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The demographic situation in Thailand

*by Fred Arnold
Robert D. Retherford
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CONTENTS

Preface *vii*

Abstract *1*

Population growth *3*

Population composition *5*

Fertility *9*

Mortality *18*

Population distribution and migration *22*

Population projections *26*

References *31*

TABLES AND FIGURES

Tables

- 1 Population size and rates of growth according to Censuses of 1911–1970: Thailand 4
- 2 Age-sex structure of Thailand's population, 1911–1970 6
- 3 Myers' Blended Index of digit preference for Censuses of 1937–1970 8
- 4 Percentage of women married, by age: Thailand, 1947–1970 8
- 5 Singulate mean age at marriage: Thailand, 1947–1970 9
- 6 Selected estimates of fertility in Thailand, 1937–1975 10
- 7 Age-specific fertility rates, 1960–1975 11
- 8 Mean number of children ever born alive to ever married women aged 15 and over, by region: 1970 12
- 9 Selected measures of fertility by region and urban-rural residence: Thailand, 1964–65 and 1974–75 13
- 10 Selected fertility measures by place of residence: Thailand, 1969–70 16
- 11 Abridged life table for males: Thailand, 1974–75 20
- 12 Abridged life table for females: Thailand, 1974–75 21
- 13 Population distribution by region: Thailand, 1947, 1960, and 1970 22
- 14 Municipal areas by size class: Thailand, 1960 and 1972 24
- 15 Lifetime migration status of population aged 5 and over: Thailand, 1970 25
- 16 Interregional five-year migrants by previous and present residence: Thailand, 1970 26
- 17 Selected population projections for Thailand, 1970–2000 27

Figures

- 1 The four regions and the 20 largest municipal areas: Thailand, 1970 2
- 2 Age pyramid for whole kingdom and municipal areas: Thailand, 1970 15
- 3 Age structure of the projected population of Thailand, 1970–2000 29

PREFACE

This paper is one of a series of reports on the demographic situation in selected Asian countries. Its purpose is to provide a summary of current demographic conditions in Thailand and recent trends in the components of population change. A discussion of the causes and the consequences of the demographic situation in Thailand is beyond the scope of this report. Readers wishing to pursue these topics more extensively or to obtain information about population topics not included here should consult a recent bibliography on population research in Thailand (Fawcett et al., 1973) or any of three comprehensive monographs on Thailand's population (Thailand, National Economic and Social Development Board et al., 1974; Thomlinson, 1971; United Nations, Economic and Social Commission for Asia and the Pacific, 1977). Additional sources containing discussions of selected aspects of Thailand's population include Prachuabmoh et al. (1972) and Unhanand et al. (1972).

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ABSTRACT *This paper reviews basic aspects of Thailand's demographic situation from the first census in 1911 to the present. The growth rate has been high throughout most of this century and has accelerated, particularly since World War II, as mortality has fallen rapidly to low levels. Recently fertility has begun to drop substantially, too, owing mainly to a fall in marital fertility. Age at marriage is already quite high by Asian standards and has changed little in recent decades. The fall in marital fertility has been paralleled by rapid expansion of family planning services. Fertility is lower in urban than in rural areas, with age at marriage generally higher and contraceptive use more pervasive in the former than in the latter. For reasons not entirely clear, the decline of fertility seems especially rapid in the Northern Region of the country.*

The urban population of Thailand is overwhelmingly concentrated in the Bangkok Metropolitan Area. Despite the rapid growth of Bangkok, however, the distribution of population among regions has changed little since 1947, and in fact the proportion in the Central Region, which contains Bangkok, has declined slightly. Presumably this change has occurred because migration from other regions has been more than offset by lower fertility in the Central Region.

Population projections show that Thailand will have to plan for a population by the year 2000 that is at least half again as large as its 1970 population of somewhat over 36 million, even if birth rates drop precipitously. Constant fertility would imply a population of 100 million by the end of the century.

Thailand is situated in Southeast Asia between 5 and 21 degrees north of the equator and between 97 and 106 degrees east longitude, comprising an area of about 514,000 square kilometers. The country is predominantly agricultural. Much of it consists of a flat alluvial plain that is flooded during the annual monsoon (approximately June to September) and is well-suited for rice cultivation. Thailand is in fact one of the major rice exporting areas of the world.

The kingdom is divided into four geographic regions (Figure 1) with broadly distinctive natural features. The Northern Region, covering about 170,000 square kilometers, includes sparsely settled mountainous areas and teak forests that extend to Burma in the north and west, and densely settled areas of rice cultivation in the fertile valleys.

FIGURE 1 The four regions and the 20 largest municipal areas:
Thailand, 1970

SOURCE: Thailand, National Statistical Office (1973, table 1B).

The Southern Region consists of peninsular Thailand, extending southward to Malaysia, with an area of about 70,000 square kilometers. The equatorial climate of this region is favorable to the cultivation of rubber, coconuts, and fruit. Tin mining is extensive, and there is also some mining of tungsten and iron. Of the 14 provinces in this region, four are populated primarily by Malay-speaking Muslims. The remainder of the country is overwhelmingly Buddhist. The combined population of the Northern and Southern regions comprises about one-third of the total population of Thailand.

The Northeastern Region is bounded by Laos to the northeast and Cambodia to the east. It is the largest of the four regions in area, covering slightly over 170,000 square kilometers, and in population, containing over one-third of the country total. It is the least developed of the four regions. The land is mainly a semi-arid plateau with relatively infertile soil and insufficient irrigation. The main crops include rice, corn, kenaf, and tapioca.

The Central Region is the most developed and most densely settled area of Thailand. It is a fertile area for rice cultivation, consisting mainly of flat alluvial plains close to sea level and subject to floods during the annual monsoon season. The Central Region contains the capital city of Bangkok, which is the economic and political center of the nation and by far its largest city.

The four regions are further divided into 71 provinces, over 600 districts, about 5,500 communes, and almost 50,000 villages. There are 118 municipal areas, and one metropolitan area. There are also over 600 sanitary districts, established when localities reach the minimum population size of a municipal area but have not yet developed characteristics generally associated with urbanism.

POPULATION GROWTH

In 1975 Thailand's population was estimated at about 42 million, making it the seventeenth most populous nation in the world. With an annual population growth rate of over 2.5 percent, it was also among the fastest growing nations in the world. Prior to the twentieth century, population in Thailand grew slowly, attaining a level of only 8 million by the time of the first census in 1911. Subsequent additions of 8 million required less and less time to complete. After 1911, it took 32 years for the population to reach a size of 16 million, 15 years to reach 24 million, ten years to reach 32 million, and only eight years to reach its estimated 1974 size of over 40 million. The growth rate accelerated throughout most of the century as a consequence of declin-

ing death rates coupled with continued high birth rates. At the present time, however, fertility appears to be dropping, so that a slow-down of growth may be imminent.

