

# The Economic and Social Impact of Declining Fertility : A Case Study of Thailand

*Declining fertility has made  
it easier for Thailand to  
sustain the shock of previously  
falling economic growth*

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Thailand is by all odds one of the most successful economic and demographic stories in South-east Asia, an area in which other success stories can also be found. The average annual growth of Thailand's gross national product

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(GNP) from 1960 to the early 1980s was almost 8 per cent and, during the period 1970 to 1985, the country's population growth rate fell from over 3 per cent per annum to about 1.5 per cent.

Prospects are for a continuing decline in fertility; replacement level fertility is expected to be reached at or not long after the turn of the century, with population stabilizing a generation or two thereafter.

The causes of Thailand's economic success and its rapid fertility decline have been investigated and discussed elsewhere and are not the point of this article (Knodel, et al., 1986). Instead the article examines the socio-economic consequences for Thailand of past, present and future declines in fertility.

For a long time, it was accepted more or less uncritically that population growth was always deleterious to economic growth. Recent "revisionist" attacks have led to abandonment of this old orthodoxy and most contemporary authors strive for a middle-of-the-road position between the extremes of the "population bomb" school on the one hand and the "ultimate resource" point of view on the other (Preston and Donaldson, 1986; Simon, 1982).

Instead of searching for a single theoretical paradigm capable of dealing with all cases, it would perhaps be more useful to examine closely the effects, positive and negative, of population growth on economic development in specific countries for specific periods. This is the rationale and the approach of this article.

The analysis focuses particularly on the economic and social prospects for Thailand in view of its continuing fertility decline. The main questions addressed are: "What are the implications of this trend?" and "what policy responses are likely to be required?"

Whatever may be said about the past economic effects of population trends, it seems clear that the most important economic influences shaping the recent past and the present in Thailand have been larger forces arising from world-wide economic trends. As with most countries of the world, Thailand has been buffeted during the last decade by momentous swings in the revenues earned from its exports, by widening gaps in the balance of trade and by fluctuating exchange rates. These events were largely outside the control of any policy maker; thus an economic slow-down would have occurred whether the population growth rate had been higher or lower than the one actually achieved. Therefore, the question is whether declining fertility now and in the future will make Thailand's ability to adjust to these changing economic circumstances easier or more difficult.

In anticipation of our conclusions, we found that the declining rate of

population growth has made it much easier for Thailand to sustain the shock of falling economic growth and the temporary uncertainty about the economic future which existed between 1982 and 1985. Moreover, the sharp declines in fertility helped and will help for some time to offset the negative economic effects of slow growth in those years.

By removing the continued pressure of rapid population growth on the labour force, Thailand's unemployment problem, while real in the short term, will be very manageable over the longer term. By easing the pressure for an increased volume of public services (education, health etc.), declining population growth will make possible an increase in the quality of those services. Thus, regardless of what can be "demonstrated" using elaborate econometric models for the long term, Thailand is much better off today and will be tomorrow as a result of having previously reduced the level of fertility. This case-study demonstrates various aspects of the effects of population on development in a developing country.

### **Demographic trends**

In the late 1960s, the Thai Government launched a vigorous family planning programme which has been successful beyond even the most optimistic expectations of the early plans (Knodel, et al., 1982). Fertility has fallen from an average completed family size of 6.6 children per couple in 1960 to roughly 3.0 children per couple in 1985, a reduction of over 50 per cent in one generation. The net growth rate has fallen from over 3 per cent to about 1.5 per cent per year in the same period. These trends continue, albeit at a slowing pace, and a replacement level of fertility is almost certain to eventuate in the next 10 to 15 years.

An average completed family size of 2.1, resulting in a net reproduction rate (NRR) of 1, means that husband and wife are, on average, replacing themselves with two children. A full "zero growth" or stationary population will occur after approximately another two generations, during which time the age distribution will slowly take on the proportional shape consistent with the low (and constant) level of fertility. During this period, i.e. between reaching  $NRR = 1$  and ultimate stabilization, the total population size will slowly level off and approach an upper asymptote.

There is some debate regarding the exact time when Thailand will reach a total fertility rate (TFR) of 2.1, but it seems clear that, whatever policy may be pursued during the next five to ten years, fertility will continue to decline and  $TFR = 2.1$  will be reached not long after the year 2000.

The decline in fertility also has had a substantial impact on the age struc-

ture of the population. The proportion of population under 15 years of age has fallen from 45 per cent in 1960 to 36 per cent in 1985; even more striking is the reduction in the proportion of total population represented by children under five years of age from 19 per cent in 1960 to 12 per cent in 1985. However, despite those proportional declines, the absolute number of children in the youngest age group increased during the same period. Nonetheless, a decline in the absolute number of persons in that age group will occur in the near future.

The corollary to these changes is that the population aged 60 years and over will continue to increase in both relative size and absolute numbers; the figure on the next page illustrates this changing age structure.

Regional rates of natural increase still differ, but show signs of convergence towards the emerging low overall level of population increase. Between 1970 and 1980, the northern region of the country grew slowest (1.8 per cent per annum) while Metropolitan Bangkok grew fastest (3.5 per cent per annum). The central and the southern regions grew about 2.6 per cent per annum, slightly above the national average of 2.5 per cent per annum, which was also the rate of growth of the north-eastern region.

Since 1970, the sources of growth in the various regions varied from region to region depending on the magnitude of net migration compared with natural increase. The northern, north-eastern, western and sub-central regions are all experiencing fertility declines and also net out-migration.

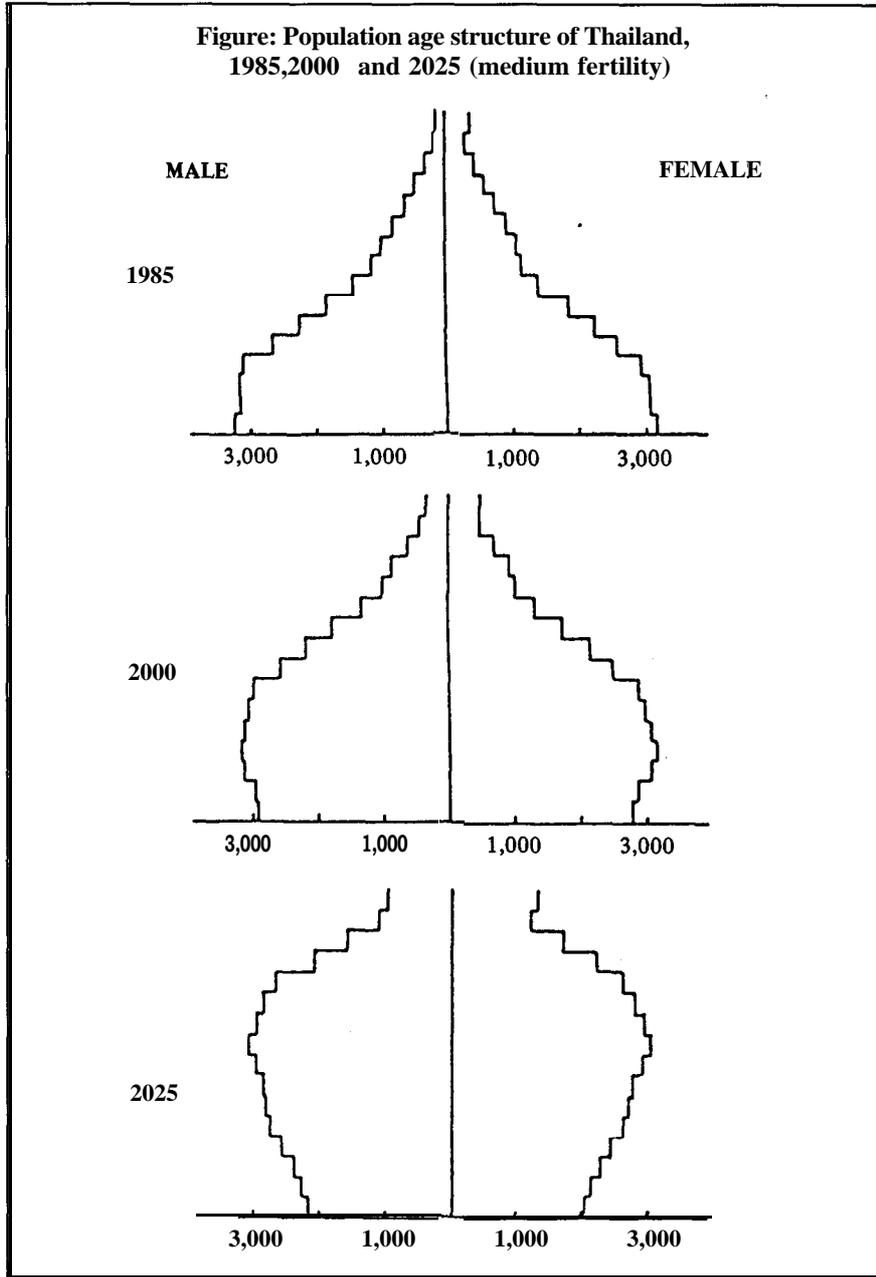
Aside from Metropolitan Bangkok (which includes the city of Bangkok and six neighbouring provinces), only the eastern region (the site of many new development projects) is gaining population through migration. In the longer term, the northern region may also be a net gainer from migration.

### **Demographic projections**

The Working Group on Population Projections of the National Economic and Social Development Board (NESDB) analyzed trends in fertility, mortality and inter-regional migration, and prepared population projections at the national and regional levels for the Government's Sixth Five -Year Plan.

Three sets of national population projections were prepared based on three assumed levels of fertility (high, medium and low) and a single assumed projection of mortality. By 2000, expectation of life at birth rises to 66 years for males and to 70 years for females. This assumption was made after a detailed study of mortality statistics to estimate a reasonable pattern of the expectation of life at birth for both sexes. Using the United Nations study of cross-

Figure: Population age structure of Thailand, 1985, 2000 and 2025 (medium fertility)



national experience with increases in life expectancy, the Working Group adjusted the pattern to one considered suitable for Thailand.

All three projections assume a base fertility of TFR = 3.46 in 1980 and then the following levels to the year 2000:

- Projection I (high fertility): fertility would decline to the replacement level (TFR = 2.1) between 2000 and 2005.
- Projection II (medium fertility): fertility would decline to the replacement level between 1995 and 2000.
- Projection III (low fertility): replacement level would be reached between 1990 and 1995.

The short-term differences in the three variants are modest; by the end of the sixth plan period (1986-1991) the high and medium projections differ by only 1 million people, and the medium and the low projections by fewer than 1 million. By 2010, the high and the medium projections differ by about 6 million people, and the medium and the low projections by about 2 million. From 1980, the base year, the increase in population using the high projection is 46 per cent by the year 2000, and 65 per cent by 2010 compared with 38 per cent and 45 per cent using the medium projection and 36 per cent and 43 per cent using the low projection, respectively.

All three projections show a decline in the proportion of the population in the age group under 15 years. By the year 2000, the high projection estimates that 31.3 per cent of the population will be under 15 years of age; the low projection, that 26.4 per cent of the population will be under age 15, a difference of only 5 per cent (**table 1**). The differences among the three projections almost disappear by the year 2015.

By 2010, in all three projections those under 15 years of age will constitute about one fifth of the total population while those in the economically active age group will constitute about 68 per cent of the total population. The proportion of the population aged 65 years and over will increase from 5.4 per cent in 1980 to 7.7 per cent in 2000 and to 9.5 per cent in 2010.

As previously noted, the various regions of the country differ markedly with regard to their demographic growth rates. Regional population changes, therefore, cannot be estimated from a fixed relationship with the national population. Thus the Working Group analyzed regional fertility, mortality and migration trends and made alternate regional projections consistent with the three national projections described previously.

Fertility was found to be highest in the southern region (TFR = 4.7) and lowest in the city of Bangkok (TFR = 2.49). In the north-eastern region,

**Table 1: Projected per cent breakdown of population by fertility assumption and broad age groups, 1980-2015**

Level of fertility and age group (years)	1980	1985	1990	1995	2000	2005	2010	2015
<b>High fertility</b>								
0 - 14	40.0	36.5	34.3	32.8	31.3	29.0	26.3	21.0
15-59	54.6	51.9	58.9	60.7	61.6	63.3	65.1	68.0
60+	5.4	5.6	6.0	6.5	7.1	1.1	8.5	11.0
<b>Medium fertility</b>								
0 - 14	40.0	36.5	33.4	30.3	21.4	25.0	23.0	21.0
15-59	54.6	51.9	60.6	62.9	65.0	56.8	61.1	68.0
60+	5.4	5.6	6.1	6.1	7.6	8.2	9.3	11.0
<b>Low fertility</b>								
0 - 14	40.0	36.5	33.2	29.1	26.4	23.1	21.8	20.0
15-59	54.6	57.9	60.7	63.5	66.0	68.0	68.7	68.7
60+	5.4	5.6	6.1	6.8	7.1	8.4	9.5	11.3

fertility was lower than in the southern region, but higher than the national average, and the western region was higher than the eastern region, which was lower than the national average.

Regional mortality differentials were derived from the 1979-1981 mortality survey of the Ministry of Public Health; from the pattern of increase in the expectation of life used in the national population projections, a set of regional mortality assumptions was constructed. Mortality was found to be highest in the southern region, followed by the north-eastern and northern regions, and lowest in Metropolitan Bangkok, followed by the central, eastern and western regions, respectively.

The size, growth and age-sex structure of the regional populations are determined not only by fertility and mortality changes, but also by the magnitude and pattern of inter-regional migration. The following inter-regional migration assumptions were made:

- Constant net migration rate of 7.20 per cent of the total population per quinquennium and constant pattern of inter-regional net migration.
- Net migration rate declining by 3 per cent per annum (i.e., from the initial 7.20 per cent in 1975-1980 to 6.56 per cent during the period 1985-1990, and 5.97 per cent during 1990-1995) and a changing pattern of inter-regional net migration.

Both of these regional projections consistently show slight declines in the percentage share of population in the north-eastern, central, northern and western regions and an increase in the percentage share of population in Metropolitan Bangkok, the southern and eastern regions. The southern region gains relatively because its fertility falls more slowly than all other regions owing to in-migration.

Using the method of Kiranandana et al.,<sup>1/</sup> we adopted the “medium” urbanization model throughout the projections,<sup>2/</sup> since it, in effect, assumes that the recent past, rather rapid, rates of urbanization will continue. Less rapid urbanization seems unlikely; more rapid urbanization would yield impossible results within five to ten years.

In summary, the most likely scenario is one of continued declines in mortality and fertility, and a convergence of all regions on low rates, but with net growth remaining positive for the foreseeable future. Continued high

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1/ The methodology was developed in connection with this project by Prof. Thienchay Kianandana and his colleagues at Chulalongkorn University, Bangkok.

2/ Within the framework of the national and regional population projections described previously, separate projections were made of the urban population over the next 15 years. This was done using methodology developed by the United Nations which centres around the concept of “tempo of urbanization”, or the urban-rural growth rate differential (URGRD), which is the simple difference in the net growth rates of the two sub-component populations. For example, in Thailand between 1970 and 1980, the urban population grew at about 5 per cent per year while the rural population grew at about 2 per cent per year, making the URGRD a little under 3 per cent per year. The URGRD coefficient, or “d” value, could then be used to project the future urban population as a ratio of projected future total population. Also, the concept of urban, which is employed in the projections, is somewhat broader than the one used by the National Statistical Office, i.e. the projections cover the population of all municipal areas and all sanitary districts with a population over 5,000 and which meet certain other requirements concerning density or location. This approach was followed using two assumed values of “d”: a constant one at the 1970-1980 average level and a value increased by 20 per cent, the former being the “constant” urbanization assumption and the latter, the “high” urbanization scenario. (A “low” urbanization scenario was also explored, but it and the high one were not adopted).

The value of “d” was calculated as follows:

$$U_2 = \frac{(T_2 + (d)R_1}{T_1} U_1$$

where T is total population and R and U are rural and urban populations, d is the tempo of urbanization coefficient (or  $u - r$  where u and r are the urban and rural growth rates) and the subscripts refer to year 1 (the present) and year 2 (the future).

levels of population redistribution are predicted, centering around rapid growth of old and new urban centres.

### **Employment implications**

The socio-economic impact of population trends over the period of the next five-year plan and beyond has two main aspects: (a) employment and labour-market problems and (b) other socio-economic problems likely to arise owing to the shifting composition, distribution and age structure of the population in the near and also longer-term future.

With regard to the well-being of the population, the primacy of employment scarcely needs justification. The other issues concern the impact on public services of the changing demographic structure which arise from the population trends projected. Areas judged to be the most important for future policy were (a) the demand for urban housing and infrastructure, (b) educational needs, (c) health needs, and (d) the special problems of the aged.

