8.0
	e_0	69.2	70.3	71.4	73.7	75.0	76.1	76.6	77.8
Israel									
	CDR	6.0	6.7	7.1	6.8	6.8	6.6	6.5	6.2
	IMR	29.0	25.0	23.0	18.0	14.0	11.0	9.0	8.0
	e_0	69.4	70.8	71.6	73.1	74.5	75.6	76.7	77.8
Turkey									
	CDR	16.4	13.5	11.6	10.2	9.4	8.4	6.9	6.4
	IMR	176.0	153.0	138.0	120.0	102.0	81.0	54.0	45.0
	e_0	52.1	54.9	57.9	60.3	62.3	64.2	67.2	69.0
Kuwait									
	CDR	9.0	6.3	5.0	4.2	3.2	2.4	2.1	2.2
	IMR	77.0	55.0	43.0	34.0	22.0	16.0	14.0	12.0
	e_0	60.8	64.4	67.3	69.6	71.6	74.0	74.8	75.9
Saudi Arabia									
	CDR	21.3	19.2	16.9	10.7	7.9	5.4	4.7	4.1
	IMR	160.0	140.0	105.0	75.0	58.0	37.0	29.0	23.0
	e_0	45.9	49.9	53.9	58.8	62.6	67.5	69.6	71.4

Source: Same as Table 2.3.1

In comparative examination of mortality patterns in selected Asian countries is provided in Table 2.4. These comparisons are made for the Asian four regions from 1980-1985 to 1995-2000.

In Eastern Asian region, CDR in Hong Kong and China have increased 21 per cent and 5 per cent, but IMR have decreased 40 per cent and 21 per cent respectively. The rate of decline in IMR for the Republic of Korea was significantly high and expectation of life at birth extended 6.5 years.

In South Central Asia region, almost all of the high mortality countries have high rates of decline that ranged from 30 to 48 per cent in CDR and 32 to 55 per cent in IMR. The extended years of e_0 were between 7.3 years to 8.4 years.

In South Eastern Asia region, the increase years of e_0 during the studied period were from 4 to 9 years. Infant mortality decline in Myanmar has been the slowest among the selected countries. However, the rate of decline in CDR was relatively high which was compared reasonably well with other countries. IMR in Malaysia decreased significantly with more than 61 per cent in the last two decades. Increase rate of expectation of life at birth in Indonesia is the highest, compared with other seven countries.

In Western Asia region, the rates of decline in IMR were relatively high with the range from 43 to 60 per cent. In Saudi Arabia, a rapid decline of CDR was found and the extended years of e_0 was the longest among the same region.

Table 2.4 Comparison of Mortality Decline in Selected Asian Countries

Countries	Rates of Decrease (%) 1980-1985 to 1995-2000		Rates of Increase (%) 1980-1985 to 1995-2000	Increase Years of
	CDR	IMR	e_0	e_0
East Asia				
China	5	-21	5	3.2
Hong Kong, SAR	21	-40	4	3.0
Japan	-11	-43	4	3.1
Korea, Rep. of	-5	-57	10	6.5
South-Central Asia				
Bangladesh	-45	-38	17	8.4
India	-30	-32	13	7.3
Iran	-48	-55	13	8.1
Nepal	-33	-34	17	8.2
Pakistan	-35	-36	14	7.9
Sri Lanka	-11	-40	7	4.7
South-East Asia				
Brunei	-24	-29	5	3.9
Indonesia	-33	-47	16	8.9
Malaysia	-20	-61	6	4.0
Myanmar	-35	-25	15	7.9
Philippines	-28	-42	10	6.4
Singapore	-9	-38	7	5.3
Thailand	-4	-34	6	3.9
Viet Nam	-39	-40	15	8.6
West Asia				
Cyprus	-15	-50	4	2.8
Israel	-9	-43	4	3.3
Turkey	-32	-56	11	6.7
Kuwait	-31	-45	6	4.3
Saudi Arabia	-48	-60	14	8.8

Note: Computed from Table 2.3.

2.4 The Extent of the Completion of Demographic Transition

Comparing the current TFR and life expectancy can make an indication of the extent to which a country has completed various stages of demographic transition. According to the UNICEF, ***The State of World's Children 2001***, the highest approximate level of TFR is 7.1 (Somalia) and the lowest is 1.1 (Spain), and the highest life expectancy is 80 (Japan) and the lowest is 39 (Sierra Leone) in 1999. For low mortality countries, the replacement level of fertility is defined as about 2.1. The completion of demographic transition involves changes in TFR between the maximum rate and replacement level, and life expectancy with respect to the limit between maximum and minimum value. A simple average of the differences between the current and maximum rate of TFR as well as the maximum value e_0 expressed as a percentage of the total change. The following formula is computed for the extent of the completion of demographic transition.

$$\frac{1}{2}\{(TFR_{max}-TFR_{current}) / (TFR_{max}-TFR_{replace})\} + \frac{1}{2}\{1-(e_{0max}-e_{0current}) / (e_{0max}-e_{0min})\}$$

Where

TFR_{max} refers to the maximum rate of TFR

$TFR_{current}$ refers to the current rate of TFR

$TFR_{replace}$ refers to the replacement level fertility

e_{0max} refers to the maximum value of expectation of life at birth

e_{0min} refers to the minimum value of expectation of life at birth

$e_{0current}$ refers to the current value of expectation of life at birth

Then the equation will be

$$\frac{1}{2}\{(7.1 - TFR) / 5\} + \frac{1}{2}\{1-(80 - e_0) / 41\}.$$

This could be used as a measure of the extent of the completion of demographic transition. This measure has some modifications from Lee-Jay Cho and Janis Y. Togoshi (1984). In this study, the average change in TFR is computed from the

difference between the maximum value and replacement level. But in Lee and Togoshi (1984), this change of TFR is computed from the difference between maximum and minimum values.

Table 2.5 shows the extent of the completion of demographic transition for selected Asian countries. The value over 100 per cent means that the country had already finished it's fertility transition and reached to the below replacement level fertility. It means that these countries have been continuing to the second demographic transition.

Table 2.5 Extent of the Completion of Demographic Transition

Countries	Population parameters(1999)			Extent of Completion (%) (1)
	Total Population (million)	TFR	e_0	
Eastern Asia				
China	1264.8	1.8	70	91
Hong Kong, SAR	6.7	1.3	79	106
Japan	126.8	1.4	80	107
Korea, Rep. Of	46.4	2.0	73	92
South-Central Asia				
Bangladesh	134.6	3.0	59	65
India	992.7	3.0	63	70
Iran	69.2	2.7	70	82
Nepal	22.5	4.3	58	51
Pakistan	137.6	4.8	65	55
Sri Lanka	18.7	2.1	74	93
South-Eastern Asia				
Brunei	22.5	2.7	76	89
Indonesia	209.3	2.5	66	79
Malaysia	21.8	3.0	72	81
Myanmar	47.1	2.3	61	75
Philippines	74.2	3.4	69	74
Singapore	3.9	1.7	78	102
Thailand	62.0	1.7	69	91
Viet Nam	77.1	2.5	68	81
Western Asia				
Cyprus	0.8	2.0	78	99
Israel	6.1	2.6	78	93
Turkey	65.7	2.4	70	85
Kuwait	1.8	2.8	76	88
Saudi Arabia	19.6	5.6	72	55

Source: UNICEF, The State of the World's Children 2001.

Note: (1) Computed from the above source by using the following formula

$$[\ \tfrac{1}{2}\{(7.1 - TFR)/5\} + \tfrac{1}{2}\{1-(80 - e_0)/41\}] * 100.$$

CHAPTER III

Recent Fertility Transition in Asia: An Analysis Using the Hutterites Indices

Contents

CHAPTER III

Recent Fertility Transition in Asia: An Analysis Using the Hutterites Indices

The fertility transition had started in Europe since the first half of the 19th century. In Asia, the fertility decline began first in Japan. Since 1980s, almost all East Asia countries have already completed their transition and reached to the below replacement level in fertility. During the same period, significant changes have occurred in the most part of South East Asia, particularly in Singapore and Thailand.

This study will be described and explained the fertility decline and then examined the age and marriage patterns of fertility to see how the patterns of fertility could be measured or defined into a theory of fertility transition. To examine the causes of fertility decline, Coale's fertility and marriage indices (Hutterites Indices) were computed for the female aged 15 and over.

3.1 Theories Related to the Fertility Transition

Several theories concern with fertility declines had been based largely on the western experiences. Major theories and contexts that with partial or full emphasis on fertility declines were: Demographic Transition Theory, Multiphasic Response Theory, Intergenerational Wealth Flows Theory, Demand Theories, Economic Theories of Fertility Decline, Innovation and Adjustment Process, Ideational Theory, Gender Equity Theory, Post-materialism.

Fertility transition theory is the classic ***demographic transition theory***. Demographic transition theory is the theory that societies progress from a pre-modern regime of high fertility and high mortality to a post-modern regime of low fertility and

low mortality (Kirk 1996). The basic concept of demographic transition theory has been outlined first by Thompson (1929), Landry (1934), Carr-Saunders (1936), and Davis (1945) and then subsequently developed by Notestein (1945). The theory states that according to the classification of population specified by different combinations of fertility and mortality levels, the standards of living rise with the industrialization. As a consequence, improvement of health conditions leads to the rapid decline in death rates (Notestein 1953, Coale & Hoover 1958).

Notestein (1953) expressed that urbanization and industrialization caused the fertility declines, and these changes initially produced a decline in mortality. Falling death rates induced to have many births for a family. Urban life stimulated the family in many functions, such as production, consumption, recreation, and education. With a rapid developing technology, new skills were needed and opportunities for individual advancement arose. Education became increasingly important. As a consequence, the cost of rearing a child has grown. Therefore, the possibilities for economic contributions by children have declined. Moreover, women found new independence from household obligations and new economic roles less compatible with childbearing.

Davis's ***theory of the multiphasic response*** was the first attempt to explain transition theory from the fertility side. Davis elaborated it by using the data on postponement of marriage, adoption of contraception and resort to abortion, and out-migration. Mortality decline and survival of too many children begin to experience the economic stress to a family and that provides the central motivation for reducing family size, but does not lead to birth limitation (Davis 1963).

Caldwell developed the ***theory of wealth flows*** to explain the fertility decline as follows:

In the pre-transitional society, high fertility has accompanied with a wealth flow from the younger to the older generation. In the post-transitional market economy, the

direction of the wealth flow has changed to the opposite side and fertility will start to decline. Mass education, child labour laws, economic structure changes and culture forces have changed the direction of the intergenerational wealth flows, since the position of children change from a net gain to a net loss for their parents (Caldwell 1978,1982).

Because of the very different types of extended family relationship, Caldwell theory may apply for Sub-Saharan Africa but may not apply well in many parts of East Asia. In those regions, the extent of family patterns changes from extended to nuclear type were very different during the period of rapid fertility decline (Lesthaeghe 1980, Freedman 1979, Thornton & Fricke 1987). The Japanese fertility transition took place in a very different context, because the extended family system was still predominant and the status of married women was low (McDonald 1993).

Becker stated the *demand and rational choice theory* as follows:

In deciding to have a child, people make the considered calculation that the benefits of an additional child outweigh the costs. The framework is the maximization of utility: if greater utility can be obtained from an alternative to an additional child, then that alternative will be chosen. Decline in fertility thus implies that the relative price of a child has increased, couple incomes have fallen or there has been a change in the shape of the couple's utility function for children versus other goods (Becker 1981). The theory explains the decision-making processes of individual couples, and couples will choose the number of children that can provide them the greatest satisfaction levels.

Easterlin's framework elaborated the *microeconomic fertility model* that contained a set of four constraints such as budget, a household's technology, a birth production function, and an infant mortality function. It explained fertility in terms of three proximate determinants: the supply of children (the number of children that parents would bear without family limitation), the demand for children (the number of

surviving children that parents would like to have), and the cost of fertility regulation (psychic, social and monetary costs). On the basis of demand theory, the microeconomic models that using 'taste' and 'supply' variables have been useful for thinking about fertility decline (Easterlin 1975, 1978; Easterlin & Crimmins 1985, United Nations 1990). Analyses focus on demand, supply, regulation costs or some combination of that three can explain well the theory of fertility decline (Carlsson 1966, Freedman 1975, Knodel & van de Walle 1979, Caldwell 1983, Ohbuchi 1988a, Harada 1999).

William P. Butz and Michael P. Ward (1979) made the new home economics model of fertility behavior. The model lies in clarifying the response of fertility into changes in income and prices, by direct connect on fertility behavior with labor market. Results in the application of Butz and Ward model and some modification of it to United States, Great Britain and Japan led to desired results (Butz & Ward 1979, Ermisch 1979, Osawa 1985, Ogawa & Mason 1986, Ohbuchi 1988b). The model basically accepts the positive income effect on fertility. Therefore, in the household with a wife not in employment, husband's income growth will lead to higher fertility. On the other hand, in the household with an employed wife, a rise in female wages will increase an opportunity cost of wife's time and hence a shadow price of children, and consequently it will have a suppressive effect on fertility. Using both Butz & Ward type and non-Butz & Ward type models, Ohbuchi (1988b) could presented a quite successful result to explain the fertility changes in post-war Japan.

Another microeconomic framework of three proximate determinants such as the relative costs of children versus other goods, the couple's income, and their preferences for children versus competing forms of consumption, which affecting couples' fertility choices was developed by G. S. Becker and T. W. Schultz (Becker 1960, Schultz 1973).

Considering fertility decline in *innovation or adjustment process* was a well-known article of Gosta Carlsson that based on the historical experience of Swedish fertility. It was an analysis of fertility decline that focused on the adjustment as the best process, i. e., the adjustment process that occurs when rising supply due to declining infant and child mortality will push households to the fertility control threshold, rather than arising one's innovation due to lower costs of regulation (Carlsson 1966). However, Knodel's review on the historical and post- Second World War fertility declines stressed the importance of innovation, since the speed and spread of fertility declines have experienced from the diffusion of a new behavioral norm. At last, Knodel concluded that both innovation and adjustment play an important role in fertility decline, innovation is necessary in the initial stage and adjustment requires in the later stage (Knodel 1977, McDonald 1993).

Ideational theory explains cultural factors, especially in the diffusion of ideas as the primary determinants of fertility declines. Cleland expressed that fertility change is seen as resulting from the spread of new aspirations, or new attitudes towards the family formation or birth control, rather than from the changes in the economic roles of family units or of children (Cleland 1985). Both culture and education are important in accepting new ideas for individual reproductive behavior (Cleland and Wilson 1987). Nevertheless, new ideas of using contraception can spread rapidly within culturally homogeneous population, the local community in pre-modern society, kin, friends, and neighbors in modern societies. This will lead to a rapid decline in marital fertility (Watkins 1987, 1990; McDonald 1993).

However, ideational theories cannot explain completely in fertility declines. Kono explained the fertility transition of Asian population in Confucianism, it combines with both structural and ideational elements. In the Japanese society, serious competition needs for every corner of life, since the country's resource is scarce and life

chances are narrow. This has led the people to overemphasize on educational attainment, hard work, emerging of mass-consumption culture for their advanced society (Kono 1986).

In 1994 International Conference on Population and Development, gender equity placed on a major discussion, especially for less developed countries to have an achievement of low fertility. ***Gender equity theory*** of low fertility, the role of gender equity in social institutions and fertility transition are introduced in the articles of McDonald. The trust of gender equity theory is that very low levels of fertility in developed countries today can be explained in terms of incoherence between the levels of gender equity applying in different social institutions (McDonald 2000a, 2000b). Chesnais and Andersen expressed that if women obtain the opportunities nearly equivalent to men in education and market employment, but these opportunities are severely curtailed by having children, then, women will restrict the number of children. They have to decide to limit the fertility at a precariously low in long-term level (Chesnais 1996, Esping-Andersen 1996).

Post-materialism is associated with second demographic transition theory. In any society, women with more highly educated, less religious, more urban or more liberal in their attitudes have lower fertility than the less educated, the more religious, more rural and the more conservative. Inglehart's measurement of post-materialism in the economic-political domain (Inglehart 1970,1990) shows that if post-materialist expects more individual recognition and satisfaction in matters related to private life, the evaluations of returns become a fundamental issue. If returns are unsatisfactory, reversibility should be an open possibility. The results of the Inglehart's materialist versus post-materialist measurement reported in Lethaeghe and Moors's Study were that the proportion of post-materialists was high in unmarried singles who live

separately with their parents, and cohabitants. But it was low in married peoples (Lesthaeghe & Moors 1996, van de Kaa 1997).

From the historical experience, Knodel and van de Walle summarized on fertility decline as follows: (Knodel & van de Walle 1979).

(1) Fertility decline took place under a wide variety of social, economic, and demographic conditions.

(2) Family limitation was not practiced (and was probably unknown) among broad sections of the population before the decline in fertility began, even though a substantial proportion of births may have been unwanted.

(3) Increases in the practice of family planning and the decline of marital fertility were essentially irreversible processes, once under way.

(4) Cultural settings influence the onset and spread of fertility decline independently of socio-economic conditions.

According to the European Fertility Project, Coale (1973) concluded that three preconditions were necessary for declines in marital fertility.

(1) Fertility must be within the calculus of conscious choice.

(2) Effective techniques of fertility reduction must be known and available.

(3) Reduced fertility must be perceived to be advantageous.

Dudley Kirk stated a widely accepted modification of fertility transition theory. It was that from the European Fertility Project's finding, high level of socio-economic development was often accompanied by fertility transition, transition is not a necessary pre-condition for development. In less developed countries, the introduction of an effective family planning program may contribute to fertility decline even at very low levels of modernization (Kirk, 1996).

3.2 An Analysis Using the Hutterites Indices

Hutterites indices were based on the standard fertility rates, which were measured on Hutterites women during the period from 1921 to 1930. The Hutterites are a Protestant religious sect (Anabaptist) founded in the 16th century. To avoid religious persecution, they moved from Western Europe to Russia in the 18th century and then migrated to the North-Central United States and South Central Canada in the 19th century. Hutterites fertility is high because Hutterites women do not practicing contraception or abortion, and they breastfeed their infants for a few months (Coale and Treadway 1986). The age specific fertility rates of married Hutterites women represent the maximum fertility reliably observed for any population; the rates are given in Table 3.1.

Table 3.1 Hutterites Fertility Rates

Age Group (i)	1	2	3	4	5	6	7
Age	15-19	20-24	25-29	30-34	35-39	40-44	45-49
Births per women	0.300	0.550	0.502	0.447	0.406	0.222	0.061

Source: Coale & Watkins (1986).

3.2.1 Data Sources and Its Limitations

The variables described in this study are defined as follows:

Age: Age is defined as age at last birthday, that is, the difference between the date of birth and the date of the occurrence of the event, expressed in completed solar years. The age classification used in this study is the following: 15-19 years, 5-year age groups through 45-49 years.

Marital status: Marital status is defined as the personal status of each individual in relation to the marriage laws or customs of the country. The Marital status used in

this study is classified as follows: single (never married), married, widowed (but not remarried) and divorced (but not remarried). Additional classifications appear for certain countries or areas when separated and marital status unknown. Unless otherwise specified, when the categories of "consensual married" and "separated" are not shown separately, it can be assumed that persons in these categories are shown as "married".

Legitimate birth: Legitimate refers to persons born of parents who were married at time of birth in accordance with the laws of the country or area. Births of unknown legitimacy status are assumed to be illegitimate.

The main sources of population statistics in this study are the following:

(1) Demographic Yearbook

(2) U.S. Bureau of the Census, International Data Base

(3) Population Censuses of Japan

(4) Population Changes and Fertility Surveys, 1991, Myanmar

(5) Fertility and Reproductive Health Survey, 1997, Myanmar

There is considerable diversity in the quality and quantity of the statistical information available for the early period. However, there has been increasing recognition of the need for uniformity in the collection and compilation of statistical information, and with few exceptions, the quality of the information is sufficiently good to be accepted.

Statistics on live births and legitimate live births by age of mother, and population by marital status, age and sex are subject to the same qualifications as have been set forth for vital statistics. The reliability of the data is an important factor in considering the limitations. Because of these statistics are classified according to age, they are subject to the limitations with respect to the accuracy of age reporting.

To measure the accuracy of data by age on the evidence of irregularities in 5-year groups, an index known as Whipple's Index (Pressat 1985), or the index of

concentration was devised for preparation in the Demographic Yearbook. The results of Whipple Index would vary between a minimum of 100, representing no concentration at all, and a maximum of 500, if no returns were recorded with any digits other than the terminal digits 5 and 0. Although Whipple Index measures only the effects of preferences for ages ending in 5 and 0, it can be assumed that such digit preference is usually connected with other sources of inaccuracy in age statements. Thus, the index can be accepted as a fair measure of the general reliability of the age distribution.

Another two criterions of reliable estimates are "the nature of base data" (Population census, Sample survey representing the majority of the population, Provided the total population is under 1000 persons those obtained by annual administrative counting of population) and "the method of time adjustment" (By the population register method, By the balancing equation method).

The completeness estimates reported for registered vital statistics in the Demographic Yearbook were prepared on the basis of the demographic analysis, dual record checks or some other specified method.

The classification of completeness and accuracy of vital statistics were obtained from the national statistical offices of the countries' or areas' own evaluation. It has been assumed that national statistical offices are in the best position to judge the quality of their data, and their evaluations have been accepted at face value.

The accuracy and quality of the data among the countries or area is indicated as follows:

Countries	Year	Age Accuracy	Vital Statistics Quality Categories
Brunei	1981	Reliable	+C
	1971	Reliable	+C
	1960	Reliable	C

Cyprus	1992	Reliable	C
	1982	Less Reliable	...
	1976	Less Reliable	...
	1973	Less Reliable	...
	1960	Less Reliable	...
Hong Kong	1996	Reliable	C
	1991	Reliable	C
	1981	Reliable	C
	1971	Reliable	C
	1966	Reliable	C
Iran	1991	Reliable	U
	1986	Reliable	U
	1976	Reliable	U
	1966	Reliable	U
Israel	1987	Reliable	C
	1972	Reliable	C
	1961	Reliable	C
Japan	1995	Reliable	C
	1990	Reliable	C
	1985	Reliable	C
	1975	Reliable	C
	1965	Reliable	C
Korea, Rep. Of	1995	Reliable	...
	1990	Reliable	...
	1985	Reliable	U
	1975	Less Reliable	U
	1960	Reliable	U
Malaysia	1991	Reliable	C

	1980	Reliable	C
	1970	Reliable	C
Myanmar	1997	Reliable	C
	1991	Reliable	C
	1983	Reliable	...
	1973	Less Reliable	...
Philippines	1990	Less Reliable	U
	1980	Less Reliable	U
	1970	Less Reliable	U
	1960	Less Reliable	U
Singapore	1990	Reliable	C
	1980	Reliable	C
	1970	Reliable	C
	1957	Reliable	C
Sri Lanka	1981	Reliable	+C
	1971	Reliable	+C
	1963	Reliable	C
Thailand	1990	Less Reliable	+U
	1980	Less Reliable	+U
	1970	Less Reliable	+U
	1960	Less Reliable	U

Note: C Data estimated to be virtually complete, i.e., representing at least 90 per cent of the events occurring each year.

U Data estimated to be incomplete, i.e., representing less than 90 per cent of the events occurring each year.

... Data for which no specific information is available regarding completeness.

+ Data tabulated by date of registration rather than occurrence.

3.2.2 Computation of the Hutterites Indices

Four indices developed at Princeton and that were extensively used in the European fertility projects (Coale and Treadway 1986) are used in this study. The analysis made here will be measured overall fertility (I_f) and its major components: marital fertility (I_g), proportion married (I_m), and non-marital fertility (I_h).

The indices are calculated as follow:

$$(I_f) = B / \sum_{i=1}^{7} H_i W_i$$

$$(I_g) = LB / \sum_{i=1}^{7} H_i M_i$$

$$(I_m) = \sum_{i=1}^{7} H_i M_i / \sum_{i=1}^{7} H_i W_i$$

$$(I_h) = IB / \sum_{i=1}^{7} H_i U_i$$

Where H_i represents the marital fertility rates of the Hutterites

W_i represents the number of women in age group i

M_i represents the number of currently married women in age group i

$U_i = (W_i - M_i)$ represents the number of unmarried women in age group i

B represents the number of live births during the considered year

LB represents the number of legitimate births during the considered year

IB represents the number of illegitimate births during the considered year

i represents the five-year age groups of women aged 15-19, 20-24, and so on

(i=1,2,……,7)

Four indices are related by an identity

$$I_f = (I_g \cdot I_m) + (1 - I_m) \cdot I_h$$

The product ($I_g \cdot I_m$) expresses the contribution of married women to attain the maximum fertility in the population; $(1 - I_m) \cdot I_h$ expresses the contribution of non-

married women's fertility; the resultant value of I_f expresses how closely the women of childbearing age approach the maximum potential fertility.

Where the case is considered as illegitimacy is small, I_f is closely approximated by $I_g \cdot I_m$.

$$I_f \simeq I_g \cdot I_m$$

The study below has assumed as all fertility occurs within marriage. Then, overall fertility (I_f) is simply the product of married fertility (I_g) and the proportion of women married (I_m).

$$I_f = I_g \cdot I_m$$

The regional analysis that used only three of the Coale's indices (Hutterites Indices) and their values are presented in Table 3.2. Because of the culture and customs of the Asian people, there were no significant number of illegitimate births (Refer to Table 3.3) and I_h was set to be zero. Depend on the availability of data, studied years are different from countries.

In general, each index will lie between 0 and 1. The indices I_f, I_g, I_h would be zero if the population of age groups (aged 15-49) had experienced no childbearing and that would be one if the rate of childbearing were the highest ever reliably recorded (equivalent to that of the Hutterites). I_m would be zero if no one in the childbearing age was married, and it would be one if all were married.

Table 3. 2 Values of the Three of Coale's Indices by Region in Asia

Countries	Year	I_f	Rates of Decline (%)	I_g	Rates of Decline (%)	I_m	Rates of Decline (%)
Eastern Asia							
Hong Kong,	1996	0.092	(-0.47)	0.174	(-0.48)	0.529	(0.01)
S.A.R	1981	0.174	(-0.31)	0.332	(-0.25)	0.523	(-0.08)
	1971	0.250	(-0.27)	0.441	(-0.15)	0.567	(-0.13)
	1966	0.341		0.521		0.655	
Japan	1995	0.110	(-0.16)	0.226	(0.02)	0.488	(-0.18)
	1985	0.131	(-0.22)	0.221	(-0.16)	0.594	(-0.08)
	1975	0.169	(-0.03)	0.262	(-0.11)	0.646	(0.09)
	1965	0.174		0.295		0.590	
Korea, Rep. of	1995	0.146	(-0.03)	0.247	(-0.03)	0.591	(-0.002)
	1985	0.150	(-0.41)	0.254	(-0.40)	0.592	(-0.02)
	1975	0.255	(-0.37)	0.424	(-0.26)	0.602	(-0.15)
	1960	0.406		0.571		0.711	
South-Central Asia							
Iran	1991	0.396	(-0.20)	0.547	(-0.17)	0.725	(-0.03)
	1986	0.493	(-0.01)	0.659	(0.02)	0.748	(-0.03)
	1976	0.499	(-0.06)	0.646	(-0.01)	0.772	(-0.07)
	1966	0.534		0.639		0.834	
Sri Lanka	1981	0.286	(-0.22)	0.556	(-0.18)	0.514	(-0.05)
	1971	0.368	(-0.21)	0.681	(-0.23)	0.541	(0.02)
	1963	0.469		0.882		0.532	

Table 3.2 (Continued)

Countries	Year	I_f	Rates of Decline (%)	I_g	Rates of Decline (%)	I_m	Rates of Decline (%)
South-Eastern Asia							
Brunei	1981	0.316	(-0.32)	0.530	(-0.28)	0.595	(-0.05)
	1971	0.462	(-0.25)	0.740	(-0.09)	0.623	(-0.18)
	1960	0.615		0.809		0.760	
Malaysia	1991	0.292	(-0.06)	0.488	(0.07)	0.598	(-0.002)
	1980	0.274	(-0.31)	0.458	(-0.25)	0.600	(-0.08)
	1970	0.395		0.609		0.649	
Myanmar	1997	0.193	(-0.17)	0.387	(0.01)	0.499	(-0.18)
	1983	0.233	(-0.24)	0.382	(-0.19)	0.609	(-0.07)
	1973	0.308		0.471		0.654	
Philippines	1990	0.280	(-0.28)	0.485	(-0.27)	0.577	(-0.02)
	1980	0.387	(0.29)	0.662	(0.31)	0.584	(-0.01)
	1970	0.299	(-0.10)	0.506	(-0.06)	0.591	(-0.05)
	1960	0.334		0.538		0.620	
Singapore	1990	0.168	(0.12)	0.307	(0.03)	0.548	(0.09)
	1980	0.150	(-0.40)	0.299	(-0.35)	0.503	(-0.08)
	1970	0.252	(-0.52)	0.461	(-0.38)	0.547	(-0.23)
	1957	0.526		0.743		0.707	
Thailand	1990	0.161	(-0.35)	0.264	(-0.36)	0.609	(0.01)
	1980	0.248	(-0.36)	0.411	(-0.32)	0.603	(-0.07)
	1970	0.387	(0.02)	0.600	(0.02)	0.645	(-0.0001)
	1960	0.379		0.587		0.645	

Table 3.2 (Contined)

Countries	Year	I_f	Rates of Decline (%)	I_g	Rates of Decline (%)	I_m	Rates of Decline (%)
Western Asia							
Cyprus	1992	0.262	(-0.02)	0.382	(-0.08)	0.684	(0.06)
	1982	0.267	(0.35)	0.414	(0.23)	0.645	(0.11)
	1973	0.197	(-0.31)	0.338	(-0.22)	0.584	(-0.12)
	1960	0.285		0.430		0.661	
Israel	1987	0.249	(-0.19)	0.377	(-0.21)	0.661	(0.03)
	1972	0.306	(0.01)	0.477	(0.15)	0.642	(-0.12)
	1961	0.303		0.414		0.731	

Data sources: 1. United Nations, *Demographic Yearbook*, various issues.

2. Government of Japan (1998), *Population Census, 1995*, "Population by Sex, Age and Marital Status"
3. U.S. Census Bureau, International Data Base (IDB) http://www.census.gov/cgi-bin/ipc/idbsprd
4. Union of Myanmar (1995), *Population Changes and Fertility Surveys, 1991*. Ministry of Immigration and Population, Myanmar.
5. Union of Myanmar/ UNFPA (1999), *Fertility and Reproductive Health Survey, 1997*. Ministry of Immigration and Population, Union of Myanmar/ UNFPA.

Note: (1) Computed from the above sources.

(2) In this table, live-births by age of mother at under15, over 50 and unknown are included.