Thailand conducted seven population censuses between 1911 and 1970. Table 1 shows the national population counts for each census and derived intercensal growth rates. As in most countries, censuses in Thailand are subject to a certain degree of undercount, and population growth rates are influenced by differential underenumeration. The earliest censuses may have been undercounted by 5 to 10 percent or more (Thomlinson, 1971). The 1947 Census was of relatively poor quality due to lingering effects of the Second World War (Chalothorn, 1963; Bourgeois-Pichat, 1959; Das Gupta et al., 1965; Thailand, National Economic and Social Development Board et al., 1974). The 1960 Census was probably underenumerated by 2 to 4 percent (Fawcett et al., 1973; Unhanand et al., 1972; Caldwell, 1967). The 1970 mid-year population has been estimated to be slightly more than 36 million, about 4 to 5 percent higher than the census count (Arnold and Phananimamai, 1975; Wanglee and Arnold, 1975; Thailand, 1974; Thailand, National Economic and Social Development Board et al., 1973; Boonpratuang and Robinson, 1973; Population Council, 1974). Under any assumptions about the extent of underenumeration within these ranges, the pattern of rapid and generally accelerating population growth in Thailand remains clear.

TABLE 1 Population size and rates of growth according to Censuses of 1911–1970: Thailand

Census date	Total population	Intercensal increase in population	Exponential rate of growth (%)
1911, 1 April	8,266,408	na	1.3
1919, 1 April	9,207,355	940,947	2.2
1929, 15 July	11,506,207	2,298,852	2.9
1937, 23 May	14,464,105	2,957,898	1.9
1947, 23 May	17,442,689	2,978,584	3.2
1960, 25 April	26,257,916	8,815,227	2.7
1970, 1 April	34,397,374	8,139,458	

na—not applicable.

SOURCES: Thailand, National Statistical Office (1973), and Thomlinson (1971, table III-1).

As shown in Table 1 the intercensal growth rate reversed its upward trend after 1960, declining to 2.7 percent between 1960 and 1970. Regional intercensal growth rates for this decade were similar to that for the country as a whole, ranging from 2.5 percent in the Central Region to 2.9 percent in the Northeast. The recent decline in the intercensal growth rate shown in Table 1 may be due partly to differential underenumeration in the censuses of 1947, 1960, and 1970; but it may also be partly real. An impressive array of evidence has been accumulating that indicates a downward trend in the growth rate over the past few years. It appears that fertility has begun to decline in response to economic and social change as well as a vigorous family planning program.

Future growth rates in Thailand will depend largely on the course of fertility, since death rates are already low and international migration is negligible. If birth rates do not decline further, the population of Thailand will more than double in the next 25 years. Even if birth rates drop precipitously, however, from a general fertility rate of 174 in 1970 to 70 between 1995 and 2000, Thailand will still have to provide for a population of about 65 million by the turn of the century.

POPULATION COMPOSITION

Table 2 shows the trend in the age-sex structure of Thailand's population starting with the Census of 1911. A slow but steady increase in the proportion of the population under age 15 is apparent from 1919 on. Up to 1937 a slow increase in the birth rate (Bourgeois-Pichat, 1959) may have been partly responsible for this trend. Caution must be exercised in making such an interpretation, however, because the birth rate estimates themselves were derived by stable population methods that utilize the census age distribution as the data base. After 1937 the principal cause of the rise in proportion under age 15 was probably the decline in infant and child mortality. The three time series of proportions in each of the three age groups are somewhat erratic, undoubtedly owing in part to variations in census underenumeration and misreporting by age from one census to the next.

The change in age structure is shown somewhat more dramatically by the trend in the dependency ratio, defined here as the number under age 15 and over 59 as a proportion of those aged 15–59. This measure of dependency is of interest for economic development, because it gives a rough idea of the capacity of the society to save and invest. The dependency ratio shows a steady increase, from 76 in 1919 to a very high value of 100 in 1970. The dependency ratio for the United States in 1970 was 75.

TABLE 2 Age-sex structure of Thailand's population, 1911–1970

Year, ^a age group, and dependency ratio ^b	Male	Female	Both sexes	Sex ratio ^c
1911				
0–14	40.4	39.7	40.0	98.7
15–59	53.8	54.8	54.3	95.5
60 and over	5.8	5.5	5.7	103.0
All ages	100.0	100.0	100.0	97.2
Dependency ratio	85.8	82.5	84.1	na
1919				
0–14	38.7	38.0	38.4	100.1
15–59	55.9	57.5	56.7	95.9
60 and over	5.4	4.5	4.9	118.0
All ages	100.0	100.0	100.0	98.5
Dependency ratio	78.7	74.0	76.3	na
1929				
0–14	39.1	39.1	39.1	101.4
15–59	56.0	56.4	56.2	100.7
60 and over	4.9	4.5	4.7	113.2
All ages	100.0	100.0	100.0	101.5
Dependency ratio	78.6	77.3	77.9	na
1937				
0–14	42.5	42.4	42.5	102.8
15–59	52.6	52.8	52.6	102.0
60 and over	4.9	4.8	4.9	101.0
All ages	100.0	100.0	100.0	102.3
Dependency ratio	90.0	89.4	89.7	na
1947				
0–14	42.7	41.9	42.3	101.8
15–59	53.3	53.7	53.5	99.3
60 and over	4.0	4.4	4.2	92.0
All ages	100.0	100.0	100.0	100.0
Dependency ratio	87.6	86.2	86.9	na
1960				
0–14	43.5	42.9	43.2	101.9
15–59	52.3	52.1	52.2	100.6
60 and over	4.2	5.0	4.6	84.9
All ages	100.0	100.0	100.0	100.4
Dependency ratio	91.3	91.8	91.6	na

TABLE 2 (continued)

Year, ^a age group, and dependency ratio ^b	Male	Female	Both sexes	Sex ratio ^c
1970				
0-14	45.9	44.4	45.1	102.6
15-59	49.6	50.3	50.0	97.8
60 and over	4.5	5.3	4.9	83.4
All ages	100.0	100.0	100.0	99.1
Dependency ratio	101.5	98.7	100.1	na

na—not applicable.

a Figures for 1911 and 1919 exclude Krung Thep (Bangkok). For 1911, 1919, and 1929, the age structure is based on ages 61 and over for the oldest group. For 1929, the youngest age group is under 16. In these early censuses age was recorded as of a person's next birthday, effectively adding one year to all ages.

b Dependency ratio = $\frac{\text{population aged 0-14} + \text{population aged 60 and over}}{\text{population aged 15-59}} \times 100$.

c Sex ratio = $\frac{\text{number of males}}{\text{number of females}} \times 100$.

SOURCES: Thailand, Central Service of Statistics (1939); Thailand, Central Statistical Office (1958, 1962); Thailand, Ministry of Finance (1919, 1923); Thailand, National Statistical Office (1973).

Sex ratios for each broad age group are also shown in Table 2. Normally sex ratios exceed unity at the young ages, since the sex ratio at birth is in the neighborhood of 105 male births per 100 female births. With few exceptions, subsequent mortality for males exceeds that for females, so that the sex ratio normally declines with age. This expected pattern of sex ratios by age occurs from 1937 onward, but not in 1911, 1919, and 1929. But even in 1937 it is unlikely that the sex ratio at ages 60 and over exceeded 100. We may conclude that for the first four censuses shown in Table 2, differential underenumeration of females was probably fairly serious at most ages.