### **Basic economic projection**

The rapid sustained economic growth (about 7 per cent per annum) of the Thai economy over the last several decades had slowed in 1982, as did real growth in nearly all countries in the Asian and Pacific region. The reasons for this slow-down involved essentially uncontrollable forces such as falling export prices, instability in world financial markets and rising costs and declining profits in domestic industry. Although these elements are beyond the scope of this article, they form the background to the macro-economic projections which NESDB prepared for the Sixth Five-Year Plan (1986-1991).

NESDB proposed an average growth rate in gross domestic product (GDP) of 5 per cent, as being the most likely to eventuate during the five-year plan period. That rate assumes the successful completion of the various projects called for in the plan, but is relatively conservative in its assumptions regarding the exogenous forces and the general state of the world economy.

The projected GDP growth rate of 5 per cent per annum comprised a growth rate of 2.5 per cent annually in the agricultural sector and 6.2 per cent in the non-agricultural sector. Manufacturing was expected to grow at 6.1 per cent and the service sector at 6.5 per cent during the five-year period. In actual fact, however, GDP growth by sector in 1986 was as follows: agriculture (-0.2 per cent), manufacturing (7 per cent) and services (4.3 per cent) (Bowring, 1987).

No regional breakdown of the national figures is available; however, indications are that the central region will lead in the growth of the non-agri-

cultural sector, followed by the eastern, northern and northeastern regions. The central and northern regions will also show the most rapid overall growth in non-agricultural output. The southern region's great potential, both in agriculture and industry, will begin to assert itself; eventually the growth rate in that region will begin to overtake that of the other regions.

Thus, the picture which was projected is one of continuity with the past. Metropolitan Bangkok and the central region combined will continue to be the largest "growth pole", regardless of what government policies are adopted. The central region will also lead in income per capita in the non-urban sector. Hence, the combined Bangkok-central region will continue to attract a stream of net immigrants from other regions, particularly the north-eastern, western and southern regions. The northern and eastern regions will also begin to attract their own in-migrants during the plan period.

The economic projections interact with the demographic projections adopted. The process of industrialization and rural transformation will continue for the next five years and beyond. Also, the demographic transition will all but be completed during this period. Rapid out-migration from the areas of previous most rapid population growth and lowest economic growth will continue. But falling fertility in the areas of previous rapid growth will begin to reduce the pressure for such out-migration.

### **Rural-agricultural projections**

The rural-agricultural projections involved the construction of a model,<sup>3/</sup> relating inputs to outputs in order to generate alternative future supply potential based on varying assumptions about the availability of inputs and of productivity of input use.<sup>4/</sup> The projections of potential supply were then related to alternative projections of possible future demand for output, yielding, as a last step, estimates of the degree of labour utilization likely in Thailand under the assumed conditions during the sixth plan period and beyond.

Four scenarios were traced using that model, but the underlying assump-

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3/ The agricultural model is very detailed, involving eight categories of land, with labour and capital as additional inputs for some 30 categories of final agricultural crop and livestock products. It is, in effect, a linear programming model based on micro-level data aggregated to a regional level. The available inputs yield a certain potential total output given assumptions about product mix. Conversely, the total output required can be shown to imply the need for a definite set of inputs. Changes in total product (and in mix), in availability of inputs and in efficiency of factor use can thus be traced as alternative scenarios.

4/ These projections and this methodology were developed by Prof. Yonngyuth Chalamwong and his colleagues at Kasetsart University, Bangkok.

tions regarding input availabilities were the same for all the variants. The availability of labour follows from the demographic scenario chosen (medium fertility, constant urbanization). The logic is that the socio-economic forces shaping the continued fertility transition as well as out-migration from the rural areas will not be affected by the level of output which agriculture produces year by year. Under the best of conditions, rural areas will not be prosperous or attractive enough to alter the long-standing trend of population out-migration.

As for land availability, the model assumes that prime, low-lying land for the production of rice is not capable of further expansion. Other rice-growing land can be expanded through capital expenditure, but only modestly. The other categories comprise the "frontier" which in the past has played a major role in absorbing labour as high natural increase forced persons to migrate out of traditionally agricultural areas. Those categories can be increased only modestly in the future. An average increased availability of 1.5 per cent per annum for all those categories was projected.

The rural population was that of the medium fertility constant urbanization model. The age-sex specific labour force participation rates from the 1983 labour force survey of the National Statistical Office were assumed constant from 1985 throughout the projection period. An adjustment to labour requirements was necessary to allow for the fact that the previously described basic production model covered only field crops and livestock whereas it is obvious that some available labour would also be used for horticultural crops (fruit, vegetables, flowers), fisheries and plantation crops. The total requirement for labour for those types of production in all scenarios was estimated, on average, as being 10 per cent of the labour available throughout the projection period.

This adjustment was made in a region-specific way since data suggested variations in the importance of non-field crop and non-livestock production items.

No adjustment was made in land availability nor was any allowance made for the numerous local industry and handicraft uses of labour which also occur in the rural areas. These are chiefly services or small-scale manufacturing industries for local markets. No allowance was made in the model because of a lack of hard data on which to base estimates; awareness of this fact must be kept in mind in interpreting the results.

Projected labour availabilities are necessarily sensitive to those underlying assumptions. Relatively small changes in labour force participation rates, in the relative importance of the non-field crop and non-livestock sectors, or

in the relative importance of local services and handicraft production could affect the conclusions significantly.

Four versions of the basic model covering requirements for field crops and livestock were run. The first scenario used the then official (but later revised) NESDB-Ministry of Agriculture and Agricultural Co-operatives projected growth rate of 2.5 per cent per year, based on the assumption that foreign and domestic markets for agricultural products will remain constrained. The second scenario removed the demand constraint and projected what possibly could be produced if markets are buoyant and expanding.

The third scenario assumed increased labour force participation rates after 1985; the fourth scenario, an increasing rate of urbanization, i.e. of out-migration from the rural-agricultural sector. However, the projections of the third and fourth scenarios were not considered plausible and the policy implications thereof were not discussed.

The first and second scenarios estimated future labour availability versus requirements under relatively pessimistic and relatively optimistic assumptions regarding market conditions.

### **Urban-industrial projections**

The urban-industrial sector is the complement of the rural-agricultural sector and the growth of the two is inescapably linked. In the development of Thailand thus far, the rural-agricultural sector has been the base on which growth has occurred. This had to be the case since it was and continues to be - the dominant sector in terms of population and labour force. The rural-agricultural sector produces surplus food to feed Thailand's cities and to export for earning foreign exchange; and it produces "surplus people" who provide the labour force for the urban-industrial sector. This process will continue throughout the next plan period, but owing to falling fertility, the flow of surplus rural labour will be reduced over the longer term.

In the past, the urban-industrial sector has grown rapidly enough to absorb an expanding share of the total labour force of the country. The rural labour force in earlier years grew by 3 to 4 per cent per year, but fully half of that growth was channelled into urban-industrial activity. The urban-industrial labour force has grown at 6 to 8 per cent per year, as has urban-industrial employment. Open unemployment in this sector has been typically less than 5 per cent, although it has risen in recent years.

Future labour available to the urban-industrial sector was derived from the age-sex and region-specific demographic projections discussed earlier (medium fertility, constant urbanization variant). The 1983 labour force par-

icipation rates were applied to the age-sex specific population projections yielding estimates of labour available by region, through the sixth plan period and beyond.<sup>5/</sup>

Using the method of Hongladarom et al., future urban-industrial demand for labour was estimated by: (a) establishing from historical data the apparent relationship between changes in employment and changes in output by region for the major non-agricultural sub-sectors of the economy (manufacturing, mining, construction, trade and services); (b) calculating the coefficient of elasticity of labour required with respect to output (the per cent change in employment caused by a given per cent change in output) and (c) deriving the labour utilization levels implied by the GDP projections (discussed previously) and the calculated elasticity relationships. With regard to future growth, these results comprise the “pessimistic” urban-industrial scenario. An “optimistic” scenario was also projected using projected GNP growth rates a full percentage point higher than those of the NESDB series for all the sub-sectors (i.e. roughly 7 per cent for the entire non-agricultural sector).

### **Labour requirements and availability**

Summing the urban-industrial and rural-agricultural data yielded estimated labour availability versus requirements for the economy by major sub-sector and region for the sixth plan period and beyond.<sup>5/</sup>

For the rural-agricultural sector the pessimistic scenario projects a 70 per cent utilization of labour available for field crops and livestock throughout the sixth plan period (i.e. to 1991). Allowing for the other ways in which rural labour is absorbed (horticulture, handicrafts etc.), this suggests an overall 90 to 95 per cent utilization of the labour available. There are large regional differences in these estimated utilization rates and the lowest levels appear in the southern and western regions. Since these are also the regions in which other (non-field crop, non-livestock) activities are important, these results may partly be an indication of problems in the estimation procedure.

The pessimistic scenario calls for labour used in agriculture to increase at the rate of about 1.92 per cent per year while available labour is growing at 1.99 per cent per year. Hence, even for such a relatively low-growth demand-constrained economic scenario, rural-agricultural labour utilization holds its own through the sixth plan period.

The second scenario, which is the optimistic demand unconstrained output projection, shows a more favourable labour utilization picture. In fact,

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<sup>5/</sup> These projections and this methodology were developed by Prof. Chira Hongladarom and his colleagues at Thammasat University, Bangkok.

for the northern and central regions the amount of labour required exceeds available supply, implying that rural-to-rural migration from the western or the southern regions would raise the utilization levels in those regions too.

The urban-industrial sector's labour balance under both scenarios was projected using estimated base-year 1986 labour utilization rates. Under the pessimistic scenario, the moderate overall GNP growth model, labour utilization holds at about the 1986 level throughout the plan period. Both labour required and labour available grow at about 3.5 per cent per year, while urban-industrial GDP grows at about 6 per cent per year. Thus, the recent high rates (relative to earlier historical trends) are projected as continuing, but not worsening, if GDP growth is moderate.

The optimistic scenario, which calls for growth one percentage point higher after 1986, shows the level of labour utilization rising by moderate amounts after 1986. By 1991, it is close to its historical trend at 95 per cent.<sup>6/</sup> There is less regional variation in the levels of labour utilization in the urban-industrial sector; however, the north-eastern region shows the lowest GDP growth rate and hence the lowest degree of urban-industrial labour utilization under both scenarios.

These findings are sensitive to the assumptions made in the projections. But, the assumptions chosen for this exercise were based on the best available information. The overall economic growth is in the range of 5 per cent per annum. Growth above that level would generate nearly full employment; growth below it would produce unemployment higher than that experienced in the last several decades. But, unemployment would still be moderate by international standards, and it would not worsen appreciably during the plan period.

If the optimistic scenario eventuates, the lower rates of unemployment shown for the urban-industrial sector will, in a fully interacting way, affect the higher rates of overall under-utilization of labour in the rural-agricultural sector. That is, the constant urbanization scenario could become, in the short-run, a high urbanization scenario, as the rate of migration from rural to urban areas increases.

### **Employment in the longer term**

The rapid decline in fertility in Thailand dates from about 1970. In the period 1985 to 1990, relatively smaller birth cohorts will begin entering the

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<sup>6/</sup> Agriculture is expected to remain the largest generator of employment, accounting for 33 per cent of all new jobs in the sixth plan targets. However, industry's component is expected almost to double to 20 per cent during the same period (Bowring, 1987).

**Table 2: Percentage change in projected male labour force age groups, 1985-2000, (Medium fertility)**

Age group (years)	1985	1990	1995	2000
15-19	100	101.4	101.0	102.6
20-24	100	115.2	117.0	117.0
25 -29	100	115.7	133.6	135.8
30-34	100	120.7	140.0	161.9
35-39	100	127.0	153.7	178.6
40-44	100	129.6	156.7	186.3

labour force, and growth in the overall labour force will begin to slow. In the late 1970s, the labour force peaked with a growth rate of well over 3 per cent per year. By 1991, the annual rate of increase in the population in the labour force age group will be well below 2 per cent and the rate will continue to fall as the overall demographic growth rate moves towards zero growth.

**Table 2** shows how this age shift will occur. Those entering the labour force age group of 15-19 years will remain almost constant in absolute numbers from 1985 to 2000. By contrast, those in the 40-44 years age group will grow by nearly 90 per cent. The table shows that the number of those in the age group 20-24 years also becomes almost stationary by 1995; for those in the age group 25 -29 years, it becomes almost stationary by about 2000.

The age distributional shift arising because of past (and continuing) declines in fertility will within the next five to ten years bring about an appreciable reduction in the growth of the labour force. Labour redundancy will be a problem for the economy only in the short-term, if at all. By the end of the sixth plan period, labour availability will be falling and, with no change whatever in government policies, even a moderate growth scenario will produce high levels of labour utilization. By the year 2000, tight labour markets and "labour shortages" are quite likely to occur.

Unemployment in urban-industrial areas is more visible and more sensitive, but as the economy becomes more and more urban and industrial, it must expect and eventually accept a degree of short-term, temporary, demand-induced unemployment greater than it has been used to in times past.

The possibility of establishing an employer-employee contributory unemployment compensation scheme should be explored. However, the Govern-

ment cannot react with sudden changes of policy or large expenditure programmes every time exports sag temporarily or an inventory build-up causes temporary layoffs. Even current relatively high – by Thai standards – rates of unemployment, in the range of 7 to 8 per cent, are comparable to (or lower than) those of western countries and those in the Association of South East Asian Nations.

### **Implications for social programmes**

Four categories of future needs for public services were examined: urban services, care of the elderly, education and health. Alternative projections of needs in each category were projected based on: (a) the basic demographic model deemed most likely to occur, (b) the economic scenarios previously described, (c) historically established relationships between population size and distribution and the volume and composition of public services, and (d) assumed future increases in the quality of those services.<sup>7/</sup>

### **Education**

Education is an important piece of unfinished business for the Thai Government. The greatest emphasis and priority must remain primary education for at least the next plan period. Basic literacy (already achieved) must be converted into a more regular system of enrolment retention and graduation from primary school. The emphasis must be on improving quality at the primary level. Even in the short-term (the next plan period) the number of new entrants into the system will become roughly constant, easing somewhat the previous need for the constant expansion of facilities to accommodate ever-larger entering cohorts. This reduction of quantitative pressure should make possible budgetary reallocations in line with a greater emphasis on quality.

Over the longer term (i.e. after the sixth plan period), when all or nearly all youth will be graduating from primary school, the need for increased emphasis on secondary school will develop naturally. By the year 2000, it would be a plausible goal to aim at ensuring that all youth receive at least 10 years of education and successfully obtain their diploma. Perhaps this should not be a legal requirement (as attendance at primary school is currently), but it should be strongly encouraged.

Specialized post-secondary school education, ranging from vocational-technical academies to the old-line universities, will continue to play a vital role in Thai society. But the present and foreseeable needs of the Thai economy

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<sup>7/</sup> The basic work on these projections was done by Prof. Thienchay Kiranandana and his colleagues at Chulalongkorn University, Bangkok.



*Attendance at primary school is mandatory for all children in Thailand, but it is likely that by the year 2000 there will be increased emphasis on secondary school attendance as well. (UNICEF photograph)*

provide no real argument for any great expansion or public financial encouragement to enlarge the capacity of such places.

### **Health**

Health is another area which Thailand, in the future, could build on the substantial successes of the past. In broad terms, during the next plan period, the public sector health system could complete its task of promoting voluntary fertility control and ensuring nearly universal acceptance of contraception. It also could complete putting in place a system of hospitals and health centres throughout the country so that all rural areas will have access to adequate curative facilities even for relatively complex problems. Much of what is being done will not require redoing.

Over the longer term, health planners could also begin to reconsider options and plan for changing needs. Maternal and child health work will decline in importance relative to that of geriatrics, which will increase in importance. With lower levels of mortality and morbidity resulting from parasitic diseases, the emphasis must also shift from curative to preventive medicine. Health, sanitation and nutrition education should become important objectives of the Ministry of Public Health.

### **Urban services**

The continuing rapid urbanization of Thailand means that there will be continued need for increasing the volume of urban public services. However,

because the changing age distribution will be occurring in the urban areas too, the relative (and eventually even the absolute) number of children to educate will diminish in the urban as well as the rural areas. Migration is mostly of young adults and is not likely to affect this phenomenon. The health and other needs of the elderly may be especially acute in urban areas, since in such areas more of the elderly live in nuclear families. Housing and other social services will probably have to expand, even on a per capita basis, compared with present levels, since such programmes have not received much emphasis thus far. Moreover, growing sophistication of the public will almost certainly lead to a greater demand for "quality" in such areas.