In the analysis below (Table 3.4), each of the Coale's indices has been classified into three components: the early childbearing ages of 15-19, the prime childbearing ages of 20-39, and the late childbearing ages of 40-49. Thus, the indices with the additional subscripts i=1,2 and 3 (eg. I_{f1}, I_{f2}, I_{f3}) represent the index of overall fertility of women aged 15-19, 20-39, and 40-49 respectively. These disaggregated indices are more insightful and better in the examination of the fertility transition rather than the overall

summary indices alone. In general, the disaggregated indices will also lie between zero and one. A value greater than one for either of the two fertility indices $I_{f(i)}$ or $I_{g(i)}$ would mean that the observed fertility is above that of the Hutterites, whereas a value of zero means no childbearing by the given age group, and a value of 0.5 implies fertility is half of the Hutterites schedule. Similarly, the disaggregated marriage index $I_{m(i)}$ can be interpreted in exactly the same way. A value of zero means there are no married women by the given age group, and a value of one means all women in the age group are married (Leete 1996).

Table 3.3 Values of the All Fertility and Marriage Indices For Selected Asian Countries

Countries	Year	$I_{fertility}$	I_g	I_m	I_h
Hong Kong, S.A.R	1981	0.174	0.322	0.523	0.012
	1976	0.203	0.362	0.532	0.022
	1971	0.250	0.440	0.567	0.000
Israel	1983	0.272	0.418	0.643	0.008
	1972	0.306	0.474	0.642	0.002
Japan	1985	0.131	0.221	0.594	0.001
	1980	0.143	0.225	0.634	0.001
	1975	0.169	0.260	0.646	0.002
	1970	0.174	0.286	0.604	0.003
	1965	0.174	0.294	0.590	0.001
Philippines	1980	0.387	0.649	0.584	0.019
	1975	0.325	0.547	0.584	0.013
	1970	0.299	0.500	0.591	0.008
	1960	0.334	0.537	0.620	0.002

Note & Sources: See Table 3.2.

Table 3.4 Values of Fertility and Marriage Indices by Age Groups

Countries	Year	I_{f1}	I_{g1}	I_{m1}	I_{f2}	I_{g2}	I_{m2}	I_{f3}	I_{g3}	I_{m3}
			(15-19)			(20-39)			(40-49)	
Cyprus	1992	0.11	1.51	0.07	0.25	0.34	0.75	0.03	0.03	0.88
	1982	0.15	1.84	0.08	0.31	0.43	0.71	0.02	0.03	0.88
	1973	0.06	1.60	0.04	0.25	0.37	0.67	0.04	0.04	0.90
	1960	0.11	1.14	0.09	0.33	0.45	0.74	0.14	0.16	0.86
Hong Kong,	1996	0.02	1.16	0.02	0.11	0.20	0.54	0.02	0.02	0.85
S.A.R	1981	0.04	1.17	0.03	0.21	0.36	0.59	0.03	0.03	0.92
	1971	0.05	1.89	0.03	0.31	0.46	0.66	0.11	0.12	0.92
Israel	1987	0.07	1.22	0.06	0.30	0.40	0.75	0.07	0.07	0.95
	1972	0.14	1.61	0.08	0.37	0.50	0.74	0.10	0.11	0.90
	1961	0.16	1.49	0.11	0.36	0.43	0.83	0.11	0.13	0.89
Japan	1995	0.01	1.98	0.01	0.14	0.28	0.50	0.01	0.01	0.86
	1985	0.01	1.59	0.01	0.17	0.26	0.64	0.01	0.01	0.88
	1975	0.01	1.02	0.01	0.21	0.30	0.70	0.01	0.01	0.88
	1965	0.01	0.85	0.01	0.22	0.33	0.68	0.01	0.01	0.84
Korea,	1995	0.01	1.46	0.01	0.18	0.28	0.64	0.01	0.01	0.89
Rep. Of	1985	0.03	3.94	0.01	0.19	0.28	0.67	0.01	0.01	0.89
	1975	0.05	1.75	0.03	0.33	0.45	0.72	0.08	0.09	0.87
Malaysia	1991	0.05	0.73	0.07	0.27	0.40	0.67	0.13	0.15	0.87
	1980	0.10	1.02	0.10	0.33	0.47	0.70	0.15	0.17	0.86
	1970	0.16	0.98	0.17	0.39	0.52	0.76	0.21	0.25	0.85
Philippines	1990	0.11	1.12	0.10	0.32	0.49	0.66	0.18	0.22	0.85
	1980	0.16	1.34	0.12	0.45	0.66	0.68	0.28	0.33	0.87
	1970	0.12	1.12	0.11	0.35	0.50	0.70	0.25	0.29	0.85
	1960	0.10	0.80	0.12	0.31	0.42	0.72	0.22	0.27	0.83

Table 3.4 (Continued)

Countries	Year	I_{f1}	I_{g1} (15-19)	I_{m1}	I_{f2}	I_{g2} (20-39)	I_{m2}	I_{f3}	I_{g3} (40-49)	I_{m3}
Singapore	1990	0.03	2.38	0.01	0.20	0.34	0.59	0.03	0.04	0.83
	1980	0.04	1.79	0.02	0.18	0.32	0.57	0.02	0.03	0.86
	1970	0.09	1.81	0.05	0.29	0.45	0.65	0.11	0.13	0.86
	1957	0.26	1.31	0.20	0.60	0.74	0.81	0.33	0.43	0.78
Sri Lanka	1981	0.13	1.55	0.08	0.33	0.57	0.58	0.11	0.15	0.76
	1963	0.17	1.54	0.11	0.47	0.77	0.61	0.19	0.28	0.67
Thailand	1990	0.15	1.08	0.14	0.17	0.25	0.68	0.06	0.07	0.82
	1980	0.16	1.05	0.16	0.27	0.38	0.69	0.18	0.22	0.83
	1970	0.17	0.96	0.18	0.43	0.57	0.75	0.37	0.44	0.84
	1960	0.13	1.07	0.13	0.43	0.58	0.74	0.39	0.47	0.82

Sources: See Table 3.2

Note: (1) Computed from the Sources in Table 3.2.

(2) In this table, live-births by age of mother at under15, over 50 and unknown are excluded.

3.2.3. An Analysis of the Results

The fertility transition in West European Countries started around 1880. In those countries, when the fertility decline started, the values of overall fertility (I_f) were around 0.3, marital fertility (I_g) ranged from 0.76 in Norway to 0.48 in French, and proportion married (I_m) ranged between 0.4 and 0.5. The French fertility transition was the first in Europe, started from around 1830 (Coale and Treadway 1986).

According to Table 3.2, values of the three of Coale's fertility indices for the studied period from 1957 to 1997 can be analyzed as follows:

Overall fertility (I_f) ranged from 0.17 (Japan) to 0.61(Brunei) in 1960s, and it had declined into the values of 0.09 (Hong Kong) to 0.40 (Iran) in 1990s. Marital fertility (I_g) ranged from 0.29 (Japan) to 0.88 (Sri Lanka) in 1960s, and it had declined

into the values of 0.17 (Hong Kong) to 0.54 (Iran) in 1990s. Proportion married (I_m) ranged from 0.53 (Sri Lanka) to 0.83 (Iran) in 1960s, and it had changed into the proportions of 0.48 (Japan) to 0.68 (Cyprus) in 1990s.

In Eastern Asia, over all fertility declined into around 0.25 and less than 0.25, marital fertility (I_g) ranged from 0.26 in Japan to 0.44 in Hong Kong, and the proportion married (I_m) ranged from 0.57 in Hong Kong to 0.65 in Japan during 1970s. Values of marital fertility started decline to a nearly the same level, on the average of 27 per cent of Hutterites marital fertility in 1980s. The declines of I_f and I_g were particularly steep in Japan and Korea during 1970s to 1980s, and in Hong Kong during 1980s and 1990s. The rate of decline in I_f values varied from 47 per cent in Hong Kong to 22 per cent in Japan. The range of declines in proportion married was between 1 per cent (Hong Kong) and 8 per cent (Japan).

Iran and Sri Lanka represent for South Central Asia in this study. These two countries had very different levels in fertility and marriage indices. In 1980s, the levels of I_f were only 0.29 in Sri Lanka but 0.49 in Iran, I_g accounted for 0.56 and 0.66, and I_m were 0.51 and 0.74. A significant changes in I_f and I_g values occurred during 1960s and 1970s in Sri Lanka, and the declines were 21 per cent and 23 per cent respectively. 20 per cent decline of I_f and 17 per cent decline of I_g occurred in Iran during 1980s and 1990s. A narrow range of the decline in I_m values was between 2 per cent in Sri Lanka and 3 per cent in Iran.

In South Eastern Asia, the decline of I_f started in Singapore into the level of 0.25 in 1970. The values of I_g and I_m were 0.46 and 0.55 respectively in the same year. In 1980s, except in Brunei and Philippines, the level of I_f fell into less than 0.25 of natural fertility, I_g ranged from 0.30 in Singapore to 0.66 in Philippines, and I_m were in the rage between 0.5 and 0.6 in that regions. There were sharp falls in both I_f and I_g values during 1970s and 1980s. The range of declines for I_f was from 24 per cent in Myanmar

to 40 per cent in Singapore. The decline in I_m values among the South Eastern Asia countries were ranging from 1 per cent in Philippines to 8 per cent in Singapore.

In Western Asia, overall fertility had started to decline into 0.19 in Cyprus since 1973. There were fairly significant declines in I_f and I_g values in Israel during 1970s to 1980s. In both countries, the corresponding rates of I_f for those periods were 19 per cent and 31 per cent, and I_m were 12 per cent in Cyprus and 3 per cent in Israel.

Since the assumption made in this table is all fertility occurs within marriage, the decline of overall fertility means either of the decline in marital fertility or proportion marriage, or both of the indices. Over all the years covered in the report, the most marked changes in overall fertility declines were occurred due to the relative changes in marital fertility. It shows the modernization of contraception among married women in Asia. During the sharp decline period, there had been no significant changes in the proportion of Asian married women, since the range of declines had narrowed.

Values of I_h for Hong Kong, Israel, Japan and Philippines are given in Table 3.3. During the studied period, illegitimate fertility I_h played a minor part in this research. Birth registration by legitimacy status in each area was available only from 1960 to 1985.

Table 3.4 presents certain findings relevant to the early childbearing ages (15-19), the prime childbearing ages (20-39), and the late childbearing ages (40-49). Significantly, the levels of teenage marital fertility I_{g1} were well above that of the Hutterites level in almost all countries in the study. Hutterits fertility rate assigned to ages 15-19 is 0.300 and the marital fertility for ages 15-19 in this study shows much higher rates than the Hutterites schedule. There are a couple of reasons for artificially high teenage marital fertility. One is still remaining traditional arrange marriage and the other is many of the married teenagers in these age range are already pregnant when married. In Asian and African society, the initiation of the control of marital fertility did

not occur within very early married women, since most of the female mean age of 18 years or less at first marriage could not be sustained except by arrangement (Coale 1992). High fertility in early entry into an arranged marriage is part of an environment that contraception is disapproval by husbands and the relatives.

The levels of I_{f1} and I_{g1} ranged from 0.1 for both indices in Japan to 0.15 and 0.14 in Thailand during 1990s. There has been a continuous decrease in both overall fertility and proportion married for teenagers. The decline in proportion of teenage marriage apparently is not only on account of the postponement of first birth but also of the postponement of marriage.

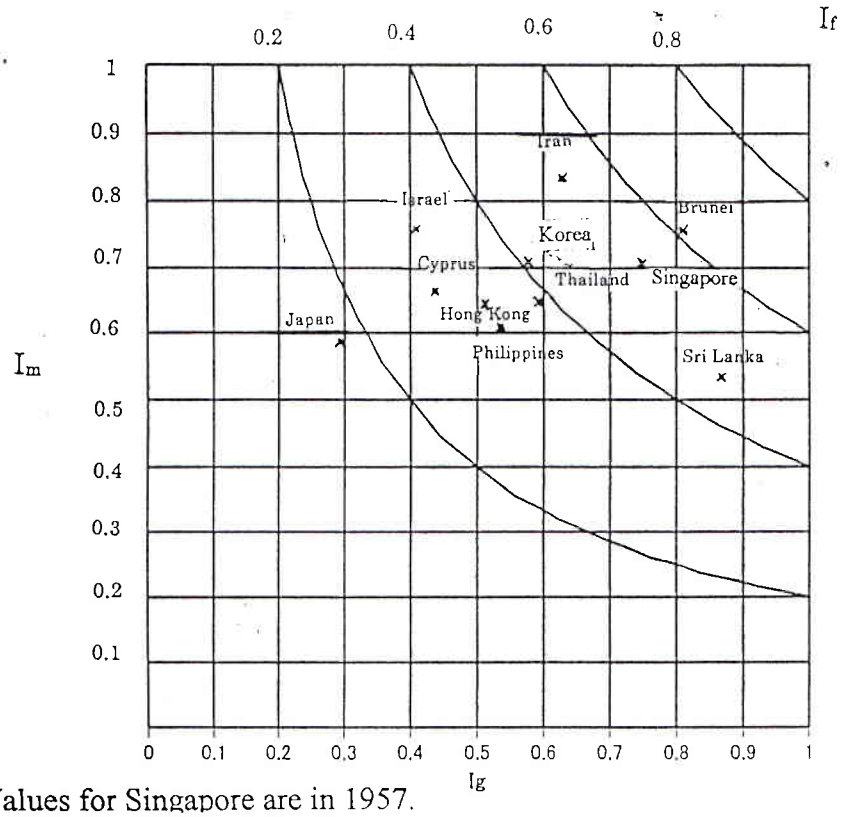
Since early 1980s, fertility of the older childbearing ages has fallen so markedly due to the corresponding declines of I_{g3}. Nevertheless, the levels of marital fertility in the prime childbearing ages were also lower than the half of the Hutterites schedule during the studied period. In 1990s, fairly significant decline in I_{g2} occurred in all countries and the maximum rate of decline in I_{m2} was 16 per cent in Japan. A continuous decline in marital fertility for both the prime childbearing ages and the late childbearing ages explains the universality in contraceptive knowledge and increase in contraceptive practice.

For different insight, Asian fertility transitions through Coale's indices are illustrated by sketching on the rectangular hyperbola. A simple presentation of the two principal indices (I_m and I_g) are plotted in a two dimensional diagram, of which the vertical dimension is I_m and the horizontal dimension is I_g. An assumption made here is all fertility occurs within marriage, then I_f is defined as the product of I_m and I_g, and which can be seen on the same diagram. The combinations of I_m and I_g indices are presented a series of contour lines or rectangular hyperbola (Coale and Watkins, 1986). These contours are useful devices to identify the levels of I_f from alternative combinations of I_m and I_g. Figures 3.1 to 3.4 display the major fertility and marriage

indices of Asian countries from 1960s to 1990s. These Figures are illustrated from the values of Table 3.2 and 3.4.

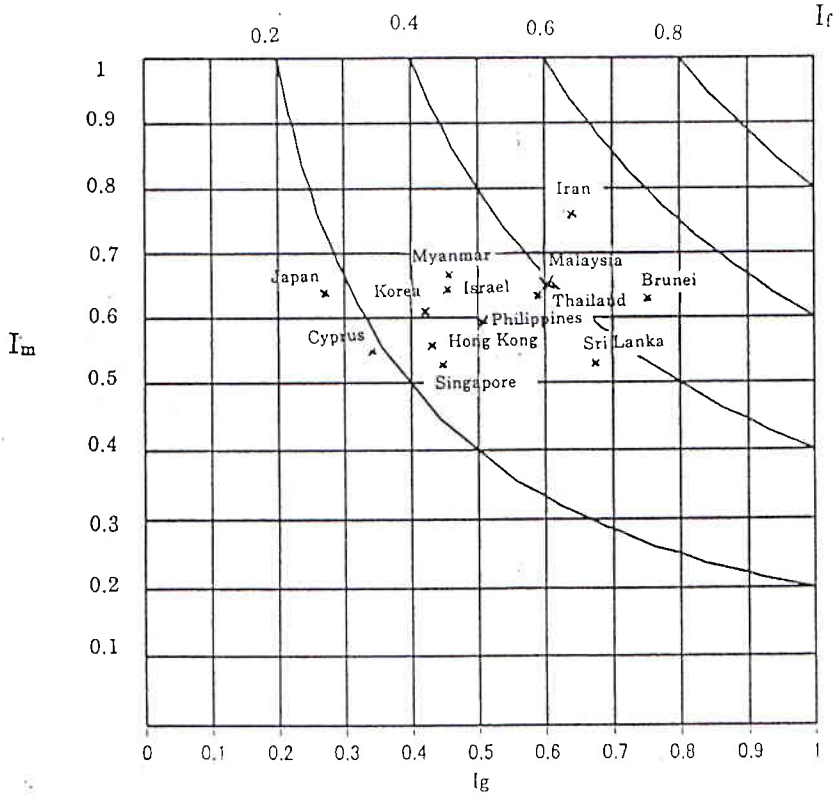
Figure 3.1 Using Rectangular Hyperbola for Analyzing the Coale's Indices

3.1.1 (In 1960s)

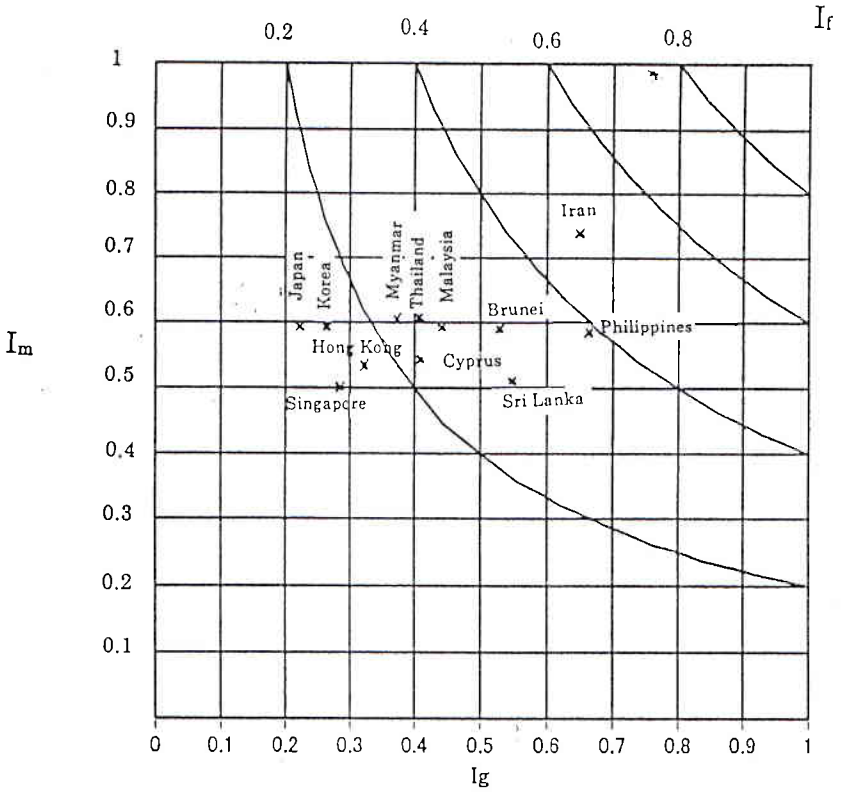


Note: Values for Singapore are in 1957.

3.1.2 (In 1970s)



3.1.3 (In 1980s)



3.1.4 (In 1990s)

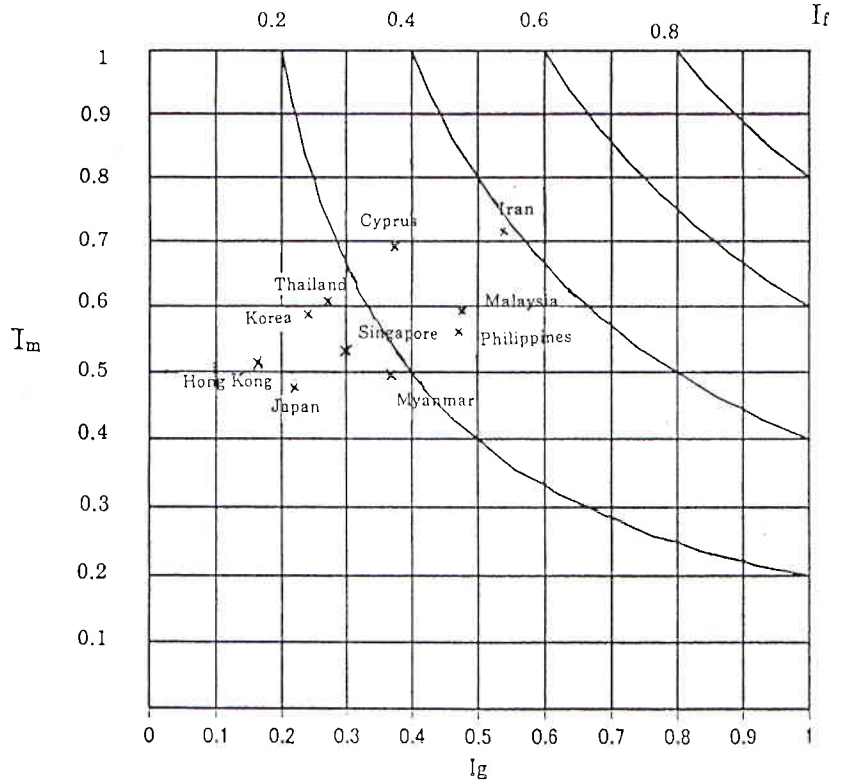
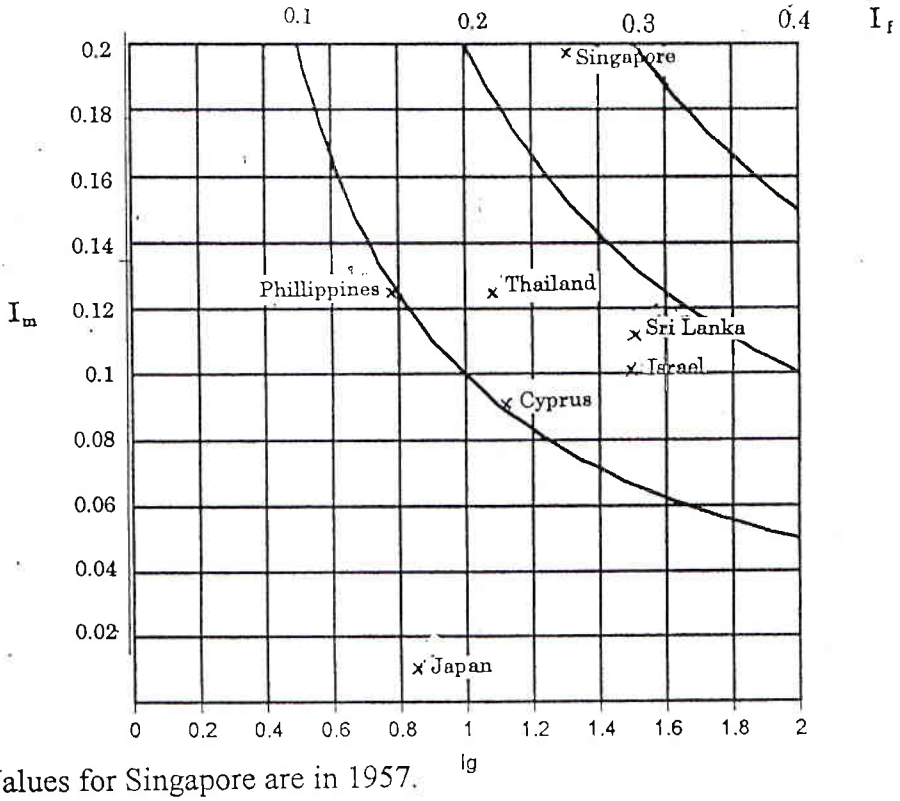


Figure 3.2 Using Rectangular Hyperbola for Analyzing the Coale's Indices

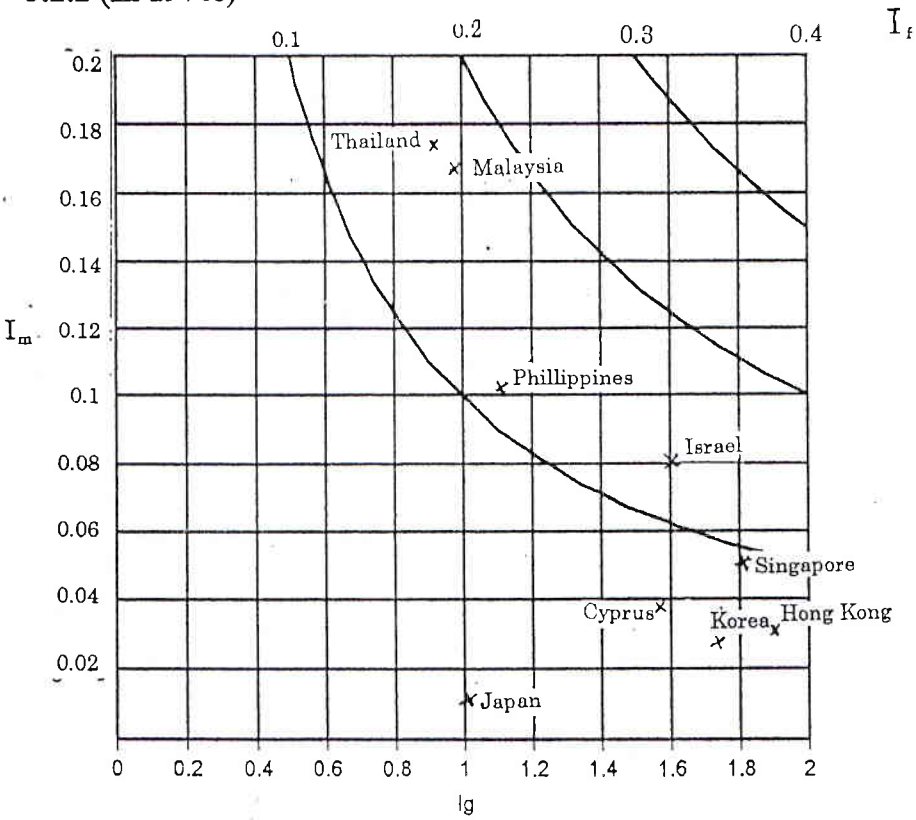
(Age Group 15-19)

3.2.1 (In 1960s)

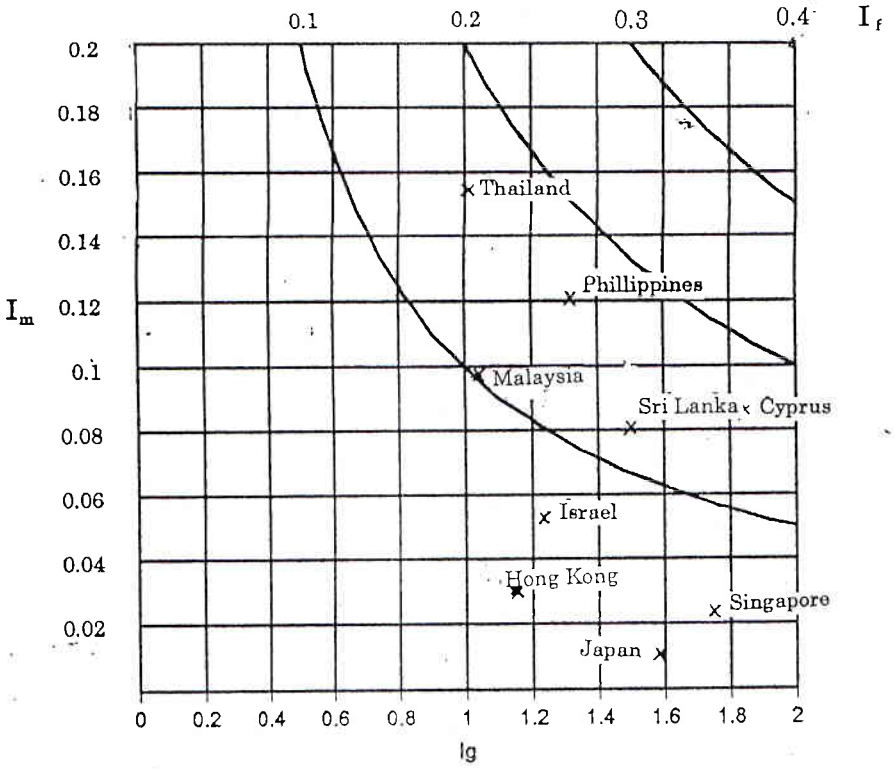


Note: Values for Singapore are in 1957.

3.2.2 (In 1970s)

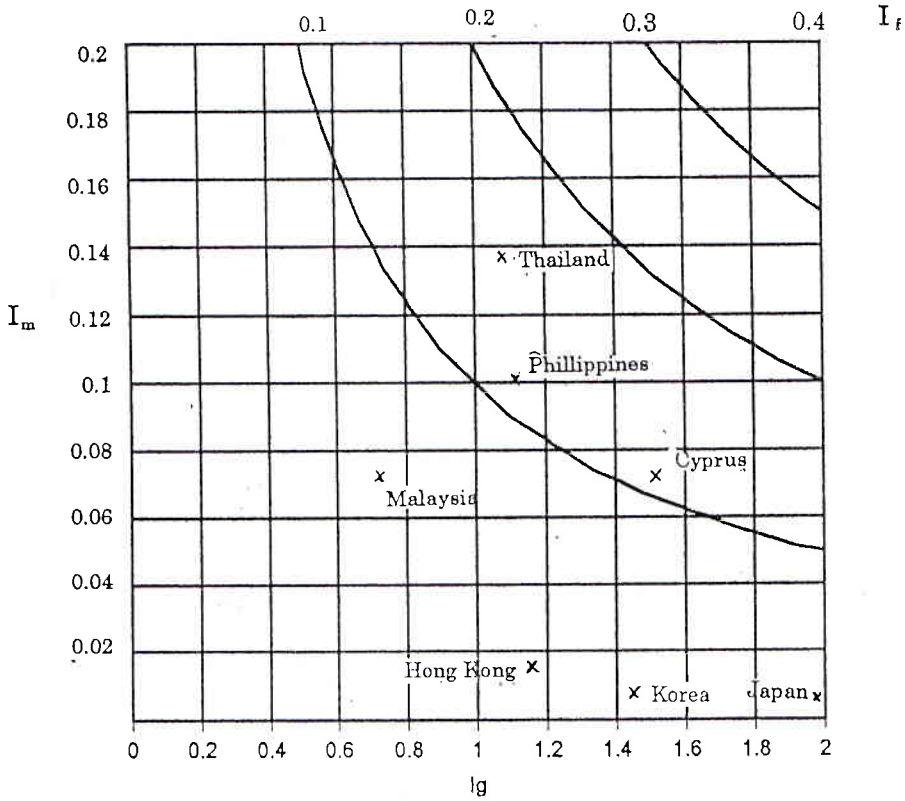


3.2.3 (In 1980s)



Note: Values for Korea are excluded.