The quality of age reporting, as measured by Myers' Index of digit preference (Myers, 1940), generally improved after 1937 (Table 3). But the index for males improved only slightly and rather erratically. The improvement for females has been steady, resulting in a lower value of the index for females than for males in 1970. For both sexes a substantial improvement occurred between 1960 and 1970, probably reflecting a change in the relevant census question from age in 1960 to date of birth as well as age in 1970. The value of Myers' Index for 1970 was 1.4 for females and 1.7 for males, indicating good quality of

TABLE 3 Myers' Blended Index of digit preference for Censuses of 1937-1970

Sex	1937	1947	1960	1970
Male	1.8	1.1	2.3	1.7
Female	2.9	2.4	2.4	1.4
Both sexes	2.1	1.8	2.2	1.4

SOURCES: Myers (1940); Thailand, Central Statistical Office (1962); Thailand, Ministry of Interior (1942); Thailand, National Statistical Office (1973, table 3); United Nations (1955).

age reporting compared with that of more developed countries. For both sexes combined the value of the index for Thailand in 1970 was 1.4. Comparable figures for the United States were 3.0 in 1940, 2.2 in 1950, and 0.8 in 1960 (Shryock and Siegel, 1973:208). Thailand's age distribution is unusually good in comparison with that of other Asian countries. Ueda (1976) reported that Thailand has the lowest score (highest accuracy) on the U.N. sex-age accuracy index among 28 countries in Asia and the Pacific. In the same study, Thailand was also shown to have relatively little digit preference according to both Myers' Index and Whipple's Index.

Table 4 shows proportions married by age for females in the reproductive ages for 1947, 1960, and 1970. Overall there was a decline in the proportions married below age 30 and an increase at subsequent ages. The singulate mean age at first marriage (Hajnal, 1953) hardly changed at all over the same period, as shown in Table 5. The mar-

TABLE 4 Percentage of women married, by age: Thailand, 1947-1970

Age group	1947	1960	1970
15-19	17.9	12.5	17.5
20-24	64.2	56.4	57.9
25-29	81.5	79.6	79.2
30-34	85.1	86.1	85.8
35-39	83.8	86.4	86.8
40-44	79.4	82.7	84.5
45-49	72.9	77.3	80.1

NOTE: Women of unknown marital status are omitted from computation of percentages.

SOURCES: Thailand, Central Statistical Office (1962); Thailand, National Statistical Office (1973); United Nations (1955).

TABLE 5 Singulate mean age at marriage: Thailand, 1947–1970

Sex	1947	1960	1970	1970, municipal areas
Males	24.3	24.5	24.7	27.2
Females	21.1	21.6	21.9	24.7

NOTE: Persons of unknown marital status are omitted from computations.

SOURCES: Calculated from Censuses of 1947, 1960, and 1970. Method is described in Shryock et al. (1973:295). Values for 1960 and 1970 taken from Chamrathirong (1976:118).

riage ages of 24–25 for males and 21–22 for females are fairly high for Asian countries at comparable levels of development.

Table 5 also shows that in 1970 people married much later in municipal areas (66 percent of whose population was in Bangkok-Thonburi) than in the rest of the country. According to the singulate mean age at marriage (SMAM) measure, women married on the average about 2.8 years later in municipal areas than in the country as a whole. Direct survey questions on age at first marriage indicate a somewhat smaller rural-urban differential, however (Knodel and Pitakrupsombati, 1973:232). The municipal-total country SMAM differentials must be interpreted with caution, because rural-to-urban migration inflates proportions single at the young reproductive ages and biases upward the values of SMAM for municipal areas (Prachuabmoh et al., 1972:50). The higher age at marriage in municipal areas suggests that as the country urbanizes further (from a level of about 15 percent municipal in 1970), the national average age at marriage might rise further and contribute to the decline in birth rates already under way. But this effect, if it occurs, will probably be small, because age at marriage was already high in 1970.

FERTILITY

Registration of births and deaths has been compulsory in Thailand since 1917, but vital registration statistics have always been incomplete to varying degrees. Official statistics show a birth rate rising to a level of 40 per thousand in the mid-1960s, but this trend undoubtedly reflects improvements in registration completeness as well as actual changes in fertility. Das Gupta et al. (1965) estimated that birth registration was about 75 percent complete in 1960, whereas the Survey of Population Change estimated 85 percent completeness for 1964–65 (Thailand, National Statistical Office, 1969). A new population growth

estimation survey is currently being conducted in Thailand, and the preliminary results from the first year of the survey indicate that further improvement in vital registration has not occurred over the last decade. In fact, the completeness rate for birth registration was estimated to have dropped to 70 percent in 1974–75 (Thailand, National Statistical Office, 1976).

Other estimates of fertility levels in Thailand show that birth rates have remained high and relatively constant throughout most of the twentieth century, with the exception of a dip in fertility around the time of World War II. Bourgeois-Pichat's (1959) estimates of fertility indicate that the crude birth rate rose from about 45 per thousand to 50 per thousand between 1920 and 1932, and thereafter remained at a level of around 47–49 per thousand until 1955, with a moderate drop during the war years.

Fertility rates presently remain at relatively high levels, although evidence of a recent reduction in fertility is mounting. The gross reproduction rate, which was estimated at 3.2 per woman for 1950–55 (United Nations, 1965), remained essentially unchanged at a level of 3.1 in 1964–65, according to the Survey of Population Change, or SPC (Thailand, National Statistical Office, 1969). (The SPC sampling universe excluded Bangkok-Thonburi, so that the gross reproduction rate for the whole country would undoubtedly have been lower than the reported level of 3.1.) The SPC total fertility rate of 6,299 per thousand women for 1964–65 also indicates high fertility. But examination of a number of data sources reveals a sustained reduction in the total fertility rate since 1960, and also in the general fertility rate except for the most recent years reported (Table 6).

TABLE 6 Selected estimates of fertility in Thailand, 1937–1975

Date	Total fertility rate	General fertility rate
1937	7,055.5	217.7
1960	6,415.5	195.3
1964–65	6,299.0	188.8
1968–69	6,104.0	184.1
1970	5,597.5	163.3
1971–72	5,331.4	148.7
1974–75	5,167.0	157.5

SOURCES: Thailand, National Economic and Social Development Board (1975: table 1, revised), and Thailand, National Statistical Office (1976).

TABLE 7 Age-specific fertility rates, 1960–1975

Age group	Overall rates					Marital rates				
	1960	1964–65	1969–70	1972–73	1974–75	1960	1964–65	1969–70	1972–73	1974–75
15–19	69	66	72	71	84	552	443	412	408	480
20–24	221	259	256	228	246	393	454	442	395	426
25–29	314	303	286	286	254	395	382	361	362	321
30–34	304	273	229	178	203	353	318	267	207	237
35–39	242	222	198	166	153	280	257	228	191	176
40–44	131	112	152	123	76	159	134	180	145	90
45–49	47	24	29	14	14	61	31	36	18	17

NOTE: Age-specific marital fertility rates (ASMRs) for 1964–65 were obtained by interpolating 1960 and 1970 Census data on female proportions married by age, and dividing this interpolated set into the age-specific fertility rates (ASFRs). The ASMRs for 1974–75 were obtained by dividing the proportion of women married at each age from the 1970 Census into the ASFRs. The ASFRs for 1969–70 and 1972–73 were obtained by multiplying the ASMRs by proportions married from the 1970 Census.