The urbanization projections presented in this article may very well be on the low side, owing to definitional problems. Many new urban areas will be created (with or, without deliberate policy efforts) and old urban settlements will expand their boundaries in unpredictable ways. Such elements of growth are hard to build into projections of the growth of an existing set of urban locations, which is essentially what was done. By the year 2000, Thailand could well be 50 per cent urban, in contrast to the 33 per cent which is the highest level that any of the projections show. Such an occurrence would mean an enormous increase, over and above the present estimates, in the demand for urban services throughout the country.

The growth of urban areas will also depend partly on the economic scenario which actually unfolds. Should the industrial-urban sector continue to grow at annual rates of 6 per cent or more, the result will be full employment of the



*By the year 2000 and beyond, some public sector policy and programme initiatives for the elderly will be required because of Thailand's currently changing age structure.*

available labour in this sector. Given the differences in urban and rural wage rates, however, such a good urban labour market will draw even more migrants from the rural areas and thus increase the rate of urbanization.

### **Care of the elderly**

The changing age structure as a result of falling fertility has given rise to concern over the special needs of the elderly.

However, a comprehensive public sector social security programme is not proposed. Most of the elderly either work, are supported by their own offspring, or have an income from savings and assets. There is no indication that the elderly are represented disproportionately among the poverty group. Indeed, there is evidence that fewer elderly are poor compared with young persons. Thus, no new policy initiative seems required in this regard during the next plan period.

However, over the longer term, by 2000 and beyond, some public sector policy and programme initiatives will be needed owing to: (a) the increase in the proportion of the total population over 60 years of age (and the large increase in their absolute numbers), (b) the decrease in relative terms of the number of persons in the labour force age group who will provide support for the elderly, and (c) the steady increase in the proportion of the elderly who live in urban places where the traditional extended family support mechanisms are weaker. The Government should begin planning now for the public sector responses that should be made to meet the needs of the elderly before the problem becomes a serious one.

### **Conclusion**

The transition from rapid demographic growth to slow (and eventually no) growth will have strongly beneficial effects for the economy and society. It will ease the burden on the public sector of providing many social services, education and health care, just as it will reduce the economic burden of child care for individual families. The slow-down of population growth will provide the opportunity for the public sector to raise "quality" as well, i.e. the quality of its services per capita and, ultimately, the quality of the country's human resources.

Such an emphasis on the quality of human resources is obviously consistent with, and even essential to, Thailand's longer term economic goal of moving away from primary products and light industry into "high-tech" and export-oriented complex manufacturing industries. Declining population growth and an improvement in the unemployment problem will make these changes easier.

The slowing down of population growth also provides an opportunity to insure that minimal public services are readily available to everyone in the country. Some groups have, for various reasons, been by-passed by progress and do not have meaningful access to education, health, personal security and other public services. These groups include urban slum dwellers, and those living in areas with security problems, such as along certain borders. The provision of such services should help to eliminate some of the more glaring of the regional and social inequities which still exist.

The convergence of all regions and strata of the population towards acceptance of the small family norm will also play a role in reducing the regional disparities in output and income per worker. Future inter-regional and inter-sectoral migration will not merely help to offset differences in natural increase, but instead will play an equilibrating role in eliminating regional economic differences. In a real sense, this is another major contribution of the family planning programme.

Whatever may be said in general theoretical terms about the relationship of demographic growth to economic well-being, in the case of Thailand, the picture is fairly clear. Declining fertility in the past helped to ease economic and social pressures on the economy at a particularly crucial stage of the country's development.

Continued fertility declines in the future will give Thailand the opportunity to provide higher quality public services, such as education and health, more equally, thus increasing the quality of the labour force as well as the quality of life of the people.

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# The 'Unreached' in Family Planning : A Case Study of the Republic of Korea

*Although the family planning  
programme has been quite  
successful, it has not been able  
to extend its services to all couples*

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The family planning programme of the Republic of Korea has been quite successful, yet it has not been able to extend its services to all couples of child-bearing age. For example, there still exists a group of couples who want no more children and yet are not currently using any contraceptive method. The

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word "*pong-eem*," which literally means "being neglected", i.e. untouched by the family planning programme, was coined to describe this group (Park et al.).

*Pong-eem* couples have comprised the first priority target group since the initiation of the family planning programme in 1962. They form a significant proportion of the population. National surveys have shown that the proportion of women of reproductive age in the *pong-eem* group was 30 per cent in 1976, 34 per cent in 1978 and 26 per cent in 1979 (see also Westoff and Pebley, 1982).

Although the *pong-eem* group was identified as a problem group in the family planning programme, few studies have focused on it specifically; in particular, the psycho-social characteristics of the *pong-eem* group had not been closely investigated.

The study on which this article is based was designed to overcome that shortcoming and provide family planning administrators and workers with the specific information they need in order to reduce the size of the *pong-eem* group. This information is also designed for the use of policy makers in formulating strategies aimed at providing those who are in the *pong-eem* group with family planning services, and to enable decision makers to allocate resources efficiently. Furthermore, it was designed to provide biomedical scientists with useful information related to the *pong-eem* group's knowledge of, and attitudes towards, specific contraceptive methods so as to improve existing methods and to develop more acceptable ones in the future.

Past studies have shown that members of the *pong-eem* group tend to have more than the average number of children compared with couples practising contraception. Those studies have revealed that the mean age of those in the *pong-eem* group is 36 years, which means they need to be protected from the risk of pregnancy for about 10 years on average. Previous studies have also shown that women in the *pong-eem* group generally have been less frequently exposed to the mass media and contacts with family planning field workers than current users of contraception.

One study (Westoff and Pebley, 1982) identified problem groups that specified a wide range of possible impediments to the family planning programme, ranging from attitudinal constraints such as the persistence of son preference to matters such as not knowing where to obtain government contraceptive supplies. That study showed that unmet need for contraception tended to be higher among women in the age group 30-44 years, those with three or more children, those living in rural areas, those working for wages and those who were among the less well educated of the population.

While conceptualizing the study, we made the following assumptions regarding the background and psychosocial characteristics of the people in the *pong-eem* group:

- Women in the *pong-eem* group are likely to be under less demographic pressure than the current users of contraception;
- They are likely to have less knowledge and information about contraceptive methods and family planning services than current users;
- They are likely to have weak motivation to practise family planning compared with current users;
- They are likely to get less social support for family planning than current users;
- They are more likely to have experiences of negative reinforcement with respect to contraceptive methods than the current users;
- Family planning services (in terms of both the actual services and perceptions of them) are likely to be less easily available and less accessible than for current users;
- Since family planning services have been made available and are accessible almost everywhere in the country owing to the scope of the national programme, psychosocial characteristics would comprise more important factors with regard to couples being in the *pong-eem* group; and
- Other things being equal, the *pang-eem* group of women are more likely to rely on alternative measures to contraception for limiting the size of their family.

### **Methodology and data**

The study was restricted to married women under 45 years of age. Women who were married but not currently living with their husbands were excluded from the *pong-eem* group as were those not at risk of pregnancy.

Since the objective of the study was to determine the effects of psychosocial characteristics on family planning practice rather than to estimate parameters for the entire population, it was not necessary to draw from a national representative sample which would have required much more effort and expense. Rather, cluster samples were chosen from both urban and rural areas using the list of 1980 census enumeration districts of the National Bureau of Statistics/Economic Planning Board. One typical subregion each from Seoul City and Choong Nam province (Sudaemun-ku and Chungyang-kun counties) were sampled. The number of *pong-eem* women interviewed was 93 and 183 in

the urban and rural areas, respectively. The proportions of women in the *pong-eem* group among currently married women under 45 years of age were estimated to be 3.8 per cent and 8.2 per cent for the urban and rural areas, respectively, the average being 6 per cent for the total population under study.

To determine whether or not respondents wanted to have more children, two questions were asked in sequence:

- (a) "Do you want to have a child now"?

If the woman answered "no" to that question, she was asked:

- (b) "Then do you want to have a child sometime in the future"?

If a respondent answered "no" to both of these questions, she was judged to want no more children. To determine their practice of family planning, respondents were asked whether they were currently using any contraceptive methods, without any distinction being made to determine whether the methods were effective or ineffective.

### **Background characteristics of respondents**

In analysing the data, an attempt was made to compare the basic demographic and socio-economic characteristics of the respondents to determine if there were any differences in characteristics between those living in the rural and urban areas.

The preliminary analysis showed that, as expected, the age composition of the respondents was older than that of a standard sampling of currently married women from the rural and urban areas. The majority of the respondents were 30 or more years of age; they had been married 10 years or more, having two or more children, with a birth interval of more than one year.

In comparing the demographic characteristics of the rural and urban respondents, however, considerable differences were revealed: on average, rural respondents were almost two years older, had been married longer and generally had one child more per couple than the urban respondents. Also, the rural women tended to have a longer open birth interval than the urban women. However, this phenomenon could have been a reflection of the composition of the rural population, which has been getting older because of the out-migration of young people to urban areas.

When the socio-economic characteristics of the two groups were compared, the differences between the rural and urban respondents were much

more striking. As expected, the levels of educational attainment and family income were much higher in the urban area. With regard to husbands' occupation, there was quite a difference between the two groups: in the rural areas, three fourths of the husbands were farmers, while in the urban area, most of them were white- and blue-collar workers. The majority of the female respondents in both the rural and urban areas did not work for wages. The proportion of nuclear families among the *pang-eem* group was remarkably higher than that of extended families in both the rural and urban areas, but much more so in the urban area. Religious affiliation was somewhat different: in the rural areas, Buddhism was predominant while in the urban area, Protestantism was predominant.

Because the two groups of respondents were so different from each other in terms of demographic and socio-economic characteristics, they were treated separately.

### **Family planning status of the *pong-eem* group**

Although the study was focused on the *pong-eem* group, the major dependent variable was the family planning status of the respondents, i.e. whether or not the individual respondent was currently using any contraceptive method. Therefore, the respondents were divided into two groups: the *pong-eem* group and the current users group,

The *pong-eem* group was further divided into two distinct subgroups: "disadopters" and non-adopters. The term disadopters refers to those who discontinued the use of contraceptive methods, whereas the term non-adopters refers to those who had never used any contraceptive method. The proportion of disadopters was 50.5 per cent in the urban area and 59.8 per cent in the rural areas. The rate of disadoption was somewhat higher in the rural areas than in the urban area, perhaps because of differences with regard to the contraceptive methods people were currently using as shown below:

	Urban (%)	Rural (%)
IUD	9.3	18.6
Oral pill	9.3	13.6
Vasectomy	17.5	4.5
Female sterilization	44.3	26.6
Condom	9.3	12.1
Other, traditional methods	10.3	24.6

**Table 1: Background characteristics of (a) respondents, by area, and (b) disadopters and non-adopters**

Background characteristics	Rural		Urban		Dis-adopters (No.=151)	Non-adopters (No.=151)
	Number	%	Number	%		
Total	377	100.0	187	100.0		(per cent)
<i>Age of respondents</i>						
Under 30 years	49	13.5	33	17.6	16.6	23.5
30 -34	88	25.5	52	27.8	24.0	30.4
35 - 39	109	27.8	53	28.3	14.7	20.9
40 or more	131	33.2	49	26.2	44.7	25.2
<i>Duration of marriage</i>						
Under 7 years	61	15.2	57	28.5	21.3	33.0
7 - 12 years	138	34.5	63	31.5	23.3	34.0
13 years or more	201	50.3	80	40.0	55.4	33.0
<i>Number of living children</i>						
1	4	1.1	18	9.5	5.1	5.2
2	77	20.4	76	40.6	26.0	38.3
3	124	32.9	64	34.2	32.7	24.3
4 or more	172	45.6	29	15.5	36.0	32.2
<i>Open birth interval</i>						
1 year or less	61	20.0	32	22.0	18.7	38.1
1-4 years	107	27.2	60	30.0	28.0	29.6
5 years or more	209	52.8	95	48.0	53.3	31.3
<i>Educational attainment</i>						
No formal education	81	21.5	13	1.0	18.0	14.8
Primary school	239	63.4	34	18.2	51.3	42.6
Middle school	42	11.1	68	36.4	19.3	26.1

High school or more	15	4.0	12	38.5	11.3	16.5
<i>Husband's occupation</i>						
No occupation	5	1.3	7	3.1	1.3	4.4
Farmer	289	76.7	-	-	55.6	42.6
Service, sales or production worker	39	10.3	107	51.2	25.2	30.4
Professional, managerial, skilled or clerical worker	44	11.7	13	39.0	11.9	22.6
<i>Respondent's occupation</i>						
No occupation	321	85.8	157	84.5	81.4	90.4
Farmer	15	3.7	1	0.5	6.0	1.1
Service, sales or production worker	38	9.5	22	11.0	11.3	7.0
Professional, managerial, skilled or clerical worker	4	1.0	8	4.0	1.3	0.9
<i>Family income (in 1,000 won per month)</i>						
Less than 200	272	72.1	35	18.7	51.0	54.8
200 - 500	100	26.5	118	63.1	44.4	39.1
500 or more	5	1.3	34	18.2	4.6	6.1
<i>Family type</i>						
Nuclear family	146	38.7	125	66.8	66.9	66.1
Extended family	231	61.3	62	33.2	33.1	33.9
<i>Religion of respondents</i>						
Buddhism	124	32.9	30	16.0	28.5	24.3
Protestantism	45	11.9	50	26.1	13.9	14.8
Catholicism	2	0.5	16	8.6	2.0	6.1
No religion*	206	54.6	91	48.7	55.6	54.8

\* Note: Six respondents (1 urban and 5 rural) who practised other religions were included in this category.

The national family planning programme emphasises the first five methods of contraception. Of them, female and male sterilization were particularly popular in the urban area, whereas the other methods were almost evenly-distributed in the rural areas, a trend which is similar to the national average. Women in rural areas tend to use temporary and ineffective traditional methods such as rhythm and withdrawal more than urban women, and, therefore, they are more likely to discontinue contraceptive use. This may also explain in part the higher incidence of *pong-eem* women in rural areas.

Disadopters in the *pong-eem* group gave the following reasons for discontinuing contraceptive use:

	Urban (%)	Rural (%)
Not too long after birth	15.0	9.8
Uncertain of the effects of methods	5.0	6.9
Due to side-effects of methods	27.5	52.0
Inconvenient to use	20.0	11.8
Other reasons	32.5	19.6

In both the urban and rural areas, the most important reasons for disadoption were related to the nature of the contraceptive methods. It was also noted that the proportion of unspecified "other reasons" was relatively high in the urban and rural areas, which indicates a need to explore the psychosocial reasons for being a *pong-eem*. Non-adopters among the *pang-eem* gave the following reasons for never having used any contraceptive method:

	Urban (%)	Rural (%)
Wanted to have a child	57.1	50.0
Think contraception morally unacceptable	4.8	–
Cannot believe the effects of contraception	2.4	1.4
Afraid of side -effects	14.3	18.6
Inconvenient to use	9.5	4.3
Near menopause	9.5	21.4
Other reasons	2.4	4.3

Surprisingly, in both the urban and rural areas, the most important reason for non-adoption was that the couples wanted to have a child. More than half of the non-adopters said that they had never used contraceptives because

they wanted to have a child, even though they had said at the time of the survey that they wanted no more children.

If the two statements "wanted to have a child" and "want no more children" are regarded as equally valid, the results may be interpreted in several ways. The first possibility is that the couple may have had the child they wanted some time before the survey, subsequently stating at the time of the survey that they "want no more children". If this was the case, they would likely be preparing to use contraceptive methods in the near future.

The second possibility is that these two statements could reveal indecision or ambivalence with respect to having a child. If this was the case, it would not have really mattered to them whether or not they would have another child, even though they had said previously they wanted no more children.

The third possibility is that the statement "want no more children" could have been regarded as a reflection of the social desirability of family planning. If this was the case, the respondents who said that they wanted no more children would not really belong to the *pang-eem* group in the strict sense because they wanted to have more children. However, since there is no clear evidence to support this interpretation, we included these respondents in the *pang-eem* group. The first possibility seems to be the most likely one, but the second and the third cannot be excluded entirely.

Another major reason for non-adoption is also related to the nature of contraceptive methods. In both the urban and rural areas, about 20 per cent of the non-adopters did not practise contraception because they were afraid of possible side-effects and because they thought it would be inconvenient to use contraceptive methods.

Furthermore, a considerable number of non-adopters said that they were approaching menopause. However, since they said they were fecund, we did not exclude them from the *pang-eem* group. Although these non-adopters thought they were fecund, their chances of getting pregnant were small. Nonetheless, their verbally stated reasons for non-adoption must be taken into account in interpreting the relationship between psychosocial characteristics and family planning status.