3.2.4 (In 1990s)

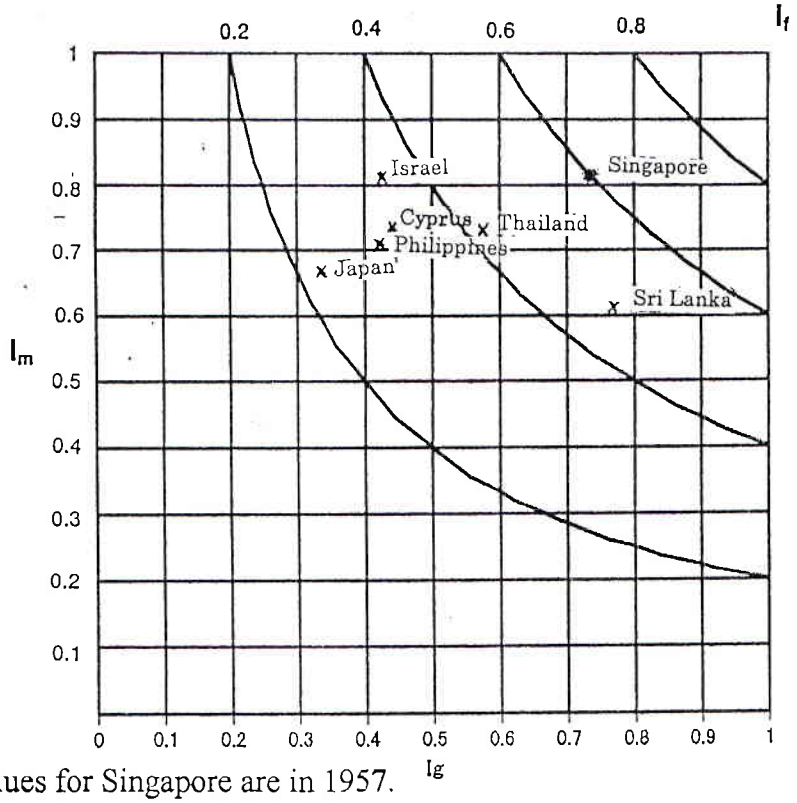


Note: Values for Singapore are excluded.

Figure 3.3 Using Rectangular Hyperbola for Analyzing the Coale's Indices

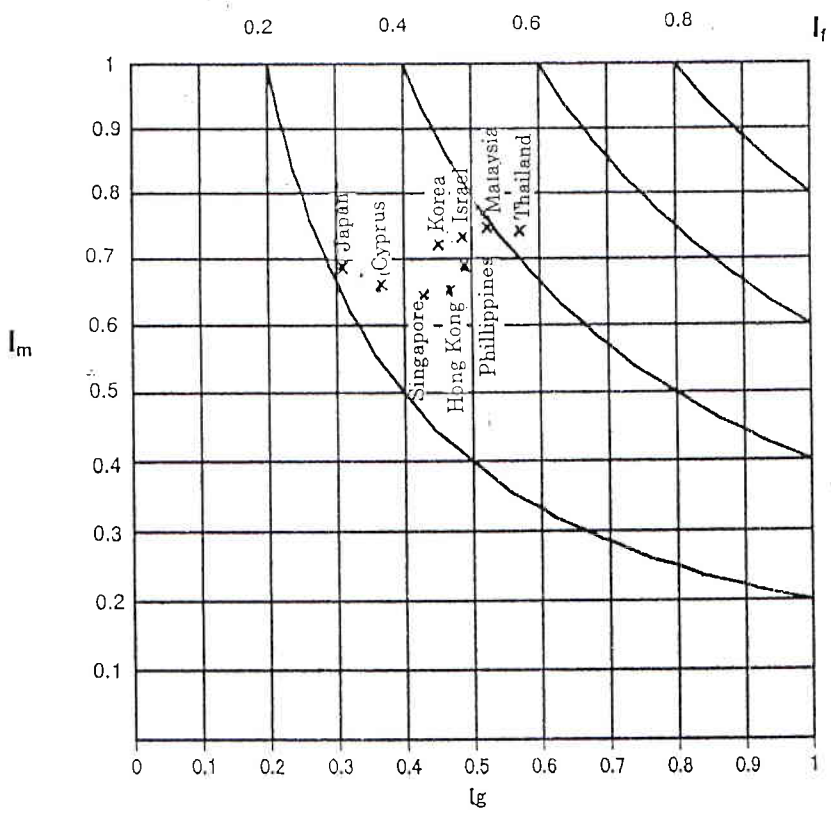
(Age Group 20-39)

3.3.1 (In 1960s)

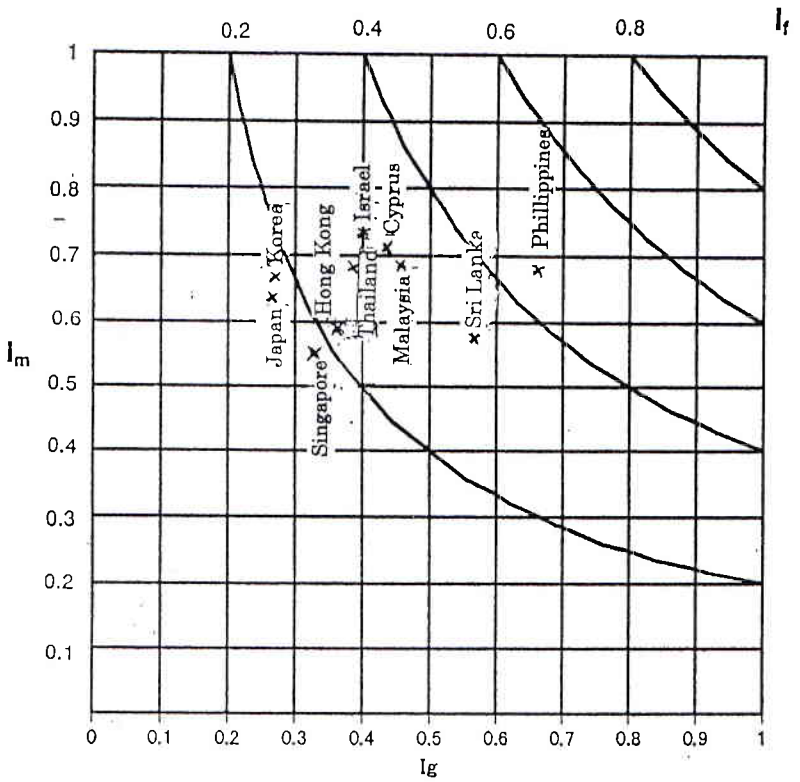


Note: Values for Singapore are in 1957.

3.3.2 (In 1970s)



3.3.3 (In 1980s)



3.3.4 (In 1990s)

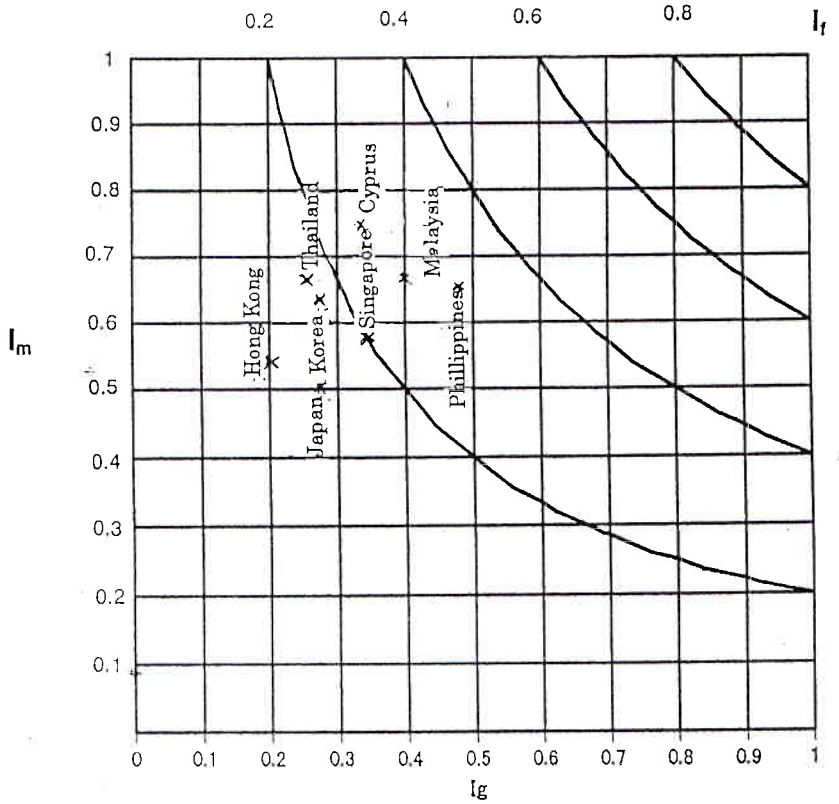
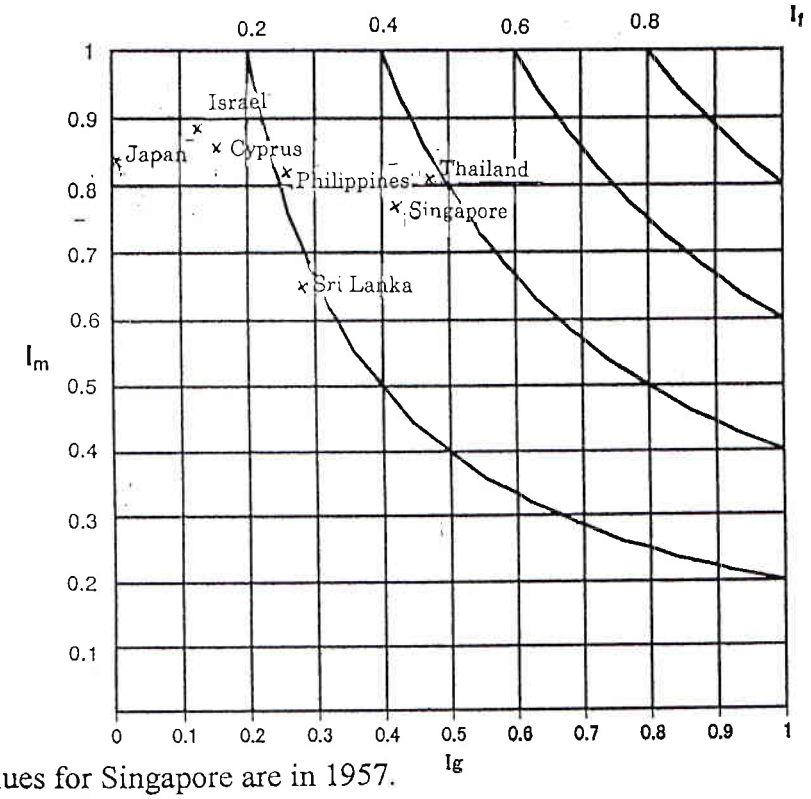


Figure 3.4 Using Rectangular Hyperbola for Analyzing the Coale's Indices

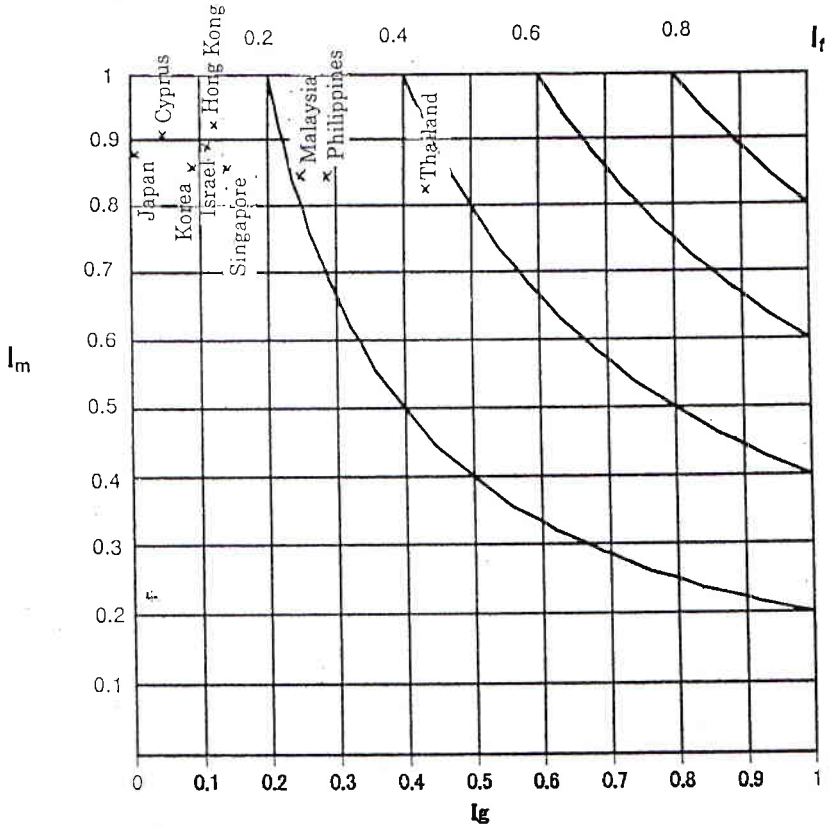
(Age Group 40-49)

3.4.1 (In 1960s)

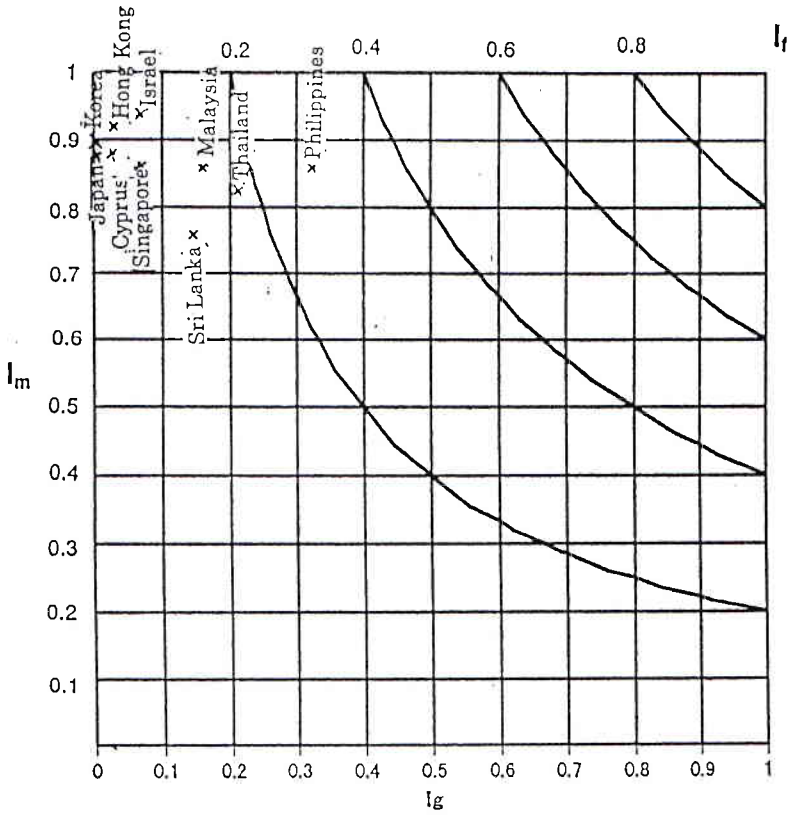


Note: Values for Singapore are in 1957.

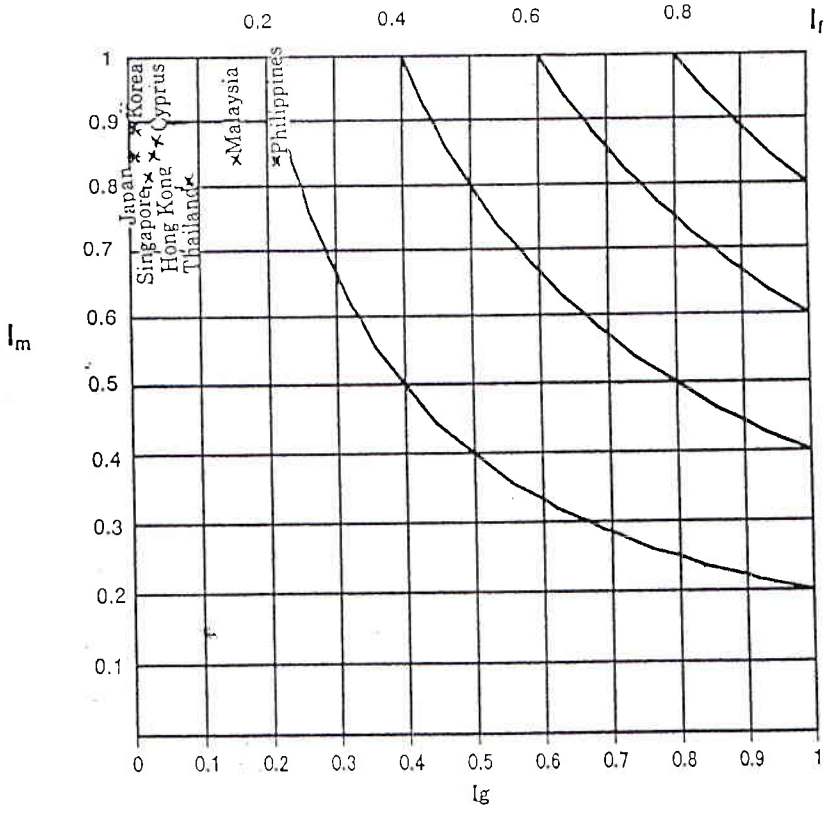
3.4.2 (In 1970s)



3.4.3 (In 1980s)



3.4.4 (In 1990s)



3.3 Conformity of Asian Fertility Patterns to a General Fertility Theory

Several theories concerned with fertility declines have been based largely on the western experiences. An analysis of the fertility decline in Europe, so-called European fertility project (Coale & Watkins 1986) is universal by now.

The index of the proportion married I_m expresses as the Malthusian factor in fertility control and it shows the extent of limitation of fertility through delayed marriage. The decline in I_m reveals greater delay of marriage. The rising in the age at marriage can be said, partly as a result of the expansion of education and partly as a result of the urbanization. Education, especially female education contributes to the survival of children and opens up the possibility of using contraception. Low fertility is associated with the high levels of education attainment. In fact, the progress of female education improves their chance for working outside and female's ability of earning. Then the time of working mother for rearing children becomes restricted. Besides, more educated mothers have higher aspirations for children that will cause a rise in the opportunity cost of rearing children and the decline in fertility.

As generally accepted, low fertility is associated with the urban population employed in non-manual occupations with relatively high levels of educational attainment. Increase in urban population is directly related to increase in non-primary sector employment rate. Nevertheless, employment of husband and of wife could influence the age and rate of marriage. The age of marriage tends to be higher in the nuclear families societies. Since marriage has to be postponed up to the age at which a couple becomes self-supported for their married life. Therefore, age of marriage and marriage rates are correlated with the employment of young people as well as with the economic fluctuations.

On the other hand, the index of the marital fertility I_g explains the control of fertility within marriage. It reflects the effect of neo-Malthusian fertility reduction. The

decline in I_g shows more use of fertility control methods. As widely accepted, modern economic development has been accompanied by the initiation and spread of effective limitation of fertility.

The transition from high to low level fertility among the Asian regions as well as countries had wide variations in levels and periods. In general, the proportion of marriage had declined significantly in the early childbearing ages (15-19), and this was characterized by big rises in age at first marriage. Further sharp declines in fertility among the old childbearing ages (40-49) were also observed due to the steep declines in marital fertility. A continuous decrease in marital fertility for both of the prime childbearing ages and the old childbearing ages has evidently shown that the influence of information provided by mass media, and improvement of knowledge on contraception, and cultural setting spread the fertility declines, independently of socio-economic conditions.

Coale (1973) concluded the three necessary preconditions for fertility decline from the evidence of the European Fertility Project (Refer to Section 1, p.56). Particularly, the second and third conditions: effective techniques of fertility must be known and available, and reduced fertility must be perceived to be advantages could explain and improve well the theories of fertility declines in developing countries.

As mentioned above, it could be concluded that the study of Asian fertility and marriage patterns have shown how development changes can impact differentially on the fertility among the countries' differences in social, economic, cultural, government intervention on fertility level and introduction of an effective family planning program. Indeed, studies based on aggregate vital registration data can only offer a partial view on the explanation of fertility decline. Many of the situations connected with the explanation of fertility declines, particularly those associated with the socio-economic

approaches, cultural setting, government's efforts on the family planning programmes are potentially important.

CHAPTER IV

The Process of Changes in Age Patterns of Fertility

Contents

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The Process of Changes in Age Patterns of Fertility

After the Second World War, most of the countries in Asia have experienced a remarkable transition in reproductive behaviour through political, economic, cultural, and religious situations. Total fertility rate in Asian countries varied a wide range from 0.99 (Hong Kong) to 5.6 (Lao PDR) in 1999. To examine these levels of difference among various countries is the main objective of this research. Age specific fertility or age of the child's mother is one of the prime important variables in the areas of demographic analysis. Age specific fertility reflect sharp differences in parity of mother (i.e., the number of children born to the women), order of birth, the interval since previous birth, age at marriage, and duration of marriage. Some other characteristic related to the age specific fertility are place of residence (urban-rural or metropolitan-nonmetropolitan), ethnic, socio-economic condition and status of parents.

The method of analysis in this study is based on United Nations (1965), Ohbuchi (1982), and some modifications of theirs. The research period is a long-term time series data from 1948 onwards. The sources of data used in this study are United Nations, *Demographic Yearbook*, various issues (For all countries except Japan); Ministry of Health and Welfare (2000), Minister's Secretariat, Statistics and Information Department, *100 Years of Vital Statistics in Japan (1899~1998)*; and Union of Myanmar/UNFPA (1999), *Fertility and Reproductive Health Survey, 1997*. Data from Demographic Yearbook has fairly satisfactory quality for studying the patterns of age specific fertility rate (Refer to Chapter 3, Section 3.2.1). The 1997 Fertility and Reproductive Health Survey is a nationally representative survey, the area excluded from the sample frame were less than 1 per cent of the country's population. About 96

per cent of the households selected in the sample were successfully interviewed and the response rate was 93 per cent for the interviews with the eligible women. It is also found that the age-sex distribution from the survey resembles closely to that of the official population estimate and it is also identical with the United Nations' population estimate of medium variant projection revised in 1998. ***Age Specific Fertility Rate*** for female population is used to generate a development process of fertility patterns. The age classification in the *Demographic Yearbook* is shown by aged under 20, 5 years groups to 40-44, and a terminal group 45 and over.

The objective of this chapter is to focus on the following:

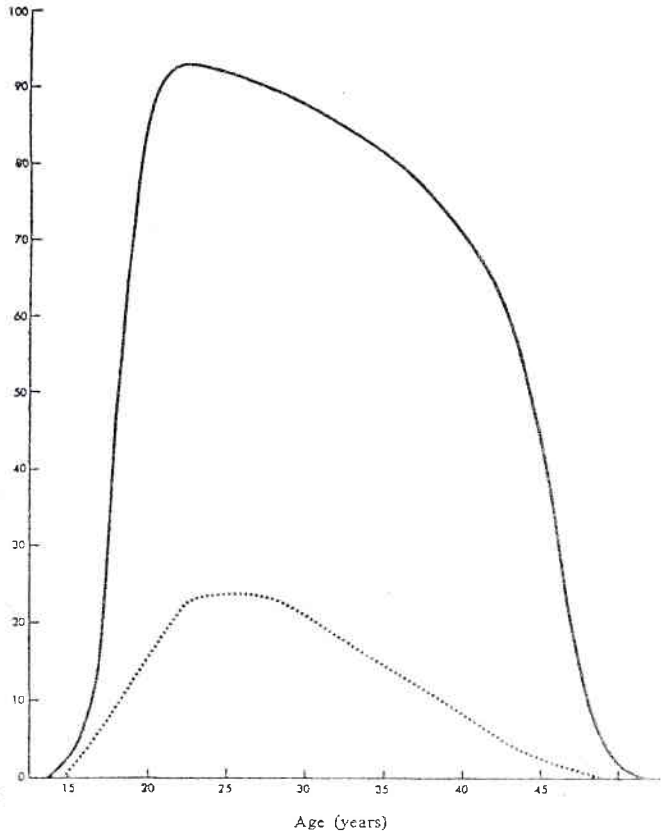
- To examine how the fertility transforms into below replacement level through the age patterns of fertility changes.
- To investigate the general form of the changing process in the age patterns of fertility.
- To explain how the changing process of fertility patterns related to the fertility transition.

4.1 Fertility Differentials as Evidence of the Age Curves of Fertility

The term ***fertility*** refers to actual birth, and ***fecundity*** refers to the physiological capacity to reproduce. One's fertility is limited by one's fecundity. Fertility is usually far below fecundity due to the incidence of sterility, marriage parity interval, the practice of family limitation, and other factors. Reproductivity of a woman is generally considered over a period of about 35 years, from the ages of 15 to 50. Figure 4.1 shows the hypothetical model of fecundity (so-called the age curve of fecundity), along with average age specific fertility rates (so-called the age curve of fertility). The age curve of fecundity shows the probability of conceiving. It is only 1 per cent at aged 14 and rising

to a maximum of 93 per cent at aged 22. At first, it falls gradually, and then changing rapidly. Finally, it reaches again to about 1 per cent at aged 50 (Lorimer 1954). The age curve of fertility in the figure shows the per cent distribution of the number of births to women of a given age group for 72 countries (United Nations 1965). These rates of childbearing are generally low at the ages of under 20 and rising to a peak at the ages of twenties, and then falling rapidly in some population and gradually in others.

Figure 4.1 Hypothetical Fecundity Model and Average Age Specific Birth Rates



_____ Fecundity model (percentage of women of given age capable of procreation)

---------- Fertility curve (annual birth per 100 women of given age)

Source: United Nations (1965), Population Bulletin of the United Nations, No.7-1963.

In this section, the comparison of fertility levels in selected Asian countries is explained by the age curve of fertility. The forms of the age curve of fertility vary among different population and significant in several ways. Table 4.1 presents the comparison of the age-specific fertility rates of the selected countries for 1960s and 1990s. Figures 4.2 and 4.3 are the line graphs of these rates that approximate a normal curve moderately skewed to the right.

The ranking of the rates and their relative magnitudes over the ages of the reproductive period are the same or approximately the same for most of the 11 countries listed. The rates for the ages of 45 and over are of little absolute in relative importance. Differences in the age pattern of childbearing can also be measured in terms of the mean age of childbearing (mean age of mother). To eliminate the effect of differences in the age-sex composition of the population being compared, this measure could be used. For the selected countries shown in Table 4.1, the highest and lowest mean ages vary 3.25 years (Thailand 31.11 and Japan 27.86) in 1960s, and 2.89 years (Myanmar 30.31 and Thailand 27.42) in 1990s. On this basis, childbearing occurred relatively early in Japan and relatively late in Thailand during 1960s, and mean age of childbearing was high in Myanmar and low in Thailand during 1990s.

Table 4.2 shows the age specific fertility rates for each age group expressed in terms of percentages of the sum of rates for all age groups (i.e., the relative combination of women in each age group to total fertility) in the most recent available date compared with during 1960s. The measure of relative frequency of childbearing at different ages for 11 countries listed in Table 4.2 show the different forms of the age curve of fertility between low fertility and high fertility countries, as well as variations within each of these groups. Figures 4.4 to 4.7 display these rates graphically. In general, the key fertility ages are 20 to 39; they contribute about 87 to 98 per cent of births. Within the ages 20-29, this range accounts for about 47 to 73 per cent of total births.

Table 4.1 Age Specific Birth Rates (1960s and 1990s)

Countries	Year	TFR	Mean age of mother	<20	20-24	25-29	30-34	35-39	40-44	45+
Hong Kong	1969	3.4	29.6	18.8	141.1	231.4	164.9	88.9	35	5.3
	1997	1.0	29.9	5.5	30.1	64.8	64.9	27.8	4.8	0.3
Japan	1960	2.0	27.9	4.3	107.2	181.9	80.1	24.0	5.2	0.3
	1998	1.4	29.6	4.6	39.8	105	94.8	29.7	3.4	0.1
Singapore	1966	4.3	29.8	14.9	195.8	272.7	197.9	123.4	50.0	8.9
	1998	1.6	30.0	7.9	40.6	110.3	104.6	43.6	7.2	0.2
Thailand	1960	4.8	31.1	18.3	200.6	243.0	213.5	178.8	89.0	24.5
	1997	1.7	27.4	37.7	91.3	97.7	67.8	30.4	8.7	1.7
Korea										
	1995	2.3	28.0	29.6	95.1	132.5	113.0	72.7	22.0	2.6
Cyprus	1966	3.3	28.5	24.8	189.3	218.4	118.6	64.8	29.0	6.7
	1997	1.8	28.2	11.8	93.2	128.2	78.7	33.6	5.4	0.5
Sri Lanka	1963	5.1	29.4	52.4	228.7	279.4	240.4	157.6	46.0	6.6
	1995	2.3	29.4	29.6	95.1	132.5	113.0	72.7	22.0	2.6
Myanmar	1997	2.7	30.31	24.6	102.3	144.2	138.1	92.2	35.3	7.2
Israel	1960	4.0	28.0	55.0	232.3	233.0	152.2	83.1	28.0	6.2
	1997	2.9	29.5	16.7	117.8	190.8	158.6	81.4	20.0	1.5
Philippines	1966	3.6	30.5	34.7	135.4	185.0	165.7	130.1	57.0	10.9
	1991	3.3	29.4	32.8	163.5	180.3	134.7	91.7	41.0	8.3
Malaysia	1966	5.6	29.4	76.1	258.1	292.0	245.5	153.7	67.0	17.4
	1990	3.3	30.2	18.5	123.9	203.3	170.5	105.8	39.0	4.4

Sources: (1) United Nations, *Demographic year book*, various issues.

(2) Government of Japan (2000), *100 years of Vital Statistics in Japan (1899~1998)*.

(3) Union of Myanmar/UNFPA (1999), *Fertility and Reproductive Health Survey, 1997*.

Note: (1) Values of TFR and Mean age of mother are computed from the above sources.

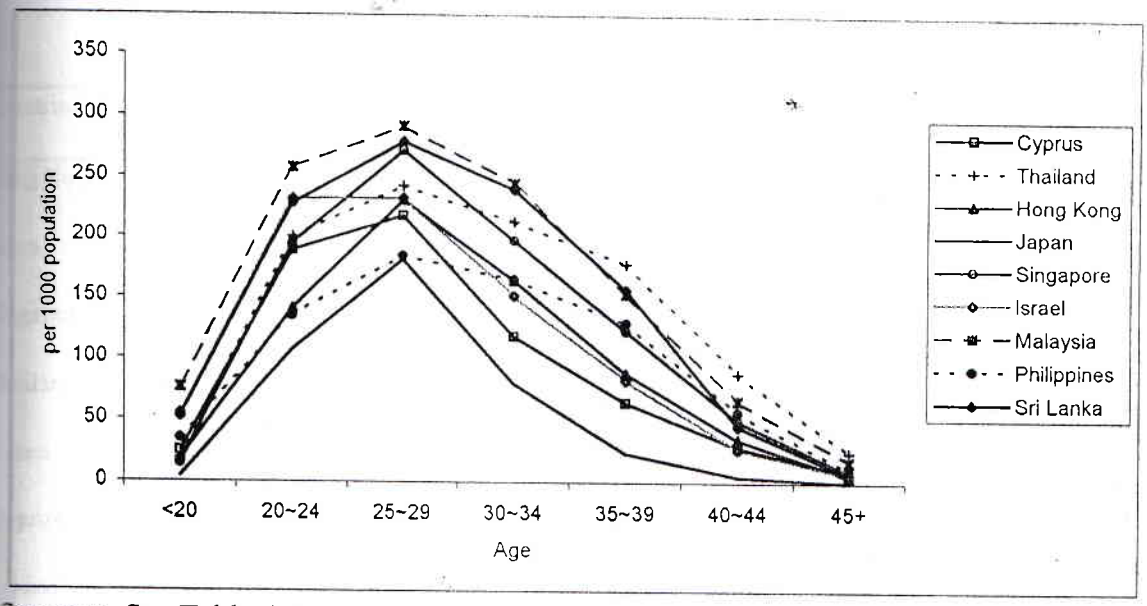
(2) Mean age of mother is computed according to the formula

$$\bar{a} = \frac{\sum_a a * f_a}{\sum_a f_a}$$

Where a represents the midpoint of each age interval (17.5, 22.5, etc.)