SOURCES: 1960: Das Gupta et al. (1965); 1964–65: Survey of Population Change (Thailand, National Statistical Office, 1969); 1969–70 and 1972–73: Longitudinal Study (Knodel and Pitaketsombati, 1975); 1974–75: Survey of Population Change (Thailand, National Statistical Office, 1976); 1970 Census: Thailand, National Statistical Office, 1973.

Age-specific fertility rates for married women and for all women also appear to have dropped since 1960 (Table 7). At the younger ages the decreases are modest, whereas at the older childbearing ages they are more pronounced, if a bit erratic. Nevertheless, one of the most outstanding features of the age pattern of fertility in Thailand is the persistence of high birth rates through the older childbearing years, compared with patterns in other countries. Age-specific fertility rates at ages 35–39 have until recently remained at more than two-thirds of the peak level occurring at ages 25–29. Marital fertility rates are relatively high above age 30, and in rural areas about one-half of all births occur to women above age 30 (Knodel and Prachuabmoh, 1973a).

Regional differences in fertility

According to the 1970 Census the number of children ever born alive to ever married women was highest in the Northeast and lowest in the South and Central Regions, with the North occupying an intermediate position (Table 8). Earlier the Survey of Population Change showed a similar ranking for 1964–65, based on other measures (Table 9). Estimates from the 1974–75 Survey of Population Change indicate changes in the ranking, with the Northeast and the South now showing the highest fertility and the Central Region and the North the lowest (Table 9). Fertility changed little in the Northeast but rose slightly in the South between the two surveys. It fell sharply in the Central Region and the North, particularly the latter, as has also been documented by Pardthaisong (1976).

TABLE 8 Mean number of children ever born alive to ever married women aged 15 and over, by region: 1970

Region	Age group of women										All ages
	15–19	20–24	25–29	30–34	35–39	40–44	45–49	50–54	55–59	60 and over	
Whole Kingdom	0.74	1.82	3.04	4.32	5.54	6.36	6.55	6.38	6.23	5.89	4.69
North	0.72	1.83	3.06	4.30	5.46	6.22	6.41	6.33	6.21	5.97	4.68
Northeast	0.71	1.83	3.16	4.65	6.06	7.05	7.25	7.12	7.02	6.82	5.00
Central	0.78	1.78	2.86	4.02	5.14	5.95	6.11	5.94	5.76	5.42	4.52
South	0.77	1.85	3.00	4.18	5.24	5.88	6.00	5.68	5.53	5.11	4.32

SOURCE: Thailand, National Statistical Office (1973: table 6).

TABLE 9 Selected measures of fertility by region and urban-rural residence: Thailand, 1964-65 and 1974-75

Period and region	Crude birth rate	General fertility rate	Standardized general fertility rate ^a	Total fertility rate	Gross reproduction rate	Net reproduction rate
1964-65						
Whole Kingdom ^b	42.2	188.8	188.8	6,299	3.1	2.6
North	43.7	201.1	198.1	6,475	3.1	2.6
Northeast	43.5	193.6	196.0	6,611	3.2	2.7
Central ^b	39.7	174.4	175.7	5,901	2.9	2.4
South	40.9	184.1	180.9	6,020	2.9	2.5
Municipal areas ^b	29.9	117.2	125.2	4,233	2.1	1.7
Nonmunicipal areas	43.2	182.5	194.7	6,489	3.2	2.6
1974-75						
Whole Kingdom	37.0	157.5	157.5	5,167	2.5	2.2
North	26.6	108.7	113.0	3,787	1.8	1.6
Northeast	45.0	204.7	199.8	6,588	3.2	2.8
Central ^b	34.1	143.0	140.7	4,668	2.3	2.0
South	41.4	190.4	192.4	6,284	3.1	2.6
Bangkok-Thonburi	32.6	108.2	104.1	3,648	1.8	1.5
Municipal areas	39.1	136.2	133.1	4,580	2.2	1.9
Nonmunicipal areas	36.7	161.6	161.0	5,313	2.6	2.2

NOTE: Rates per thousand, except for the gross reproduction rate and net reproduction rate, which are per woman.

a Standardized on the age distribution of the Whole Kingdom.

b Excluding Bangkok-Thonburi.

SOURCES: Thailand, National Statistical Office (1969: table A, revised); Thailand, National Statistical Office (1976: table 4).

Urban-rural differences in fertility

Data from early rounds of the Longitudinal Study of Social, Economic, and Demographic Change in Thailand (LS), conducted by the Institute of Population Studies, Chulalongkorn University, strongly suggest a substantial decline in marital fertility over the last generation among urban women but no such decline in rural areas (Knodel and Prachuabmoh, 1973b). More recent rounds of the LS suggest that fertility is beginning to decline in rural areas as well. In any event, all available sources of data point to a substantial difference in fertility rates between municipal and nonmunicipal areas. In 1964–65, the Survey of Population Change estimated fertility in municipal areas (excluding Bangkok-Thonburi) to be only two-thirds as high as in nonmunicipal areas (Table 9). Low levels of fertility in municipal areas, as well as high rates of net migration of young adults to municipal areas, can also be seen indirectly from the age pyramids for municipal areas (including Bangkok-Thonburi) and the Whole Kingdom (Figure 2). The age pyramid for the whole country exhibits the broad base characteristic of a rapidly growing, high-fertility country. The age pyramid for municipal areas, on the other hand, shows approximately equal numbers of people in each of the first four age groups, suggesting a much slower rate of growth that is due primarily to lower fertility. (There is probably substantial undercount of children aged 0–4 in both age pyramids, but since there is no reason to believe that the relative undercount in this age group was greater for municipal areas than for nonmunicipal areas, comparison of the shape of the pyramids is still valid.) Within municipal areas, fertility is lower in Bangkok-Thonburi than in provincial urban areas (Tables 9 and 10). The average ever married woman in Bangkok-Thonburi has borne about one child less than her counterpart in rural areas. The Survey of Fertility in Thailand, part of the World Fertility Survey, also shows lower fertility in urban areas, with urban fertility about 75 percent as high as in rural areas (Institute of Population Studies and Thailand, National Statistical Office, 1977).

Socioeconomic differences in fertility

Substantial fertility differentials have been found with respect to educational attainment, recent migration status, and occupation, with migrants and those having higher education and nonagricultural occupations showing lower fertility than nonmigrants and those with lower education and agricultural occupations (Goldstein, 1971; Knodel and Prachuabmoh, 1973b). The relationship of fertility to religion and to

FIGURE 2 Age pyramid for whole kingdom and municipal areas:
Thailand, 1970

SOURCE: Thailand, National Statistical Office (1973, table 4).