In comparing demographic characteristics between disadopters and non-adopters, there were differences such as the age of respondents, duration of marriage and birth interval. Non-adopters were evenly distributed among all age groups, but the proportion of disadopters was the highest among those 40 or more years of age. A similar pattern was noted with regard to the duration of marriage; 55.4 per cent of the disadopters had been married 13 years or more. However, the disadopters and non-adopters were different with re-

**Table 2: Per cent distriiution of family planning status, by age of respondents and by area**

Status	Urban				Rural			
	Under 30 years old	30-34	35-39	40 or more	Under 30 years old	30-34	35-39	40 or more
<i>Pang-eem</i>	54.5	55.8	22.6	61.2	69.4	50.0	31.2	49.6
Current user	45.5	44.2	11.4	38.8	30.6	50.0	68.8	50.4

gard to open birth interval. Disadopters tended to have longer open birth intervals compared with non-adopters. Also, the proportion of disadopters was much higher among women with an open birth interval of five years or more, while the distribution was even among non-adopters. As for other demographic characteristics, there were no major differences between disadopters and non-adopters.

### Background characteristics

**Table 2** shows a statistically significant relationship between the age of respondents and their family planning status in both the urban and rural areas. The proportion in the *pong-eem* group was higher among respondents under 30 years of age; it decreased drastically up to age 40, but abruptly increased after 40 years of age.

We speculated about the reasons for these phenomena. Although all the respondents stated verbally that they did not want any more children, younger women seemed more likely to remain in the *pong-eem* group because they were not fully determined to have no more children. They simply may have hesitated about using certain contraceptive methods or they may not have made a decision regarding contraception. By contrast, women 40 or more years of age were more likely to remain in the *pong-eem* group because there was less risk of their getting pregnant, even though they thought they were fecund.

Similar patterns were found with regard to the duration of marriage and family planning status.

The relationship between the number of living children and family planning status is examined in **table 3**. The proportion in the *pong-eem* group was higher than expected for those women having two or fewer children but was lower for women with three children. (It may be noted that the goals of the “stop at two” campaign of the national family planning programme had not yet

**Table 3: Per cent distribution of family planning status, by the number of living children and by area**

Status	Urban			Rural		
	2 or fewer	3	4 or more	2 or fewer	3	4 or more
<i>Pong-eem</i>	50.0	40.6	55.2	61.7	41.1	44.2
Current user	50.0	59.4	44.8	38.3	58.9	55.8

been realized, particularly in rural areas.) The proportion of women in the *pong-eem* group having four or more children was higher in the urban area than in the rural areas despite the older age composition of the rural population. This may have been due to the ease with which induced abortion could be obtained in the urban area.

In both the urban and rural areas, the proportion of women in the *pong-eem* group was highest for those who had no sons, whereas it was the lowest for those women who had at least two sons (table 4).

Despite the fact that all of the respondents said that they did not want any more children, the respondents who had no sons were quite likely to remain in the *pong-eem* group whether they were from the rural or urban areas.

Son preference influences family planning status; *pong-eem* women who had no sons probably wanted to have at least one son, even though they openly claimed, in front of the interviewers, that they did not want any more children. However, it should be remembered that the number of women who had no sons was very small, i.e. 3 per cent of the respondents in the rural areas and 10 per cent of those in the urban area.

**Table 4: Per cent distribution of family planning status, by the number of sons and by area**

Status	Urban			Rural		
	0	1	2 or more	0	1	2 or more
<i>Pong-eem</i>	72.2	46.6	43.2	80.0	61.8	39.3
Current user	27.8	53.4	56.8	20.0	38.2	60.7

**Table 5: Per cent distribution of family planning status, by open birth interval and by area**

Status	Urban			Rural		
	1 year or less	1-4 years	5 Years or more	1 year or less	1-4 years	5 Years or more
<i>Pong- eem</i>	81.3	38.3	42.1	78.7	52.3	34.9
Current user	18.8	61.7	57.9	21.3	47.7	65.1

The open birth interval may be defined as the interval between the last live birth and the time of the survey. However, those women with an open birth interval of three months or less were excluded from the survey. The proportion of women in the *pong-eem* group tends to be inversely correlated with the open birth interval (table 5). Although the open birth interval may also be determined by family planning status, it is noteworthy that the proportion of women in the *pong-eem* group was much higher among women from both the urban and rural areas who had an open birth interval of one year or less. Some of those women may have still been in postpartum amenorrhea although they said they were fecund; also many of them may have wanted to remain in *pong-eem* status for psychosocial reasons.

In assessing the socio-economic characteristics of the respondents, it was found that only two variables, the educational level and occupation of respondents, were worth discussing. The proportion of women in the *pong-eem* group in the urban area tended to be inversely correlated with their educational level, whereas in the rural area, it tended to be high among those women who attained higher education. Generally, it may be expected that educated women are less likely to remain in the *pong-eem* group, as actually observed in the rural areas.

**Table 6: Per cent distribution of family planning status, by the educational level of respondents and by area**

Status	Urban			Rural		
	Primary school or less	Middle school	High school or more	Primary school or less	Middle school	High school or more
<i>Pong- eem</i>	55.3	52.9	37.5	45.0	57.1	60.0
Current user	44.7	47.1	62.5	55.0	42.9	40.0

Because it would be meaningless to classify respondents by occupation owing to the small number of working women in both the rural and urban areas, we simply dichotomized the working status of respondents and examined that relationship with their family planning status (**table 6**). The proportion of women in the *pang-eem* group was considerably higher for urban working women than for those who were not working for wages, whereas for rural women, the reverse was true. Thus the relationship in the urban area was contrary to our expectation that working women would be less likely to remain in the *pong-eem* group. Although the reason for this is not clear, the age of the respondents and the kinds of work they performed may have been confounding factors. Other socio-economic characteristics were not statistically significant.

### **Psychosocial characteristics and family planning status**

Among the factors affecting the family planning decisions of couples is demographic pressure, which may be defined operationally as the degree to which the respondents felt pressure with respect to the number of living children they had.

Demographic pressure was measured first by asking respondents directly whether they felt any burden in rearing, educating and training their living children, and second by combining their responses. However, there was no statistically significant relationship between demographic pressure and family planning status.

With regard to the couples' knowledge about contraception, two measures were used: knowledge of contraceptive methods and knowledge about where to obtain family planning services and specific contraceptives. The level of knowledge was generally high in both the rural and urban areas. As expected, the higher the respondents' level of knowledge was, the lower was their proportion in the *pong-eem* group.

In a country such as the Republic of Korea where the national family planning programme has been implemented for a long time, attitudes towards family planning are generally favourable and usually have no significant effect on contraceptive practice. Thus we attempted to measure attitudes more specifically by asking respondents whether or not they approved of various family planning incentives and disincentives adopted by the Government. In both the urban and rural areas, the proportion of women in the *pong-eem* group was higher among those who disapproved of the Government's population policies, although the proportion was not statistically significant in the rural areas.

Motivation to practise family planning was measured by a composite index obtained from responses to the following questions:

- What would you do if your husband wants you to have more children?
- What would you do if your parents-in-law want you to have more children?
- What would you do if your close relatives want you to have more children?

Although the relationship between motivation to limit family size and family planning status was not significant in either the urban or rural areas, the proportion of women in the *pang-eem* group was much higher among those who were least motivated.

Social support for family planning refers to the degree to which individual respondents get support from others, such as husbands, family members, relatives, neighbours, close friends and medical personnel, to practise contraception. It was measured, first, by asking respondents how much they talked about contraception with others and, second, by asking them whether such people approved of their use of contraceptive methods.

It was found that the relationship between family planning status and the degree of communication with others was statistically significant in both the urban and rural areas.

As was expected, the lower the level of social support for family planning, the higher was the proportion of women in the *pong-eem* group in both the urban and rural areas.

Among the psychosocial characteristics, social support for family planning was the most closely related to the family planning status of couples no matter what measure of social support was used.

The last psychosocial characteristic in our conceptual framework was negative reinforcement concerning contraception which refers to the degree to which respondents were exposed to negative information or had any negative experience with respect to contraception. Disadopters and current users were asked whether or not they had experienced any side-effects with any contraceptive method; **table 7** shows that the proportion of women in the *pong-eem* group was higher among those who had experienced side-effects, although it was not statistically significant.

Next we examined the relationship between family planning status and the degree of exposure to negative information regarding contraception or contraceptive methods. Negative reinforcement was measured by asking

**Table 7: Per cent distribution of family planning status, by respondents' working status and by area**

Status	Urban		Rural	
	Not working	Working	Not working	Working
<i>Pong-eem</i>	45.9	56.7	48.3	39.3
Current user	54.1	43.3	51.7	60.7

respondents whether they had read or heard about any negative aspects (mainly side-effects) concerning various contraceptive methods.

More than half of the disadopters had discontinued their practice of contraception because of method-related reasons; nearly one fourth of the non-adopters did not practise contraception because of method-related reasons such as doubts about the effectiveness of contraceptives, side-effects and inconvenience. Such reasons were likely to have negatively reinforced women's decisions regarding family planning. Contrary to our expectation, however, negative reinforcement regarding family planning did not make any significant difference in the proportion of women in the *pong-eem* group in both urban and rural areas. A certain level of negative reinforcement seems to be inevitable both for the current users and the *pong-eem* group; however, it does not seem to matter very much in this country because several alternatives are readily provided by the national family planning programme.

#### **Family planning services and family planning status**

Factors related to family planning services comprise another group of independent variables in the conceptual framework. The Republic of Korea's family planning services are provided through two separate channels: the Government's national family planning programme and the private or commercial sector. The family planning services of the national programme are provided mostly by family planning field-workers, designated physicians, health centres and authorized hospitals, whereas those of the private sector are provided by pharmacies, private clinics and hospitals.

The availability of family planning services was measured by asking whether there were any such channels which provided family planning services in the community. The responses showed that, because family planning services have been available almost everywhere in the country since the initiation of the national programme in 1962, the availability of services does

not seem to make any significant difference with regard to family planning practice. Furthermore, the distance to such centres where family planning services are available and the time needed to get to them either on foot or by bus was measured, but this factor was found to be statistically insignificant.

This finding was the opposite of what had been expected. Although we have no plausible explanation for this finding, it could be that respondents were reluctant to visit nearby clinics for fear of a loss of privacy. Also, it could be that the variations in distance to the service points in both the urban and rural areas are not great enough to make a significant difference in the practice of family planning. Public transport is relatively well developed in both the rural and urban areas; most respondents could easily reach service points within a half hour, or an hour at most.

Finally, contact with family planning field-workers was assessed since they are the educators about family planning and the providers of services at the grass-roots level. While family planning field-workers are located almost everywhere in the Republic of Korea, accessibility to them varies from one area to another. The worker-to-population ratio is generally higher in rural areas than in urban areas. Contact with family planning workers may be regarded as a consequence of accessibility, availability and the worker's activity.

**Table 8** shows that, although the proportion of those who had contact with family planning workers was higher in the rural areas than in the urban area, contact with the workers was statistically significant only in the urban area.

Because family planning services are available almost everywhere throughout the country, we could not conclude that the availability and accessibility of family planning services are not important factors to the individual practice of contraception.

**Table 8: Contact with family planning workers and family planning status, by area**

Status	Urban		Rural	
	No	Yes	No	Yes
<i>Pong- eem</i>	56.6	37.5	55.6	44.3
Current user	43.4	62.5	44.4	55.7

## Multivariate analysis

The manner in which each of the background characteristics, psychosocial characteristics and family planning services variables was related to the dependent variable, i.e. family planning status, was examined. Since some of those variables may have been related to each other, multivariate analysis, using the multiple classification analysis (MCA) available on the Statistical Package for the Social Sciences, was carried out. It made possible an evaluation of the independent and relative effects on the dependent variable of each variable in the analytical framework. It also enabled us to evaluate the relative and the total effects of each group of variables and finally the total effects upon the family planning status of all variables included in the conceptual framework.

Based on the results of the bivariate tabular analysis, five background characteristics were selected for entry in the MCA: age of respondents, number of sons, open birth interval, educational attainment and working status of the respondents.

The age of the respondents and the open birth interval were found to be significantly related to family planning status in the urban area, with the open birth interval being the most powerful of the two predictors.

Nonetheless the explanatory power of the number of sons and educational level was considerable. The five background characteristics together explained 22.1 per cent of the variance in the proportion of women in the *pong-eem* group.

In the rural areas, the open birth interval and the age of respondents were also powerful predictors of family planning status. In contrast with the urban area, however, the number of sons was significantly related to the proportion of rural women in the *pong-eem* group, which may have been due to the stronger preference for sons in the rural area. The explanatory power of the educational level and working status was reduced considerably in the rural areas, mainly because most of the rural female respondents had completed only primary school or a lower level of education and did not work for wages but were engaged in farm work. They may have felt, therefore, that there was less of a need for them to practise family planning.

Two groups of independent variables were also entered separately into the MCA. First, the effects of the five psychosocial characteristics, namely knowledge of contraceptive methods, attitudes towards family planning, motivation for family planning, social support for family planning and exposure to negative information about contraception, were analyzed.

In the rural areas, knowledge of contraceptive methods and social support for family planning were significantly related to family planning status; however, the explanatory power of these two variables was not sufficiently high. In particular, the effect of negative reinforcement was negligible despite the fact that the most frequently stated reason for disadoption and non-adoption was related to the negative aspects concerning contraceptive methods. Most of the respondents had been exposed to some degree of negative information regarding contraceptive methods, but this did not seem to make much difference to their practice of family planning. In the rural areas, on the whole, all of the psychosocial characteristics explained only 6 per cent of the variance in the dependent variable.

As for family planning services, two alternative measures, i.e. the availability and accessibility of those services and contact with family planning workers, were entered into the MCA. In the urban area, three of the service variables were shown to be closely related to family planning status, namely availability measured by whether or not respondents had ever met the family planning worker or had ever gone to a health centre for family planning services, accessibility measured by the actual distance to service points, and contact with a family planning worker during the previous year. Although the measures of availability and contact to some extent conceptually overlap, they had remarkable independent effects on the dependent variable, even when the effects of the other variables were taken into account.

While the family planning worker-to-population ratio was much lower in the urban area, contact with a worker was the most powerful predictor of family planning status. The availability of family planning service points in the community and accessibility measured by the time required to reach the service points had very weak explanatory power, because family planning services points, private and public, are available in most urban communities and, in most cases, can be easily reached within about half an hour. On the whole, the five family planning service variables explained only 11 per cent of variance in the dependent variable.

In the rural area, contact with a family planning worker was the most powerful predictor, although its explanatory power became weak. Unlike in the urban area, the availability of service points and accessibility measured by time do matter in the rural areas. On the whole, the variance explained by the family planning service variables was only 3 per cent.

The amount of variance explained by psychosocial characteristics was larger than that of family planning service variables in both the urban and rural areas, owing to the fact that more emphasis has been put on services since the initiation of the national family planning programme. Family plan-

ning services have been made more standardized throughout the country so that little variation exists from one county to another.

To examine the total effects of the two groups of independent variables, we entered the five psychosocial characteristics into the MCA using the five service variables as covariates; the total amount of variance explained by them was 19 per cent and 8 per cent in the urban and rural areas, respectively. Without taking into account the interaction between them, it may be said that background characteristics proved to be more powerful predictors of family planning status than the two groups of independent variables. However, the effect of background characteristics on family planning status was likely to have been mediated by the two groups of independent variables in our conceptual framework.

To examine the total effects of all variables on the dependent variable in our conceptual framework, we selected five background characteristics as covariates and five independent variables that were strongly related to family planning status (three psychosocial characteristics and two service variables) and put them into the MCA. The total amount of variance explained by the five independent variables together with the five background characteristics was 27 per cent and 19 per cent in the urban and rural areas, respectively, which is not very impressive, particularly in the rural areas. The urban-rural differences in the amount of explained variance seem to reflect the differences in the execution of the national family planning programme. At any rate, the amount of variance in the dependent variable not explained by background characteristics and independent variables still remains remarkable in both the urban and rural areas. This seems to be due partly to the fact that the *pong-eem* group under study consisted of two distinct subgroups, disadopters and non-adopters.

### **Induced abortion, family planning status and future behavioural intentions**

An important factor in the analysis was induced abortion. Despite the fact that induced abortion for the purpose of controlling family size is prohibited by law, it is widely practised by women who want to limit the number of their children. Thus, the women who rely on induced abortion are not likely to practise contraception.

When asked if they approved of induced abortion to limit family size, the majority of respondents said that they did.

Attitudes towards induced abortion, however, did not make any significant difference with regard to family planning status, probably because the

women knew that they could easily have an abortion whenever they wanted, regardless of their attitude towards the practice. About 40 per cent of the respondents in both the rural and urban areas had experienced one or more induced abortions.

Experience of induced abortion was related to family planning status, although the relationship was not significant in the urban area. Unexpectedly, in the urban and rural areas, the proportion of women in the *pong-eem* group was lower among those who had experienced an induced abortion. It may be that *pong-eem* women are more likely to rely on induced abortion as an alternative to contraception. One explanation for this contradiction would be that Korean women seem to regard induced abortion as an alternate, rather than an alternative, method to control family size.