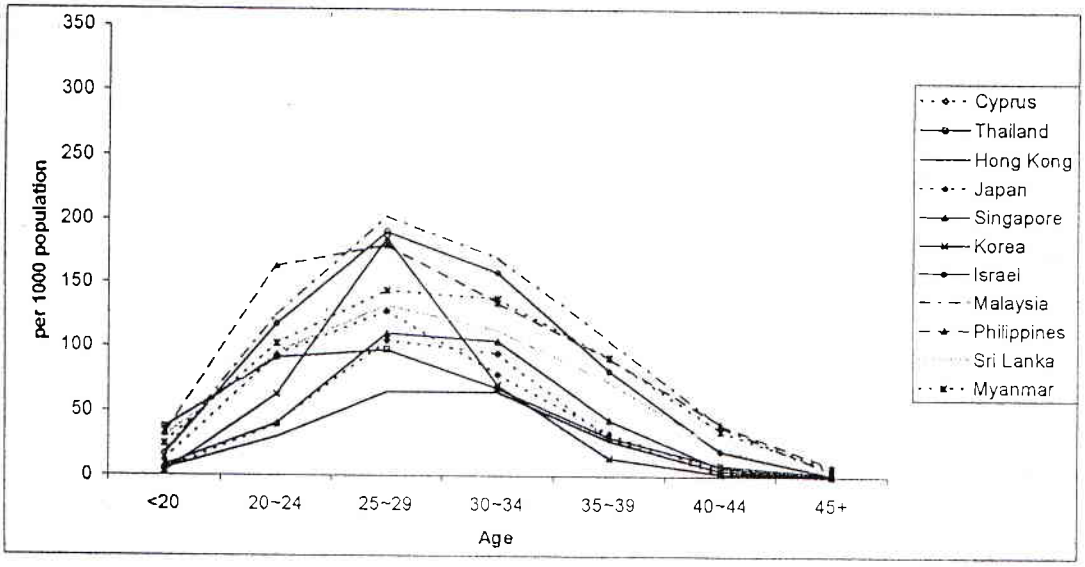
f_a represents an age specific birth rate for a 5 –year age group.

Figure 4.2 Age Curves of Fertility During 1960s



Sources: See Table 4.1

Figure 4.3 Age Curves of Fertility During 1990s



Sources: See Table 4.1

Table 4.2 Percentage Distribution of Age Specific Birth Rate

(1960s and 1990s)

Countries	Year	TFR	Total	<20	20-24	25-29	30-34	35-39	40-44	45+
Hong Kong	1997	1.0	100	2.8	15.2	32.7	32.7	14.0	2.4	0.2
Japan	1998	1.4	100	1.7	14.3	37.9	34.2	10.7	1.2	0
Singapore	1998	1.6	100	2.5	12.9	35.1	33.3	13.9	2.3	0.1
Thailand	1997	1.7	100	11.2	27.2	29.1	20.2	9.1	2.6	0.5
Korea	1995	2.3	100	1.0	18.5	54.8	20.8	4.2	0.6	0.1
Cyprus	1997	1.8	100	3.4	26.5	36.5	22.4	9.6	1.5	0.1
Sri Lanka	1995	2.3	100	6.3	20.4	28.4	24.2	15.6	4.7	0.6
Myanmar	1997	2.7	100	4.5	18.8	26.5	25.4	17.0	6.5	1.3
Israel	1997	2.9	100	2.8	20.1	32.5	27	13.9	3.4	0.3
Philippines	1991	3.3	100	5.0	25.1	27.7	20.7	14.1	6.2	1.3
Malaysia	1990	3.3	100	2.8	18.6	30.5	25.6	15.9	5.9	0.7

Sources: See Table 4.1

According to Table 4.2 and Figures 4.4 to 4.7, the differences of age curve of fertility can be analyzed in terms of peak age of fertility, and concentration of fertility at peak age. Peak age of fertility are described into four major types:

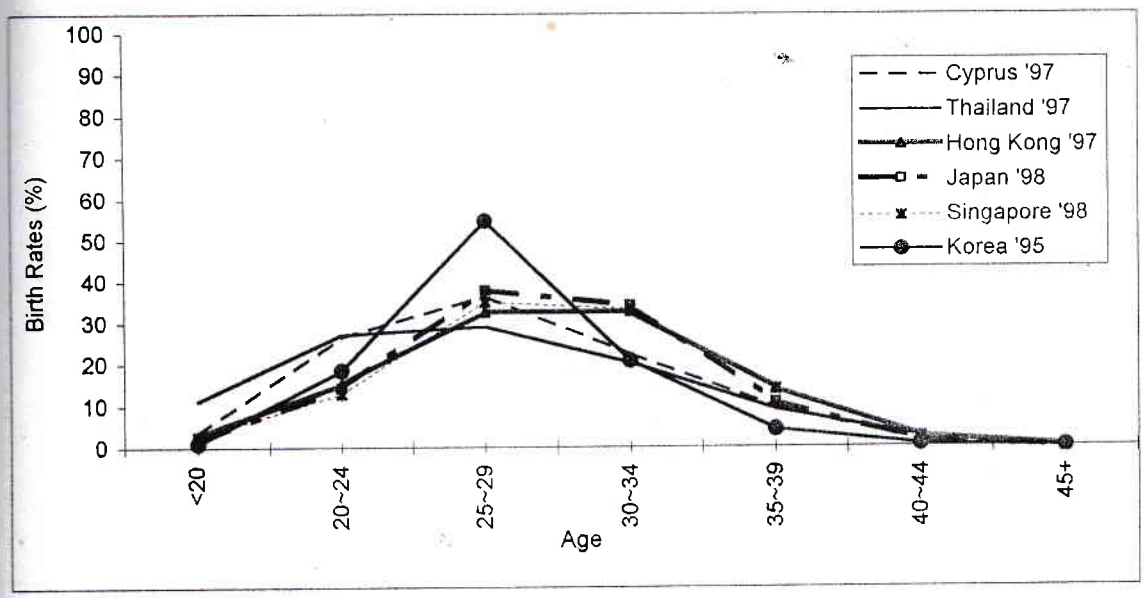
(1) early peak type (maximum fertility occurred in the age 20-24)

(2) late peak type (---------- 25-29)

(3) broad peak type (---------- 20-24 and 25-29)

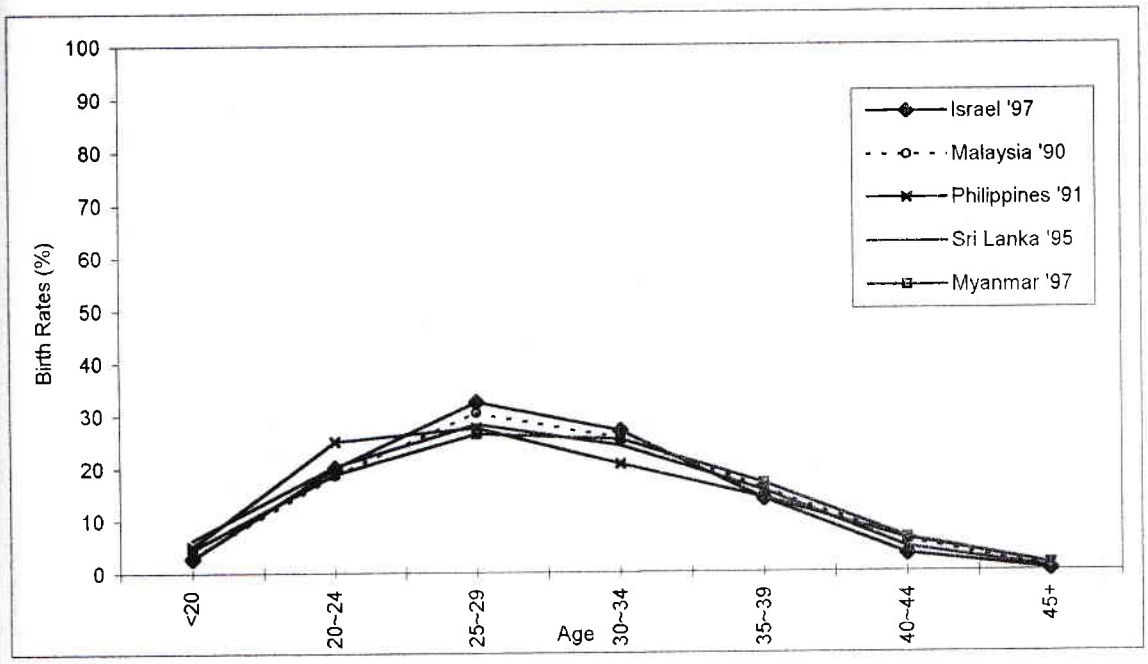
(4) late broad peak type (---------- 25-29 and 30-34)

Figure 4.4 Percentage Distribution of Age Specific Birth Rate (TFR<2)



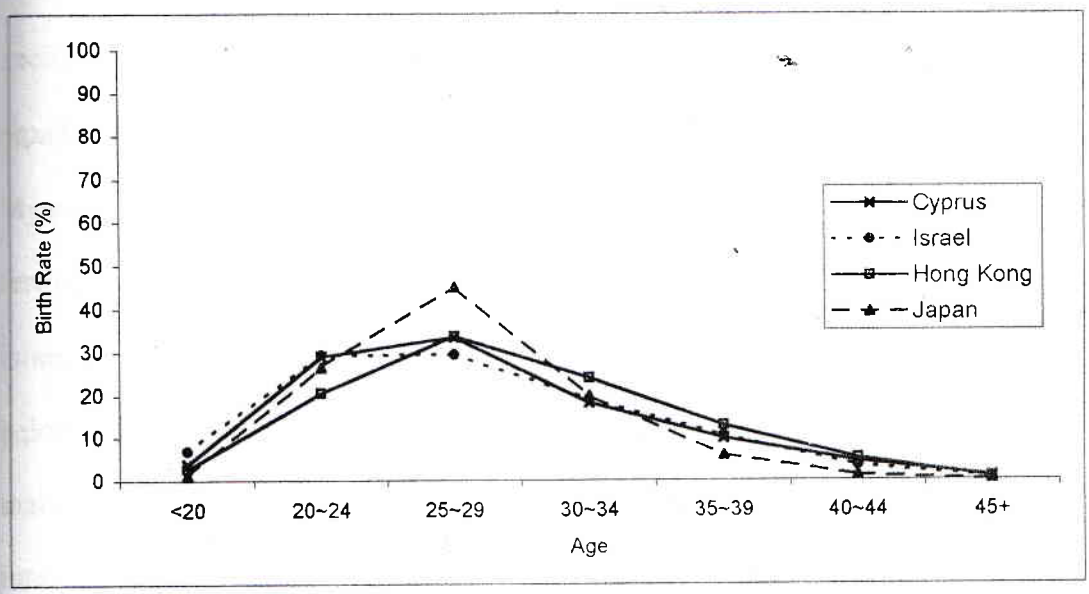
Sources: See Table 4.2

Figure 4.5 Percentage Distribution of Age Specific Birth Rate (TFR>2)



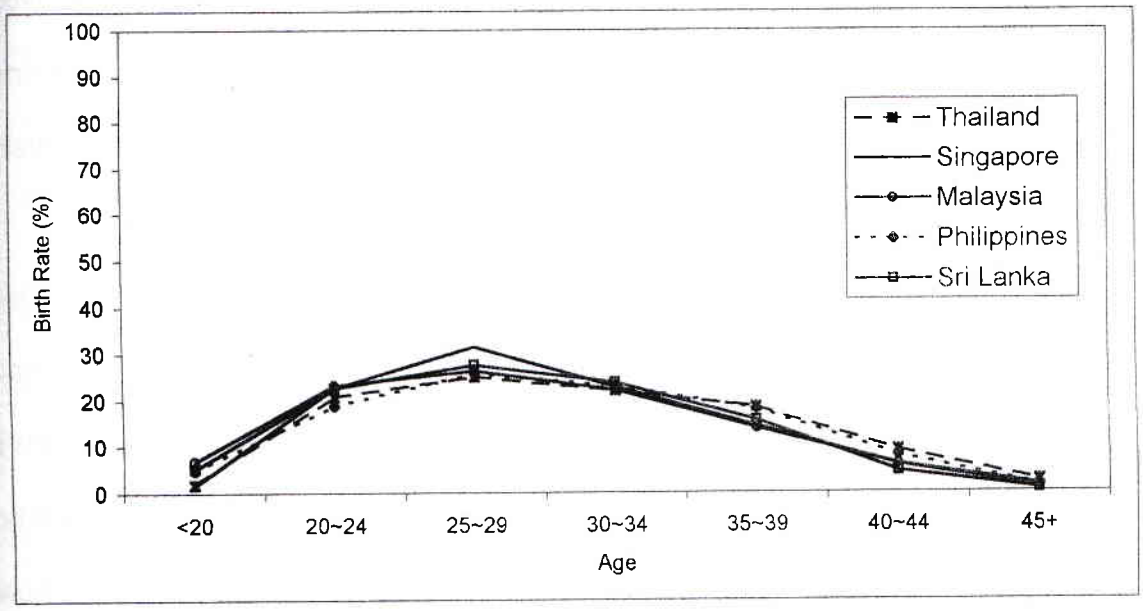
Sources: See Table 4.2

Figure 4.6 Percentage Distribution of Age Specific Birth Rates During 1960s (TFR≤4)



Sources: See Table 4.2

Figure 4.7 Percentage Distribution of Age Specific Birth Rates During 1960s (TFR > 4)



Sources: See Table 4.2

In 1960s, The broad peak type of fertility curves was found in Israel and Malaysia. Late peak fertility patterns were found in Hong Kong, Japan, Singapore,

Cyprus, and Sri Lanka. This pattern is associated with an average age of women at marriage. An increase in age at marriage plays a major role in the initial stage of fertility decline. Thailand and Philippines could offer an example of high fertility with the late broad peak type of fertility curves. During 1990s, Hong Kong, Japan, Singapore and Myanmar had belonged to the late broad peak, where women marry late and the peak fertility rates occurred in the groups 25-29 and 30-34 years. Korea, Cyprus, Sri Lanka, Israel, and Malaysia had belonged to late peak; Thailand and the Philippines had belonged to broad peak type. In developing Asian countries, women's average age of marriage is still relatively lower than low fertility countries. But government intervention on fertility level and introduction of an effective family planning program contribute to limiting fertility and early completion of family building in developing countries.

The countries in early peak type of fertility did not include over all the years covered in the report. In Asia, India assigned to this type during late 1950s, since the arranged marriage for girl in extremely early age had been a tradition in India (United Nations 1965).

Age account for 15 per cent or more of total fertility contributed by women shows the years of concentration in fertility. Number of years for women's concentration of childbearing has become a narrow range in low fertility countries. In 1960s, Thailand, Sri Lanka and the Philippines accounted for a total of 20 years, and the others accounted for a total of 15 years in the concentration of fertility. In 1990s, women in Japan and Singapore had concentrated in fertility only for 10 years. On the other hand, women in Sri Lanka, Myanmar, and Malaysia had passed 20 years for their childbearing. In spite of these differences, women in the other countries had concentrated their childbearing between the aged 20 to 34.

4.2 An Analysis of the Age Patterns of Fertility

In general, the examination from the age curve of fertility shows the following remarkable conditions.

(1) Among the high fertility countries, the extraordinary high concentration of fertility has not occurred in the peak age group of 20-24 and 25-29 years. The age curves of fertility are homogeneity patterns with low peak, since women's concentration in childbearing vary widely in the range of age, and fertility in their thirties are also high.

(2) In contrast, women in low fertility countries concentrate in childbearing with a narrow range of age. Fertility levels in the age group 25-29 years are extremely high.

(3) In many of the very low fertility countries, fertility levels for women in the age group 25-29 and 30-34 years differ only slightly.

(4) Fertility levels in the age group under 20 years can not be identified among the Asian countries, since marriageable age and adolescent fertility depend mainly on the ethnic, culture and the custom of a country.

According to the above stated conditions, more detailed studies are required to specify the age patterns of fertility. At first, it is proper to classify the age group into three categories (under 20 years, 20~29 years and 30 years and over). Next, the long period time series data on the percentage of age specific birth rates are analyzed into the maximum values, minimum values, and the values within these ranges for each age group. As a result, the levels of fertility also need to be classified into three stages; A, B and C for each of the three age groups. Levels of fertility (A, B, C) are defined according to the ascending order fertility rate in percent distribution. Finally, the standardized fertility levels for a hypothetical age patterns of fertility is provided in Table 4.3.

Table 4.3 Hypothetical Age Patterns of Fertility: Standardized ASFR (%)

Age Groups	A	B	C
~20	~2.4	2.5~4.9	5.0~
20~29	~49.9	50.0~59.9	60.0~
30~	~29.9	30.0~39.9	40.0~

Note: Modified from Ohbuchi (1982)

ASFR means Age Specific Fertility Rate

There have been some modifications from Ohbuchi (1982) in Table 4.3. The origin of Ohbuchi (1982) classified the levels of fertility into four stages; A to D, and the defined standard fertility rates for age groups under 20 years, and 30 years and over were also different. An analysis of the time series data (1948 to 1997) on the age specific fertility rates for Asian countries showed that the fertility rates of age group under 20 years had decreased significantly, and the rates for age group 30 years and over had increased.

From the standard fertility rates in Table 4.3, there are 27 combinations for three age groups, but 6 cases are less than a total of 100 for combining three age groups, and 3 cases are over a total of 100 for combining only two age groups. Except these cases, the following 18 combinations are assumed to be the possible age patterns of fertility.

AAC	BAC	CAA*
ABB	BBB	CAB*
ABC	BBC	CAC
ACA	BCA	CBA*
ACB	BCB	CBB
		CBC
		CCA
		CCB

Note: The sign of * means the rare case for age pattern of fertility.

For example, pattern AAC means that fertility level in age group under 20 years is A (less than 2.5 per cent of fertility rate), fertility level in age group 20~29 years is A (less than 49.9 per cent of fertility rate), and fertility level in age group 30 years and over is C (greater than 40.0 per cent of fertility rate).

The average percent distribution of age specific fertility rates for countries assigned to age patterns of fertility by 5 years interval time periods are tabulated in Table 4.4. A set of 15 patterns is provided in the table and the models of these patterns are charted in Figure 4.8. In high fertility countries, patterns form into significantly high fertility rates in the age group 30 years and over. During the transitional periods (from high to medium level fertility), fertility has been concentrating in the age group 20~29 years, and childbearing in the aged 30 and over has decreased slightly. In low fertility countries, childbearing has been heaping on the women's ages of twenties, and fertility has relatively declined in the age group 30 years and over.

In this study, a total of 5 countries (Japan, Singapore, Hong Kong, Korea, Thailand) have already completed their fertility transition or reach to the below replacement level fertility since late 1970s to 1980s. Net reproduction rate (NRR) of 1 means that a generation of mother produces sufficient daughters to replace itself exactly. In low fertility countries, TFR of about 2.1 means the replacement fertility level.

Thus, the study has to be continued to examine the patterns of fertility in very low fertility level. In this level, total fertility rate declined into less than 2 and childbearing in the age group 20~29 declines from C to B and then to level A. In the age group 30 years and over, the levels of fertility change in order of A, B, C.

All of the findings in the age patterns of fertility during 1948 to late 1970s are identical with Ohbuchi (1982). Nevertheless, the changing process of the age patterns of fertility resembles closely to the age curves of fertility analysis.

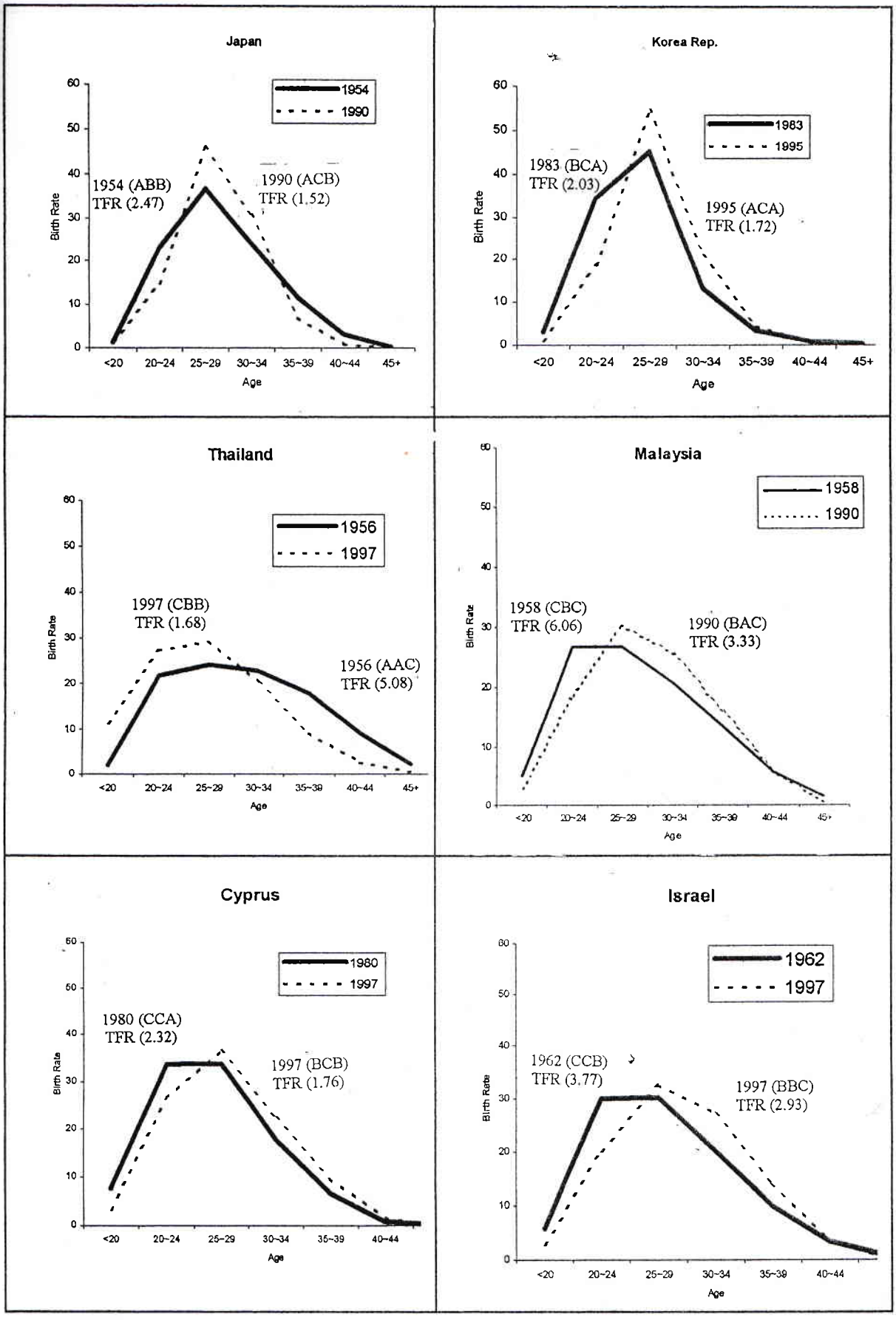
Table 4.4 Age Patterns of Fertility in Asian Countries

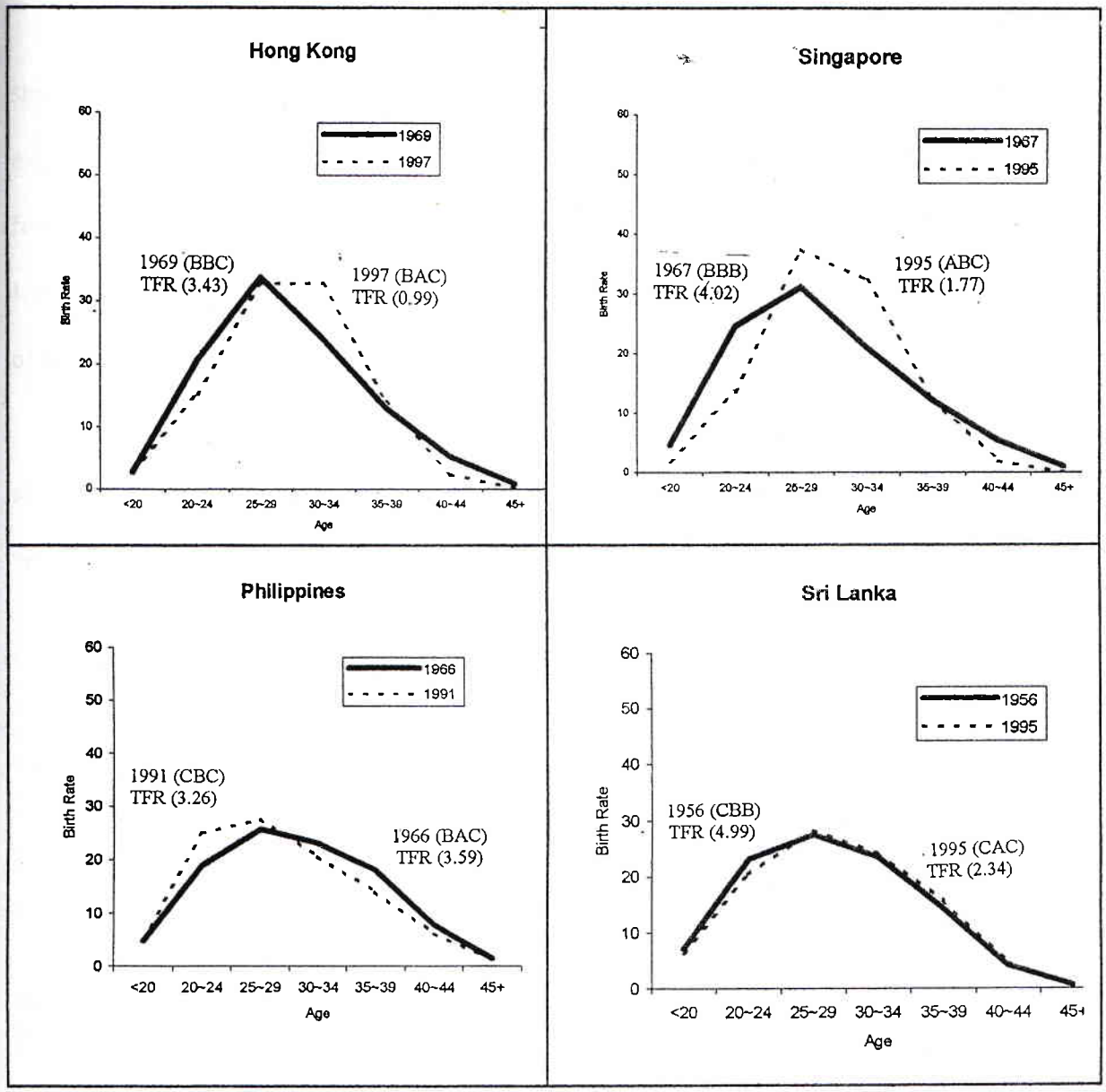
Countries	1948-52	1953-57	1958-62	1963-67	1968-72	1973-77	1978-82	1983-87	1988-92	1993-97
Cyprus	BAC	BBC	CBB (58)	BCB (66,67)	BCB	BCA	CCA	CCA	CCA	BCB (93,94,96,97)
Hong Kong					BBC	BBB	BCB	BBB	ABC	BAC
Israel	CBB	CBB	CBB	CBB	CBB	CBB	CBB	BBB	BBB	BBC (93,94,95,97)
Japan	ABC	ACB	ACA	ACA	ACA	ACA	ACA	ACB	ACB	ABC
Singapore		CBC (57)	CAC (58)	BBC (66,67)	BBB	BCB	BCB	BBB	ABC	ABC
Korea						ACB	ACA	BCA	ACA	ACA (93,94,95)
Malaysia			CBC (58)	CAC (66,67)	CBC	CBC	BBC	BBC	BAC	
Philippines				CAC (66,67)	CAC	CAC	CAC	CBC	CBC	
Thailand		AAC (56)	AAC		CAC (70,72)	CAC	CBB	CBB	CBB	CBB (94,97)
Sri Lanka		CBC (53,55,56)		CBC (63)	CBC (68)		CBC	CBB	CBC	CAC (97)

Note: Patterns are according to the standard rates in Table 4.3.

Sources: (1) United Nations, *Demographic Yearbook*, various issues. (For all countries except Japan)
(2) Government of Japan (2000), *100 Years of Vital Statistics in Japan (1899-1998).*

Figure 4.8 Shifts in Age Patterns of Fertility (Percent Distribution of ASFR)




Hong Kong
1969
1997
1969 (BBC)
TFR (3.43)
1997 (BAC)
TFR (0.99)
Birth Rate
Age
<20
20-24
25-29
30-34
35-39
40-44
45+
Singapore
1967
1995
1967 (BBB)
TFR (4.02)
1995 (ABC)
TFR (1.77)
Philippines
1966
1991
1991 (CBC)
TFR (3.26)
1966 (BAC)
TFR (3.59)
Sri Lanka
1956
1995
1956 (CBB)
TFR (4.99)
1995 (CAC)
TFR (2.34)

4.3 Age Patterns of Fertility Related to the Fertility Transition

Results from the age patterns of fertility compared with the total fertility rate are shown in Table 4.5. The general form of pattern development process has been explaining by TFR ≥ 2 and TFR<2. The case in TFR ≥ 2 means the transitional period fertility patterns; from natural fertility to family limitation as well as high fertility to low fertility level. The case in TFR<2 means the very low fertility or extremely low fertility of below replacement level fertility patterns.

There have had some modifications from the origin of Ohbuchi (1982). The study made here extends the period to the present and examines the pattern changes when fertility reaches to the below replacement level.

Table 4.5. Development Process in Age Patterns of Fertility

	TFR ≥ 2			TFR<2	
	AAC BAC CAC →	ABC ABB ACB BBC BBB BCB CBC CBB CCB →	ACA BCA CCA	ACB ABB BCB BBB CCB CBB →	ABC AAC BBC BAC CBC CAC
Development Process	I	II	III	IV	V
Level of Fertility	High	Medium	Low	Very Low	Extremely Low

Note: (1) Modified from Ohbuchi (1982).

(2) CAA, CAB and CBA are excluded in the pattern development process.