TABLE 10 Selected fertility measures by place of residence: Thailand, 1969-70

Fertility measure and period	Rural	Provincial urban	Bangkok-Thonburi
Mean number of children born to all ever married women (1970)	4.78	4.25	3.86
Mean number of children born to all ever married women (1969-70)	4.98	4.15	3.86
Mean number of living children for ever married women (1969-70)	4.06	3.66	3.54
Total marital fertility rate for currently married women aged 15-49 (1969-70)	.272	.193	.165
Percentage of currently married women aged 15-44 who have ever used contraception (1969-70)	14.6	36.6	41.9

SOURCES: Thailand, National Statistical Office (1973: table 6); Prachuabmoh et al. (1972); Knodel and Pitaktpsombati (1973, 1975).

female labor force participation appears to be more complex. Pronounced socioeconomic differentials in fertility are limited largely to urban women (Knodel and Prachuabmoh, 1973b). Overall, the pattern of fertility differentials by social, economic, and cultural characteristics has led analysts to support modernization of family roles and expansion of alternative sources of satisfaction, especially for women, as fruitful policies that could result in further reductions in family size (Thailand, National Economic and Social Development Board et al., 1974; Goldstein et al., 1972).

Two factors that are often associated with a fertility decline are an increasing age at marriage and the introduction or expansion of family planning services. In an earlier section of this paper it was shown that the age at marriage for couples in Thailand increased very little between 1947 and 1970. The decline in fertility between 1960 and 1970 was therefore due principally to a fall in marital fertility, to which family planning considerations are pertinent. The influence of Thailand's population policy and family planning program is discussed briefly below.

Population policy and family planning

The early pronatalist stance of the Thai government in the first half of the twentieth century slowly gave way to an official national pop-

ulation policy in March 1970 supporting voluntary family planning. The Ministry of Public Health had begun family planning activities on a wide scale in 1968. In 1972, referring to the national population policy of the government, Thailand's Third Five-Year Economic and Social Development Plan included a statement in favor of lowering population growth rates. One of the specific objectives of this policy was to reduce the rate of population growth from over 3 percent to about 2.5 percent by October 1976. To attain this goal, a realistic set of targets for new acceptors of family planning was adopted, and at the end of the Third Five-Year Plan (1976), it appears that the goal of a 2.5 percent growth rate may have been attained. The Fourth Five-Year Plan calls for a continued reduction in fertility in order to achieve a growth rate of 2.1 percent by 1981.

Knowledge of family planning was already widespread in Thailand in 1969, with over three-quarters of the rural population and nine-tenths of the urban population indicating at least a superficial familiarity with one or more contraceptive methods (Knodel and Pitaktepsombati, 1973). Urban-rural differentials in contraceptive use were also substantial at that time. Almost 43 percent of currently married women in the childbearing ages in Bangkok-Thonburi had used at least one contraceptive method, and a substantial proportion of women in provincial towns (37 percent) had likewise ever used contraception. On the other hand, only 15 percent of rural women reported experience with contraception. Both approval and practice of family planning increased substantially among both rural and urban women between 1969 and 1972, the first and second rounds of the Longitudinal Study (Knodel and Pitaktepsombati, 1975). Further substantial increases in contraceptive use were found in the Survey of Fertility in Thailand (SOFT) in 1975. About 31 percent of ever married women in the childbearing ages and 37 percent of all exposed women were current users of contraception at the time of the SOFT survey (Institute of Population Studies and Thailand, National Statistical Office, 1977). Even in rural areas 35 percent of exposed women were using contraception, and in the urban areas the proportion using had risen to nearly 50 percent. These urban-rural differentials in contraceptive use, as well as the differentials in age at marriage discussed earlier, are quite consistent with the decidedly lower level of fertility observed in municipal areas than in the countryside. Women in urban areas marry at older ages and tend to make more use of contraception within marriage, and they also bear fewer children than their rural counterparts.

MORTALITY

Historical estimates of Thailand's crude death rate go back to 1920, but they are predicated on a variety of adjustments and corrections of the original data and must be interpreted with caution. Bourgeois-Pichat's (1959) yearly estimates for the period 1920–55 show rates close to 30 per thousand for the years 1920–37, 24–28 for 1938–44, and 30–32 for 1945–47. Between 1948 and 1955 his calculations indicate a steady decline to 18 per thousand. The Survey of Population Change (SPC) indicates a crude death rate of about 11 in 1964–65 for the whole country, excluding Bangkok-Thonburi, and a crude death rate of 8.9 in 1974–75 for the whole country, including Bangkok-Thonburi (Thailand, National Statistical Office, 1969, 1976). The SPC also found that death registration was only about 63 percent complete in 1964–65, and about 60 percent complete in 1974–75, so that official registration figures cannot be relied on by themselves for accurate estimates of mortality.

Figures on male life expectancy since 1937, derived by Brass's death distribution method, are 39 years in 1937, 40 years in 1947, 51 years in 1960, and 56 years in 1970 (Rungpitarangsi, 1974:57–63). These estimates may be compared with earlier estimates of 35 years in 1937, 50 years in 1947, and 56 years in 1964–65 (Thailand, National Economic and Social Development Board et al., 1974:7).

The latter estimate of 35 years for 1937 is based on a stable population assumption. If Bourgeois-Pichat's estimates of roughly 30 for the crude death rate and 50 for the crude birth rate are accepted as accurate, and if the 1937 population was roughly stable—which seems likely since Bourgeois-Pichat's estimates of birth and death rates were very close to constant between 1920 and 1937—then the 1937 population conforms reasonably well to a level 8 Model West stable population (Coale and Demeny, 1966) with a life expectancy of about 35 years. Brass's death distribution method also assumes a stable population, but it has the advantage of being quite robust to small departures from stability. It therefore seems likely, though by no means certain, that the Rungpitarangsi estimate of 39 years is more accurate than the earlier estimate of 35 years.

Rungpitarangsi's male life expectancy estimate of 40 years in 1947 is almost certainly more accurate than the earlier estimate of about 50 years. A life expectancy of 50 would erroneously indicate substantially more rapid mortality decline prior to World War II than after. In fact, the earlier 1947 estimate of 50 is based on death registration, which suffered from substantial underreporting at that time. Addi-

tional evidence supporting the contention that life expectancy must have been in the neighborhood of 40 years in 1947 is the trend in the death rate from malaria. This trend roughly indicates the declining trend in general infectious-parasitic mortality, which in turn was primarily responsible for the rapid postwar drop in the crude death rate. The death rate from malaria has been estimated at 329 per 100,000 in 1943, 300 in 1947, and 14 in 1966 (Unhanand et al., 1972:3; Thomlinson, 1971:65). The principal decline in malarial mortality thus came after 1947 and could not have produced a substantial gain in life expectancy between 1937 and 1947.

With the exception of the recent Rungpitarangsi mortality estimates, most mortality estimates since 1960 for Thailand have been based on the 1964–65 round of the Survey of Population Change, which estimated life expectancy at 56 years for males and 62 years for females. If Rungpitarangsi's estimates of male life expectancy are averaged for 1960 and 1970 to give an estimate for 1965, the result of 53.2 is about 2.7 years lower than the corresponding SPC estimate. The discrepancy may be due largely to the large departure from stability in 1964–65, which somewhat biases results based on the death distribution method. New life tables from the 1974–75 Survey of Population Change, shown in Tables 11 and 12, indicate that life expectancy increased by about two years for both males and females between 1964–65 and 1974–75, according to SPC estimates for both dates.