To the question: "Now that you said you want no more children, what would you do if you become pregnant accidentally in the future?", about 80 per cent of the respondents in both the urban and rural areas said that they would get an induced abortion. In both areas, however, the proportion of women who would get an abortion was considerably higher for the current users of contraception than for the *pong-eem* group.

As previously mentioned, one of the important reasons for being in the *pong-eem* group is related to the perceived side-effects of contraceptives. Thus we attempted to determine if the experience of any side-effects negatively affected the respondents' intention to use contraceptives. Contrary to expectations, more than 80 per cent of the respondents in both the rural and urban areas said that they would continue to practise contraception. More specifically, the current users would continue to practise contraception in the future, while the disadapters in the *pong-eem* group would discontinue.

With regard to the future behavioural intentions of the *pang-eem* group, about half of the women in the group said they would use contraception in the near future and the remaining *pong-eem* women said that they either would not use contraception or did not know what they would do. Nearly half of the *pang-eem* women in both the urban and rural areas who would not practise family planning in the future seemed to rely on their ability to have an induced abortion if they were to get pregnant.

### **Policy implications**

In spite of the long history of the Republic of Korea's national family planning programme, there still exists a considerably large number of women in the *pang-eem* group in both urban and rural areas, although their proportion in the population has been reduced greatly in recent years.

The findings of this study about the *pong-eem* group have some policy implications that may be of interest to administrators and researchers who want to reduce the size of the *pong-eem* group, particularly in rural areas. However, it should be pointed out that the findings of the study cannot be generalized for developing countries where the family planning programme has had only a short history. The following are the major policy implications:

- Considering the composition of the *pong-eem* group, efforts should be made both to increase the continued use of contraceptive methods and to recruit new adopters of contraception. It would seem desirable to make male and female sterilization more widely available also in urban areas.
- Dissatisfaction with contraceptive methods seemed to be a salient point among both the *pong-eem* group and the current users. Considering the fact that the major reasons for disadoption and for non-adoption are method-related, the need for the further development of contraceptive technology cannot be over-emphasized. Administrators should attempt to identify improved contraceptive methods and make them easily available and accessible.
- Greater efforts should be made in recruiting new adopters among women under 35 years of age who do not want any more children. Efforts should also be made to enable older women to continue their practice of contraception, even though they are less fertile.
- Primary efforts should be directed towards those women with an open birth interval of less than one year, encouraging them to adopt contraception or to resume their use of contraceptive methods. Some kind of post-partum programme is highly recommended for this group.
- It would seem to be appropriate to consider some shift in the allocation of resources in the family planning programme. Considering the fact that psychosocial characteristics explained more variance in the family planning status than service variables, more resources should be allocated to IEC (information, education and communication) activities in order to reduce the proportion of women in the *pong-eem* group.
- With regard to IEC activities, emphasis should be placed on creating a social atmosphere favourable towards family planning. This would involve promoting changes in the values and norms regarding having children and changes in motivation and attitudes towards family planning. Strategies to reduce the level of son preference should be considered, particularly in rural areas. The IEC programme should

provide necessary information regarding contraceptive methods and services. The problem of disadoption should also be handled with IEC activities.

- The finding that contact with family planning workers made a significant difference in family planning status, particularly in the urban area, would make it desirable to increase the currently low family planning worker-to-population ratio in the urban area. Accessibility to service points should be enhanced in rural areas by establishing more service points in each community.
- The illegality of induced abortion should be reviewed, particularly in the case of accidental pregnancy owing to contraceptive failure.

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# **Multivariate Area1 Analysis of the Impact and Efficiency of the Family Planning Programme in Peninsular Malaysia**

*Both 'development' and family  
planning programmes influence fertility*

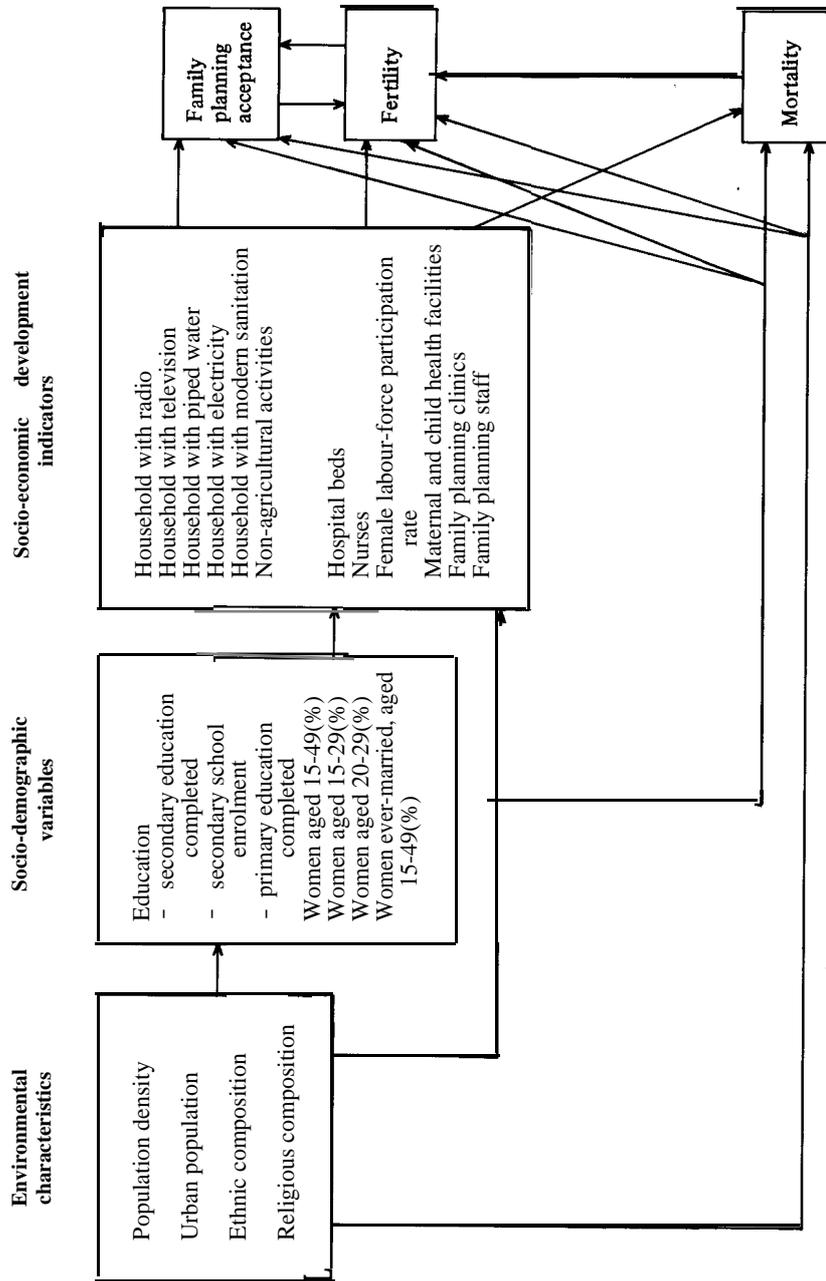
By Tan Boon Ann\*

The contributions of development and of family planning programmes to fertility decline in third world countries have been the subject of enquiry and controversy for several decades. Although opinions still differ on the relative influence of development and the provision of family planning services

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\* The author of this article is Tan Boon Ann of the National Population and Family Development Board of the Government of Malaysia. It is based on a regional study of ESCAP completed in 1987 with funding provided by the United Nations Fund for Population Activities.

Figure 1: Framework for fertility behaviour analysis



on fertility, there is a growing consensus that both factors are important and may influence fertility.

Thus, it is necessary to examine the impact of family planning programmes on their ultimate objective, namely fertility reduction, net of the contribution of socio-economic change. Furthermore, in view of the increasing size of Governments expenditures on family planning, it has become increasingly important to examine not only the impact but the efficiency of national family planning programmes.

Two approaches are commonly adopted to accomplish those goals. The first approach involves common individual or household-level analysis; the second approach involves areal analysis, which examines aggregate fertility levels. Areal analysis covers distinctive and meaningful geographical areas where data on socio-economic development indicators are available; the dependent variable is either the aggregate level of fertility at a given point in time or change in fertility at a given point in time (Cutright, 1983; Mauldin and Berelson, 1978; Darney, 1975).

This article focuses on the findings of the final phase of a three-phase multivariate areal analysis study undertaken by ESCAP in five countries of the Asian and Pacific region, one of the countries being Malaysia. That study used Malaysia's administrative district as the unit of analysis because, among other reasons, the administration and implementation of socio-economic development activities, as well as the family planning programme, are dependent to a large extent on the decisions of local organizations at the district or State levels.

The article shows that the findings of multivariate areal analysis can help to assess the impact of family planning programmes and increase understanding of the dynamics of programme management, thus guiding programme managers in the allocation of financial and human resources.

### **Data and methodology**

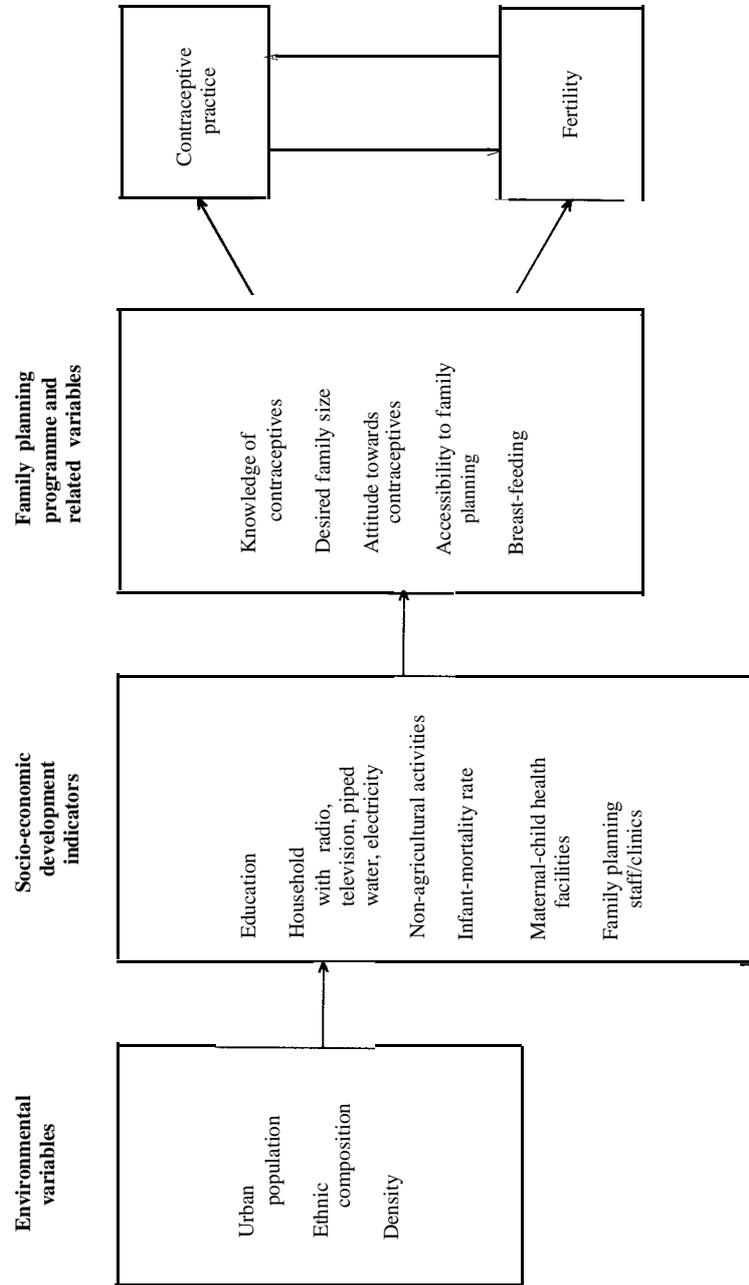
In order to clarify some of the methodological aspects of the study, the three phases are described briefly below,

#### **Phase I**

In phase 1, existing programme and non-programme data were analysed using areal multivariate technique to separate the impact of the family planning programme net of other developmental activities.

Based on the Freedman framework for analysis of fertility, a simplified analytic model was developed to provide a basis for identifying the key variables for analysis of fertility behaviour at the district level (**figure 1**).

**Figure 2: Framework for fertility behaviour analysis**



The main source of socio-economic development indicator data<sup>1/</sup> for phase 1 of the study was Malaysia's 1980 population census, 1982 vital statistics, family planning service statistics (1978-1982) and data generated by a health monitoring and evaluation study (1978-1979). Owing to the availability and quality of data, the analysis was restricted to Peninsular Malaysia.

In addition to the simple descriptive statistics used to describe the fertility pattern and fertility control, multiple regression was used to disentangle some of the complex relationships among ethnicity, selected variables on socio-economic-demographic factors and fertility behaviour. Also for simplicity, path analysis was used based on the method of ordinary least squares to estimate regression function<sup>2/</sup>

From the regression coefficients of the first stage analysis, the expected demographic output (i.e. level of fertility or contraceptive practice) in an area was derived from the observed values of environmental and family planning programme input variables for that area. The expected output was regarded as the average demographic consequence of a specified configuration of environmental and family planning programme influences.

The observed deviation from the expected value for each area was assumed to represent the efficiency with which family planning programme inputs had been deployed in each area, plus a random error component. The deviation thus formed an index of efficiency, which is a measure of how well an areal unit is performing by comparison with the average unit in the country, after taking into account environmental influences and the magnitude of the family planning programme inputs.

## Phase 2

The methodology for the second phase of the project consisted essentially of in-depth investigation of selected areas in an attempt to discern the dynamics and determinants of efficiency.

During this phase, the underlying causes of relatively better and poorer performance were investigated by undertaking micro-studies of the selected subunits from two extreme quartiles. Thus data on socio-economic and cul-

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1/ The socio-economic development variables lag two years behind the fertility and the family planning acceptance variables.

2/ The general linear regression equation used was:

$$Y_i = b_0 + b_1v_{i1} + b_2v_{i2} + \dots + b_pv_{ip} + e_i$$

where:  $b_p$  = regression coefficient for each predictor;  $V_{ip}$  = predictor variable;  $e_i$  = random error term;  $p$  = number of predictors; and  $i = 1, \dots, n$ .

tural factors were obtained from key knowledgeable persons in three efficient districts and three less efficient districts. Service statistics reports and records were also used to supplement the data sources. In addition, a questionnaire was designed to collect data and information from key family planning programme personnel concerning organisational structure, facilities, logistics and supplies, transportation, supervision and the staff's job satisfaction, attitude and commitment.

### Phase 3

In the third and final phase of the study, the insights gained in phase 2 regarding the dynamics of performance were used to refine the input variables of the phase 1 model; thereafter, the phase 1 analysis was repeated. Thus a new set of explanatory variables (mainly family planning programme related variables) were incorporated in order to analyse fertility behaviour at the district level.

In the impact model, the dependent variable was fertility (total fertility rate), while in the efficiency model the dependent variable was contraceptive practice, reversing the causal ordering: fertility influencing contraceptive practice. (Figure 3 on page 53 shows the relationships of the models.)

The variables that were available for the analysis of fertility behaviour as depicted in figures 1 and 2 are given in table 1. These were carefully selected based on the theoretical consideration, structural relationships, the shape of the distribution (based on kurtosis and skewness measure) and zero-order correlation coefficients. Highly correlated variables were meticulously chosen to avoid the problem of multicollinearity in the regression analysis. The results presented in the following paragraphs are based on the findings of the phase 3 study.

### Impact study

Insignificant variables and factors were trimmed in order to present a simplified model for studying the impact of environmental, socio-economic development, family planning programme and related factors on fertility.

The family planning programme and development variables (non-programme supplies, time taken to obtain supplies and information, or accessibility, approval of family planning, and breast-feeding), which conceptually were thought to be important, were found to be insignificant in explaining fertility after controlling for the factors depicted in figure 2. In other words, these variables were redundant or their explanatory power was taken over the other family planning programme and development variables in the final model.