Pattern changes during the transitional fertility period (for the case in TFR ≥ 2) are identical with the Ohbuchi (1982). The development process of the age patterns of fertility has changed to the opposite direction when a country reach to the below

replacement fertility level. The development process of age patterns of fertility and the levels of fertility can be analyzed as follows:

In the case of TFR ≥ 2

- In high fertility level, women's concentration in childbearing is relatively high in their thirties rather than in their twenties.
- In low fertility countries, women's concentration in childbearing is in contrast with the high fertility countries. Fertility has been heaping on 20~29 years age group, and childbearing is very low in age group 30 years and over.
- In medium fertility level, childbearing in the age group 20~29 years has increased from level B to C, and childbearing in the age group 30 years and over has decreased into Level B.
- Fertility in the age group under 20 years belongs to different levels of fertility (A, B, C) among the countries, as well as within the each stage of fertility level.

In the case of TFR<2

- Fertility level in the women's ages of 20~29 has been decreasing in order of C, B, A.
- Fertility level in the women's ages of 30 years and over has been increasing in order of A, B, C.
- Fertility level in the women's ages of under 20 has been identical with the situations of the transitional period.

4.4 Recent Fertility Transition and Age Patterns of Fertility in Asia

Age patterns of fertility observed in Asian countries have been likely to be changed by the timing of childbearing. Delayed childbearing caused the fertility declines and level of differences among countries, since childbearing rates have declined sharply in women aged 20-29. Women's age at marriage has increased and that plays a major role in the initial stage of fertility decline. In general, the proportion of marriage in the age group under 20 has declined significantly. This has been characterizing the big rise in age at first marriage. This segment has modified the age patterns of fertility.

During the transitional period (from high to low level fertility), there have been wide variations in levels and patterns of fertility among Asian countries. In developing Asian countries, government intervention on fertility level and introduction of an effective family planning program has been an efficient factor of significant decline in fertility. A continuous decrease in marital fertility has shown the influence of information provided by mass media, the improvement of knowledge on contraception, access to modern contraception methods. A wide spread practice of birth control and an early completion of family building have also explained the pattern changes.

The fertility of teenage or adolescent fertility could not identify and explain in the fertility patterns. It depends mainly on the custom and cultural setting of one's country. Pre-marital conceptions and teenage sub-fecundity have a large and irregular impact on teenage fertility (Knodel 1977).

The International Planned Parenthood Federation (IPPF) estimates that more than 15 million women of 15-20 years old give birth annually in the worldwide. International health experts say that this figure is only an approximation. It does not include girls younger than 15 years and statistics on abortion and miscarriages are incomplete. Openness about sex and sex education has not accompanied with the shift

from extended to nuclear family especially in Asian developing countries. To ensure the access to high quality of policies and programmes, appropriate family planning counseling and services for sexually active teenagers, maternal and child health programmes for teens, educational and legislative measures to discourage early marriage and childbearing, and educational and employment alternatives to early marriage and childbearing are required (UNFPA 1994).

The classical demographic transition theory derived from the general experience of the West could explain the fertility declines in some East and South East Asian countries, but it could not explain well the declines in others.

In this study, satisfactory data is lacking for some of the most populous countries, such as China (mainland), India, Bangladesh, and Indonesia.

CHAPTER V

The Influence of Socio-Economic Development on Fertility Decline

Contents

CHAPTER V

The Influence of Socio-Economic Development on Fertility Decline

Large share of views on Asian community is male dominated. But with the continual changing of the socio-economic conditions, women have been taken more initiatives and active participation in the society for their better living conditions even more than before.

Population growth has two impacts on particular economy in both demand and supply side. Although all people consume goods and services, only part of the entire population of a country engage in the producing sector for goods and services. There are a number of countries with similar socio-economic levels and trends but with different fertility levels.

At the macro level, fertility behavior influences population growth, which has consequences on such things as pressure on resources, unemployment rates, savings and investments. In turn, such consequences represent changes in the socio-economic variables that may affect fertility behavior. At the micro level, the presence of children affects the income and opportunities of parents, and thus feeds back into the determination of fertility.

This study identifies the socio-economic factors that effect on fertility levels in developed countries as well as developing countries in Asia. A common factors that cause fertility decline and differences between countries are economic development, urbanization, education, maternal and child health, delayed age at marriage, improvements in the status of women, contraceptive use, and diffusion of the mass media.

Several indices could be selected as indicators of socio-economic conditions. The indicators used for this study are (i) Economic indicators (ii) Health indicators (iii) Educational indicators and (iv) Urbanization.

Socio-economic development influences on fertility are observed by using Multiple Linear Regression Models. The Multiple Linear Regression Model is probably the most widely used multivariate technique in social sciences for studying causal relationships between one dependent variable and several independent variables. Both dependent variable and independent variables should be measured on an interval-level scale. Independent variables are also called predictor variables as they are expected to influence the dependent variable. The dependent variable, also called the criterion variable that can be predicted from independent variables.

To estimate the unknown regression parameters, the SPSS regression program has been used in this study. Multivariate statistical model of demographic indices will be developed in this chapter.

The general scheme can be divided into three parts:

(a) An examination of the relating socio-economic nature with fertility decline.

(b) Defining the set of likely associations between the fertility variable and socio-economic variables.

(c) Discussion of the conceptual structure in which fertility decline explained by social and economic events.

5.1 The Nature of Fertility Decline and Socio-Economic Development

From the experience of developed countries, many demographers accepted that fertility could decline when a country had reached a certain threshold of economic and social development. Nowadays, fertility decline is concerned only partly with socio-economic development in developing countries, because a number of developing

countries have experienced their fertility decline with the predominantly rural, lack of well-developed economic and social development.

Ronald Freedman presented some assumptions related to fertility decline at the 1964 World Population Conference in Belgrade. The assumptions were that fertility rates ought to decline first and most rapidly under the following conditions:

(a) Where significant social development has already occurred;

(b) Where mortality has been relatively low for some time;

(c) Where there is evidence that many people, wanting moderate sized families, are beginning to try to limit family size;

(d) Where there are effective social networks, transcending local communities, through which family planning ideas and services and other modernizing influences can be disseminated;

(e) Where there are large scale, effective organized efforts to disseminates family planning ideas and information;

(f) Where such new contraceptives as IUDs or contraceptive pills are effectively available.

Then Freedman maintained that it is not necessary to assert that all of these are necessary preconditions for any fertility decline (Freedman 1979).

Some review of the literatures related to the models are classified as follows:

(1) Mortality decline as a precondition of fertility decline

(2) Relation between fertility and economic development

(3) Fertility and female labour force participation

(4) Mechanisms of education effect on fertility

(1) Mortality decline as a precondition of fertility decline

A number of theories expressed that there has been positive relationship between mortality and fertility, because falling death rates induced to have many births for a family. The basic concept of demographic transition theory states that according to the classification of population specified by different combinations of fertility and mortality levels, the standards of living rise with the urbanization and industrialization (Notestein 1953, Coale & Hoover 1958). These changes caused the fertility declines and that initially produced a decline in mortality.

Davis (1963) explained that mortality decline and survival of too many children begin to experience the economic stress to a family and that provides the central motivation for reducing family size, but it does not lead to birth limitation. In the simulation model of world employment/population relationship made by the International Labour Office, there included an assumption that life expectancy increase gradually with the increase of average household income (International Labor Office, 1973).

(2) Relation between fertility and level of economic development

It has been widely observed that there has been a negative relationship between income and standards of living and the family size of married females (Grille, 1969). At the same time, the relationship between economic indicators and current fertility with a lag of one or more years over the business cycle has been found to be strongly positive. Simon (1969) argues that this apparent paradox arises essentially because of the omission of the lagged effects of income, as well as systematic changes in 'taste' for children caused by income changes or, a modernization effect. Easterlin (1969) says that family size can be considered within the economic framework of household choice, if this framework is extended to include 'taste' factors emphasized in the social work.

Family size then becomes a matter of constrained choice, and fertility variations in time and space reflect variations in the relevant preferences and /or constraints.

Caldwell developed the theory of wealth flows and explained that in the post-transitional market economy, the direction of the wealth flow has changed to the opposite direction and fertility will start to decline. Moreover, Becker (1981) stated that decline in fertility implies that the relative price of a child has increased. It has also meant that the income of a couple has fallen or there has been a change in the shape of the couple's utility function for children versus other goods.

(3) Fertility and Female Labour Force Participation

In general, fertility has a negative relationship to female employment. There are a number of possible explanations for the negative association between the presence of young children and the mother's participation in the labour force. More recent cohorts of women have higher levels of educational attainment which may increase the opportunity of economically activity in outside home (Leibowitz and Klerman, 1995).

Willis (1973) argues that while child quality increases, the fertility decreases. Ryder suggests that, if the weight of the income effect relative to the substitution effect is caused by an increase in the wife's wage, a general increase in the price of female time might help to explain the decline in the variance of cohort TFR (Ryder, 1986).

William P. Butz and Michael P. Ward (1979) made the new home economics model of fertility behavior. The model lies in clarifying the response of fertility into changes in income and prices, by direct connect on fertility behavior with labor market. The model basically accepts the positive income effect on fertility. Therefore, in the household with a wife not in employment, husband's income growth will lead to higher fertility. On the other hand, in the household with an employed wife, a rise in female wage rates will increase an opportunity cost of wife's time and hence a shadow price of

children, and consequently it will have a suppressive effect on fertility. Using U.S data, Butz and Ward successfully tested their model and John Ermisch (1979) got a good result in the application of the Butz and Ward model to Great Britain. In the case of Japan, some recent modifications of the Butz and Ward model made by Osawa (1985), and Ogawa and Mason (1986) led to desired results. Using both the Butz & Ward types, and non-Butz & Ward type models, Ohbuchi (1988b) could present a quite successful result to explain in post-war Japan.

(4) Mechanisms of education effect on fertility

Cochrane (1979) mentioned that education and fertility have non-linear relations. According to Cochrane (1979), the effect of education on fertility can be divided into three portions: effects on demand for and supply of children, and on fertility regulation. In Easterlin model (1983), the process of modernization can be regarded as of educational development. Less literate countries have excess demand or situation of excess supply with inability to control fertility.

Cleland (1985) expressed that the spread of new aspirations, or new attitudes will lead the family formation or birth control, and education and culture are important for these new ideas of individual reproductive behavior. This will lead to a rapid decline in marital fertility.

5.2 Model Structures and Database

Apart from the economic factors, it is difficult to predict the trends and changes of the social, cultural and traditional norms of a country, since the availability of data is so limited. The study emphases on the explanations of the fertility models in Asian countries and each model will be formed by the predicted relationship between fertility and a set of factors assumed to determine fertility. The estimated relationships between

fertility and the measured explanatory factors should be consistent with the predictions of the model. Variables representing the socio-economic factors suggested by theories of fertility decline are infant mortality, education attainment, urbanization, female labour force, per capita income, etc.

A simple method of regression analysis has been applied to study the effect of socio-economic changes on the level of fertility. The regression models show the different greatest possible variables that explain fertility among the countries. In this research work, 9 countries of Japan, Singapore, Hong Kong, Israel, Republic of Korea, Malaysia, Thailand, Philippines, and Sri Lanka are analyzed and the studied period is from 1970 to 1999. Data sources and notation of the variables conducted in the model are as follows:

Variables in Regression Analysis

Dependent Variable

TFR	Total fertility rate

Independent Variables

IMR	Infant mortality rate (per 1000 live-births)
E0	Expectation of life at birth
URBAN	Population in urban area (%)
EDN2	Secondary school enrolment ratio (%)
FLF	Female labor force participation rate (%)
PCI	Per capita GNP (U.S.$)

Sources: 1. World Bank, World Tables 1987, 1995. (Data for 1970-1993)

2. World Bank, World Development Indicators. (Data for 1994-1999)

The condition of signs expected a priori for all variables in the model is as follows:

Dependent Variables	Independent Variables					
TFR	IMR	E0	URBAN	EDN2	FLF	PCI
	+	-	-	-	-	+,-

A plus sign means that an increase in the variable enhances fertility, and a minus sign indicates a suppressing effect.

The following is the relationship between dependent and independent variables in the model.

$$TFR = f \{ IMR, E0, FLF, EDN2, URBAN, PCI, (PCI)^2 \}$$

$$TFR = a0 + a1\ IMR + a2\ E0 + a3\ FLF + a4\ EDN2 + a5\ URBAN + a6\ PCI + a7\ (PCI)^2 + u1$$

In order to avoid the effect of unit, the natural logarithm of regression model will be used. Logarithmic linear regression adopted in the model is

$$\ln TFR = a0 + a1\ \ln IMR + a2\ \ln E0 + a3\ \ln FLF + a4\ \ln EDN2 + a5\ \ln URBAN + a6\ \ln PCI + a7\ \ln(PCI)^2 + u1$$

5.3 An Analysis of Regression Results

As already noted in Table 5.1, the correlation between fertility and various indicators of social and economic progress are strong and they generally agree with expected directions in the majority of countries. But there are some exceptions of low correlation, less than 0.5 between fertility and female labour force in Japan, Hong Kong and the Philippines. In Sri Lanka, the correlation between fertility and urban population is only 0.25. The correlation of Thai female labour force with other variables violates from the desired directions. Thus, the variable of female labour force is removed in

Thailand fertility model. Despite this mildly encouraging result, the observation of fertility and socio-economic development displayed reasonably high correlation and desired direction results.

Table 5.1 Correlation Matrices Related to Fertility

Table 5.1.1 Hong Kong

	TFR	IMR	E0	FLF	EDN2	URBAN	PCI
TFR	1	0.96	-0.94	-0.45	-0.89	-0.91	-0.98
IMR		1	-0.93	-0.57	-0.85	-0.95	-0.95
E0			1	0.43	0.84	0.89	0.94
FLF				1	0.01	0.51	0.48
EDN2					1	0.93	0.89
URBAN						1	0.88
PCI							1

Table 5.1.2 Israel

	TFR	IMR	E0	FLF	EDN2	URBAN	PCI
TFR	1	0.93	-0.89	-0.83	-0.92	-0.92	-0.95
IMR		1	-0.99	-0.90	-0.94	-0.92	-0.97
E0			1	0.89	0.92	0.89	0.95
FLF				1	0.70	0.73	0.84
EDN2					1	0.95	0.96
URBAN						1	0.92
PCI							1

Table 5.1.3 Japan

	TFR	IMR	E0	FLF	EDN2	URBAN	PCI
TFR	1	0.94	-0.96	-0.42	-0.91	-0.90	-0.96
IMR		1	-0.93	-0.29	-0.90	-0.90	-0.99
E0			1	0.53	0.95	0.90	0.93
FLF				1	0.46	0.33	0.32
EDN2					1	0.92	0.93
URBAN						1	0.91
PCI							1

Table 5.1.4 Korea, Rep. of

	TFR	IMR	E0	FLF	EDN2	URBAN	PCI
TFR	1	0.94	-0.94	-0.66	-0.86	-0.98	-0.98
IMR		1	-0.94	-0.82	-0.76	-0.94	-0.95
E0			1	0.81	0.91	0.95	0.96
FLF				1	0.56	0.68	0.73
EDN2					1	0.90	0.89
URBAN						1	0.99
PCI							1

Table 5.1.5 Malaysia

	TFR	IMR	E0	FLF	EDN2	URBAN	PCI
TFR	1	0.92	-0.96	-0.98	-0.94	-0.95	-0.96
IMR		1	-0.97	-0.90	-0.89	-0.88	-0.88
E0			1	0.96	0.96	0.94	0.94
FLF				1	0.95	0.95	0.96
EDN2					1	0.98	0.95
URBAN						1	0.97
PCI							1

Table 5.1.6 Philippines

	TFR	IMR	E0	FLF	EDN2	URBAN	PCI
TFR	1	0.95	-0.93	-0.24	-0.94	-0.94	-0.91
IMR		1	-0.98	-0.50	-0.94	-0.97	-0.89
E0			1	0.47	0.93	0.97	0.89
FLF				1	0.22	0.47	0.36
EDN2					1	0.95	0.90
URBAN						1	0.84
PCI							1

Table 5.1.7 Singapore

	TFR	IMR	E0	FLF	EDN2	PCI
TFR	1	0.76	-0.75	-0.87	-0.65	-0.81
IMR		1	-0.98	-0.82	-0.91	-0.98
E0			1	0.85	0.90	0.97
FLF				1	0.61	0.83
EDN2					1	0.96
PCI						1

Table 5.1.8 Srilanka

	TFR	IMR	E0	FLF	EDN2	URBAN	PCI
TFR	1	0.99	-0.95	-0.76	-0.96	-0.25	-0.98
IMR		1	-0.97	-0.76	-0.96	-0.19	-0.98
E0			1	0.79	0.89	0.26	0.97
FLF				1	0.56	0.62	0.83
EDN2					1	0.004	0.93
URBAN						1	0.32
PCI							1

Table 51.9 Thailand

	TFR	IMR	E0	EDN2	URBAN	PCI
TFR	1	0.91	-0.98	-0.83	-0.88	-0.98
IMR		1	-0.93	-0.52	-0.98	-0.90
E0			1	0.79	0.90	0.96
EDN2				1	0.50	0.87
URBAN					1	0.89
PCI						1

In the multiple regression analysis of Asian countries, three types of analysis are introduced. These types of analysis are classified by studied period of 1970-1999, 1970-1984, and 1985-1999. Since 1980s, almost all countries in East Asia have already reached to the below replacement fertility level (Chapter 4, Section 4.2) and significant changes have occurred in the developing countries of medium and low levels socio-economic development (Chapter 6, Section 6.3). Thus, the analyses classified by before and after mid-1980s intend to examine how the related social and economic conditions differ in those periods.

During 1970-1999 (Table 5.2), the combined effects of infant mortality, life expectancy, female labour force, urban population, secondary level school enrolment and per capita GNP explained the total fertility rate in the variation of between 90 per cent and 97 per cent in all countries except Singapore. The influence of Singapore female labour force and secondary level's school enrolment ratio over the total fertility rate explained only 65 per cent. These analyses show that the signs of the relationship

accord with their hypothesized direction and these variables are statistically significant. Nevertheless, Durbin Watson tests show the values between 1 and 2 for Japan, Israel, the Republic of Korea, Malaysia, Sri Lanka. These values for Singapore, Hong Kong, Thailand, the Philippines are as low as from 2. According to overall summarized result, all of these variables are important factors in predicting TFR.

Table 5.2 Model Summary (1970-1999)

Countries		Constant	IMR	E0	FLF	EDN2	URBAN	PCI
Japan		3.91			-0.59*			-0.13*
		(0.79)			(0.22)			(0.01)
R Square	0.94							
D.W	1.29							
S.E	0.03							
Singapore		4.94			-0.93*	-0.26**		
		(0.71)			(0.25)	(0.15)		
R Square	0.65							
D.W	0.92							
S.E	0.08							
Hong Kong		14.02					-2.46*	-0.26*
		(3.15)					(0.74)	(0.03)
R Square	0.97							
D.W	0.94							
S.E	0.05							
Israel		13.21					-2.44**	-0.13*
		(4.79)					(1.13)	(0.03)
R Square	0.95							
D.W	1.24							
S.E	0.04							
Korea,Rep. of		6.90					-1.46*	
		(0.26)					(0.06)	
R Square	0.96							
D.W	1.28							
S.E	0.06							

Table 5.2 (Continued)

Countries		Constant	IMR	E0	FLF	EDN2	URBAN	PCI
Malaysia		8.84			-1.99*			-0.06*
		(1.07)			(0.35)			(0.02)
R Square	0.97							
D.W	1.06							
S.E	0.03							
Thailand		14.57		-2.85*				-0.23*
		(2.70)		(0.74)				(0.06)
R Square	0.97							
D.W	0.63							
S.E	0.06							
Philippines		10.09		-1.41*		-0.66*		
		(1.76)		(0.63)		(0.23)		
R Square	0.90							
D.W	0.57							
S.E	0.05							
Sri Lanka		0.10	0.41*			-0.29**		
		(0.80)	(0.07)			(0.14)		
R Square	0.97							
D.W	1.16							
S.E	0.04							

Note: * Significant at 1% level ** Significant at 5% level

D.W: Durbin Watson Test

S.E: Standard Error of Estimate

Values in parentheses are standard error of regression coefficients.

During 1970-1984 (Table 5.3), the combined effects of IMR with other variables explained mostly to the total fertility rate (TFR), and they account for 96 to 99 per cent in the regression models. The influence of the secondary level enrolment ratio, per capita GNP, and the expectation of life at birth explained the total fertility rate in the variation of between 80 and 99 per cent. The conditions of signs of regression are the

same as expected and all the predictor variables are also statistically significant at 1% and 5% levels. The values of Durbin Watson test show in the range of 1.51 to 2.24 for Japan, Singapore, Hong Kong, Israel, Malaysia, the Philippines, Sri Lanka, the Republic of Korea, and the values less than 1.5 for Thailand.

During 1985-1999 (Table 5.4), TFR is explained mostly by the combined effects of per capita GNP with other variables, and they account for 72 to 98 per cent in the regression models. The influence of E0 and IMR over TFR explained in the variation of 52 to 69 per cent. The signs of coefficient agree with those expected before. In addition, all analyzed factors have significant effects on the TFR. It indicates that these variables are important factors in predicting TFR.

Table 5.3 Model Summary (1970-1984)

Countries		Constant	IMR	E0	FLF	EDN2	URBAN	PCI
Japan		8.31				-1.70*		
		(1.29)				(0.28)		
	R Square	0.80						
	D.W	1.85						
	S.E	0.02						
Singapore		5.91	0.28*		-1.71*			
		(1.20)	(0.10)		(0.28)			
	R Square	0.97						
	D.W	2.00						
	S.E	0.04						
Hong Kong		2.94						-0.26*
		(0.06)						(0.01)
	R Square	0.99						
	D.W	1.74						
	S.E	0.02						
Israel		0.21	0.35*					
		(0.06)	(0.02)					
	R Square	0.96						
	D.W	1.51						
	S.E	0.02						
Korea,Rep. of		1.13	0.43**			-0.37**		
		(1.30)	(0.19)			(0.15)		
	R Square	0.99						
	D.W	2.13						
	S.E	0.01						

Table 5.3 (Continued)

Countries		Constant	IMR	E0	FLF	EDN2	URBAN	PCI
Malaysia		0.08	0.53*				-0.14*	
		(0.36)	(.05)				(0.05)	
R Square	0.99							
D.W	1.78							
S.E	0.01							
Thailand		1.81	0.45*				-0.77*	
		(1.12)	(0.13)				(0.22)	
R Square	0.99							
D.W	0.86							
S.E	0.01							
Philippines		-3.35	1.24*					
		(0.08)	(0.02)					
R Square	0.99							
D.W	1.97							
S.E	0.01							
Sri Lanka		13.23		-2.68*		-0.16*		
		(0.46)		(0.13)		(0.03)		
R Square	0.99							
D.W	2.24							
S.E	0.01							

Note: Same as Table 5.2

Table 5.4 Model Summary (1985-1999)

Countries		Constant	IMR	E0	FLF	EDN2	URBAN	PCI
Japan		2.31						-0.18
		(0.28)						(0.03)
R Square	0.78							
D.W	0.97							
S.E	0.04							
Singapore		7.73		-1.66				
		(1.89)		(0.44)				
R Square	0.52							
D.W	1.11							
S.E	0.05							
Hong Kong		3.18						-0.30
		(0.38)						(0.04)
R Square	0.82							
D.W	1.27							
S.E	0.07							
Israel		2.53						-0.16
		(0.40)						(0.04)
R Square	0.72							
D.W	1.10							
S.E	0.05							
Korea,Rep. of		-0.08	0.26					
		(0.13)	(0.05)					
R Square	0.69							
D.W	0.97							
S.E	0.07							

Table 5.4 (Continued)

Countries		Constant	IMR	E0	FLF	EDN2	URBAN	PCI
Malaysia		3.32						-0.26
		(0.33)						(0.04)
R Square	0.74							
D.W	0.64							
S.E	0.05							
Thailand		3.43				-0.15		-0.28
		(0.14)				(0.06)		(0.04)
R Square	0.98							
D.W	1.93							
S.E	0.03							
Philippines		-0.01	0.36					
		(0.30)	(0.08)					
R Square	0.61							
D.W	0.62							
S.E	0.04							
Sri Lanka		7.27				-1.33		-0.12
		(0.57)				(0.17)		(0.04)
R Square	0.96							
D.W	2.21							
S.E	0.02							

Note: Same as Table 5.2

5.4 Summary of Findings

Demographic variables are closely linked to social and economic policy and these are important for improving the quality of life of the people. As generally accepted, population growth is characterized by the level of fertility, mortality and migration of population. Among these three components of growth of population, the first two constitute the major and vital determinants of population growth. Migration is not a uniformly influencing factor of population growth. Thus the rate of population growth is determined by fertility rates in combination with mortality rates.

All of the socio-economic indicators introduced in this study had strong correlation with the levels of fertility. Low fertility is also highly correlated with low infant mortality and high per capita GNP.

Furthermore, the knowledge required for healthy living is associated with the level of education and the information provided by mass media. Education, especially female education contributes to the survival of children and opens up the possibility of using contraception. The level and distribution of education among the people are also factors that influence the value attached to health. In addition, the possibility of obtaining the resources needed for good health can be determined in both demand side, by the level of income, and supply side, by the quantity of health services distribution.

When studying fertility, the factors, which determine the values taken by the health indices are also required to consider. Health and mortality have a close relationship. In the developing countries, a principal component of high mortality is high infant mortality. In fact, infant mortality is considered an important indicator of demographic welfare. Since it reflects the best in prevailing economic and social conditions of a country.

National income is probably the best single indicator of living standard in a country. Per capita national income is an index of the total value of final products produced per inhabitant during a defined period, exclusive of goods, which merely replace losses from depreciation of capital equipment. A higher income implies larger real consumption of items in two ways. One is the consumption affecting health, such as food, housing, medical and public health services, education, leisure, health-related research and another way is automobiles, cigarettes and animal fats, as of luxury goods.

Urban life stimulated the family in many functions, such as production, consumption, recreation, and education. With a rapid developing technology, new skills were needed and opportunities for individual advancement arose. Education became

increasingly important. As a consequence, the cost of rearing a child has grown. Therefore the possibilities for economic contributions by children have declined. Moreover, women found new independence from household obligations and new economic roles that less compatible with childbearing. It also depends on the country's modernization, such as the slow progress in modern values has continued a relatively high fertility (ex. the rich oil-exporting countries), and rapidly progress in modernization has changed significantly to a low level fertility (ex. newly industrializing economies).

As mentioned above, it could be concluded that low fertility is associated with the high levels of educational attainment. In fact, educational progress improves female's ability to earn much and spend more time working outside. Then the time of working mother for rearing children becomes restricted. Educational development also provides better knowledge about health and nutrition. Sufficient chance of access to nutritious food and medical services leads to reduce infant mortality rate. Besides, more educated mothers have higher aspirations for children that will cause a rise in the opportunity cost of rearing children and the decline in fertility. As generally accepted, low fertility is associated with the urban population employed in non-manual occupations with relatively high levels of educational attainment. Increase in urban population is directly related to increase in non-primary sector employment rate.

Many of the problems connected with the explanation of demographic patterns, particularly those associated with the socio-economic approaches reflect limitations on the availability of data. Indeed, the regression estimates based on some aggregate socio-economic indicators in this study can only offer a partial view on the explanation of fertility levels. For other potentially important variables, the data is not available in the majority of Asian Countries.

CHAPTER VI

The Impact of Population Policy on Fertility Decline

Contents

CHAPTER VI

The Impact of Population Policy on Fertility Decline

It is obvious that the countries in Asia are more diverse than any other region in the world. From East to West Asia, a total of 50 countries varies significantly in political, cultural, social, economic, and demographic situation. In this chapter, an overview of the progress made by Governments of Asian countries in achieving the goals and implementing the recommendations of the 1974 World Population Plan of Action in Bucharest is discussed.

Population policies are government actions of laws, regulations, and programs. These policies intend to improve the quality of life that consistent with the available resources in a country. As a way to attain the goal of promoting the social and economic development, the policies must take into consideration the three components of population change: fertility, mortality, and migration. In many parts of the developing countries, rapid population growth has been induced by the policies aimed at reducing fertility, especially through the adoption of family planning (Pressat 1985).

Family planning means conscious effort of couples or individuals to control the number and spacing of births. Family planning is used synonymously with many terms such as birth spacing, birth control, fertility regulation, planned parenthood, family limitation and many others. The term implies a general reproductive strategy, however, and should not be used to mean just contraception, since it composes practices aimed both at preventing births at certain times and at inducing them at others (Pressat 1985).

The United Nations held the global population meetings with the collaboration of International Union for the Scientific Study of Population (IUSSP) in 1954 and had convened roughly every 10 years. After 1950, the introduction of modern medicine and

increased access to health services had led to the rapid decline in death rates, but birth rates remained highly in developing countries. The result of rapid population growth could hinder the countries' development with limited resources. Since those periods, population policies and programs had been developed. In 1952, India became the first country of initiating a state sponsored family planning program to slow population growth in the world (Gwatkin 1979).

At the 1974 World Population Conference in Bucharest, an Indian delegate expressed the views of many developing countries' leaders that "development is the best contraceptive". An increasing number of developing countries accepted the ideas of government actions on slow population growth through the socioeconomic development, and adopted national population policies to that end. At the 1984 World Population Conference in Mexico City, the formal declaration that called on governments as a matter of urgency were to make family planning services "universally available". At the 1994 International Conference on Population and Development (ICPD) in Cairo, the concepts of "reproductive rights and reproductive health" had been defined. The definitions state as (United Nations 1995): *reproductive health is a state of complete physical, mental, and social well-being and not merely the absence of disease or infirmity, in all matters relating to the reproductive system and to its functions and processes.* Reproductive health takes into account the relationship of rights, equity, dignity, and responsibly. *Reproductive rights include the basic right of all couples and individual to decide freely and responsibility the number, spacing and timing of their children, and to have the information and means to do so, the right to a satisfactory and safe sex life.* Incorporating family planning and other reproductive health services into basic health care is called the new population policies (Ashford 2001).

6.1 Overview of the Governments' Policies and Plans in Asian Fertility Decline

In Asian countries, fertility transition was led by Japan (Taeuber 1958), followed by the oversea Chinese in East and South East Asia, and the population in the major cities of China, Thailand and the Republic of Korea. As Japan had completed its transition in during the late 1950s and early 1960s, population in Hong Kong, Singapore, Taiwan, Thailand and the Republic of Korea had been starting theirs (Leete 1996).

East Asia

Asian fertility transition began first, came to its completion, and reached to the below replacement level in East Asia. Rapid fertility decline in China (mainland) was significantly due to the government's strong anti-natalist policy and modern methods of family planning. But there is concern over the ageing of the population as a consequence of lower fertility. Population control is one of the important components of the Government's overall development strategy. China's current population policy limits on the most urban couples to one child, two if both parents are only children, and allows rural residents two children if the first child is a daughter. In 1995, the Chinese government called for reorienting the family planning program to be driven by people's interest and to emphasize more comprehensive services. The government took steps in selected areas to improve the quality of family planning services that offer counseling on method choices, prenatal care, and premarital counseling. If it is successful, these initiatives may be expanded to the whole countries (Kennedy 2000; Ashford 2001).