Regional mortality differences estimated by the SPC must be interpreted with caution. Estimates by sex and age are in most cases based on small numbers of deaths and show a somewhat irregular pattern (Thailand, National Statistical Office, 1976), due no doubt largely to sampling variability. Nevertheless, crude death rates by region appear to be based on a large enough number of deaths to be meaningful. The 1974–75 CDR for the Whole Kingdom (including Bangkok-Thonburi) was 8.9. Crude death rates for the North, Northeast, and South were similar, ranging from 10.0 to 10.3, while the rate for Bangkok-Thonburi was only 4.3 and that for the rest of the Central Region was 6.8.

Deaths by cause are reported in the annual Public Health Statistics Report, but owing to underreporting and inaccurate diagnosis stemming from insufficient numbers of trained medical personnel, these statistics are not of much use to demographers. For example, cause-of-death statistics for 1972 attributed 53 percent of deaths to senility or ill-defined or unknown causes (Thailand, Ministry of Public Health, 1976). Because of the unknown magnitude of improvements in reporting of deaths by cause, trends in cause-specific death rates based on published data are difficult to interpret.

TABLE 11 Abridged life table for males: Thailand, 1974-75

Age interval Period of life between two exact ages stated in years x to $x+n$	Proportion dying	Of 100,000 born alive		Stationary population		Average re- maining life- time
	Proportion of persons alive at beginning of age interval dying during interval nq_x	Number alive at beginning of age interval l_x	Number dying during age interval nd_x	In the age interval nL_x	In this and all subsequent age intervals T_x	Average number of years of life remaining at beginning of age interval e_x
Under 1	0.091888	100,000	9,189	92,998	5,762,771	57.63
1-4	0.030879	90,811	2,804	356,235	5,669,774	62.43
5-9	0.013525	88,007	1,190	437,060	5,313,540	60.38
10-14	0.007979	86,817	693	432,308	4,876,481	56.17
15-19	0.011358	86,124	978	428,311	4,444,173	51.60
20-24	0.015804	85,146	1,346	422,382	4,015,862	47.16
25-29	0.012630	83,800	1,058	416,467	3,593,480	42.88
30-34	0.022748	82,742	1,882	409,309	3,177,013	38.40
35-39	0.031215	80,860	2,524	398,338	2,767,704	34.23
40-44	0.045409	78,336	3,557	382,806	2,369,367	30.25
45-49	0.035065	74,779	2,622	367,889	1,986,561	26.57
50-54	0.085973	72,157	6,204	345,922	1,618,672	22.43
55-59	0.086950	65,953	5,735	316,243	1,272,750	19.30
60-64	0.167962	60,218	10,114	276,342	956,507	15.88
65-69	0.165795	50,104	8,307	230,043	680,166	13.58
70-74	0.275314	41,797	11,507	180,899	450,123	10.77
75-79	0.382282	30,290	11,579	122,655	269,225	8.89
80 and over	1.000000	18,711	18,711	146,570	146,570	7.83

SOURCE: Thailand, National Statistical Office (1976: table 6, revised).

TABLE 12 Abridged life table for females: Thailand, 1974-75

Age interval Period of life between two exact ages stated in years x to $x+n$	Proportion dying	Of 100,000 born alive		Stationary population		Average re- maining life- time
	Proportion of persons alive at beginning of age interval dying during interval nq_x	Number alive at beginning of age interval l_x	Number dying during age interval nd_x	In the age interval nL_x	In this and all subsequent age intervals T_x	Average number of years of life remaining at beginning of age interval e_x
Under 1	0.059556	100,000	5,956	95,095	6,355,898	63.56
1-4	0.035669	94,044	3,354	367,792	6,260,803	66.57
5-9	0.012317	90,690	1,117	450,658	5,893,012	64.98
10-14	0.006954	89,573	623	446,264	5,442,355	60.76
15-19	0.010222	88,950	909	442,487	4,996,091	56.17
20-24	0.007619	88,041	671	438,566	4,553,604	51.72
25-29	0.012511	87,370	1,093	434,244	4,115,039	47.10
30-34	0.014803	86,277	1,277	428,479	3,680,795	42.66
35-39	0.029023	85,000	2,467	419,043	3,252,317	38.26
40-44	0.027720	82,533	2,288	407,290	2,833,275	34.33
45-49	0.051346	80,245	4,120	391,018	2,425,986	30.23
50-54	0.035906	76,125	2,733	373,836	2,034,968	26.73
55-59	0.059077	73,392	4,336	356,715	1,661,132	22.63
60-64	0.081038	69,056	5,596	332,000	1,304,418	18.89
65-69	0.122149	63,460	7,752	299,540	972,418	15.32
70-74	0.240079	55,708	13,374	245,155	672,878	12.08
75-79	0.188770	42,334	7,991	191,889	427,723	10.10
80 and over	1.000000	34,342	34,342	235,835	235,835	6.87

SOURCE: Thailand, National Statistical Office (1976: table 6, revised).

POPULATION DISTRIBUTION AND MIGRATION

Table 13 shows the trend in regional distribution of Thailand's population over the period 1947 to 1970. The Northeast, geographically the largest region, also has the largest share of population; and the South, geographically the smallest region, has the smallest share of population. Despite the rapid growth of Bangkok, the distribution of population among regions has changed little since 1947, and in fact the proportion in the Central Region has declined slightly. Presumably this has occurred because migration from other regions has been more than offset by lower fertility in the Central region. Population density has increased rapidly in all regions, reflecting the high rate of population growth and stable distribution of population among regions. Population density is highest in the Central Region, which includes the Bangkok Metropolitan Area.

Table 13 also shows that the pace of urbanization in Thailand has been modest, despite rapid absolute gains in urban population (shown in Table 14). Urban population is defined here as persons residing in municipalities, which are administrative areas set up under the Municipal Act of B.E. 2496 (1953). There are three types of municipalities: *nakhon* (city), *muang* (town), and *tambon* (small town). To be classified as *nakhon*, a municipality must have 50,000 or more inhabitants and a population density not fewer than 3,000 persons per square kilometer. A *muang* must have at least 10,000 inhabitants and a density not fewer than 3,000 per square kilometer. The seat of a provincial administration office is also required by law to be incorporated as

TABLE 13 Population distribution by region: Thailand, 1947, 1960, and 1970

Region	Percentage distribution			Population/km ²			Percentage in municipal areas	
	1947	1960	1970	1947	1960	1970	1960	1970
North	21.0	21.8	21.8	21.3	33.7	44.0	6.4	5.9
Northeast	35.6	34.2	35.0	36.2	52.8	70.6	3.5	3.7
Central	31.1	31.5	30.8	52.0	79.9	102.5	27.4	30.3
South	12.4	12.5	12.4	30.6	46.6	60.9	10.1	10.7
Whole Kingdom	100.0	100.0	100.0	33.7	51.1	66.9	12.5	13.2

SOURCES: Thailand, Central Statistical Office (1958, 1962); Thailand, National Economic and Social Development Board et al. (1974); Thailand, National Statistical Office (1973).

a *muang* municipality, however, regardless of its population size and density. *Tambon* municipalities achieve their status through official decrees by the Ministry of Interior and are not defined by precise numerical criteria. Some localities, having reached the minimum size and density for designation as municipality, are nevertheless judged not to have developed other characteristics associated with urbanism and are designated instead as "sanitary districts." Since a locality may retain this designation for some time after actually achieving the other urban characteristics previously lacking, the estimates of urban population in Tables 13 and 14 are undoubtedly somewhat low. According to the household registration system, which follows the above definitions, the municipal population accounted for 14.5 percent of the country's population as of 1 April 1970 (calculated from data in Wanglee and Arnold, 1975).