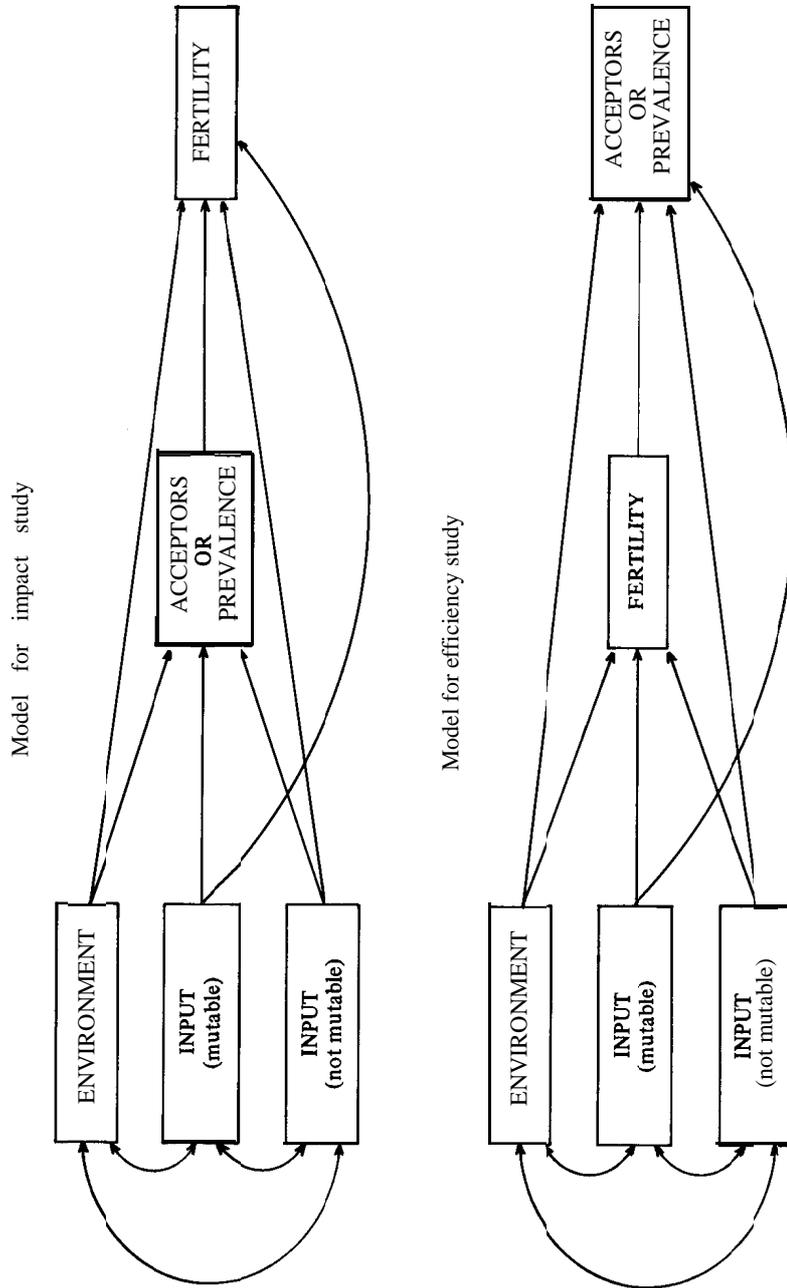
**Table 1: Variables and their definition**

<b>Variable</b>	<b>Definition with reference to district</b>
Crude death rate	Number of deaths in 1980 per 1,000 mid-year population of 1980
Crude birth rate	Number of births in 1980 per 1,000 mid-year population of 1980
Urban population proportion	Percentage of 1980 population that was in urban areas with population of 10,000
Secondary education proportion	Percentage of 1980 population that completed secondary education (11 years of schooling)
Secondary enrolment ratio	Ratio of students aged 13-17 years to population aged 13-17 for year 1980
Population density	Number of persons per square kilometre for year 1980
Ethnic composition	Percentage of 1980 population that was of Malay origin
Chinese population proportion	Percentage of 1980 population that was of Chinese Origin
Indian population proportion	Percentage of 1980 population that was of Indian origin
Radio ownership proportion	Percentage of 1980 households having radios
Television ownership proportion	Percentage of 1980 households having television sets
Piped water proportion	Percentage of 1980 households having piped water
Electricity proportion	Percentage of 1980 households with an electrical supply
Incidence of poverty	Percentage of 1979 households that were in the rural poverty category
Hospital bed ratio	Government hospital beds per 10,000 population (1979)
Nurses ratio	Nursing personnel per 10,000 married women aged 15-49 years (1979)
Non-agricultural	Percentage of 1980 labour force engaged in non-agricultural work
Sanitation proportion	Percentage of 1980 households with modern sanitation
Women aged 15 -49	Women aged 15-49 years per 100 population aged 15-49 (1980)
Women aged 15 -29	Women aged 15-29 years per 100 population aged 15-49 (1980)
Women aged 20- 29	Women aged 20-29 years per 100 population aged 15-49 (1980)
Ever-married women aged 15-49	Married women aged 15-49 years per 100 women aged 15-49 (1980)
Women's schooling	Women who completed primary education per 100 women aged 15-49 years (1980)
Total fertility rate	Sum of age-specific rates for year 1982. Numerator (births) was obtained from Vital Statistics of 1982, while denominators (women 15-49 years old) were projected from the 1980 census.
Muslim population proportion	Muslim persons per 100 population (1980)
Buddhist population proportion	Buddhist persons per 100 population (1980)
Cumulative acceptance rate	Cumulative acceptors (1978-1982) per 1,000 married women aged 15-49 years (1980)

**Table 1: (continued)**

<b>Variable</b>	<b>Definition with reference to district</b>
Female labour force participation rate	Females earning an income per 100 female labour force (1980)
National family planning board clinic staff	Number of national family planning board clinic staff (1980)
Family planning clinics	Number of clinics from the participating agencies (NFPB, Ministry of Health, FPA etc.) of the national programme
Infant mortality rate	Number of deaths under one year of age per 1,000 live births (1980)
Mother-child health facility ratio	Maternal-child health facilities per 10,000 women aged 15-49 years (1979)
Family planning clinic ratio	Family planning clinics per 10,000 women aged 15-49 years (1980)
Child-woman ratio	Number of children aged 1-4 years per 1,000 women aged 15-49 (1980)
Share of national development and expenditure	Percentage share of national development and expenditure (1976-1980)
Total fertility rate (< 30)	Total fertility rate for women under 30 years of age (1982)
Total fertility rate (>30)	Total fertility rate for women 30 years of age or more (1982)
Total fertility rate (15-49)	TFR<30 + TFR> 30 (1982)
No. of efficient methods known	Number of efficient methods that currently married women (15-49 years old) knew (1984)
Ever used efficient method	Per cent of currently married women (15-49 years old) who ever used any contraception (1984)
Currently using	Per cent of currently married women (15-49 years old) currently using any contraception (1984)
Non-programme supplies	Per cent of currently married women (15-49 years old) who knew of non-programme supplies (1984)
Time for supplies/information	Average time taken (in minutes) to obtain supplies/information on family planning (1984)
Approval of family planning	Per cent of currently married women (15-49 years old) who approved of family planning (1984)
Desired family size	Ideal number of children desired by wife (1984)
Breast-feeding	Per cent of mothers who breast-fed their youngest child (1984)
TFR	Total fertility rate of women (15-49 years old) for year 1984
TFR<30	Total fertility rate of women (15-29 years old) for year 1984
TFR>30	Total fertility rate of women (30-49 years old) for year 1984
Ever used efficient method	Per cent of currently married women (15-49 years old) who ever used efficient contraception (1984)
Currently using efficient method	Per cent of currently married women (15-49 years old) currently using efficient contraception (1984)

Figure 3: Path models for impact and efficiency studies



As expected, the proportion of the population which completed secondary education was directly and strongly influenced by the variable, per cent of urban population, (.61) and moderately negatively affected- by ethnic composition (-.24). The percentage of the population which completed secondary education had a very strong direct effect on non-agricultural activities (.64), while the percentage of urban population had a moderate effect (.20), which was consistent with expectations.

Ethnic composition moderately negatively influenced non-agricultural activities (-.20), which was expected as Malays are involved mainly in agricultural occupations. The indirect effects of urban population and ethnic composition on non-agricultural activities via secondary education were, respectively, .39 and -.15.

The indicator of modern development, i.e. television ownership, was strongly positively influenced by secondary education (.42), but strongly negatively influenced by ethnic composition (-.58).

The living/health conditions indicator, as represented by the infant mortality rate (IMR), was strongly inversely affected by television ownership (-.56), suggesting that better health and living conditions result in lower IMR. As expected, it was also moderately negatively influenced by secondary education (-.26), indicating that areas where people have a higher rate of completing secondary education would have lower IMR.

Contraceptive knowledge, as measured by the number of efficient contraceptive methods known, was affected directly and fairly strongly by television ownership and ethnic composition, although the former was positive (.44) while the latter was negative (-.34). IMR seems to have had a small negative relationship with contraceptive knowledge; the other important variable that had a reasonable indirect effect on contraceptive knowledge was secondary education (.23).

The most important determinant of contraceptive prevalence, as depicted by the proportion of currently married women who have ever practised efficient contraception, was contraceptive knowledge (.73), indicating the expected relationship, i.e. greater knowledge of efficient contraceptive methods results in greater contraceptive practice.

IMR seemed to correlate negatively with contraceptive practice, suggesting that better health and living conditions (i.e. lower IMR) leads to a higher level of contraceptive practice. However, an unexpected negative association between secondary education and contraceptive practice appeared (-.29), which could have occurred because the efficient contraceptives being made available by the family planning programme are used more readily in



*Trainees undergoing instruction in midwifery techniques will return to their provinces upon completion of the two-year course. Improved health care is one of the goals of the Malaysian Government.*

those areas where the people are not too highly educated, which also indicates that the programme is reaching the target clientele.

In the first phase, ethnic composition was found to be the strongest determinant of fertility in 1982. In the third phase, ethnic composition still appeared to have had the strongest influence on fertility, although the path coefficients were reduced slightly.

For women under 30 years of age, ethnic composition had a strongly positive effect (.33) on the total fertility rate (TFR < 30), consistent with the expectation that Malay TFR is higher than that of non-Malays (Khoo, 1984). Equally strong in its effect on TFR < 30 was the variable ever used efficient contraception, i.e. -.32. This is in accord with the family planning programme focus of encouraging more younger women at lower parity to practise more efficient methods of contraception.

Secondary education inversely affected TFR < 30, (-.25), indicating that people living in areas where there is better education have lower fertility. Contraceptive knowledge and modern development (i.e. television ownership) were the only variables that had a reasonable effect on fertility (-.23 and -.18, respectively). IMR had no direct effect on fertility, although its indirect effect via contraceptive use amounted to only .12, which is insignificantly small.

For older women (aged 30 years and over), TFR > 30 was strongly affected by ethnic composition, non-agricultural activities and secondary education. As expected, ethnic composition had the strongest direct effect (.76) on TFR >30, followed by non-agricultural activities (.42), unexpectedly suggesting that modern development encourages higher fertility among older women, after taking into account ethnicity, education and desired family size.

Desired family size showed some positive direct effect (.17) on fertility, indicating that larger desired family size results in higher fertility among older women.

### **Efficiency study**

In the efficiency model, family planning acceptance was the dependent variable and the past fertility level was an intermediate variable, whereas in the impact model the ordering between those two variables was reversed. The basic features of the two models are illustrated in [figure 3](#).

In the efficiency model, the dependent variable used was the proportion of currently married women who had ever used efficient methods of contraception. In order to avoid a time-lag problem in causal ordering, the 1982 total fertility rate was used as the fertility variable vis-&vis 1984 contraceptive knowledge and 1984 desired family size, based on the assumption that past fertility behaviour would predict better contraceptive knowledge, intended family size and contraceptive use.

The ultimate dependent variable, i.e. ever used efficient contraception, was directly affected by contraceptive knowledge (.62), secondary education (-.32), infant mortality rate (-.26) and total fertility rate (-.23).

Knowledge of efficient contraceptive methods had the strongest direct effect on contraceptive use, in accordance with the expected direction that districts where people have better contraceptive knowledge have higher contraceptive prevalence.

The next most important-variable, secondary education status, had a considerable negative direct influence on contraceptive practice, suggesting that districts where the education status is lower tend to have greater contraceptive use. This unexpected relationship is probably due to the fact that family planning programmes are increasingly being implemented in areas where education is not so widely available.

Past fertility and health/living conditions measured by IMR had a significant direct effect on contraceptive practice. This seems in agreement with the fact that districts where there is lower fertility or better child-spacing have higher contraceptive prevalence. Similarly, areas with a lower infant mortality rate (i.e. better health/living conditions) tend to have higher contraceptive use, even after controlling for other variables.

The two variables that had sizeable indirect effects on contraceptive prevalence were exposure to modernization and socio-economic development (i.e. television ownership) and ethnic composition. Socio-economic development had a reasonably large, positive, indirect effect on contraceptive prevalence (.48) via IMR and contraceptive knowledge. Ethnic composition had quite a large, negative, indirect effect on contraceptive prevalence (-.30) via past fertility, socio-economic development and contraceptive knowledge.

Unfortunately, desired family size does not seem to influence significantly contraceptive prevalence. Desired family size had only a marginally significant effect on current fertility for older women (.17). However, desired family size was influenced more strongly by the past fertility behaviour of 1982 (.42) but had no significant effect on current contraceptive prevalence, suggesting that intended family size does not seem to concord well with prevalence.

Family planning programme input/effort, past fertility behaviour, health/living conditions and educational status all have significant independent effects on contraceptive prevalence. When these four variables were held con-



*The availability of health services in a district helps to increase the practice of contraception in Malaysia.*

stant, only one of the socio-economic development indicators (modernization and development represented by television ownership) and one environmental variable (ethnic composition) had a reasonably large indirect effect on contraceptive practice.

In order to measure the areal variation among the subunits of the programme, an efficiency index was used based on the difference between the actually observed output of a district and the output expected on the basis of the estimation multiple regression equation where environmental and socio-economic development influences had been controlled. This index is deemed a better measure than the usual ratio measures such as productivity measures (couple years of protection (CYP), per man-hour or other inputs) and cost-effectiveness measures (cost per acceptor or per CYP etc.).

Using the multiple regression technique, the relationship between family planning acceptance and a number of indicators of socio-economic development, and other inputs can be estimated from the formula:

$$X = f(S_i, I_j, E_k),$$

Where X = the measure of the output of the family planning programme;

$S_i$  = socio-economic development indicators;

$I_j$  = inputs of the family planning programme; and

$E_k$  = environmental factors.

This estimation equation was used to calculate the expected level of contraceptive prevalence or use in a particular district; deviation from the observed output was taken as a measure of programme efficiency. This resulting measure, i.e. the efficiency index, is an improvement on the simple input-output ratio measure.

From the analysis, an estimation equation for observed contraceptive use/prevalence was formulated<sup>3/</sup>

A measure was also constructed for assessing the performance of each district net of socio-economic development indicators, environmental conditions, and family planning programme and development inputs<sup>4/</sup>

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3/ Estimation of observed contraceptive use/prevalence = 49.58159 - 1.024863 (secondary education completed (per cent) in 1980) - 0.0042506 (total fertility rate of women 15-49 years old in 1982) - 0.6998838 (infant mortality rate in 1980) + 9.387048 (No. of efficient contraceptive methods known in 1984).

4/ Efficiency index = Per cent of currently married women who have ever used efficient contraceptive method(s) in 1984 (minus) estimation of observed contraceptive use/prevalence (divided by) estimation of observed contraceptive use/prevalence.

A zero value implies that the observed output equalled expected output, i.e. the district or subprogramme performed as well as expected.

A high negative value indicates that the performance was far from desired, i.e. observed output was much lower than the expected/estimated output for the given socio-economic development indicators, family planning programme inputs and environmental conditions.

A high positive value suggests that the observed performance was beyond the expected or estimated one.

**Table 2** presents the observed acceptance rate, expected acceptance rate and efficiency rate, by State and district. The efficiency rate is ranked so as to indicate the relative performance of each district, based on the proposed equation or model.

It becomes easy, therefore, to identify the 10 best districts and the 10 worst districts in terms of their efficiency rating, for example. Such a ranking enables programme managers, administrators and evaluators to assess the performance of each subprogramme at the district level. It also enables them to play a more effective role in decision-making in the context of programme planning and operation, including resource allocation.

However, in evaluating the performance of each district, other factors, such as strength of the political system and governmental machinery, that are not available for inclusion in the study model, should be taken into consideration.

The omission of some of these other factors may explain why the amount of variance in contraceptive use/prevalence is low. The reliability of fertility and birth data at the district level should also be considered carefully in assessing performance, as incorrect areal classification could severely affect the efficiency rating. In some districts, misclassification of births by place or district of mother's residence and by place of occurrence (hospitals, health centres etc.) is possible.

### **Discussion of the findings**

The results of the analysis were found to be in the expected direction, if the weighting correction needed for different sizes of the unit of analysis (district) is ignored. The findings were also in accordance with those of individual or micro-level studies (Tan, 1981).