In the Republic of Korea and Taiwan, governments support in the contexts of rapid social and economic development played significant roles in family planning programmes. Fertility in these rapidly industrialized countries has still continued to fall sharply although the government activities of the family planning programmes were

scaled down in the 1980s. Korea's family planning programme began in 1962, and the Government and Private Family Planning Association had created it. Since 1980s, rapid population growth in the Seoul metropolitan area has been regarded as undesirable for strategic as well as for economic reasons. The process of constructing satellite cities and a new capital has been under way (UNFPA 1990).

South-East Asia

In Singapore, the goal of two children family as a social norm was established, and a series of social and economic disincentives were introduced which actively discourage large family. In 1976, Singapore was announced that a replacement level of fertility had been achieved. As a result, the former programmes were being maintained as part of maternal and child health as well as family welfare services (UNFPA 1990).

Population in Thailand and Indonesia was predominantly rural, and economic development was very modest. Government leadership and family planning programmes in supporting modern contraception played important roles in fertility level changes. Indonesia has undergone first to a large fertility decline among the predominantly Islamic population countries in Asia (Leete & Alan 1993). Indonesia has a comprehensive planning process which recognizes that population variables must be considered in all sectors of planning. In Thailand, although the health situation is considered acceptable, continuing effort is being made to integrate methods of preventing local diseases into the general public health services (UNFPA 1990).

Since 1970s, the population policies of both Malaysia and the Philippines have been placing greater emphasis on family welfare. The Malaysian National Family Planning Programme began in 1966, and a special National Family Planning Board, which included members from relevant Government Ministries, directed it, and Non-Government sectors. Since late 1970s, overall level of fertility in Malaysia has been

declining more than 15 per cent in each decade. The Government of Malaysia has stated that establishing a fixed target of a total population of 70 million by the year 2100 will facilitated the adjustment and monitoring of current and future socioeconomic development (UNFPA 1990). Fertility in the Philippines has declined rapidly during late 1970s to 1980s and only modestly in 1990s. The policy was to reduce the rate of population growth and natural increase to 2.0 per cent by 1987 and 1.7 per cent by the year 2000 (UNFPA 1990).

Myanmar and Vietnam had significant fertility decline since the decade of 1980s. However, socioeconomic development was very limited in these countries. In Myanmar, the organized family planning programmes had also lacked. But there is some concern over its relation with maternal and child health. Development objectives are considered that manpower has been the most important factor (UNFPA 1990).

The Government of Vietnam considers the population size and rate of growth to be too high and seeks to reduce them through programmes of direct intervention. The National Family Planning Programme includes the social and economic restructuring as extending educational opportunities and raising the status of women (UNFPA 1990). Since 1980s, there had been rapid decline in fertility.

South Asia

At the national level, only Sri Lanka had a substantial fertility transition. The transition has occurred in spite of limited economic development, but it has been associated with relatively higher education level of population. The government has made a commitment to reduce the rates of growth and natural increase by expanding family planning services, promoting women's education and employment, raising the legal age of marriage, renewing its effort to combine sterilization with fiscal and monetary incentive and disincentive measures (UNFPA 1990).

India initiated a national policy to slow population growth in 1952 and stepped up efforts to promote family planning program to the targets for contraceptive acceptance. In 1996, the "target-free approach" called for planning to the community level and it set targets for individual to access reproductive needs (Government of India 2000). Some significant decline of fertility has occurred in particular states of Kerala and Karnataka in India since 1960s.

Bangladesh and Nepal have appeared slow fertility decline, and fertility level in Pakistan has still remained high. In these countries, low level of education, low status of women, ethnic and religious conflicts tend to limit the efficiency of government policy in promoting sustained economic growth and strong family planning programmes. The government of Bangladesh has projected to promote the two-child family norm among the youth rural out-of-school population. The Government of Nepal considers the population policy as an integral part of development and population control is essential for raising the standard of living of the population. Government provides adequate education and health services, and increases employment opportunities for this development process. In Pakistan, in order to decrease fertility levels, the population-planning programme was integrated into an expanded health infrastructure, contraceptives were given wider distribution, and the participation of women in the labour force was increased. (UNFPA 1990)

West Asia

Fertility maintains at relatively high levels among the most of Arab countries in West Asia, including oil-exporting nations. An important factor of sustained high fertility is caused by the slow progression of modernization that generally accompanied with economic development. In most of these countries, per capita income is high, but, the status of women in those countries remains low (Leete & Alan 1993).

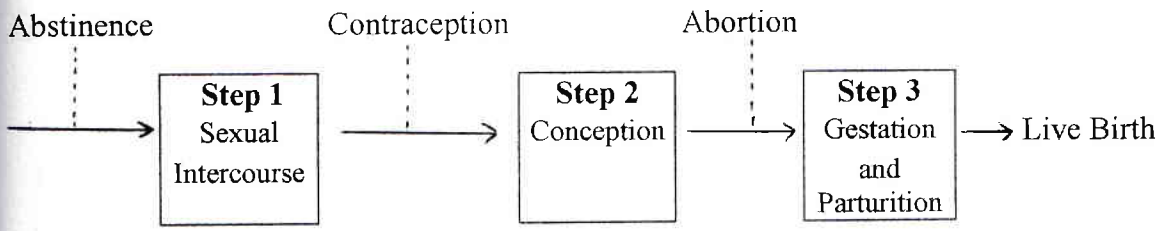
Kuwait Government views the high population growth rate as a positive contribution to socioeconomic development, and has designated population policy as an important and integral component of economic and social planning. Iran has not active attempt to achieve development objectives through the implementation of population policies. The Government of Iraq considers the population policy of promoting a sustained increased in population size is desirable in order to achieve an adequate manpower for economic growth and development, as well as to maintain the national identity. No specific population policy statement has been made in Saudi Arabia. (UNFPA 1990)

Fertility trends in non-Arab countries of Cyprus, Israel and Turkey have undergone substantial transition. The long-term decline in fertility has led the Government of Cyprus to formulate the policy deals with the problem of low fertility, emigration and small population size that contribute to labour shortages (UNFPA 1990). The Government of Turkey has adopted a policy of lowering the growth rate by providing family planning services.

6.2 The Diffusion of Modern Contraceptive Innovation

In the expression of Davis and Blake (1956), three steps of intervening in human reproduction: (1) Sexual intercourse, (2) Conception, and (3) Gestation and Parturition are required for fertility control. Figure 6.1 shows the different stages of fertility control. The policies that focus on the provision of contraception are generated between step 1 and 2, and the policies on the provision of abortion are developed between step 2 and 3. But some policies that promote public intervention perform explicitly before step 1.

Figure 6.1 The Reproductive Process



Source: Davis and Blake 1956.

According to the World Fertility Survey (WFS), the methods of modern contraception are defined as: Pill, IUD, Condom, Injection, Sterilization, Spermicide, and Diaphragm.

The exact origin of condom is unknown and it appears first in the literature of the Italian anatomist Gabriel Fallopius in 1564 (Himes, 1970). Around 1700, condoms made from animal membranes were sold in Central London (McFarlane & Meier 2001). The rubber form of product became available on a large scale in the mid-1800s. The diaphragms were invented in the late nineteenth century. An oral pill of steroid hormones was developed in the late 1950s. It provides first for effective fertility control. Plastic Intra-Uterine Contraceptive Device (IUCD or IUD) became a modern acceptance in the late 1950s and early 1960s, but the metal version had already appeared twenty years earlier in Germany and Japan. It has been the second most frequently sponsored method by family planning programmes in the developing countries. The use of sterilization has grown much more rapidly than any other methods. Thus the development and mass production of modern contraceptives began actively in the 1960s (Tsui 1985).

The average level of contraceptive use in the more developed regions is estimated at 70 per cent, and it is estimated at 55 per cent in the less developed regions. There are large differences in the levels of use within less developed regions, with an

average of 60 per cent or more in Asia, Latin America and Caribbean, but it has been only 20 per cent in Africa. Between 1988 and 1998, contraceptive prevalence has increased markedly even in some African countries (United Nations 1999b).

6.2.1 The Demand for Contraception

Fertility control includes contraception and abortion. The demand for contraception and the demand for abortion are related. If contraceptives are very expensive or unavailable, but abortion is legal and accessible, the abortion will become a common method of fertility control (ex. Japan). Otherwise, if contraceptives are readily available, the incidence of abortion will drop (ex. Netherlands) (McFarlane & Meier 2001).

Figure 6.2 explains the demand curves for fertility control. The left side of the demand curve expresses the individuals with weak preferences for fertility control. People avoid any barrier to fertility control where demand for contraceptive and abortion is highly restricted.

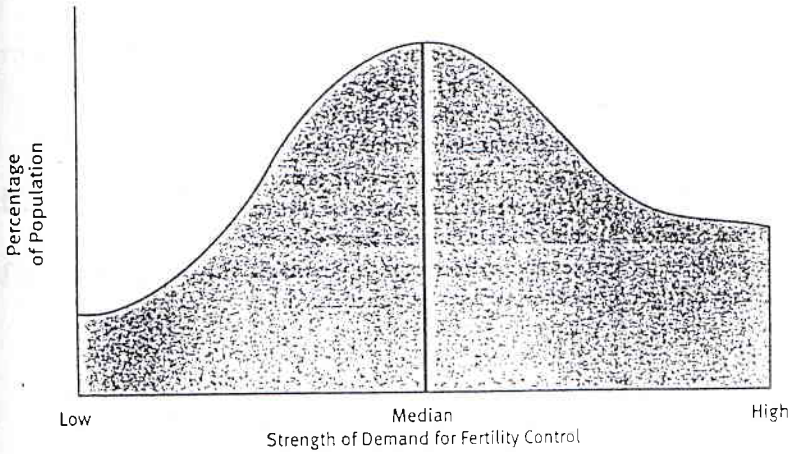
The middle of the curve expresses the individuals with moderate demand for fertility control. In this stage, fertility control is a normal economic goods and the consumption is determined by supply and demand.

The right side of the curve expresses the individuals with a high demand for fertility control. People's demand for fertility control is highly inelastic and conception has been avoided as much as possible since it imposes major costs.

During the reproductive lifetime, women's demand for contraception has been changing diffferently. Teenagers would have very low demand for fertility control, since the proportion of married teenagers were very low and the initiation of the fertility control did not occur within very early married women (Refer to Chapter 3, pp. 70-71). Women in their twenties and thirties would have moderate demand for fertility control.

They use contraception intermittently before achieving their intended family size. Women, especially in their old childbearing ages would have a high demand for fertility control, since they had already reached their desired number of children.

Figure 6.2 Demand Curve for Fertility Control



Source: McFarlane & Meier 2001.

6.2.2 The Supply of Contraception

In the demographic framework of fertility regulation, the supply of contraception in the Least Developed Countries (LDCs) relies mainly on the efforts made by public birth control programmes. In the urban areas of developing countries, contraception is privately available from hospital, clinics, health centers, physicians, and pharmacies. The increase of contraceptive supply will change the diffusion of modern contraceptive innovation as well as fulfil a large part of the unmet need.

The international funds for population assistance to the world's most populous LDCs had been increasing from US$ 6 million in 1961 to US$ 1 billion in 1980. The main providers of population assistance funds in early 1980s are the United States of America through its Agency for International Development, the United Nations Fund

for Population Activities, the International Planned Parenthood Federation, and the World Bank (Tsui 1985). Since 1986, Japan has become the top supporter of population assistance funds (UNFPA 1996).

The world's most populous LDCs, especially the nations in Asia including India, Indonesia, Thailand, and the Philippines are the main recipients of these funds. These countries received the assistance for national programmes between $ 15 and $ 44 million during 1977-1979 (Tsui 1985).

After the 1974 World Population Conference, a program on the Fertility Impacts of Development (FID) initiated in Asia by the Population Council in 1978. The objectives of the program were (Stoeckel & Jain 1986):

- To generate new knowledge about the impact of socioeconomic development on fertility
- To assist policymakers and program managers in incorporating the implications of development on fertility in the planning.

In general, three different forms of direct, indirect and coercive methods are introduced in the fertility control programmes. Direct methods are the most common used in the populous developing countries. The methods include:

- Spreading the use of contraceptives
- Educating the public in their use
- Promoting voluntary sterilization programmes
- Providing cheap and easily obtained abortions
- Producing or distributing enough contraceptive devices

In developing countries, indirect methods occasionally stress on

- Providing the family planning information, counseling, communication and services
- Advancing the education of women

- Promoting the economic growth, or urbanization
- Promoting and achieving gender equality and equity

as the best means of limiting fertility.

Coercive methods have been employed in the countries where the government perceives the need and has the capacity to implement such policies. The governments of China and Singapore are the prime examples. They both use negative economic incentives, including fines and higher tax to discourage fertility (Ness & Climent 1999).

In the United Nations report (1999), out of the 179 countries which information was available, there are 2 countries that have an official policy of limiting access to contraception. The remaining 177 countries that do not limit access to contraceptive methods. Of those countries, 79 per cent provided direct support for family planning services through the government operated facilities; an additional 7 per cent provided indirect support of family planning information, and services through the Non-Governmental Organizations (NGO); and 22 countries did not provide support in either direct or indirect.

6.3 The Impact of Fertility Control Policies

Between 1974 World Population Conference (when the World Population Plan of Action was adopted) and 1998 (Caio+5), dramatic demographic changes had occurred. During the past quarter-century, life expectancy for males increased by 6.7 years to reach 63.2 years and for females increased by 8.2 years to reach 67.6 years. The average number of children per women decreased from 4.5 in 1970-1975 to 3.3 in 1985-1990, declining fastest in the 1970s. During the early 1990s, the decline in fertility levels accelerated again to reach 2.9 in 1990-1995 and 2.7 today as fertility declines spread through more countries in Asia and Africa. As a consequence of these trends, the peaked population growth rate in 1965-1970 declined from nearly 2 per cent in 1970-

1975 to 1.7 per cent in 1975-1980. After holding steady at about 1.7 per cent per year until 1990, it experienced a sharp decline to reach the current annual rate of 1.3 per cent in 1995-2000 (United Nations 1999b).

The Governments' views on fertility and family planning program activities as well as services are shown for 1976 to 1996 in the following Table 6.1. Governments' view on fertility level identifies the Governments' perception of the overall acceptability of aggregate national fertility. It is divided into three categories: not satisfactory because too low; satisfactory; not satisfactory because too high.

The following four categories are the governmental policy concerning the level of support for modern methods of contraception.

(1) The Government limits access to information, guidance and materials in respect of modern methods of contraception that would enable persons to regulate their fertility more effectively and would help them achieve the desired timing of births and completed family size.

(2) The Government does not limit access to information, guidance and materials. But any kinds of support (direct or indirect) are not provided for their dissemination.

(3) The Government provides indirect support for the dissemination of information, guidance and materials. The indirect support may take various forms, such as direct grants, tax reductions or rebates, or assignment of special status.

(4) The Government provides direct support for the dissemination of information, guidance and material within Government facilities.

Tables 6.2 to 6.4 express the Governments' intervention on fertility level of the country and socioeconomic scores of HDI compared with the rates of decline in total fertility rate. These tables show how the socioeconomic development will reduce fertility by how much, as well as what can governments do to accelerate the process of changes. In particular, generating this scientific knowledge that concerned with the

interrelationship between socioeconomic development and population processes could be incorporated in the development planning process.

HDI, Human Development Index is a composite index of achievement in basic human capabilities in three fundamental dimensions: a long and healthy life, knowledge and a decent standard of living. Three variables of life expectancy; educational attainment and income have been chosen to represent the index.

Governmental intervention concerning the level of fertility is classified as four type; (*a*) to raise the fertility level, (*b*) to maintain the fertility level, (*c*) to lower the fertility level, and (*d*) no intervention or no policy formulated.

The present study reflects the changing patterns of Governments' views and policies concerning fertility behavior since the adoption of the World Population Plan of Action in 1974. From 1976 to 1999, among the countries that viewed fertility as too high were the majority from South-central Asia and Southeast Asia. The countries that viewed the fertility level as satisfactory included most of the countries in Eastern and Western Asia. In 1976, only two countries, Cambodia and Israel viewed their fertility level as too low. In 1996, Governments in Japan, Singapore, Cyprus, and Israel viewed their fertility level as too low and adopted policies aimed at raising the current level of fertility. But Japan did not intervene and formulate policies to affect the fertility level. Recently, Singapore considers the introduction of a large tax rebate that would be paid to women if they had their first child before the age of 28 years, since relatively early childbearing will not lead to below replacement level fertility.

As of 1999, only Saudi Arabia reported that they limited access to contraceptive information and materials. Among the 40 countries in Asia, 7 countries in Southeast Asia and Western Asia did not limit and no supports were provided for contraceptive dissemination. Japan, Cyprus and Israel provided only indirect support and the rest 29 countries supported Government facilitated contraceptive use directly.

During the follow-up period 1976-1989, all countries that considered fertility rates as too high intervened the measures to lower the growth rate. But in1999, most of the countries changed its intervention to maintain the rate of growth.

Most of the predominantly Islamic population countries: Malaysia, Iraq, Kuwait and Saudi Arabia view their rates as satisfactory and intervened to maintain that rate of growth, but others with satisfactory level did not undertake positive intervention.

Table 6.1 Governments Views on Fertility and Policies on Contraceptive Access

Country	View			Contraceptive Access		
	1976	1986	1996	1976	1986	1996
Eastern Asia						
China	Too High	Too High	Satisfactory	DS	DS	DS
Japan	Satisfactory	Satisfactory	Too Low	DS	NS	IS
Korea Rep. of	Too High	Too High	Satisfactory	DS	DS	DS
South-central Asia						
Bangladesh	Too High	Too High	Too High	DS	DS	DS
India	Too High	Too High	Too High	DS	DS	DS
Iran	Too High	Satisfactory	Too High	DS	IS	DS
Nepal	Too High	Too High	Too High	DS	DS	DS
Pakistan	Too High	Too High	Too High	DS	DS	DS
Sri Lanka	Too High	Too High	Satisfactory	DS	DS	DS
South-eastern Asia						
Brunei	...	Satisfactory	Satisfactory	...	NS	NS
Cambodia	Too Low	Too Low	Too High	Limits	Limits	DS
Indonesia	Too High	Too High	Too High	DS	DS	DS
Malaysia	Too High	Satisfactory	Too High	DS	DS	DS
Myanmar	Satisfactory	Satisfactory	Satisfactory	NS	IS	DS
Philippines	Too High	Too High	Too High	DS	DS	DS
Singapore	Satisfactory	Too Low	Too Low	DS	DS	DS
Thailand	Too High	Too High	Satisfactory	DS	DS	DS
Vietnam	Too High	Too High	Too High	DS	DS	DS
Western Asia						
Cyprus	Satisfactory	Too Low	Too Low	NS	DS	IS
Iraq	Satisfactory	Too Low	Satisfactory	DS	Limits	DS
Israel	Too Low	Too Low	Too Low	DS	DS	IS
Kuwait	Satisfactory	Too Low	Satisfactory	NS	NS	NS
Saudi Arabia	Satisfactory	Satisfactory	Satisfactory	Limits	Limits	Limits
Turkey	Too High	Too High	Too High	DS	DS	DS

Source: a. United Nations (1998), *National Population Policies.*

b. United Nations (2000), *Global Population Policy Database 1999.*

Note: DS Direct Support; IS Indirect Support; NS No Support.

Table 6.2 Socioeconomic Score, Government's Intervention on Fertility Level and Rates of Decline in TFR (1965-1975)

Government Intervention(1976) a		Lower		Raise		Maintain		No Intervention		
Socioeconomic Score (1975)	HDI b	Countries	Rates of Decline (%) c	Countries	Rates of Decline (%)	Countries	Rates of Decline (%)	Countries	Rates of Decline (%)	Average Total
High	0.845							Japan	-10	
HDI>0.800	0.802			Israel	-3					
				Average	-3			Average	-10	-6.5
Medium	0.725							Singapore	-40	
0.500<HDI<0.799	0.684	Korea, Rep. of	-18							
	...					Kuwait	-3			
	0.648	Philippines	-6							
	0.620	Malaysia	-10							
	0.612	Sri Lanka	-14							
	0.600	Thailand	0							
	0.590	Turkey	2							
	0.588					Saudi Arabia	-1			
	...							Jordan	-11	
	0.566	Iran	-3							
	0.530							Syrian Arab Rep.	-8	
	0.518	China	-41							
		Average	-11			Average	-2	Average	-20	-12

Table 6.2 (Continued)

Government Intervention(1976) a		Lower		Raise		Maintain		No Intervention		
Socioeconomic Score (1975)	HDI b	Countries	Rates of Decline (%) c	Countries	Rates of Decline (%)	Countries	Rates of Decline (%)	Countries	Rates of Decline (%)	Average Total
Low	0.465	Indonesia	0							
HDI<0.500	...	Viet Nam	3							
	...					Mongolia	-5			
	...					Iraq	-1			
	...							Myanmar	-5	
	0.405	India	-8							
	...			Cambodia	8					
	0.352	Pakistan	3							
	0.329	Bangladesh	-3							
	...					Lao-PDR	2			
	0.291	Nepal	3							
	...							Buhtan	5	
	...							Yemen+	3	
		Average	0	Average	8	Average	-2	Average	1	-1
Average			-7		3		-2		-10	-6

Sources: a 1. United Nations (2000), *Global Population Policy Database 1999.*
2. United Nations (1998), *National Population Policies.*
b 1. World Bank, *World Development Report* 1978,1987,1992,2000/2001.
2. World Bank, *World Tables* 1987, 1991.
3. World Bank, *World Development Indicators* 1999.
c UNDP (2000), *Human Development Report* 2000.

Note: 1. Rates of decline are computed from the source b.
2. + means government's intervention did not mention in the sources.

Table 6.3 Socioeconomic Score, Government's Intervention on Fertility Level and Rates of Decline in TFR (1976-1985)

Government Intervention(1986)		Lower		Raise		Maintain		No Intervention		
Socioeconomic Score (1985)	HDI	Countries	Rates of Decline (%)	Countries	Rates of Decline (%)	Countries	Rates of Decline (%)	Countries	Rates of Decline (%)	Average Total
High	0.888							Japan	-5	
HDI>0.800	0.841			Israel	-19					
				Average	-19			Average	-5	-12
Medium	0.785			Singapore	-19					
0.500<HDI<0.799	0.765	Korea, Rep. of	-27							
	...			Kuwait	-21					
	0.696					Malaysia	-16			
	0.685	Philippines	-17							
	0.673	Thailand	-27							
	0.673					Saudi Arabia	-3			
	0.676	Sri Lanka	-18							
	0.651	Turkey	-13							
	...							Jordan	-11	
	0.616							Iran	-8	
	0.605							Syrian Arab Rep.	-11	
	0.584	China	-24							
	0.580	Viet Nam	-26#							
	0.578	Indonesia	-16							
	...			Mongolia	-9					
	...			Iraq	-6#					
	0.505							Myanmar	-19	
		Average	-21	Average	-14	Average	-9	Average	-12	-16

Table 6.3 (Continued)

Government Intervention(1986)		Lower		Raise		Maintain		No Intervention		Average Total
Socioeconomic Score (1985)	HDI	Countries	Rates of Decline (%)	Countries	Rates of Decline (%)	Countries	Rates of Decline (%)	Countries	Rates of Decline (%)	
Low HDI<0.500	0.470	India	-15	Cambodia	-33*					
	...									
	0.420	Pakistan	-5			Lao-PDR	2			
	...									
	0.369	Nepal	-3					Buhtan	-3	
	...							Yemen+	0	
	...									
	0.381	Bangladesh	-11							
		Average	-8	Average	-33	Average	2	Average	-2	-4
Average			-17		-18		-6		-8	-14

Sources : See Table 6.2

Note: 1. See Table 6.2

2.The rates of decline in TFR are calculated during *(1975-1990); ** (1990-1997); # (1975-1985)

Table 6.4 Socioeconomic Score, Government's Intervention on Fertility Level and Rates of Decline in TFR (1990-1998)

Government ntervention(1999) a			Lower		Raise		Maintain		No Intervention		
Socioeconomic Score (1998)	HDI Rank	HDI b	Countries	Rates of Decline (%) c	Countries	Rates of Decline (%)	Countries	Rates of Decline (%)	Countries	Rates of Decline (%)	Average Total
High	9	0.924							Japan	-13	
	23	0.883			Israel	-4					
HDI>0.800	24	0.881			Singapore	-21					
	31	0.854							Korea, Rep. of	-11	
	36	0.836							Kuwait+	-18	
					Average	-12			Average	-14	-13
Medium	61	0.772					Malaysia	-18			
	75	0.747							Saudi Arabia+	-19	
0.500<HDI<0.799	76	0.745	Thailand	-24							
	77	0.744					Philippines	-3			
	84	0.733					Sri Lanka	-13			
	85	0.732							Turkey+	-31	
	92	0.721					Jordan	-35			
	97	0.709					Iran	-56			
	99	0.706	China	-24							
	108	0.671					Viet Nam	-39			
	109	0.670					Indonesia	-13			
	111	0.660							Syrian Arab Rep+.	-40	
	117	0.628							Mongolia	-47	
	125	0.585	Myanmar	-18							
	126	0.583							Iraq	-24**	
	128	0.563					India	-20			
	135	0.522					Pakistan	-16			
	136	0.512	Cambodia	0							
			Average	-17			Average	-24	Average	-32	-24

Table 6.4 (Continued)

Government Intervention(1999)			Lower		Raise		Maintain		No Intervention		
Socioeconomic Score (1998)	HDI Rank	HDI	Countries	Rates of Decline (%)	Countries	Rates of Decline (%)	Countries	Rates of Decline (%)	Countries	Rates of Decline (%)	Average Total
Low	140	0.484					Lao-PDR	-18			
	142	0.483					Buhtan	0			
HDI<0.500	144	0.474					Nepal	-23			
	146	0.461					Bangladesh	-33			
	148	0.448					Yemen	-18			
							Average	-18.00			-18
Average				-17		-12		-22		-25	-19

Sources : See Table 6.2

Note: 1. See Table 6.2

2.The rates of decline in TFR are calculated during *(1975-1990); ** (1990-1997); # (1975-1985)

6.4 Policy Implications and Recommendations

Fertility decline in the most of the developing Asian countries had experienced of a strong government anti-natalist policy and modern methods of family planning. Fertility decline due to policy factor is new in historical experience that has never seen in development process of demographic transition in western experience (Ohbuchi 2000).

McDonald (1993) proposed Asian-European differences as a relevance to understand fertility behavior. Some of his expressions are: ① women's status varies significantly in Asia, and status of overall women in Asia is significantly lower than Europe; ② Asian governments strongly favor and actively promote the small family norm, and it related to that the people have knowledge of, and access to a much wider range of contraceptive methods.

Finally, it could be concluded that the countries in low level status of women need strong government leadership and effective national family planning programmes in changing fertility level.

Fertility declines in several Asian countries (Japan, the Republic of Korea, Hong Kong, S. A. R., Singapore, Taiwan, Thailand) have already reached to their replacement level. The continuation of fertility decline has called into question and the notion that the demographic transition is completed when fertility and mortality levels balance each other at a low level (van de Kaa 1987, John et al (eds.) 1997, United Nations 2000b).

Fertility in Japan, NIEs (Newly Industrializing Economies) countries has been still falling and already reached to the below replacement level during late 1970s to 1980s. These countries have already introduced and planned that center on the future size and composition of the labour force, social and welfare policies for ageing, and the consistence between demographic trends and socioeconomic development.

The objectives of the Program of Action in the area of fertility planning are (United Nations 1995):

- To help couples and individuals who meet their reproductive goals
- To prevent unwanted pregnancies and reduce the incidence of high-risk pregnancies
- To make quality family planning services affordable, acceptable and accessible to all who need and want them
- To improve the quality of family planning advice, information, education, communication, counseling and services
- To increase the participation and sharing of responsibility of men in the actual practice of family planning
- To promote breastfeeding

By the year 2015, all countries are required to step up these family planning needs, and provide universal access to a full range of safe and reliable family planning methods to their populations.

The following quantitative and qualitative goals will be required for achieving the goals and objectives of the Programme of Action,

- Universal access to primary education
- Closing the gender gap in primary and secondary school education
- Universal access to a full range of comprehensive reproductive health care services, including family planning
- Reduction in infant, child and maternal morbidity and mortality
- Increased life expectancy
- Mutual support to these set of quantitative goals and objectives.
- Sovereign right of each country
- Consistent with national laws and development priorities

- Full respect for the various religious, ethnical and cultural backgrounds of its people
- Conformity with universally recognized international human rights.

Governments should intensify efforts to equip planners and decision makers with a better understanding of the relationships among population, poverty, gender inequity and inequality, health, education, the environment, financial and human resources, and re-examine recent research concerning the relationships among reductions in fertility and economic growth and its equitable distribution.

CHAPTER VII

The Nature and Causes of the Fertility Transition in Myanmar

Contents

CHAPTER VII

The Nature and Causes of the Fertility Transition in Myanmar

7.1 Geographic, Demographic and Economic Background

Geographic Background

The Union of Myanmar (formerly Burma) is the westernmost country in Southeast Asia. Myanmar is a tropical country with the total land area of 676,577 square kilometers. Myanmar shares common borders with five countries: Bangladesh and India on the Northwest, China on the Northeast, Laos on the East and Thailand on the Southeast. The Bay of Bengal lies in the west and the Andaman Sea is in the south of the country. It has a total coastline of 2832 km.

Myanmar could be taken as a forest-clad mountainous country, out of the total land area, 57 per cent is covered with forests. As it is mainly in the Tropical Region, Myanmar has a tropical monsoon climate with three seasons: the hot season from mid-February to mid-May, the rainy season from mid-May to mid-October and the cool season from mid-October to mid-February. Annual rainfalls vary from 500 cm in the coastal regions to 75 cm and less in the central dry zone. Mean temperature ranges from 32˚ C in the coastal and delta area to 21˚ C in the northern lowlands. During the hot season, temperatures run considerably high in the central dry zone.

Demographic Background

Population distributes over seven states and seven divisions in Myanmar is estimated at 51.12 million in 2001 with the growth rate of 2.02 per cent (Ministry of Health 2001). Under the 14 administrative domains, there are many tribes and races, the major races with the descending order population size are Bama, Shan, Kayin, Rakhine, Mon, Chin, Kachin, and Kayah. The Bama lives mainly in the divisions and the other major races live mainly in their own states.

Table 7.1 Summary Measures of Demographic Statistics

Summary Measures	1973	1983	1993	2000
Population (Million)	29.06	36.01	43.82	49.01
Annual Growth Rate (%)	2.23	2.02	1.87	1.84
Population Density	43.00	52.00	65.00	72.00
Proportion Urban (%)	23.50	24.00	24.56	27.00[a]
Broad Age Group (%)				
<15	41.50	38.60	34.10	32.80
15-64	54.80	57.50	61.10	61.90
65+	3.70	3.90	4.80	5.30
Dependency Ratio	90.00	82.00	64.00	61.00
Sex Ratio	98.90	98.60	98.90	98.80
Child Woman Ratio (%)	65.00	54.00	46.00	46.00

Sources: (1). Union of Myanmar (1997), *Statistical Yearbook.*

(2). UNICEF (2001), *The State of the World's Children 2001.*

Note: a... percent of urban population in 1999

The level of urban population is quite low; the proportion has remained unchanged at around 24 per cent during 1973 to 1993. This rate increased slightly into 27 per cent in the year 2000. Dependency ratio had declined from 90 in 1973 to 61 in

2000. In those periods, more than one-third or around one-third of the population comprised of children below 15 years of age. The crude measure of fertility, child women ratio had decreased considerably.