Table 14 indicates that the municipal population of Thailand is overwhelmingly concentrated in Bangkok-Thonburi, which had a population of 3.1 million at the end of 1972. In 1960, the two municipalities of Bangkok and Thonburi were separate but by 1972 they had been combined into a single municipality, so that the number of municipal areas of at least 100,000 population declined from two to one over the same period. The next largest city is Chiang Mai in the North, with a 1972 population of less than 95,000. Thus the Bangkok Metropolitan Area, with a population of 3,793,763 in 1972, is more than 40 times as large as the second most populous city. Thailand has one of the highest primacy rates in the world.

Table 14 does not provide a good basis for calculating growth rates for municipal population, because the 1960 figures are from the census and the 1972 figures are from the household registration system. Registration in 1970 was more complete than the census in municipal areas, especially in Bangkok. It has been estimated that the census undercounted municipal population in 1970 by about 11 percent and the Bangkok area population by about 14 percent, relative to registration figures (Wanglee and Arnold, 1975). If one computes the growth rate for all municipal areas using census figures for both 1960 and 1970, the result is an average annual growth rate of 3.4 percent. Similar calculations for Bangkok-Thonburi yield an annual intercensal growth rate of 3.9 percent. On the basis of registration figures for the period between 1 April 1970 and 31 December 1972, the municipal population grew at an average annual rate of 3.1 percent and the Bangkok-Thonburi population at an average annual rate of 3.7 percent (calculated from Table 14 and data in Wanglee and Arnold, 1975). It seems reason-

TABLE 14 Municipal areas by size class: Thailand, 1960 and 1972

Year and size	<i>Nakhon</i>		<i>Muang</i>		<i>Tambon</i>		Total	
	Number	Population	Number	Population	Number	Population	Number	Population
1960								
100,000+	2	1,703,346					2	1,703,346
75,000-99,999							0	
50,000-74,999	1	65,736					1	65,736
40,000-49,999			1	42,218			1	42,218
30,000-39,999			8	264,065			8	264,065
20,000-29,999			10	246,353			10	246,353
10,000-19,999			32	472,216	8	93,476	40	565,692
5,000-9,999			23	178,811	23	161,868	46	340,679
2,500-4,999			8	30,851	4	14,925	12	45,776
All sizes	3	1,769,082	82	1,234,514	35	270,269	120	3,273,865
1972								
100,000+	1	3,133,834					1	3,133,834
75,000-99,999	1	93,353	1	77,397			2	170,750
50,000-74,999			7	303,012			7	303,012
40,000-49,999			4	179,935			4	179,935
30,000-39,999			10	359,954			10	359,954
20,000-29,999			17	410,603	2	49,891	19	460,494
10,000-19,999			29	431,968	16	214,980	45	646,948
5,000-9,999			13	109,159	12	98,840	25	207,999
2,500-4,999			2	9,370	4	17,459	6	26,829
All sizes	2	3,227,187	83	1,881,398	34	381,170	119	5,489,755

NOTE: 1960 figures are from the 1960 Census and 1972 figures are from the household registration system.

SOURCES: Thailand, Central Statistical Office (1962); Thailand, Ministry of Interior (1973).

ably certain that Bangkok-Thonburi was growing faster than other municipal areas over these two periods and therefore that the primacy of Bangkok-Thonburi increased. The comparatively low municipal growth rates presented here are consistent with the modest increases in the percentage of population living in municipal areas between 1960 and 1970 shown in Table 13.

Table 15 shows lifetime migration status for persons enumerated in the 1970 Census. By this measure Thailand's population is not characterized by a great deal of internal movement. Over 85 percent of the population were living in the same province in which they were born and only about 5 percent were born outside their region of present residence. The Northern and Central Regions in 1970 had the highest percentage of persons born in another region, 6.3 percent and 5.8 percent respectively; and the Northeast, which is the poorest region of the country, the smallest, 1.9 percent. The Central Region is also characterized by the largest migratory movements from one province to another within a region.

Five-year interregional migration figures give a somewhat different perspective on population movements in Thailand (Table 16). The Central Region has by far the largest percentage of in-migrants in relation to the size of its population, but it is also subject to a very large flow of out-migrants. For the five-year period between 1965 and 1970, in which internal movement was dominated by the growth of Bangkok, the North ranked second in the degree of in-migration. The Northeast had a comparatively high rate of five-year out-migration and also exhibited the lowest rate of in-migration. Although regional differentials

TABLE 15 Lifetime migration status of population aged 5 and over: Thailand, 1970

Region of present residence	Percentage born in province of present residence	Percentage born in other province in same region	Percentage born in other region	Percentage born in foreign countries
North	86.9	6.3	6.3	0.5
Northeast	89.7	8.1	1.9	0.3
Central	77.9	14.0	5.8	2.2
South	89.2	6.6	3.3	0.9
Whole Kingdom	85.4	9.4	4.2	1.0

SOURCE: Thailand, National Statistical Office (1973: Regional Reports, table 8).

TABLE 16 Interregional five-year migrants by previous and present residence: Thailand, 1970

Region	Population aged 5 years and over, 1970	Migrants aged 5 and over by previous residence		Migrants aged 5 and over by present residence	
		Number	Percentage	Number	Percentage
North	6,345,184	113,691	1.79	120,031	1.89
Northeast	9,773,127	185,188	1.89	100,182	1.03
Central	9,058,148	169,272	1.87	257,765	2.85
South	3,561,745	52,474	1.47	42,647	1.20
Whole Kingdom	28,738,204	520,625	1.81	520,625	1.81

NOTE: Data are based on 1970 Census questions on length of residence in present place of residence and (for those who have lived fewer than five years in their present place of residence) previous place of residence.

SOURCE: Thailand, National Economic and Social Development Board et al. (1974: table V-7).

in migratory movements are substantial, the outstanding fact about internal migration in Thailand is the geographical stability of its population (Arnold and Boonpratuang, 1976).