The inclusion of a set of family planning programme and development variables in the third phase of the study increased the predictive power of the impact model: the explained variance for total fertility rate of women under

**Table 2 : Acceptance rate, expected acceptance rate and efficiency rate by district**

State and district	Acceptance rate	Expected acceptance rate	Efficiency rate	Ranking
<b>Johore</b>				
Batu Pahat	43.3	51.4	-0.157	58
Johor Bahru	41.9	49.7	-0.036	41
Keluang	44.6	47.5	-0.062	46
Kota Tinggi	39.1	45.1	-0.133	52
Mersing	50.0	39.9	0.253	14
Muar	51.4	45.9	0.120	22
Pontian	53.1	51.5	0.031	30
Segamat	70.2	56.6	0.241	16
<b>Kedah</b>				
Baling	41.9	21.3	0.964	3
Bandar Baru	70.0	48.6	0.440	8
Kota Setar	50.7	45.8	0.106	24
Kuala Muda	42.6	41.6	0.024	31
Kubang Pasu	58.6	40.1	0.462	7
Kulim	40.0	42.1	-0.049	44
Langkawi	15.0	23.6	-0.365	72
Padang Terap	21.4	28.7	-0.255	66
Sik	18.2	19.2	-0.054	45
Yan	62.6	49.5	0.265	13
Pendang	31.5	35.8	0.049	28
<b>Kelantan</b>				
Bachok	16.7	12.8	0.309	10
Kota Bahru	22.8	24.8	-0.080	47
Machang	18.2	25.3	-0.280	68
Pasir Mas	2.4	0.6	3.354	1
Pasir Putih	5.0	18.0	-0.722	75
Tanah Merah	24.3	21.3	0.140	21
Tumpat	0.0	7.1	-1.000	77
Ulu Kelantan	0.0	2.0	-1.000	76
Kuala Krai	9.0	10.6	-0.148	56
<b>Melaka</b>				
Melaka Utara	40.9	42.1	-0.028	40
Melaka Selatan	16.7	44.1	-0.621	14
Melaka Tengah	59.6	53.6	0.112	23
<b>N. Sembilan</b>				
Jelevu	46.1	51.8	-0.099	50
Kuala Pilah	42.8	49.9	-0.142	53
P. Dickson	47.9	53.1	-0.097	49
Rembau	30.0	42.2	-0.288	69
Seremban	48.8	50.6	-0.036	42
Tampin	56.5	37.5	0.508	6
Jempol	42.8	51.6	-0.170	59
<b>Pahang</b>				
Bentong	55.5	55.2	0.006	33
C. Highland	40.0	39.8	0.005	34

**Table 2: (continued)**

<b>State and district</b>	<b>Acceptance rate</b>	<b>Expected acceptance rate</b>	<b>Efficiency rate</b>	<b>Ranking</b>
Jerantut	42.1	41.9	0.004	35
Kuantan	51.0	41.1	0.240	17
Kuala Liuis	45.0	39.3	0.146	20
Pekan	14.3	20.3	-0.296	70
Raub	44.4	41.0	0.083	27
Temerloh	46.9	47.0	0.002	38
Rompin	45.5	28.4	0.063	4
<b>P. Pinang</b>				
Daerah Tengah	53.2	62.1	-0.143	54
Daerah Utara	56.9	43.5	0.309	11
S. Perai Selatan	35.8	42.4	-0.155	57
Timur Laut	66.7	55.1	0.210	19
Barat Daya	33.3	42.1	-0.210	64
<b>Perak</b>				
Batang Padang	38.0	46.3	-0.179	61
Manjung (Dinding)	61.3	49.0	0.251	15
Kinta	52.2	50.3	0.038	29
Kerian	39.6	31.1	0.275	12
Kuala Kangsar	57.9	52.6	0.101	25
Larut Matang	35.2	40.2	-0.124	51
Hilir Perak	37.7	38.2	-0.013	39
Hulu Perak	0.0	30.6	-1.000	78
Perak Tengah	38.9	32.1	0.212	18
<b>Perlis</b>				
Perlis	51.0	37.8	0.348	9
<b>Selangor</b>				
Corn bak	36.5	42.7	-0.145	55
Kelang	47.3	47.4	-0.002	37
Kuala-Langat	42.3	53.1	-0.204	63
Kuala Selanaor	50.0	49.9	0.002	36
Petaling	51.2	50.0	0.024	32
Sabak Bernam	52.4	48.0	0.092	26
Sepang	44.4	55.0	-0.193	62
Hulu Langat	41.6	45.9	-0.094	48
Hulu Selangor	47.8	58.1	-0.178	60
<b>Trengganu</b>				
Besut	12.9	16.4	-0.214	65
Dungun	23.5	15.0	0.562	5
Kemaman	16.0	22.2	-0.279	67
Kuala Trengganu	7.4	18.6	-0.603	73
Marang	25.0	10.0	1.499	2
Hulu Trengganu	10.0	15.0	-0.335	71
<b>W. Persekutuan</b>				
W. Persekutuan	49.9	52.4	-0.048	43

*Note:* Because new districts were created in the early 1970s, the total number of districts in Peninsular Malaysia in 1980 was 78 compared with 72 in 1970, which created some problems with regard to time-trend analysis.



*For women over 30 years of age in Malaysia, ethnic composition is one of the major factors related to their fertility. (UNICEF photograph)*

30 years of age increased from 71 per cent (in the first phase) to 79 per cent. It also raised the explained variance of the efficiency model from 34 per cent to 70 per cent.

For women aged 30 years and over, their total fertility rate was affected directly by the ethnic composition variable (.76), secondary education status (-.45) and modern non-agricultural occupation (.42), among others.

The zero -order correlation between non-agricultural activities and  $TFR > 30$  was -.52. When controlled for other socio-economic development and environmental indicators, the non-agricultural activities had a positive direct effect on  $TFR > 30$ , which seems to contradict the expected conventional knowledge that modernization and development would lower fertility. However, the change of sign of the effects may be due to some time-lag problem; for example, older women (aged  $>30$ ) who had almost completed their child-bearing, progressed from agricultural occupations to more modern occupations, owing partly to their participation in modern activities resulting from their work experiences and the governmental developmental inputs in the traditional agricultural sector.

No direct effects were found to come from other socio-economic development indicators, once these factors were controlled. For the older women, this implies that ethnic, cultural, occupational and fertility intention factors seem to enhance fertility. While secondary educational status is the only factor that depressed fertility directly, urbanization did so indirectly.

As the fertility of older women declines with age, the family planning programme and the national development programme would not have a great effect on those in the older age group, although an increase in earlier education might help to curb their desire for larger family size which would; therefore, influence their fertility. Thus, their impact on fertility decline will not be as substantial as that of women in the younger age group (below age 30).

The three factors that have direct effects on the fertility of women below 30 years of age are ethnic composition (.33), contraceptive prevalence (-.32) and secondary education status (-.25). Other family planning programme variables (contraceptive knowledge) and socio-economic development indicators (exposure to modernization as measured by television ownership, and health/living conditions measured by IMR) affect fertility significantly but indirectly.

Thus, ethnic composition directly and infant mortality indirectly enhance fertility, while family planning programme factors (knowledge and prevalence) and socio-economic development factors (secondary education and exposure to modernization) seem to lower fertility significantly.<sup>5/</sup> Factors which depress fertility, therefore, seem to be somewhat easily manipulated, i.e. it is easier to design programmes to influence desired change in fertility behaviour.

In the efficiency model, the unexpected relationship of education and contraceptive use (higher educational status, lower contraceptive use) can be explained by the fact that in the 1980s family planning programme efforts were given priority in areas where there was less education available and this resulted in higher prevalence.

The efficiency index or rate, as listed in **table 2**, was based on the efficiency model, using four out of nine explanatory variables which were important in terms of theoretical and conceptual considerations as well as empirical experiences. They are statistically significant, explaining about 70 per cent of the variance in contraceptive prevalence.

Thus, the ranking of the districts helps programme managers to assess the relative performance of each district based on past fertility, socio-economic development indicators and family planning programme efforts. However, this methodology has the disadvantage of not being able to obtain a sufficiently large sample for some districts so as to estimate the observed con-

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<sup>5/</sup> It has been generally observed that couples who experience the loss of an infant eventually have more children than those who have not had such an experience. This relationship is much stronger in countries where the infant mortality levels are high. However, in countries such as Malaysia, where the infant mortality levels are generally low, this relationship is gradually weakening.

traceptive prevalence. Therefore, this shortcoming may tend to exaggerate estimates for those districts, especially for the ones ranked best and worst.

Multivariate areal analysis, although limited in several aspects, has a certain advantage in the assessment of the impact of family planning programmes, particularly when most of the family planning inputs are related and manipulated at the administrative areal unit or district. The inclusion of family planning programme variables can guide programme managers and administrators in the allocation of resources, including redeployment of field workers to areas where they can be most effective or efficient.

### **Recommendations**

The findings of this study lead to a number of important recommendations for policy and programme action and future research:

- There is a strong cultural/environmental factor affecting fertility. It is recommended that importance should be attached to decreasing traditional boundaries among social classes and promoting opportunities for social mobility. Social mobility is essential in the socio-economic development which will facilitate fertility change.
- Family planning programme efforts (clinics/service outlets, contraceptive information/education, personnel, resources) should be strengthened as they affect contraceptive prevalence and fertility significantly and directly.
- Formulating policy that improves health/living conditions and increases educational achievement will help to regulate fertility and improve family planning prevalence.
- In-depth case studies of the districts which are categorized by efficient or less efficient units should be undertaken on a regular basis to formulate hypotheses regarding the determinants of efficiency, which will include both programme-related variables and environmental and socio-economic development indicator variables.
- Efforts should be directed at developing simple statistical estimation procedures for multivariate areal analysis to overcome the unequal areal sizes, as ordinary least square regression analysis tends to bias estimates without appropriate weighting.
- The development of a better theory of fertility behaviour/contraceptive use at the areal and the individual levels, standardization of operational definitions/measurements and reduction of measurement errors as well as the improvement of estimating techniques will help to strengthen areal analysis.

- As fertility behaviour and contraceptive prevalence are influenced by individual characteristics and the socio-economic environment, multi-level analysis (or contextual analysis), which is a strategy for combining data from more than one level of observation in studying behaviour and prevalence change, is increasingly being applied. This type of analysis encourages closer collaboration and co-operation among policy makers, programme managers and researchers, as more interactions among them help to incorporate programme and community factors of policy relevance to analysis and promote greater utilization of research findings.
- Family planning programmes are being increasingly integrated with development programmes (such as maternal-child health, family development and parasite control). It is important that new techniques to measure and evaluate their impact and efficiency should be developed and utilized. This includes developing better theory to explain fertility and prevalence change, as well as better quality data and indicators of integrated programme inputs and costs, demand and quality of outputs so that policy and strategy can be better formulated, programmes better designed and implemented, targets better set and served – all ultimately to improve the quality of life of the population.

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### Correction

The authors of the article entitled "Socio-economic Development and Mortality Patterns and Trends in Malaysia", which was published in the March 1987 issue of the *Journal* (vol. 2, No.1), would like to make the following correction of footnote number 7 on page 12 of that issue:

Neonatal deaths are those that occur within 28 days of birth while post-neonatal deaths include those occurring between 28 days and one year of birth.

## Changing Age Structure

Two or three decades ago, when birth rates were high in most of the countries and areas of the Asian and Pacific region, the major emphasis of population policies was on reducing fertility. Government family planning programmes introduced in the 1950s and 1960s combined with sustained socio-economic development resulted in reduced birth rates. The crude birth rate for the region as a whole is estimated to have declined from 40 to 36 per thousand in the period 1970-1975 and to 27 per thousand in the period 1980-1985.

This rapid decline in fertility has made population policy formulation and the integration of population factors into development planning considerably more complex. The demonstration that government programmes could alter demographic trends meant that population could no longer be treated merely as an exogenous variable in development planning. In addition, continued fertility decline has resulted in large shifts in the age composition of national populations.

Owing to the implications that a changing age structure holds for development planning, this issue was highlighted in a note prepared by the ESCAP Population Division for consideration at the forty-third session of the Economic and Social Commission for Asia and the Pacific (ESCAP) held at Bangkok from 21 to 30 April 1987.

The combination of previously high fertility and declining mortality in the region, which particularly affected the survival rates of infants and



*The decline in fertility over the past two decades has resulted in a changing age structure that holds several implications for planners and policy makers. (UNFPA photograph by Mark Edwards)*

children, resulted in a small increase in the proportion of the population of the region below age 15, from 37 per cent in 1950 to 41 per cent in 1970; because of declining fertility, that percentage fell to 35 by 1985. The note pointed out that such changes must be taken into account in development planning, especially in the education and health sectors.

As a result of previously high fertility and more recent declines, the proportion of the population in working-age groups increased from 56 per cent in 1975 to 61 per cent in 1985 and is projected to reach 65 per cent by the turn of the century. Providing employment for the rapidly increasing population of labour-force age will be a major challenge for countries of the region over the next several decades.

In a few countries in Asia and the Pacific, birth and death rates were already low by 1960. These countries are currently confronting the issue of demographic aging, or a high proportion of their population in the older age groups, age 65 and above. As the rate of population growth *per se* decreases in importance as a planning goal, other aspects of population, such as its spatial distribution, take on greater significance.

The note also considered other implications related to changing patterns of the school-age population, the labour-force population, migration and urbanization, the role of women, health and mortality, and aging, among others.

A revised version of the secretariat's note will be published later this year as one of the numbers in ESCAP's *Population Research Leads* series.

# Census Data for Studying Elderly Populations \*

As fertility and population growth rates decline in the Asian and Pacific region, populations of the elderly (people age 65 years and older) are growing rapidly. Increasing attention is being devoted to the issue of aging, and censuses have a role to play in providing information to policy makers as they prepare to accommodate their aging populations.

**Table 1** provides three measures of aging for countries and areas of the region: the absolute number of elderly, the proportion of the population age 65 and over, and the annual growth rate of the elderly population. Although the emphasis of this paper is on census data, the table presents statistics for 1980 and 2000, as estimated by the United Nations, as a starting point of comparison. First, in 1980, the number of elderly were more or less equally divided between the more developed and the less developed countries of the world; however, in the future, the majority of the elderly will live in less developed countries, especially in Asia. By the year 2000, Asia will be home to 48 per cent of the world's elderly; the two largest elderly populations on Earth will be in China and India.

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\* The information contained herein is extracted and/or adapted from a paper by Linda G. Martin, Research Associate, East-West Population Institute, and Associate Professor of Economics, University of Hawaii. An earlier version of this paper was presented at the Eleventh Asian and Pacific Population Census Conference, sponsored by the East-West Population Institute and the Australian Bureau of Statistics in Sydney and Canberra, 9-13 February 1987.

**Table 1: Absolute numbers, population proportions and growth rates of the elderly population (65+ years)**

Region and country or area	1980		2000		Annual growth rate (per cent)
	Absolute number (thousands)	Population proportion (per cent)	Absolute number (thousands)	Population proportion (per cent)	
<b>World</b>	255 939	5.7	404 966	6.6	2.3
<b>Asia</b>	102 580	4.1	193 157	5.7	3.2
Bangladesh	3 008	3.4	4 154	2.8	1.6
China	47 009	4.1	85 932	6.8	3.0
Hong Kong	325	6.5	660	9.6	3.5
India	22 187	3.2	46 337	4.8	3.7
Indonesia	5 047	3.3	9 368	4.6	3.1
Japan	10 559	9.0	19 010	14.9	2.9
Malaysia	508	3.7	934	4.5	3.0
Nepal	439	3.0	797	3.5	3.0
Pakistan	2 482	2.8	4 241	3.0	2.7
Philippines	1 380	2.9	3 083	4.1	4.0
Republic of Korea	1496	3.9	3 238	6.5	3.9
Singapore	114	4.7	208	7.0	3.0
Sri Lanka	616	4.2	1 239	5.9	3.5
Thailand	1458	3.1	2 954	4.5	3.5
<b>Pacific</b>	1 825	7.9	2 757	9.1	2.1
Australia	1 369	9.3	2 051	11.0	2.0
Fiji	19	3.1	40	5.0	3.7
New Zealand	293	9.3	387	10.5	1.4
Papua New Guinea	104	3.2	196	3.7	3.2

Source: United Nations, *World Population Prospects: Estimates and Projections as Assessed in 1984*, Sales No. E.86.XIII.3 (New York, United Nations, 1986).

More significant for the individual countries and areas of the region, however, is the fact that most will come close to experiencing a doubling of their populations of elderly people in the 20-year period between 1980 and 2000. Although the proportions age 65 and over currently are not large (close to 10 per cent), except in Australia, Hong Kong, Japan and New Zealand, the absolute numbers are growing rapidly.

The annual growth rate of the elderly population over the 20-year period is projected to be as high as 3.7 per cent in India and Fiji, 3.9 per cent in the Republic of Korea and 4.0 per cent in the Philippines. Thus, to the extent that Governments choose to become involved in the lives of the elderly, they will have a growing clientele and must begin planning how to accommodate their increasing numbers. There are a variety of sources of data on the elderly, most importantly surveys,<sup>1/</sup> but censuses can provide significant information for that planning process.