Economic Background

Myanmar is basically an agricultural country. Agriculture is the major source of income and employment for the majority of its people. Since independence in 1948, the country has followed different economic systems: capitalist type economic system from 1948 to 1962, a centrally planned economic system from 1962 to 1988, and a market oriented economic system from 1988 onwards.

According to the industrial distribution by using Colin Clark's classification on Myanmar economy, the contribution to GDP by the primary sector is about 50 per cent and has remained almost unchanged from 1973 to 1997. The primary sector absorbed nearly two-thirds of the total workforce. The secondary sector contributed about 8 per cent to GDP and absorbed nearly 10 per cent of the total employment. The tertiary sector contributed nearly two-fifth of GDP and absorbed 25 per cent of the total employment.

Labour productivity of the secondary sector was found to be twice as much as that of in the primary sector from the years 1991 to 1997. The tertiary sector was about 2.5 times that of the primary sector over all the year covered in the study. Therefore, as for labour productivity, the primary sector fell far behind the other two sectors. The average earning of a worker engage in non-agricultural activities varied between 1.5 to 2.5 times that of a worker engage in agricultural activities. The earning differential that exits between agricultural and non-agricultural activities would continue to be one of the strongest factors influencing the regional redistribution of population. Around the year 1990, GDP and labour productivity decreased in all sectors because of the first

stage of transition period from socialist economic system to the market oriented economic system in Myanmar (Table 7.2).

Table 7.2 GDP and Employment by Economic Sector

Year	1973	1983	1993	1994	1995	1996	1997
GDP share (%)							
Primary	48.03	48.52	46.67	45.97	45.06	44.43	43.92
Secondary	10.78	12.39	14.39	14.80	15.56	16.2	16.52
Tertiary	41.19	39.09	38.94	39.23	39.38	39.37	39.56
Employment Share (%)							
Primary	63.83	64.63	68.69	67.84	67.37	66.58	65.87
Secondary	12.81	11.10	9.79	10.80	11.20	11.71	12.17
Tertiary	23.36	24.27	21.52	21.36	21.43	21.71	21.96
Labour Productivity (Kyat/Month)							
Primary	201.74	263.29	195.48	204.56	211.51	219.94	224.96
Secondary	225.71	391.36	423.08	414.04	439.23	455.91	457.82
Tertiary	472.68	564.84	520.53	554.43	581.19	597.56	607.89
Earning Ratio (non agriculture /agriculture)	1.44	1.94	2.51	2.48	2.52	2.49	2.46

Sources: Computed from *Review of the Financial, Economic and Social Conditions of The Union of Myanmar.*

7.2 The Characteristics of Fertility Decline

7.2.1 Overview of the Levels and Trends of Fertility and Mortality

Table 7.3 and Figure 7.1 show that CBR in the urban areas was observed under 30 per thousand population for the 1910s to 1920s period. The rate started to increase in the range of 31 to 35 from 1930s to 1948. It fluctuated around 40 after the country's independence in 1948 until the early 1970s. From the year 1975 to 1997, the reported CBR has fallen into less than 30 per thousand population. The figures of CDR varied from 31 to 36 during the periods 1910s to 1920s. CDR was very high at the beginning of the post-war period and started to decline into about 20 per thousand population in the mid-1950s. Moreover, the decline has continued up to 8.5 per thousand population in 1997.

A significant decline in fertility can be seen in the period 1970s. A continuous downward trend started from the beginning of 1970s. There was 11.6 per cent decline between 1966-70 and 1971-75, and 21 per cent decline from 1971-75 to 1976-80. The rapid decline in mortality was obvious since the beginning of 1950s. A sharp decline in CDR of about 36 per cent was observed from late 1940s to mid-1950s. The trend of mortality continued to decline gradually and a considerable decline was examined at around 32 per cent during the first half and second half of 1960s period (War War Win 2000).

Table 7.3 CBR, CDR and the Rates of Decline (Urban)

Year	Urban CBR	Changes %	Urban CDR	Changes %	Rate of Natural Increase
1911-15	29.5		31.4		-1.9
1915-21	26.2	11.0	36.7	-16.9	-10.5
1921-25	26.7	-1.9	34.9	4.9	-8.2
1925-31	28.5	-6.6	31.4	10	-2.9
1931-35	31.8	-11.6	29.4	6.4	2.4
1938-40	35.0	-10.2	34.9	-18.7	0.1
1941-47	33.0	5.9	32.9	5.7	0.1
1948-50	38.3	-16.3	42.4	-28.9	-4.1
1951-55	39.1	-2.1	27.2	35.8	11.9
1956-60	38.0	2.8	20.4	25.0	17.6
1961-65	39.9	-4.9	17.4	14.7	22.5
1966-70	39.2	1.7	11.8	32.2	27.4
1971-75	34.7	11.6	10.4	11.9	24.3
1976-80	27.4	21.0	8.8	15.4	18.6
1981-85	28.1	-2.4	8.8	0	19.3
1986-90	28.5	-1.4	8.8	0	19.7
1991-95	28.2	0.9	8.8	0	19.4
1996	28.1	0.4	8.8	0	19.3
1997	27.8	1.1	8.5	3.4	19.3

Sources: (1) Union of Myanmar, *Vital Statistics Report*, various issues

(2) Union of Myanmar, *Review of the Financial, Economic and Social Conditions*, 1997/98

(3) Sundrum (1957)

During 1911 to 1997 periods, CBR in the rural areas had three patterns. First, during 1920s, it fluctuated in the range of 25 to 30 per thousand populations. Second,

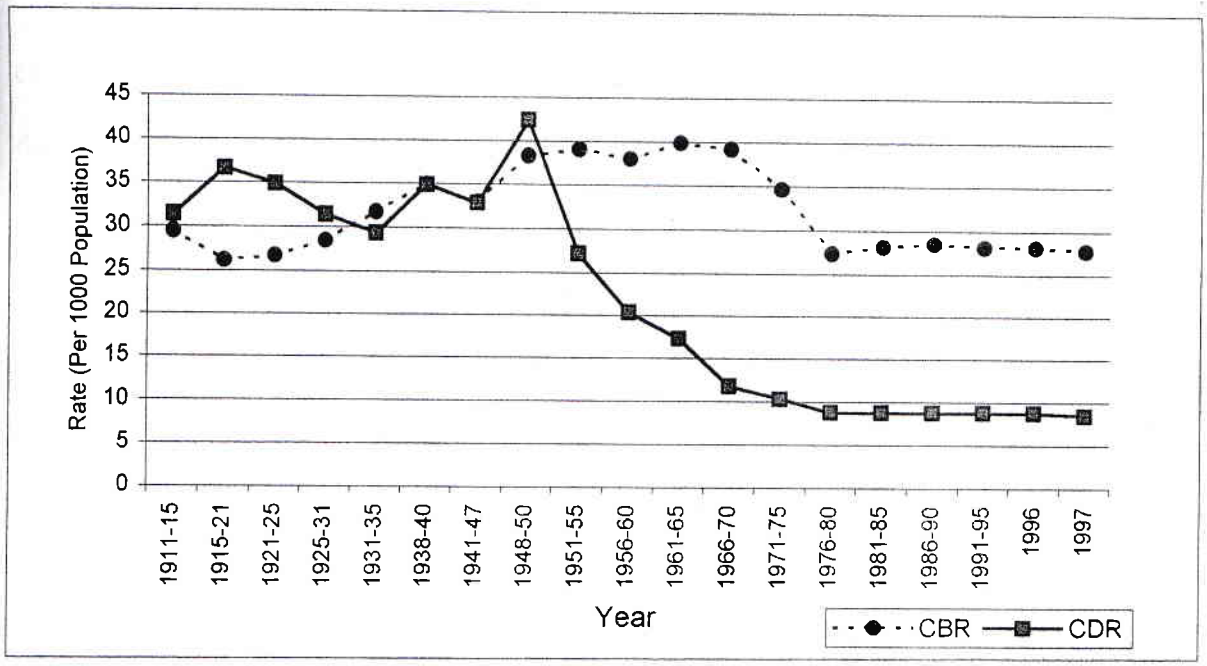
the rate increased up to around 40 in the late 1960s. Third, there was 28 per cent decline between 1969 and 1979, and then changes in fertility decline continued successively to around 30 over the 1000 population since the late 1970s. Mortality in rural areas was lower than the urban areas till the end of 1960s. Between 1915 and 1921, the reported CDR decline was 26 per cent and a steady decline reached at a low level of 8.7 per thousand population in 1997 (Refer to Table 7.4 and Figure 7.2) (War War Win 2000).

Table 7.4 CBR, CDR and The Rates of Decline (Rural)

Year	Rural CBR	Changes %	Rural CDR	Changes %	Rate of Natural Increase
1915	36.2		26.8		9.4
1921	30.3	16.3	19.7	26.5	10.6
1925	25.1	17.2	16.8	14.7	8.3
1931	26.1	-4.0	15.9	5.4	10.2
1935	32.9	-26.1	19.1	-20.1	13.8
1969	40.1	-21.9	8.3	56.5	31.8
1979	28.7	28.4	10.3	-24.1	18.4
1981-85	29.6	-3.1	9.8	4.9	19.8
1986-90	30.1	-1.7	9.7	1.0	20.4
1991-95	30.2	-0.3	9.8	-1.0	20.4
1996	30.0	0.7	9.9	-1.0	20.1
1997	29.2	2.7	8.7	12.1	20.5

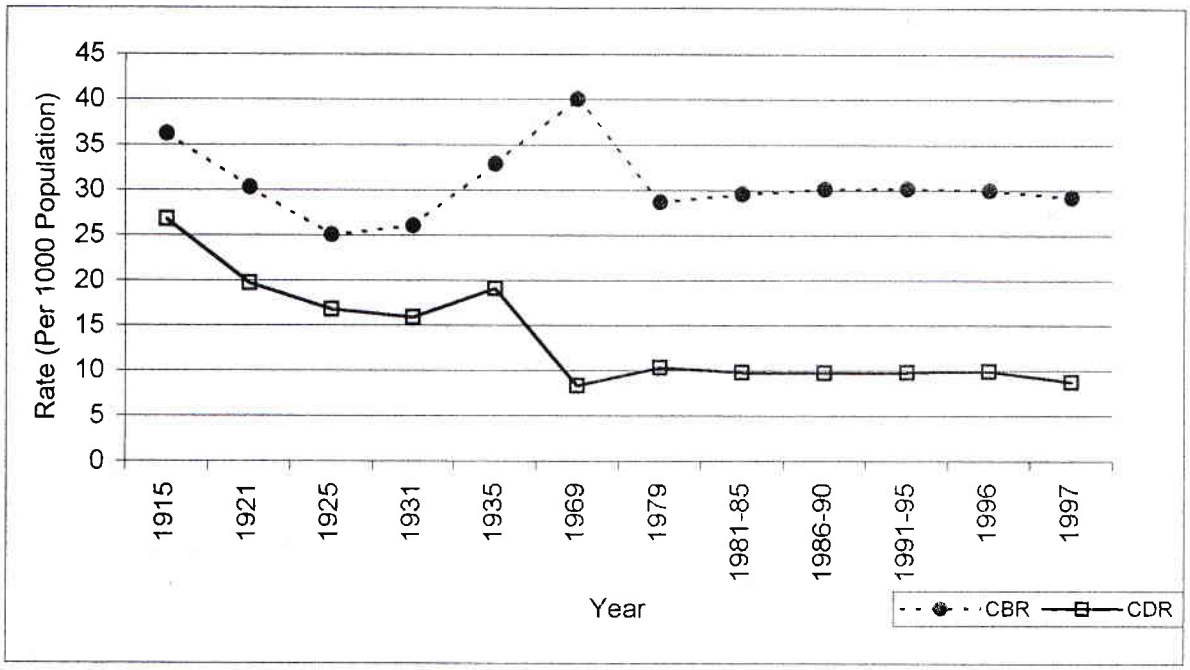
Sources: Same as Table 7.3

Figure 7.1 CBR, CDR for Myanmar (Urban)



Source: Same as Table 7.3

Figure 7.2 CBR, CDR for Myanmar (Rural)



Source: Same as Table 7.4

7.2.2 Changes in the Marriage Patterns

Age of marriage connects with the women's abilities to make decisions concerning their reproductive lives. If the age of marriage is low, women face more dangers to health that arise from early and frequent pregnancies.

In Myanmar, according to the 1997 Fertility and Reproductive Health Survey (FRHS), the number of never married women accounted for 44.9 per cent of the female population aged 15-49 years while married women were 51.1per cent. Compare with 1973 and 1983 statistics, the rates of never married women increased while the rates of married and widowed women have decreased. A significant change of age specific marriage pattern has been found during the studied period. Marriage rates of women aged (20-24) and (25-29) were 60.9 per cent and 78.6 per cent respectively in 1973. These rates had decreased into 33.4 per cent and 56.9 per cent in 1997. These figures show the delayed marriage and which effect on decreasing the family size.

The proportion never married has increased continuously from 1973 to 1997 for both male and female. In 1997 FRHS survey, the proportion never married among females is as high as 15 per cent in age group 40-44 and 12 per cent in 45-49. In Myanmar, non-marriage generally results in non-participation in reproduction.

Changes in age at marriage and proportions marrying are important influence on fertility trends. Mean age at marriage in Myanmar has increased rapidly, especially in urban areas. The singulate mean age at marriage (SMAM) has increased for both males and females. The legal age of marriage in Myanmar is 18 years for both boys and girls. The singulate mean age at marriage for female rose from 21.2 in 1973 to 24.5 in 1991 and 26.0 in 1997. Table 7.5 presents the trends in age at first marriage during 1973-1997.

Table 7.5 Changes in Singulate Mean Age at Marriage

SMAM	1973		1983		1991		1997	
	M	F	M	F	M	F	M	F
Union	23.8	21.2	24.5	22.4	26.3	24.5	27.6	26.0
Urban	24.9	21.9	25.7	23.3	28.1	26.3	29.7	28.0
Rural	23.4	21.0	24.1	22.1	25.6	23.7	26.8	25.3

Source: (1) Union of Myanmar, *Population Changes and Fertility Survey*, 1991
(2) Union of Myanmar, *Fertility and Reproductive Health Survey*, 1997

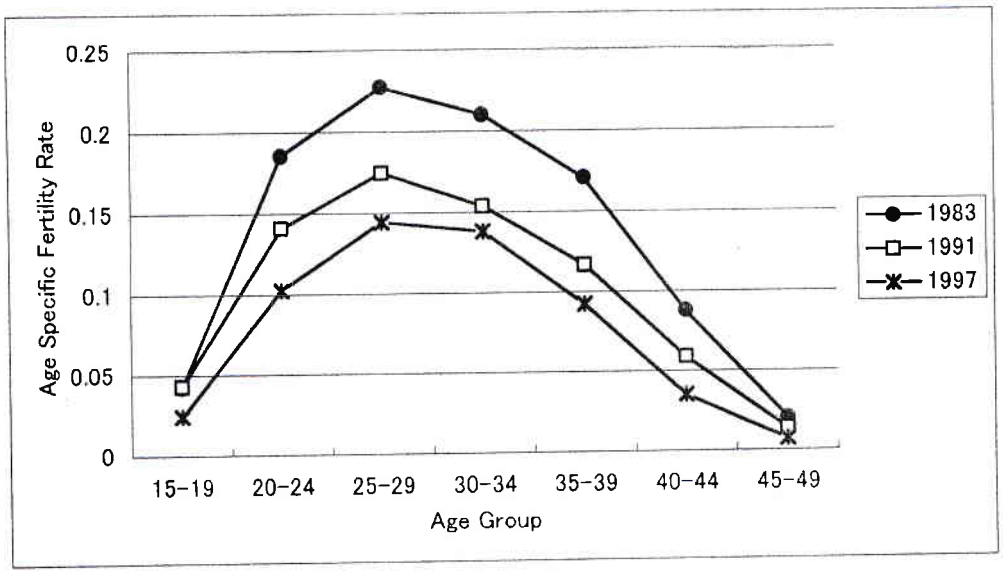
In urban areas, SMAM of females increased 1.4 years during 1973 and 1983, and it increased 4.7 years during 1983 and 1997. On the other hand, in rural areas, the increase was 1.1 years between 1973 and 1983, and it rose 2.7 years during 1983 and 1997. The late marriage of women caused by a rise in SMAM, produced a considerable decrease in the crude measure of fertility, the child-woman ratio (CWR). (Refer to Table 7.1)

7.2.3 Changes in the Age Patterns of Fertility

The patterns of fertility by age group are the same in 1983, 1991 and 1997. Fertility has declined in all age groups, and the peak in fertility has not shifted from age group 25-29 during 1983 to 1997.

Figure 7.3 shows the changing age patterns of fertility from 1983 to 1997. The fertility performance has been essentially concentrated at ages between 20 and 35. The contribution to the overall fertility at ages under 20 and over 40 has been very small. Teenagers participating in reproduction have been only 3 to 4 per cent in any given year. Urban fertility is significantly lower than rural fertility at all ages (Union of Myanmar 1995, Union of Myanmar/UNFPA 1999).

Figure 7.3 Age Specific Fertility Rates



Source: Union of Myanmar, Population Changes and Fertility Survey, 1991.

In 1997 FRHS, TFR is 2.7 as a whole, 1.8 for urban and 3.1 for rural area. Table 7.6 shows the fertility trends from own children estimates. The accuracy of the own children estimates varies according to the mortality estimates used, and the quality of the matching procedure. Sampling error will be smaller for own children estimates because they are based on a much larger sample, but non-sampling errors may be larger. The degree of consistency between own children and birth history estimates gives an indication of the extent of both sampling and non-sampling errors.

Table 7.6 Total Fertility Rate and Mean Age at Childbearing

	TFR (1976-1990)			Mean Age at Childbearing		
Year	**Total**	**Urban**	**Rural**	**Total**	**Urban**	**Rural**
1976	4.71	4.03	5.03	29.6	29.8	29.5
1977	4.59	4.16	4.79	29.6	29.2	29.7
1978	5.04	3.92	5.57	29.7	29.4	29.7
1979	4.27	3.65	4.55	29.5	29.3	29.5
1980	4.80	3.92	5.22	29.8	29.5	29.9
1981	4.41	3.67	4.77	29.9	29.9	29.9
1982	4.35	3.43	4.78	30.0	29.6	30.1
1983	4.39	3.47	4.83	29.9	29.7	29.9
1984	4.43	3.38	4.93	30.0	29.6	30.1
1985	4.34	3.17	4.90	30.3	30.0	30.4
1986	3.93	2.98	4.38	30.2	30.0	30.3
1987	3.77	2.76	4.26	30.2	29.6	30.4
1988	3.68	2.64	4.17	30.2	29.7	30.3
1989	2.96	2.10	3.38	30.2	30.0	30.3
1990	2.86	1.97	3.29	30.5	30.1	30.6

Sources: Union of Myanmar, *Population Changes and Fertility Survey*, 1991

A comparison of the own children estimates for 1990 with the estimates calculated from reports of births in households during the 12 months prior to the survey are shown in Table 7.7 below. This comparison provides evidence on the accuracy of the own children estimates for individual years. At the union level, own children estimate in 1990 was 2.86 children per women, and the difference is 0.05 children per woman and 1.7 per cent below the estimate of births during the 12 months prior to the survey. The corresponding own children estimates for urban and rural areas are 1.97 and 3.29 children per woman respectively. The urban figure is essentially equal and the rural

figure is 2.1 percent (0.07 children per woman) below the estimate from births during the past 12 months.

The total fertility rate (TFR) has declined steadily in Myanmar since the early 1980s. The trend of fertility gave a quite different pattern of decline in urban and rural areas. There has been a rapid decline in rural fertility during 1985 and 1990, and very sharp drops were evident between 1985-1986 as well as 1988-1989. Urban fertility also declined almost linearly from 1976 through 1988, but dropped sharply between 1988-1989.

Table 7.7 Comparison of Own Children Estimates and Household Survey Estimates

Age Group	Age-Specific Birth Rates (1990)					
	Own Children Method			Births in Household Sample		
	Union	Urban	Rural	Union	Urban	Rural
15-19	0.029	0.019	0.033	0.029	0.022	0.033
20-24	0.111	0.076	0.128	0.113	0.081	0.129
25-29	0.141	0.110	0.156	0.144	0.108	0.160
30-34	0.138	0.099	0.158	0.141	0.103	0.160
35-39	0.096	0.059	0.114	0.099	0.058	0.119
40-44	0.049	0.027	0.059	0.047	0.023	0.059
45-49	0.008	0.006	0.010	0.009	0.003	0.011
TFR	2.86	1.97	3.29	2.91	1.99	3.36

Source: Union of Myanmar, *Population Changes and Fertility Survey*, 1991

7.3 Socio-Economic Development, Cultural Changes and Fertility Decline

7.3.1 Changes in Industrial Structure and Economically Active Women

From the experience of developed countries, many demographers accepted that fertility could decline when a country had reached a certain threshold of economic and social development. Nowadays, fertility decline is concerned only partly with socio-economic development in developing countries. This is because a number of developing countries has experienced their fertility decline with the lack of well-developed economic and social development.

The emphasis in this section on the partial view of fertility decline has been presented by the relationship between fertility and some socio-economic variables, including education, women's employment. Table 7.8 shows the industrial distribution of employed population by three main sectors such as primary, secondary and tertiary. Each of these sectors is made up of the following industries:

Sector	Industrial Groups
1. Primary	Agriculture, Hunting, Forestry and Fishing
2. Secondary	Mining & Quarrying, Manufacturing, Constructing
3. Tertiary	Electricity, Gas, Water & Sanitary Service, Wholesale &Retail Trade, Restaurant & Hotels, Transportation, Storage & Communication, Social Services, Activities not adequately defined.

Table 7.8 Employed Population by Industrial Distribution and Gender

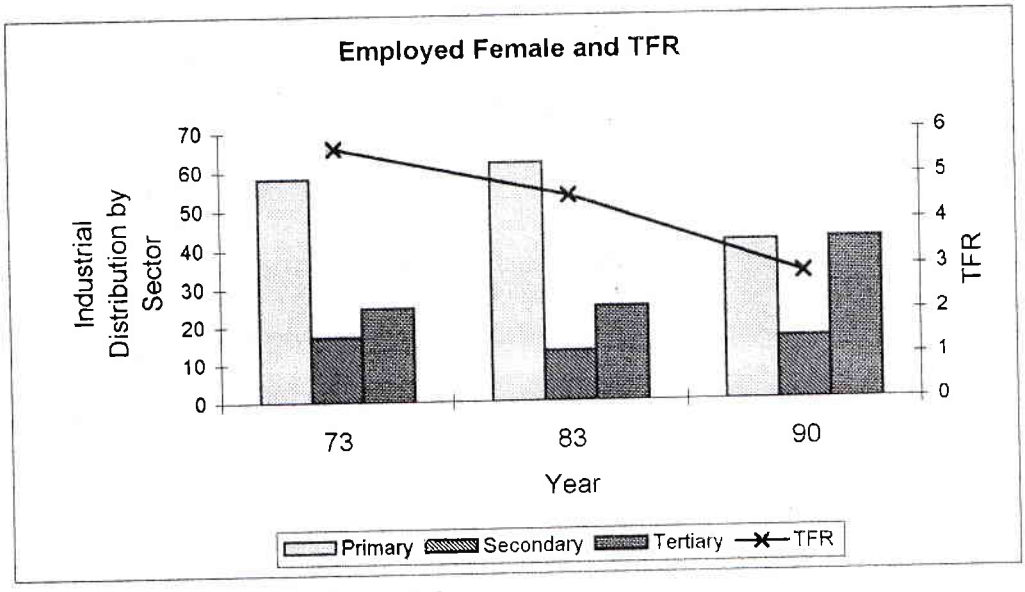
Sector	1973		1983		1990		Female Share (%)		
	M	F	M	F	M	F	1973	1983	1990
Primary	66.63	58.24	66.10	62.05	62.89	41.67	30.46	34.77	22.34
Secondary	10.67	17.06	9.91	13.19	14.40	16.24	44.48	40.04	32.85
Tertiary	22.70	24.70	23.99	24.76	22.71	42.09	35.28	36.94	44.53
All Industries	100	100	100	100	100	100	33.38	36.21	30.25

Source: (1) Union of Burma (1976), *Population Census 1973*

(2) Union of Burma (1986), *Population Census 1983*

(3) Union of Myanmar/UNFPA/ILO (1993), *Report on Myanmar Labour Force Survey 1990.*

Figure 7.4 Employed Female and TFR



Source: Same as Table 7.8

As the economy develops or as manufacturing and processing industries develop, the proportion of those employed in non-agricultural activities will increase. By the 1990 Labour Force Survey, working female in primary sector declined

significantly and became nearly doubled the 1973 figures in the tertiary sector. Total fertility rate also decreased from 5.65, 4.59 to 2.86 in 1973, 1983 and 1990 respectively. This shows an inverse relationship between family size and the extent of female participation in the tertiary sector economy (War War Win 2000). Women work for wages, rather than the self-employed or unpaid family workers, have a significantly lower fertility than non-working women (United Nations 1973, Davis 1984, Fuchs 1988, Mincer 1985).

7.3.2 Access to Education, Health Development and Urbanization

Education in Myanmar enjoys a favorable environment as people have traditionally placed education on the highest priority in their lives since the time of King Anawrahta (1044-1077) when Theravada Buddhism became predominant (Nyan Myint 1991). In ancient days, monastic education was dominant, children were sent to monasteries for learning Buddhist literature, basic arithmetic, reading and writing the Myanmar language and Pali. But the monastic education became less prominent under the British rule. Since Myanmar gained her independence in 1948, the formal education or the school education system has been centralized. Moreover, Myanmar has also experienced successful literacy campaigns since the late 1960s that involve volunteers of university students. Myanmar won UNESCO prizes in 1971 and 1983. The literacy movement has recently developed into the "Education For All" activities that aims at providing basic education to all Myanmar nationals. This emphasis has raised primary school enrolment as well as non-formal education for early dropouts.

Since the early 1980s, Myanmar has made great strides toward universal access to primary education. Except in the remotest areas, access to primary education in Myanmar is relatively high, compared with other countries at a similar level of development. In education development, Myanmar compares favorably with the other

developing countries. Literacy rate and primary school enrolment ratio are well above those of the low income countries.

In the primary health care system, the rural population's access to basic health services had increased from 4.42 per cent in 1960 to 53.5 per cent in 1993. In international comparisons, although the health services and the health indicators are far from satisfactory, compare reasonably well with other developing countries.

In the urban areas of Myanmar, mortality rate has been steadily declining since the beginning of post World War II. Mortality decline in rural areas started earlier than in urban areas. Crude Death Rate has declined up to less than 9 per thousand population in recent years. (Refer to Section 7.2.1)

In urban areas, infant mortality rate (IMR) has started to decline from more than 200 to below 200 per thousand live-births since mid-1950s. The decline has continued to below 100 per thousand live births in late 1960s. In 1997, this steady decline reached at a level of less than 50 per thousand live births.

Since late 1950s, maternal mortality rate (MMR) has progressively declined over the years. That continuous downward trend reached the lowest point 0.9 in 1985. Late foetal death rate (LFDR) declined from 48.1 in 1954 to 9.9 in 1997. The speed of decline was very high during 1960s. This drop has been due to the improvement in medical services and public health. Life expectancy at birth and at various ages has improved steadily. In both urban and rural areas, male life expectancy at birth increased from about 46 years in 1973 to about 61 years in 1996, and female life expectancy in those years were 49 years and 65 years respectively (War War Win 2001).

An increasing emphasis by the government on Maternal and Child Health Care Services at the beginning of the 1960s produced a significant reduction in maternal mortality (Khin Nu Win, 1991).

The increasing proportion of the urban population affects the cultural, socio-economic and political aspects of the country. Before industrial development, the region of administrative, economic, cultural and trading centers characterizes urban area. After industrial revolution, development of urban area became dependent on the growth of industrialization and marketing.

In the censuses of Myanmar, urban areas were defined as the places, which had a population of 5000 and over. Municipalities and Cantonment Areas were also classified as urban by The Town Act, even if the area under consideration had the size of less than 5000 population. During the 1973-1983 intercensal period, the urban population had changed slightly, 23.58 per cent in 1973 and 24.07 per cent in 1983. The Proportion of urban population was estimated at about 27 per cent in 2000 (UNICEF 2001). The urban population growth remains almost unchanged during the studied period and Myanmar is still predominantly rural country.

7.3.3 Empowerment of Women and Reproductive Rights/Health

Myanmar women of all ranks enjoy a high degree of freedom and equality with men. Women control not only the family economy but also most of the retail trade such as hawkers, the proprietors of the stalls and shops in the town and city bazaars. Nevertheless, they could well be represented in large business enterprises, political activities and as the members of international delegations. Moreover, except for engineering, education as well as employment is not discriminated. Women are liberally represented in the professions. Women who participate in the production of agricultural economy could receive the same wages like men for the same work. Legally, the family estate is divided equally between sons and daughters. Women own property in their own name, and after marriage husband and wife own all property jointly. At the family level, women have full authority to participate in all financial and social decision

making, since Myanmar women provide mutual support for family and social development. Thus, they have to carry the burden of both child rearing and household economy. In the Buddhist Customary Law, women are allowed to liberal rights in the matters of marriage, divorce and inheritance. In Myanmar, over 80% of the population are Buddhists.

Demographic changes have a great impact on the status of women. Myanmar places high priority on maternal and child health. Adequate knowledge or access to birth spacing is required not only for maternal and child health but also for sufficient resources to support human life. A healthy reproductive life depends upon gender relations and paternal responsibilities. Husbands ought to be concerned that birth spacing is advantageous for their families. In Myanmar, gender constraints do not limit women from gaining access to contraceptives, and male attitudes towards women using birth spacing are seemingly positive, compared to earlier decades.

According to 1997 FRHS, the contraceptive knowledge is almost universal and the contraceptive practice has been increasing among couples. The disapproval of contraception by husband and the relatives is quite low, only about 2 per cent.

7.4 National Strategy on Fertility Decline

7.4.1 Performance of Birth Spacing Programme

Myanmar has adopted a pronatalist policy since independence in 1948. Among several reasons for this pronatalist policy, the important factors are:

(1) The country is considered to be under-populated,

(2) Availability of abundant natural resources such as arable land, forests and marine resources.

(3) Low population density, and

(4) Perception of population growth as an asset for development.

There was no explicit policy on regulating fertility and limiting population growth. Fertility control is desirable if it improves maternal and child health concerns. The State allows termination of pregnancies and female sterilization only for maternal health concerns. Maternal and child health are the integral parts of comprehensive health care delivery system. To improve the status of maternal and child health, Birth Spacing Programme is an important strategy.

One of the measures from a number of population strategies, Birth Spacing Programme has been introduced in Myanmar since 1991. National Population Policy focuses mainly on;

(a) Health and standard of living,

(b) Promoting the role and status of women, and

(c) Improving human resources development

The provision of birth spacing services is one of the important components of the policy's primary focus. The overall objectives of this project are to improve the health status of mothers and children by reducing the high fertility, morbidity and mortality rates through birth spacing services.