POPULATION PROJECTIONS

In recent years several organizations have published projections of Thailand's population through the year 2000. Four sets of the most recent projections are shown in Table 17. These projections have been calculated by Tomas Frejka of the Population Council, the International Demographic Statistics Center of the United States Bureau of the Census, Jeanne C. Sinquefeld of the Community and Family Study Center at the University of Chicago, and a joint Working Group on Population Projections of the National Statistical Office, the National Economic and Social Development Board, and the Institute of Population Studies at Chulalongkorn University. The low fertility projection made by the last-mentioned Working Group is the official population projection used for planning by the Thai Government.

All of the projections start with a midyear 1970 population of slightly over 36 million. Although the fertility and mortality assumptions behind each projection vary greatly, one is struck by the inescapable conclusion that Thailand will have to plan for a population by the year 2000 that is at least half again as large as its 1970 population, even if fertility rates drop precipitously. If fertility rates remain con-

TABLE 17 Selected population projections for Thailand, 1970–2000

	Total population (millions)						
Source and assumptions	1970	1975	1980	1985	1990	1995	2000
Thailand Working Group							
High fertility	36.4	41.9	48.2	55.4	63.5	72.7	82.8
Medium fertility	36.4	41.9	47.7	53.9	60.3	67.0	73.6
Low fertility	36.4	41.9	47.2	52.1	56.7	61.2	65.4
Population Council							
NRR = 1 in 1970–75	36.6	38.2	40.3	42.9	45.9	49.0	51.6
NRR = 1 in 1980–85	36.6	41.2	45.0	47.6	50.7	54.1	57.7
NRR = 1 in 2000–05	36.6	42.1	48.0	54.2	60.5	66.6	72.1
NRR = 1 in 2020–25	36.6	42.3	48.8	56.0	64.0	72.6	81.5
NRR = 1 in 2040–45	36.6	42.4	49.2	56.9	65.6	75.4	86.0
U.S. Census Bureau							
Constant fertility	36.4	42.9	50.7	60.2	72.1	86.7	104.5
NRR = 1 in 1980–85	36.4	41.3	45.3	48.1	51.7	55.7	59.8
NRR = 1 in 1990–95	36.4	41.9	47.4	52.8	57.9	62.1	66.7
NRR = 1 in 2000–05	36.4	42.2	48.3	54.9	61.8	68.9	75.3
Chicago							
Constant fertility	36.2	42.8	50.9	60.8	72.9	87.6	105.3
TFR = 3.5 in 2000	36.2	42.5	49.5	57.2	65.7	74.6	83.6
TFR = 3.0 in 2000	36.2	42.5	49.3	56.6	64.5	72.4	80.1
TFR = 2.5 in 2000	36.2	42.4	49.0	56.1	63.3	70.3	76.6
NRR = 1 in 2000	36.2	42.4	48.9	55.7	62.5	69.0	74.4

SOURCES: Working Group on Population Projections (1976); Population Council (1974); U.S. Bureau of the Census (1971); Sinqefield (n.d.).

stant, on the other hand, the population will reach a size of 100 million before the end of this century. Continued growth at that rate would result in a population the size of the present population of the United States by 2020, and a population larger than India's present population 30 years later. Projections assuming constant fertility are of course merely illustrative and do not purport to be predictions of the probable course of future population growth. The best current "guesstimate" of Thailand's future population is that it will reach a size of about 52 million by 1985 and 65–70 million (i.e., nearly double its 1970 size) by the year 2000.

For economic and social planning it is useful to disaggregate projected population into its geographical distribution and its age and sex distribution. Detailed projections by geographical area have not yet been released, but it is possible from the Working Group projections to follow the likely changes in Thailand's age distribution between 1970 and 2000. It is convenient to plot the broad age structure (ages 0–14, 15–64, and 65 and over) on a triangular graph (see Figure 3). Any percentage age distribution that is divided into three age groups can be represented by a single point on an isosceles triangular graph. Movement between any two age distributions is shown as a vector between two points. Movements toward the top of the graph imply a larger percentage of the population in retirement ages (65 and over), movements toward the upper left imply a smaller proportion of the population in the child dependent age group (ages 0–14), and movements toward the lower left imply a larger proportion of the population in the labor force ages (ages 15–64). Since the dependency ratio is uniquely defined by the proportion of the population in the 15–64 age group, the lines on the graph running from upper left to lower right can also be thought of as iso-dependency ratio lines. That is, movements toward the lower left imply a lower (more favorable) dependency ratio. Also shown on the graph are iso-child dependency ratio lines, which are not parallel as are the iso-dependency ratio lines. Since most age distributions fall in a rather limited area of the graph, the relevant portion has been enlarged in Figure 3 to show differences more clearly.

Point A represents the 1970 age distribution of Thailand. With 45 percent of the population below age 15, Thailand exhibits a very young age distribution similar to that of Indonesia, West Malaysia, and the Philippines. (See Nortman, 1974, for a summary of age distributions in more developed and less developed countries.) The vectors starting at point A show the change in the age distribution in each suc-

Figure 1 is a ternary diagram illustrating the relationship between the percentage of the population aged 0-14, 15-64, and 65 and over. The diagram features a grid of solid lines and dashed lines representing iso-child dependency ratios. A series of points (A-H) are plotted, showing a trend from high child dependency (A) to low child dependency (H). An inset diagram shows a smaller version of the ternary diagram with a shaded region and a dashed arrow pointing to the main diagram.

Legend:

- — — — — Iso-child dependency ratio lines
- A : Thailand, 1970 (medium projection)
- B : Thailand, 1980 (medium projection)
- C : Thailand, 1990 (medium projection)
- D : Thailand, 2000 (medium projection)
- E : Less developed countries, 1970
- F : More developed countries, 1970
- G : Thailand, 2000 (high projection)
- H : Thailand, 2000 (low projection)

29

cessive ten-year period according to the Working Group medium projection. Under these assumptions, between 1980 and 1990 Thailand will have an age distribution similar to that of the average less developed country today. The aging process will continue throughout the twentieth century, achieving an age distribution similar to that of present-day Hong Kong by the year 2000. The vectors of change over time reveal a rapid aging of Thailand's population resulting principally from a sharp decrease in the proportion under age 15, together with a small increase in the proportion aged 65 and over. The population in the labor force ages increases from 52 percent to 62 percent during the entire period. Since the vectors are nearly perpendicular to the iso-child dependency ratio lines it is clear that the child dependency ratio will fall rapidly. The total dependency ratio will also decrease substantially, but not quite as quickly owing to an increasing old-age dependency burden.

In the year 2000, it is projected that one-third of the population will still be under 15 years old (compared with 26.7 percent in the more developed countries), but Thailand will enjoy a relatively low dependency ratio of 61 because of the small proportion in the retirement years (4.5 percent compared with 9.6 percent in more developed countries). Even with the decrease in the proportion under age 15, the absolute number of these young people increases by over 8 million before the year 2000. The absolute number of persons in the labor force ages increases by 140 percent and the number of old people jumps by 210 percent during the same period.

Of course these results all depend on the rather tenuous assumptions of the medium fertility projection. With either the low fertility or high fertility assumption the direction of change would remain the same but the speed of the change would alter. In any event, it is likely that the population of Thailand will continue to age, with a smaller proportion of child dependents and a slightly larger proportion of old-age dependents relying on the production of a relatively larger population of labor force age.

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