### **Age detail in census publications and heterogeneity of the elderly<sup>2/</sup>**

**Table 2** provides information on the type of age detail available in the most recent round of censuses in the region. Except for Bangladesh, with counts to 70+ years, and Hong Kong, Indonesia, Pakistan and Papua New Guinea with counts to 75+ years, all the censuses listed provide counts of the population to fairly high ages (and to the exceptionally high age of 140+ years in the case of China). Because of the relatively low proportions of the population who are elderly in most of the afore-mentioned countries and areas, the age detail is adequate; however, in the case of Hong Kong, with its larger proportion of elderly and its fairly high expectation of life (approximately 75 years), more age detail might be useful. The table indicates the age detail for simple population counts only; for other published tables, e.g., marital status and economic activity, the amount of age detail is often limited.

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1/ The World Health Organization recently funded surveys of the elderly in Fiji, Malaysia, the Philippines and the Republic of Korea. Australia funded surveys of the elderly in the countries of the Association of South-East Asian Nations (ASEAN). There have been numerous other recent surveys of the elderly in individual countries throughout the region, including related work undertaken by ESCAP and the United Nations University.

2/ The comments here are in reference to the publications of the 1980-round of censuses that are currently available in the library of the East-West Population Institute (see list on pages 81-82 for the documents used). Although the collection is substantial, it is not necessarily complete, thus some limitations of census data indicated here may be due to the limitations of the collection. Furthermore, for countries that conducted mid-decade censuses, the results of which were not available at the time of writing, some of the remarks made here may no longer apply.

**Table 2 : Age detail in population counts**

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<b>Asia</b>	
Bangladesh (1981)	Single years to 70+
China (1982)	Single years to 140+
Hong Kong (1981)	Single years to 75+
India (1981)	Single years to 100+
Indonesia (1980)	Single years to 75+
Japan (1980)	Single years to 100+
Malaysia (1980)	Single years to 99+
Nepal (1981)	Single years to 99+
Pakistan (1981)	Single years to 75+
Philippines (1980)	Single years to 100+
Republic of Korea (1980)	Single years to 85+
Singapore (1980)	Single years to 98+
Sri Lanka (1981)	Single years to 110
Thailand (1980)	Single years to 98+
<b>Pacific</b>	
Australia (1981)	Single years to 100+
Fiji (1976)	Single years to 95+
New Zealand (1981)	Single years to 118
Papua New Guinea (1980)	Single years to 75+

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*Sources:* National censuses for the years indicated.

*Note:* See pages 81-82 for the complete list of sources.

One myth that should be dispelled is that the elderly comprise a homogeneous group. In the past, much has been made of distinguishing between the so-called "young-old" (65 to 74 years) and the "old-old" (75+ years), but recently, in many discussions about the elderly, the number of categories has been expanded to three: the young-old (65 to 74 years), the middle-old (75 to 84 years), and the old-old (85+ years). Increased detail is necessary, as more and more people in their sixties and seventies remain healthy and active, and hardly seem "old."

For many of the more developed countries, it is the 85-year-old-and-above group that is growing most rapidly, so it is critical to understand how it differs from the other groups, rather than stereotyping the elderly by assuming that they are all alike, physically, socially, economically and politically. Binstock (1983) described the swing in public opinion from the 1970s, when the elderly were perceived as poor, frail, politically powerless and victimized

by mandatory retirement and a youth-oriented society, to the 1980s, when they are viewed as relatively well-off and politically powerful.

Among stereotypes about the elderly in the Asian and Pacific region, one that is frequently mentioned is the enormous respect that the elderly are given and how Asian families, in particular, would not dream of abandoning their elderly family members as Western families are perceived to do. Yet values and behaviour are changing in the region. Social changes such as migration, urbanization and increased female labour-force participation mean that different generations of a family may live in different places,, that they may live in places where there is no housing to accommodate a multi-generational family, or that traditional caretakers (women) are working outside the home.

### Marital status and living arrangements

**Table 3** indicates the amount of older-age detail available on marital status in the 1980-round of censuses. Except for Japan and the Republic of

**Table 3 : Age detail on marital status**

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<b>Asia</b>	
Bangladesh	5-year groups to 60+
China	50-59,60-79,80+
Hong Kong	5-year groups to 65+
India	5-year groups to 70+
Indonesia	5-year groups to 75+
Japan	Single years to 85+
Malaysia	5-year groups to 65+
Nepal	5-year groups to 65+
Pakistan	5-year groups to 60+
Philippines	5-year groups to 75+
Republic of Korea	Single years to 59,5-year groups to 85+
Singapore	5-year groups to 80+
Sri Lanka	5-year groups to 75+
Thailand	5-year groups to 70+
<b>Pacific</b>	
Australia	5-year groups to 65+
Fiji	5-year groups to 75+
New Zealand	5-year groups to 75+
Papua New Guinea	Not available

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*Sources:* See pages 81-82.

**Table 4: Proportions of males and females 60+ years, by marital status**

	Females			Males		
	Single	Married	Widowed Divorced	Single	Married	Widowed Divorced
<b>Asia</b>						
Bangladesh	.005	.329	.664	.007	.907	.085
China	.003	.412	.581	.025	.690	.270
Hong Kong	.066	.430	.494	.040	.828	.124
India	.004	.348	.644	.020	.781	.194
Indonesia	.010	.310	.624	.008	.852	.122
Japan	.016	.436	.514	.009	.842	.133
Malaysia	.021	.371	.539	.035	.799	.140
Nepal	.062	.610	.321	.078	.808	.109
Pakistan	.026	.496	.475	.026	.855	.117
Philippines	.079	.503	.405	.030	.807	.153
Republic of Korea	.001	.316	.680	.002	.847	.148
Singapore	.050	.372	.568	.046	.798	.145
Sri Lanka	.047	.508	.441	.066	.811	.117
Thailand	.021	.406	.515	.015	.757	.167
<b>Pacific</b>						
Australia	.074	.449	.433	.074	.749	.123
Fiji	.038	.377	.529	.033	.757	.160
New Zealand	.079	.462	.416	.066	.759	.125
Papua New Guinea	Not available					

Sources: See pages 81-82.

Korea, data are published using five-year groups rather than single-year groups, which does not result in too great a loss of detail for most purposes.

More significant though is the lumping together of the very highest age groups. Except for Indonesia and the Republic of Korea, all the censuses lower the last age for which they provide detail in their published tabulations of marital status data in comparison to tabulations of population counts (compare tables 2 and 3). Bangladesh and Pakistan provide information on marital status by five-year groups only to age 60, and four countries or areas – Australia, Hong Kong, Malaysia and Nepal - stop at age 65. China provides data using the age groupings 50-59 years, 60-79 years and 80+ years. Japan, the Republic of Korea and Singapore are notable for providing data on marital status into the age groups of 80-year-olds. Once again, the amount of detail that is appropriate for a particular country or area is best reflected in the degree of population aging that is taking place.

One important aspect of heterogeneity of the elderly is apparent when the actual data on marital status are examined. For the sake of comparison, the proportions of females and males in each country or area aged 60 years and above who are single, married, widowed and divorced or separated are shown in table 4. In all countries and areas, older men are much more likely to be married than older women, and conversely, older women are much more likely to have lost their spouses through death than older men. The proportion of women 60 years and over who are married range from .310 in Indonesia to .610 in Nepal; for men, the range is from .690 in China to .907 in Bangladesh. Differences in marital status across countries and areas are affected by the extent to which women marry men who are older, by mortality in general and by sex differentials in mortality in particular, by divorce and by remarriage after the loss of a spouse either through death or divorce.

Although marital status provides some indication of family relations, of greater concern to policy makers is the extent to which the generations live together. Censuses potentially are a rich source of data on living arrangements; however, except for Japan, that potential is not being realized. The available census publications of China, Fiji, India, Nepal, Pakistan, Papua New Guinea, Philippines and Sri Lanka provide either no information on living arrangements or no older-age detail on the arrangements. The most common item of information for the others is “age of household head”, which is sometimes cross-tabulated with other information on the household, as indicated below:

Australia: Five-year age groups to 65+ years by family type  
(number of adults and number of dependents).

Hong Kong:	Five-year age groups to 65+ years by household size. Ten-year age groups to 60+ years by type of living quarters.
Malaysia:	Five-year age groups to 65+ years.
New Zealand:	45-59,60+ years by household size. 45-59, 60+ years by number of income earners. 45-59, 60+ years by household type (one family only, one family plus other persons, two families, three or more families, non-family households, one-person households).
Republic of Korea:	Five-year age groups to 60+ years by type of living quarters.
Singapore:	Ten-year age groups to 70+ years by household size. Ten-year age groups to 70+ years by household type (one-person, no family nucleus, married couple with parent, other family nucleus, parents and children couples, other two-family nuclei, more than two family nuclei). Ten-year age groups to 70+ years by type of living quarters.
Thailand:	Five-year age groups to 70+ years by household type [unrelated individuals, nuclear, vertical (stem), horizontal (joint), vertical and horizontal (stem-joint)] .

While such tabulations are a step in the right direction, an elderly person may not necessarily be listed as the household head; information on a household with an elderly person may be contained in the group of households with heads aged 40- 45 years, for example.

Other helpful types of information on the living arrangements of the elderly contained in censuses include, in Hong Kong, the number of people living alone by 10-year age groups to 60+ years and the number of households with a member aged 60 and over by the number of elderly members, household size and household composition (single, one nuclear, vertically or horizontally extended nuclear, more than one nuclear, related but not nuclear, or unrelated). Indonesia tabulates relations to household head by five-year age groups to 75+ years, and the Republic of Korea publishes data on households by the number of generations living in them and household size, but with no

age details. Bangladesh, Hong Kong and Singapore publish tabulations of the numbers of individuals living in institutions by five-year groups to 70+ years, by 10-year groups to 60+ years, and by five-year groups to 80+ years, respectively .

The different types of tabulations of living arrangements found in Japanese census publications are too numerous to describe in full here. Examples are headship by single years of age to 85+ years; headship by five-year groups to 85+ years by household size and by family type (16 groups);<sup>3/</sup> number living alone, number living in households with unrelated members and number living in institutions by single years to age 85+; number of households with members over age 65; and aged-couple households and one aged-person households by source of household income, by labour force status, and by type and size of residence.

Of particular interest, however, are tabulations by five-year groups to 85+ years of individuals by their relationship to the household head (as in Indonesia) and by family type. These last two tabulations provide valuable information on the living arrangements of the elderly and their roles in households. For example, in Japan the proportion of those 65 years and older living with their children declined from 76.9 per cent in 1970 to 68.7 per cent in 1980. The proportion living with a spouse only increased from 12.1 to 18.9 per cent, and the percentage living alone increased from 5.5 to 8.2 per cent.

Thus, in just 10 years, there has been a significant change in the extent to which the generations live together in Japan, and the censuses quite valuably document that change.

Of course, children and other family members may help to support the elderly even if they are not living together, but information on living arrangements, especially over time, provides one indication of how attitudes and behaviour may be changing.

It is important for Governments to ascertain the extent to which some elderly may need public assistance of one kind or another should they be left on their own. However, many of the elderly today can take care of themselves and maintain active, productive lives.

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3/ The family types used in the 1980 Japanese census publications are married couple only; married couple with children; father with children; mother with children; a couple with parents; a couple with a parent; a couple with children and parents; a couple with children and a parent; a couple with other relatives; a couple with children and relatives other than parents; a couple with parents and relatives other than children; a couple with children, parents and other relatives; brothers or sisters only; other relatives; non-relatives; and one-person households.

**Table 5: Age details on labour force participation**

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<b>Asia</b>	
Bangladesh	Five-year age groups to 65+ years by urban/rural
China	Five-year age groups to 60-64 years
Hong Kong	Five-year age groups to 65+ years
India	50-59 years, 60+ years by urban/rural
Indonesia	Five-year age groups to 65+ years by urban/rural
Japan	Five-year age groups to 85+ years by geographical area
Malaysia	Five-year age groups to 65+ years by urban/rural
Nepal	Five-year age groups to 65+ years by geographical area
Pakistan	Five-year age groups to 60+ years by urban/rural
Philippines	Not available
Republic of Korea	Five-year age groups to 70+ years by geographical area
Singapore	Five-year age groups to 65+ years
Sri Lanka	Five-year age groups to 75+ years by urban/rural
Thailand	Five-year age groups to 65+ years by geographical area
<b>Pacific</b>	
Australia	Five-year age groups to 65+ years by geographical area
Fiji	50-59years,60+years
New Zealand	Five-year age groups to 75+ years by geographical area
Papua New Guinea	Five-year age groups to 65+ years by geographical area

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*Source:* See pages 81- 82.

### **Economic activity**

As shown in **table 5**, most of the censuses provide information on labour force participation to ages 60 or 65 and above. In all cases, the data are also disaggregated by sex, and in most cases, details on labour force participation for either urban/rural or other geographical areas are given. Several countries or areas also provide cross-tabulations of other variables by age-specific data on labour force participation. For example, cross-tabulations by education or literacy are provided for Fiji, India and Pakistan; by marital status, for Japan (females only), New Zealand, Singapore, Sri Lanka and Thailand; and by ethnicity or overseas-birth, for Australia, Fiji, Malaysia and Singapore. Several countries also provide very useful data on unemployment by age group.

Because of the variety of definitions used in calculating labour force participation in the different countries, no actual data are presented here, since the comparisons would be meaningless. However, older men are reported to work more than older women, and labour force participation at older ages tends to be higher in rural areas than in urban areas.

Such information is of value in assessing the productivity of the elderly, in understanding their economic situation and in measuring their response to pension programmes. Where it is government policy to encourage the employ-

ment of the elderly, as in Japan, it is also valuable to have data on the occupations of the elderly. For example, in Japan, between the censuses of 1950 and 1980, there was a significant decline in the employment of older persons in agriculture and an increase in their employment in wholesale and retail trade and services, although agriculture remains the largest employer of the elderly (Martin and Ogawa, 1983).

Although labour force surveys are useful in collecting such data, if survey data are not available, censuses can help to fill the information gap. In the 1980-round of censuses, age-specific employment data by industry were published by all countries except Indonesia and the Philippines. (For Malaysia, data for Peninsular Malaysia only were found.) Data on occupation are generally available, except for Bangladesh, India, Indonesia, Malaysia, Papua New Guinea and the Philippines.

One final source of information on the economic activity and status of the elderly are census questions on income. Although such data might be collected in Income and expenditure surveys, census data can be very valuable. In the 1980-round of censuses, Australia, Hong Kong and Singapore produced data on income by age, although for Hong Kong, the tabulations present income only from the main employment of the individual and do not include income from other sources. Japan published information on living arrangements by source of household income, but no amounts are given. The New Zealand census publications provide the greatest wealth of information on this topic with tabulations on income ranges by employment status and age as well as details on type and amount of social security benefits.

### **Conclusion**

While the focus of this paper has been on data concerning population counts, marital status and living arrangements, and economic activity, censuses also can be used to provide data on a variety of other topics, which cannot be detailed here for lack of space. However, some examples would be educational attainment or literacy of the elderly population. All but Hong Kong, India, Pakistan, the Philippines and Thailand provide age detail on ethnic groups, foreign-born populations, or languages spoken at home. There is also a variety of age-detail available by geographic area. Such information is useful to planners of programmes for the elderly if the concentration of the elderly varies by area or if the needs of one educational or ethnic group are greater than those of another. Also of particular interest in assessing the health and quality of daily life of the elderly are the additional tabulations on disability or illness in the census publications of Fiji, Indonesia, Nepal and Pakistan.

Census offices receive requests for data from a variety of constituencies, only one of which is composed of scholars and policy makers concerned with

the elderly. There are, of course, limits to the number of questions that can be asked and to the amount of detail that can be provided in published tabulations. Besides time and financial constraints, the amount of detail on the elderly may be limited by small numbers when working with sample data from censuses. Nevertheless, more information will be needed on the elderly in the future and much of it can be made available simply by increasing the amount of detail, by age, in published tabulations.

One of the major policy questions facing Governments with aging populations concerns the Government's role versus that of the family. Thus, it is imperative that better information be obtained on living arrangements and support from family members, as well as the extent to which the elderly can work and care for themselves.

A related critical issue is the question of how needy are the elderly. The elderly are a heterogeneous group of people in different situations and with different needs. It has been argued elsewhere (Martin, 1987) that in the long run, as populations age, age-based public programmes will place an unbearable burden on the younger generation.

A first step in addressing such policy questions is obtaining information on who is truly in need and to what degree families can be relied upon to help those who cannot help themselves. Certainly censuses are not the only sources, but they can provide a regular, reliable flow of data and information that will form the foundation for designing programmes for the expanding elderly populations of Asia and the Pacific.

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