Myanmar has accepted birth spacing as a vital component of the programme aimed at achieving better health for women and children. The birth spacing service aims to improve the health of both mothers and children by timely spacing of birth and preventing unwanted pregnancy. Birth spacing services are made available to all married couples who are voluntarily seeking such services.

The Maternal and Child Health and Birth Spacing project was funded partly by the Government and have received substantial assistance from WHO, UNICEF, UNDP, UNFPA and UNHCR as well as International Non-governmental Organizations (NGOs) such as World Vision, International Family Planning Assistance. The programme started in a township in the lower region of Myanmar with the assistance of an NGO,

International Family Planning Assistance. In 1992, a large Birth Spacing Programme was implemented in 20 townships (about 1/10 of total country population) by the assistance of UNFPA. In 1996, the implementation of birth spacing programme was extended to 52 additional townships, it became a total of 72 townships and it is running well now. Under these 72 townships, the prevention of HIV/ AIDS was made in 6 townships with UNICEF's project.

7.4.2 The Interval of Births

In 1997, a nationally representative survey, so-called Fertility and Reproductive Health Survey (FRHS) was conducted by the Population Department. It is a component of the project entitled "Strengthening of Birth Spacing Programme" funded by UNFPA.

Measuring the duration of breastfeeding would also be a practical use for implication in birth spacing programme. Generally, fertility is inversely related to the duration of birth interval, and a long birth interval is usually associated with fewer children ever born. In the absence of any practice of fertility control, a prolonged lactation period protects women against pregnancy. The consequence of prolonged breastfeeding improves the infant health and increases the length of postpartum amenorrhoea. Breast milk is an important source of nutrients for infants. The awareness of breastfeeding is widespread in Myanmar and breastfeeding is also prolonged.

In 1997 FRHS, mean duration of breastfeeding is about 19 months and mean duration of postpartum amenorrhoea is found to be 10 months. Nearly 94 per cent of mother fed their breast milk to their last births that occurred during the five years preceding the survey.

Age at first birth is an important determinant of marital fertility. In 1997 FRHS, mean age at first marriage for Myanmar women was 20 years and mean age at first birth was nearly 21 years. This also shows first birth follows soon after marriage. In the

context of marital fertility, a little over 30 per cent of ever-married women had their first birth in their teenage. Another 40 per cent had their first birth between ages 20 and 25.

The intervals between successive births have impact not only on health of mothers and children but also on the level of fertility. According to 1997 FRHS, the interval after the previous birth is 37 months on the average. About 32 per cent of births occur four or more years after the previous birth, and 20 per cent of births occur less than 2 years after the previous births. Urban women have longer birth interval than rural women.

7.4.3 The Rise of Modern Contraception

1997 FRHS has also focused on the determinants of knowledge of contraceptive methods and knowledge regarding where to obtain them. The levels of use of contraceptives provide the most obvious and widely accepted criterion of success in birth spacing programme.

Population Changes and Fertility Survey in 1991 indicated that knowledge of contraception among ever-married Myanmar women aged 15-49 was very high at 84 per cent and it increased into 92 per cent in 1997 FRHS. The reported level of current use was merely 17 per cent in 1991 PCFS and 33 per cent in 1997 FRHS. Current use among urban women is three times that of rural women, 34.3 versus 10.3 per cent in 1991, and it became nearly 51 per cent for urban and 27 per cent for rural in 1997. Use of any method ranges from under 10 per cent for women with no education to nearly 40 per cent for women who completed high school level in 1991, and it changed into 18 per cent and 50 per cent for these two categories in 1997.

Knowledge of contraceptive methods and sources is virtually universal now. As the knowledge of sources of supply/ services for all modern methods, the private sources (56 per cent) are mentioned more often than the Government sources (40 per

cent). In the case of pill, the private sources (63.1 per cent) are mentioned twice as many times as the Government sources (31.9 per cent). In Myanmar, there is no organized opposition to contraception. More than 50 per cent of the married women and 45 per cent of the husbands approve contraception and hardly any method-related problems are mentioned. However, the results especially in rural areas indicate that a large unmet need does exist.

Among ever-married women, the most common used modern method is injection (23.2 per cent) followed by pill (18.9 per cent) and the third most widely used is female sterilization (5.4 per cent) in 1997.

According to the 1997 FRHS, mean idea size of children is 3.6 and it is only slightly larger than mean actual children ever born of 3.3. It shows that the majority of women are fairly limited on the number of children they would like to have.

Population Reference Bureau indicated that 20 to 25 per cent of married women of reproductive age have used family planning and half of them rely on traditional methods. In 1983 census and 1997 FRHS, Total Fertility Rate decreased from 4.6 children per women to 2.7 in those periods, this decline suggests the use of birth spacing or birth limiting methods or both.

Conclusions

At present, Asia combines about 60 per cent of the world's population. Therefore world population growth contributed by Asian countries are of great part. But Asia has experienced a rapid decline of fertility over the second half of 20th century. Asian countries vary differently in political, social, economic, cultural, religious, and demographic conditions. Fertility decline in each country has also occurred differently. Continuous fertility decline that leads to the below replacement level fertility has also experienced in some other East and South East Asian countries since the previous quarter of a century.

The study aims at the examination of how and why the fertility decline has occurred in Asian countries. And then how could the patterns and causes of Asian fertility decline be measured or defined into a general theory of fertility transition are examined.

Overview of Demographic Levels and Trends in Asian Regions

In Chapter one, the comparison of fertility and mortality decline for four major regions: Eastern Asia, South Central Asia, South Eastern Asia, and Western Asia were presented. Fertility decline during 1960 to 2000 showed that Asia had higher rate of decline than the world, and mortality decline for the same period showed that all Asian regions had higher rates of decline than all regions of the world. Out of 50 Asian countries, 12 countries have already reached the replacement fertility level in 2000. According to the medium variant projection, it will be increased into 21 countries in 2010, and 34 countries in 2020.

Since the ageing of the population is primarily a result of decline in the total fertility rate, the measurements of population ageing have been made in this process. It

was showed that ageing in Asia had been still lower than the world throughout the study. But the burden of child dependency in Asian regions (except Eastern Asia) had been relatively higher than the world and the world's less developed regions.

Therefore the combination of continuous fertility decline, lower rate of ageing, and the present burden of child dependency will remain Asia to achieve an adequate manpower for economic growth and development.

Demographic Transition in Selected Asian Countries

In Chapter two, the extent of the completion of fertility transition and demographic transition in selected countries were discussed. In these selected countries, Hong Kong, Japan and Singapore have already finished their fertility transition and the continuation of the second demographic transition has occurred now. China, the Republic of Korea, Sri Lanka, Thailand, Cyprus and Israel had reached more than 90 per cent to complete their demographic transition. Nepal, Pakistan and Saudi Arabia had still remained very low extent (between 51 and 55 per cent) to complete their demographic transition. Out of 23 countries in the study, 15 countries had already reached more than 80 per cent to complete their demographic transition.

Therefore although Asian societies have diverse socio-economic conditions, there is an important dimension of innovation/diffusion that caused fertility decline within a relative short time.

An Analysis of Natural Fertility to Controlled Fertility

In Chapter three, the Hutterites indices were used to analyze the difference between natural fertility and family limitation in selected countries. The analysis made here was measured overall fertility (I_f), and it's major components: marital fertility (I_g), proportion married (I_m), and non-marital fertility (I_h). Each indices of (I_f), (I_g), and (I_m)

were classified again into three components by age group: the early childbearing ages of 15-19, the prime childbearing ages of 20-39, and the late childbearing ages of 40-49.

Over all the year covered in the study, the relative changes in marital fertility had occurred in Hong Kong, Japan, the Republic of Korea, Sri Lanka, Singapore, and Turkey during 1970s. It had occurred in Brunei, Malaysia, Myanmar, Thailand, and Israel during 1980s. In Iran and the Philippines, marital fertility started to decline in 1990s. During the studied period, illegitimate fertility (non-marital fertility) (I_h) played a minor part in this research.

Certain findings relevant to the analyses by age group had occurred. Significantly, the levels of teenage overall fertility and proportion married had decreased continuously. The decline in proportion of teenage marriage showed the postponement of marriage. Marital fertility for both the prime childbearing ages and the late childbearing ages had also declined continuously. This showed the increase in the practice of family planning.

According to knodel and van de Walle (1979), the practice of family planning and the decline in marital fertility were irreversible processes. It could also be assumed that when the fertility reach to below replacement level, the society has already practiced the family limitation. Therefore the postponement of age at marriage, the practice of family planning, and the decline in marital fertility in Asian countries are irreversible, but the family limitation has not been practiced broadly yet.

The Process of Changes in Age Patterns of Fertility

In Chapter four, age specific fertility rate for female population was used to generate the process of decline in fertility. The general form of the changing process in the age patterns of fertility resulted for the transitional fertility period (the case of TFR $\geq$ 2) and post-transitional fertility period (the case of TFR<2). In the transitional

period, age patterns of fertility and fertility levels were classified as high, medium, and low level. In the post-transitional period, fertility had already attained to below replacement level, and the levels were classified as very low and extremely low level.

In the transitional period, women's concentration in childbearing have been changing from the aged 30 and over to 20~29. In the post-transitional period, childbearing has been changed from the aged 20~29 to 30 and over. Fertility in the aged under 20 belongs to different levels of fertility among the countries.

Therefore teenage fertility depends mainly on the custom and cultural setting of one's country. Pre-marital conceptions and teenage sub-fecundity have a large and irregular impact on teenage fertility. The process of changes in age patterns of fertility during the transitional period showed the wide spread practice of birth control and an early completion of family building.

The Conceptual Models of Fertility

In Chapter five, the regression estimates of fertility variable TFR based on some aggregate socio-economic indicators were defined for selected countries.

For the analysis between 1970 and 1999 period, urbanization and per capita GNP were more important factors in predicting TFR for high-income countries of Japan, Hong Kong, Israel, and the Republic of Korea. The analysis during 1970-1984 showed that the combined effects of IMR with other variables were the most important factors in predicting TFR. The analysis during 1985-1999 showed that the combined effects of per capita GNP with other variables were the most important factors in predicting TFR.

Therefore the results of a statistical analysis assessing the relative importance of socio-economic development inputs explained well the variations in fertility decline.

The National Strategies of Family Planning Programmes

In Chapter six, The fertility decline due to the governments' strong anti-natalist policy, family planning programmes and changes in socio-economic score of HDI (Human Development Indicators) were examined.

The results of this analysis expressed that the governments' intervention on fertility level had much effect on the rates of fertility decline for the countries in medium and low level socio-economic development. Therefore government policies on reduction in fertility has required in formulating especially for least developed countries.

A Case Study of Myanmar

In Chapter seven, the nature and causes of fertility transition in Myanmar was discussed. Myanmar neither has explicit policy nor organized family planning programmes on regulating fertility and limiting population growth. Nevertheless, socio-economic development is very limited. But Myanmar had significant fertility decline since 1980s.

The main causes of fertility decline in Myanmar could be summarized as follows:

- The proportion of never married has increased continuously from 1973 to 1997 for both males and females. The proportion of never married female is as high as 15 per cent in the age group of 40-44, and 12 per cent in the age group of 45-49 in 1997.
- The singulate mean age at marriage (SMAM) has increased for both males and females. The legal age of marriage is 18 years for both boys and girls; SMAM for female rose from 21.2 in 1973 to 24.5 in 1991 and 26.0 in 1997.

- The contribution to the fertility at the age of under 20 years, as well as 40 years and over has been very small. This means the early completion of family building.
- Female labour shares in industrial structures have changed. A decrease in the primary industry employment and an increase in the tertiary industry employment have occurred. This fact shows the association between low fertility and non-manual occupation.
- Female's adult literacy is high, and gender inequality in access to primary education has also lack. This shows the relation between low fertility and the gender equity, as well as level of education.
- The contraceptive knowledge is almost universal and the contraceptive practice has been increasing among couples. The disapproval of contraception by husband and relatives is quite low. Therefore empowerment of women and reproductive rights/health are reasonably high.

Sources of Data

Government of Japan (1998), *Population Census 1995*, "Population by Sex, Age and Marital Status", Association of Statistics, Ministry of Health and Welfare, Tokyo, Japan.

---------- (2000), *100 Years of Vital Statistics in Japan (1899-1998)*, Statistics and Information Department, Ministry of Health and Welfare, Tokyo Japan.

Sundrunm, R.M. (1957), *Population Statistics of Burma,* Statistical Paper No.3, Economics, Statistics and Commerce Departments, University of Rangoon. Rangoon, Burma.

UNDP (2000), (2001), *Human Development Report (2000), (2001)*, United Nations Development Programme, New York.

Union of Burma (1976), *Population Census 1973, Burma*, Immigration and Manpower Department, Ministry of Home and Religions Affairs, Rangoon, Burma.

Union of Burma (1986), *Population Census 1983, Burma*, Immigration and Manpower Department, Ministry of Home and Religions Affairs, Rangoon, Burma.

Union of Myanmar, *Vital Statistics Report.* 1964-1994 (URBAN); 1979-1988 (RURAL), The Central Statistical Organization and The Department of Health, Yangon.

----------/ UNFPA/ ILO (1993), *Report on Myanmar Labour Force Survey, 1990* Department of Labour, Ministry of Labour, Yangon.

---------- (1995), *Population Changes and Fertility Survey, 1991,* Immigration and Population Department, Ministry of Immigration and Population, Yangon, Myanmar.

----------, *Statistical Yearbook*, Various Issues, Central Statistical Organization (CSO), Ministry of National Planning and Economic Development, Yangon, Myanmar.

----------/ UNFPA (1999), *Fertility and Reproductive Health Survey 1997*, Department of Population, Ministry of Immigration and Population, Yangon.

----------, *Review of the Financial Economic and Social Condition of the Union of Myanmar*, Various Issues, Ministry of National Planning and Economic Development, Yangon.

UNICEF (2001), *The State of the World's Children 2001: Early Childhood*, United Nations Children' Fund.

United Nations (1998), *National Population Policies*, Department of Economic and Social Affairs, Population Division, New York.

---------- (1999), *World Population Prospects,* The 1998 Revision, Volume 1, Comprehensive Tables. Department of Economic and Social Affairs, Population Division, New York.

---------- (2000), *Global Population Policy Database 1999*, Department of Economic and Social Affairs, Population Division, New York.

----------, *Demographic Yearbook*, Various Issues, Department of Economic and Social Affairs, Population Division, New York.

World Bank, *World Development Report (1978), (1987), (1992), (2000/2001)*, The International Bank for Reconstruction and Development, New York.

----------, *World Development Indicators*, Various Issues, The International Bank for Reconstruction and Development, New York.

----------, *World Tables (1987), (1991), (1993), (1995)*, The International Bank for Reconstruction and Development, New York.

United States, *International Data Base (IDB)*, http://www.census.gov/ cgi-bin/ipc/idbsprd, U.S. Census Bureau.

Bibliography

Ashford, Lori S. (2001), "New Population Policies: Advancing Women's Health and Rights", *Population Bulletin*, Vol.56, No.1, Population Reference Bureau, Washington, D.C.

Becker, G. S. (1960), "An Economic Analysis of Fertility", *Demographic and Economic Change in Developing Countries*, A conference of the Universities-National Bureau Committee for Economic Research, Princeton: Princeton University Press.

---------- (1981), *Treatise on the Family*, Harvard University Press, Cambridge.

Butz, William P. & Michael P. Ward (1979), "The Emergence of Counter-Cyclical U.S. Fertility", *American Economic Journal*, Vol.69, No.3.

Caldwell, John C. (1978), "A Theory of Fertility: From High Plateau to Destabilization", *Population and Development Review*, Vol.4, No.4.

---------- & Lado T. Ruzicka (1978), "The Australian Fertility Transition: An Analysis", *Population and Development Review*, Vol.4, No.1.

---------- (1982), *Theory of Fertility Decline*, Academic Press Inc., London.

---------- (1983), "Direct Economic Costs and Benefits of Children", in R. Bulatao & R. D. Lee, (eds.), *Determinants of Fertility in Developing Countries: Summary of Knowledge*, Academic Press, New York.

Carlsson, Gosta (1966), "The Decline of Fertility: Innovation or Adjustment Process?" *Population Studies* Vol.20, No.2.

Carr-Saunders, A. M. (1936), *World Population: Past Growth and Present Trends*, Clarendon Press, Oxford.

Chesnais, J. C. (1996), "Fertility, Family and Social Policy in Contemporary Western Europe", *Population and Development Review*, Vol.22, No.4.

Cho, Lee-Jay & Janis Y. Togoshi (1984), *Industrial Transition and Demographic Dynamic of the Asia-Pacific Region*, International Symposium on the Role of Asia-Pacific Region in World Economic Development, in Commemoration of the 80th Anniversary; College of Economics, Nihon University.

Cleland, John (1985), "Marital Fertility Decline in Developing Countries: Theories and Evidence", in J. C. Cleland & J. Hobcraft (eds.), *Reproductive Change in Developing Countries: Insights from Developing Countries*, Oxford: Oxford University Press.

---------- & C. Wilson (1987), "Demand Theories of Fertility Transition: An Iconoclastic View", *Population Studies*, Vol.41, No.1

Coale, Ansley J. & E. M. Hoover (1958), *Population Growth and Economic Development in Low-Income Countries*, Princeton: Princeton University Press.

Coale, Ansley J. (1973), "The Demographic Transition Reconsidered", in International Population Conference, Liège, *Liège: International Union for the Scientific Study of Population*, Vol. 1.

---------- and Roy Treadway (1986), "A Summary of the Changing Distribution of Overall Fertility, Marital Fertility, and the Proportion Married in the Provinces of Europe", in A. J. Coale and S. C. Watkins (eds.), *The Decline of Fertility in Europe*, Princeton: Princeton University Press.

---------- and Susan Cotts Watkins (eds.) (1986), *The Decline of Fertility in Europe*, The Revised Proceedings of a Conference on the Princeton European Fertility Project, Princeton: Princeton University Press.

---------- (1992), "Age of Entry into Marriage and the Date of the Initiation of Voluntary Birth Control", *Demography*, Vol.29, No.3.

Cochrane, Susan H. (1979), *Fertility and Education: What Do We Really Know?*, World Bank Staff Occasional Paper. No.26.

Davis, Kingsley (1945), "The World Demographic Transition", *Annals of the American Academy of Political and Social Science*, No.273.

Davis, K., and J. Blake (1956), "Social Structure and Fertility: An Analytic Framework", *Economic Development and Cultural Change* No.4.

Davis, Kingsley (1963), "The Theory of Change and Response in Modern Demographic History", *Population Index,* Vol.29.

---------- (1984), "Wives and Work: The Sex-role Revolution and Its Consequences", *Population and Development Review*, Vol.10, No.3, New York.

Easterlin, R.A. (1969), "Towards a Socio-economic Theory of Fertility", in S. J. Behrman, L. Corsa and R. Freedman (eds.), *Fertility and Family Planning: A Worldview*, University of Michigan Press.

Easterlin, R. A. (1975), "An Economic Framework for Fertility Analysis", *Studies in Family Planning,* No.6.

---------- (1978), "The Economics and Sociology of Fertility: A Synthesis", in C. Tilly (ed.), *Historical Studies of Changing Fertility*, Princeton: Princeton University Press.

Easterlin, R.A. (1983), "Modernization and fertility: A critical Essay", in Rodolfo A. Bulatao and Ronald D. Lee (eds.) *Determinants of Fertility in Developing Countries*, Vol.2, Fertility Resolution and Institutional Influences.

---------- & E. N. Crimmins (1985), *The Fertility Revolution: A Demand-Supply Analysis*, University of Chicago Press, Chicago.

Ermisch, John F. (1979), "The Relevance of the 'Easterlin Hypothesis' and the 'New Home Economics' to Fertility Movements in Great Britain", *Population Studies* Vol.33, No.1.

Esping-Andersen, G. (1996), "Welfare States Without Work: The Impasse of Labour Shedding and Familialism in Continental European Social Policy", *Welfare States in Transition: National Adaptations in Global Economies*, London: Sage Publications.

Freedman, Ronald (1975), *The Sociology of Human Fertility*, John Wiley, New York.

---------- (1979), "Theories of Fertility Decline: A Reappraisal'' *Social Forces* Vol. 58, No. 1.

Fuchs, Victor R. (1988), *Women's Quest for Economic Equality*, Cambridge, Mass: Harvard University Press.

Government of India (2000), *National Population Policy 2000*, Ministry of Health and Family Welfare, New Delhi.

Grille, Halvor (1969), *Summary Review of Fertility Differentials in Developed Countries*, I.U.S.S.P Conference, London. (Mimeographed)

Gwatkin, Davidson R. (1979), "Political Will and Family Planning: The Implications of India's Emergence Experience", *Population and Development Review*, Vol.5, No.1.

Himes, N. E (1970), *Medical History of Contraception*. 1936 Reprint, New York Schoken Books.

Inglehart, R. (1970), *The Silent Revolution*, Princeton: Princeton University Press, 1970.

---------- (1990), *Culture Shift in Advanced Industrial Society*, Princeton: Princeton University Press.

International Labor Office (1973), *Economic Demographic Modeling Activities of the World Employment Programme*, Geneva, Mimeographed.

Jones, G. W., R. M. Douglas, J. C. Caldwell, and R. M. D'Souza (eds.) (1997), *The Continuing Demographic Transition*, Clarendon Press, Oxford.

Kennedy, Bingham (2000), "For China, a Census That Really Counts", *Population Today*, Population Reference Bureau, Washington, D.C., October 2000.

Khin Nu Win (1991), *An Analysis of Urban Mortality in Myanmar 1973 & 1983*, Master's Thesis, Institute of Economics, Yangon, Myanmar.

Kirk, Dudley (1996), "Demographic Transition Theory", *Population Studies*, Vol.50, No.3, London.

Knodel, John (1977), "Family Limitation and the Fertility Transition: Evidence from the Age Patterns of Fertility in Europe and Asia", *Population Studies*, Vol.31, No.2, London.

Knodel, John (1979), "From Natural Fertility to Family Limitation: The Onset of Fertility Transition in a Sample of German Villages", *Demography*, Vol.16, No.4.

Knodel, J. and E. van de Walle (1979), "Lessons From the Past: Policy Implications of Historical Fertility Studies", *Population and Development Review*, Vol.2, No.2, New York.

Kono, Shigemi (1986), "Comment", in K. David, M. S. Bernstam, and R. Ricardo-Campbell (eds.), *Below-Replacement Fertility in Industrial Societies, Population and Development Review, A Supplement to Volume 12*, Cambridge: Cambridge University Press.

---------- (1998), "Demographic Aspects of Population Ageing in Japan", in JARC, *Aging in Japan*, Japan Aging Research Center, Japan.

Landry A. (1934), *La revolution démographique*, Paris.

Leete, R. & Iqbal Alan (eds.) (1993), *The Revolution in Asian Fertility: Dimensions, Causes and Implications*, Oxford: Clarendon Press.

Leete, R. (1996), *Malaysia's Demographic Transition: Rapid Development, Culture, and Politics*, South-East Asian Social Science Monographs, Oxford: Oxford University Press.

Leibowitz, A and J. Klerman (1995), "Explaining Changes in Married Mother's Employment over Time", *Demography*, Vol.32, The Population Association of America: Washington, D.C.

Lesthaeghe, R. (1980), "On the Social Control of Human Reproduction", *Population and Development Review*, Vol.9, No.3.

---------- & G. Moors (1996), "Living Arrangements, Socio-Economic Position, and Values Among Young Adults: A Pattern Description for France, West Germany, Belgium, and the Netherlands", in David Coleman (ed.), *Europe's Population in the 1990s*, Oxford: Oxford University Press.

Lorimer, Frank et al., (1954), *Culture and Human Fertility*, UNESCO, Paris.

McDonald, Peter (1993), "Fertility Transition Hypotheses", in R. Leete and I. Alam, *The Revolution in Asian Fertility: Dimensions, Causes and Implications*, Oxford: Clarendon Press.

---------- (2000a), "Gender Equity in Theory of Fertility", *Population and Development Review*, Vol.26, No.3.

---------- (2000b), "Gender Equity, Social Institutions and the Future of Fertility", *Journal of Population Research*, Vol.17, No.1.

McFarlane, Deborah R. & Kenneth J. Meier (2001), *The Politics of Fertility Control*, Chatham House Publishers, Seven Bridges Press, LLC, New York.

Mincer, Jacob (1985), "Intercountry Comparisons of Labor Force Trends and Related Developments", *Journal of Labor Economics* Vol.82, No.2.

Ness, I. & J. Ciment (1999), *Encyclopedia of Global Population and Demographics, 1999*, Fitzroy Dearbon Publishers, Chicago.

Notestein, Frank W. (1945), "Population: The Long View", in T. Schultz (ed.), *Food for the World*, Chicago.

---------- (1953), "Economic Problems of Population Changes", *Proceedings of the English International Conference of Agricultural Economics*, New York.

Nyan Myint (1991), *Population Growth and Its Effect on Educational Development*, Seminar on Population and Socio-economic Development, Institute of Economics and UNFPA, Yangon, Myanmar.

Ogawa, Naohiro & Andrew Mason (1986), "An Economic Analysis of Recent Fertility in Japan: An Application of Butz-Ward Model", *Jinkogaku Kenkyuu* No.9, Japan.

Ohbuchi, Hiroshi (1988b), "The Quantity and Quality of Children, Labor Supply and Wages of Married Women in Postwar Japan", *Journal of Population Studies*, No.11, The Population Association of Japan.

Osawa, Michiko (1985), "Determinants of Japanese Fertility Rates in Postwar Period", *Population Index* Vol.51, No.3.

Pressat, R. (1985), *The Dictionary of Demography*, edited by Christopher Wilson, Basil Blackwell, New York.

Ryder, N. (1986), "Observations on the History of Cohort Fertility in the United States", *Population and Development Review*, No.12, New York.

Schultz, T. W. (ed.) (1973), "New Economic Approaches to Fertility: Proceedings of a Conference, June 8-9,1972", *Journal of Political Economy*, Vol.81, No.2, Part II .

Shryock, Henry S. & Jacob S. Siegel (1976), *The Method and Materials of Demography*, Condensed Edition by Edward G. Stockwell, Academic Press, California.

Simon, J.L. (1969), "The Effect of Income on Fertility", *Population Studies*, Vol.23, No.3, London.

Stoeckel, J & A. K. Jain (eds.) (1986), *Fertility in Asia: Assessing the Impact of Development Projects*, Frances Pinter Publishers, London.

Taeuber, I. B. (1958), *The Population of Japan*, Princeton: Princeton University Press.

Thompson, W. S. (1929), "Population", *American Journal of Sociology*, No.34, Princeton: Princeton University Press.

Thornton, A. & T. E. Fricke (1987), "Social Change and the Family: Comparative Perspectives from the West, China, and South Asia", in J. M. Stycos (ed.), *Demography as an Interdiscipline*, Transaction Publishers, New Jersey.

Tsui, Amy Ong (1985), "The Rise of Modern Contraception", in J. Cleland & J. Hobcraft (eds.) in collaboration with B. Dinesen, *Reproductive Change in Developing Countries*, Oxford: Oxford University Press.

Union of Myanmar (2001), *Health in Myanmar 2001*, Ministry of Health, Myanmar.

---------- (1995), *Population Changes and Fertility Survey, 1991*, Immigration and Population Department, Ministry of Immigration and Population, Yangon, Myanmar.

----------/ UNFPA (1999), *Fertility and Reproductive Health Survey 1997*, Department of Population, Ministry of Immigration and Population, Yangon.

United Nations (1965), *Population Bulletin of the United Nations*, No.7, 1963: *With Special Reference to Conditions and Trends of Fertility in the World*, "Age Patterns of Fertility", ST/SOA/Ser. N/7, New York.

---------- (1973), *The Determinants and Consequences of Population Trends*, Vol. 1, United Nations Publication, New York.

---------- (1990), *Step-by-Step Guide to the Estimation of Child Mortality*, Department of International Economic and Social Affairs, Population Studies No. 107, United Nations, New York.

---------- (1995), "Programme of Action of the International Conference on Population and Development", *Report of the International Conference on Population and Development*, Cairo, 1994 Sept. 5-13.

---------- (1999a), *Population Growth and Demographic Structure*, Department of Economic and Social Affairs, Population Division, New York.

United Nations (1999b), *Review and Appraisal of the Progress Made in Achieving the Goals and Objectives of the Programme of Action of the International Conference on Population and Development*, 1999 Report, Department of Economic and Social Affairs, Population Division, New York.

---------- (2000a), *World Population Prospects*, The 1998 Revision, Vol. 3, Analytical Report. Department of Economic and Social Affairs, Population Division, New York.

---------- (2000b), *Below Replacement Fertility*, Population Bulletin of the United Nations, Special Issue Nos.40/41, 1999, New York.

UNFPA (1990), *Inventory of Population Projects in Developing Countries Around the World 1988-1989*, United Nations Population Fund.

---------- (1994), *Empowering Women, Saving Earth: The Women of Capiz Province Sex and the Teenage Girls*, POPULI, Vol.21, No.3, The UNFPA Magazine, New York.

---------- (1996), Global Population Assistance Report 1996, United Nations Population Fund.

UNICEF (2001), *The State of the World's Children 2001: Early Childhood*, United Nations Children's Fund.

van de Kaa, D. (1987), "Europe's Second Demographic Transition", *Population Bulletin* Vol.42, No.1, Population Reference Bureau, Washinton, D.C.

van de Kaa, D. (1997), "Postmodern Fertility Preferences: From Changing Value Orientation to New Behaviour", *Working Papers in Demography*, No.74, Demography Program, Australian National University, Camberra.

van de Walle, Etienne (1992), "Fertility Transition, Conscious Choice, and Numeracy", *Demography*, Vol.29, No.4, November.

Watkins, S. C. (1987), "The Fertility Transition: Europe and the Third World Compared", *Sociological Forum*, Vol.2, No.4.

---------- (1990), "The Transformation of Demographic Regimes in Western Europe, 1870-1960", *Population and Development Review*, Vol.16, No.2.

Willis, Robert J. (1973), "A New Approach to the Economic Theory of Fertility Behavior", *Journal of Political Economy*, Part II, March/April.

Harada,（原田　理恵）(1999),「日本の出生率決定要因の分析_____イースタリンによる相対所得仮説の検証_____」『大学院研究年報』　第28号　経済学研究科　中央大学。

Ohbuchi,　（大淵　寛）(1982),「出生力の年齢パターン」　大友篤・嵯峨座晴夫編『アジア諸国 の人口動態』研究双書310　アジア経済研究所

_____ (1988a),『出生力の経済学』中央大学出版部。

_____ (2000),「人口と経済：その動向と将来展望」石　南國・早瀬　保子『アジアの人口問題』シリーズ・人口学研究10、大明堂。

War War Win (2000),「ミャンマーにおける出生力転換の性質と要因」『大学院研究年報』　第29号　経済学研究科　中央大学。

War War Win (2000),「死亡率転換の性質と要因　_____ミャンマーの事例研究_____」『大学院研究年報』　第30号　経済学研究科　中央大学。