

Is Development Really the Best Contraceptive?: A 20-Year Trial in Comilla District, Bangladesh

Attempting to have an effect on development through family planning seems a better strategy in Bangladesh than doing it the other way around

By Barkat-E-Khuda, Sarah F. Harbison and Warren C. Robinson*

The present generally accepted theoretical approach to understanding fertility sees population and development as mutually interacting; that is, fertility affects development and development affects fertility as well. The effect of high fertility and rapid population growth on development goals has been well-

* The authors of this article are Barkat-E-Khuda, Professor of Economics, University of Dhaka; Sarah F. Harbison, Associate, The Population Council; and Warren C. Robinson, Visiting Professor, University of Nairobi.

understood since Coale and Hoover's pioneering effort in 1958, but the notion that development programmes, other than family planning programmes as such, affect fertility is a somewhat newer and more novel idea.¹

As a logical proposition, the interactive relationship described here seems undeniable, yet the search for the precise nature and strength of the linkages is a tortuous one. Berelson suggested "thresholds" or levels of various indices of socio-economic development at which fertility could be expected to decline based on the experience of countries already well into the transition.² The Smithsonian group carried this a step further and calculated elasticities such that the effect of, say, a one per cent change in income could be predicted as a proportionate change in fertility.³

In the most ambitious effort to date, a United Nations report has suggested a very comprehensive matrix framework for analyzing 10 population variables, including fertility; 15 development indicator variables (per capita income etc.); 14 economic variables (capital stock etc.); 15 socio-cultural and exogenous variables (group structure etc.); and seven instrument variables (family planning programmes etc.).⁴ Several volumes of case studies have also been produced.⁵ Simmons has also examined this issue at length in several papers.⁶

This article examines the impact of a major development project on contraceptive practices and fertility in a selected group of villages in Comilla district of Bangladesh.⁷ It is well-known that Bangladesh, already a poor country, is faced with rapid population growth and declining resource availability. Efforts to reduce fertility have been under way for the entire lifetime of the country. Public policy is now exploring the use of "beyond family planning" measures in addition to contraceptive distribution programmes.

The present article examines which public programmes and which socio-economic development indicators have an impact on the factors related to population growth. This research, undertaken in 1985, replicates a similar knowledge, attitudes and practice (KAP) study undertaken in these same villages some 20 years earlier, in 1967/68.⁸ We are thus able to analyze with some specificity the changes which have occurred in fertility, family planning practice, and infant and child mortality during this period of time. Comilla district has been the scene of intense rural development programmes during this same period. Thus, the two studies provide a unique look at demographic behavioural characteristics when these agricultural development programmes were in an early stage and then 20 years later.

The research hypothesis is that rural-agricultural-technological change will trigger changes in demographic values, attitudes and behaviour such that contraceptive prevalence will rise and fertility will fall. It should be noted

here that although the original programme included a substantial family planning effort, this component very early was reduced to a rather narrow contraceptives distribution effort. Thus it can reasonably be hypothesized that any attitudinal or behavioural changes related to contraception and fertility are the result of all the other aspects of the programme.

The BARD Programme

The Academy for Rural Development (ARD, later “BARD” for Bangladesh Academy for Rural Development) began work in 1959 in Comilla. It was a pioneering effort to create a viable community-based agricultural development programme through the provision of key inputs, such as new high-yielding varieties, fertilizer, irrigation, and technical and organizational assistance in creating local co-operatives and village associations to manage and sustain such efforts.⁹

An integrated, comprehensive approach was followed and agricultural extension, rural education, women’s programmes, family planning and rural infrastructure development projects were all launched by BARD. The BARD Programme was aimed at obtaining full community participation and full community benefit. The planned components of the programme were the following:

The Co-operative Project

Starting in 1960, the BARD faculty encouraged the formation of voluntary credit co-operatives at the village level, aimed particularly at the small- and medium-scale farmers. As the co-operatives evolved over time, they provided not only credit, but also a mechanism for better distribution of supplies and new technology. They also promoted greater acceptance of extension training. These co-operatives were run by the villagers themselves, with an elected chairman (usually an older person) and an “organizer” (later known as “manager”, who usually was a younger person).

The Rural Works Programme and the Thana Irrigation Programme

The rural works programme was started in 1961 in recognition of the rural people’s need for outside resources for flood control and road building. Flood control would reduce risks in agricultural innovations and lending. Roads would enable farmers to take surplus produce to market. These projects, designed at the union level and co-ordinated by the Thana Council, employed local people who worked under the supervision of union and council members, with some direction and training from BARD. Eventually, the programme expanded from simple road and drainage projects to a more complex irrigation and electrification system. (A *thana* and *upazila* are terms for “subdistrict.”)

Rural education

The BARD-administered rural education programme was designed to raise literacy and to make education more practical and useful in the lives of the villagers. Teachers were provided training to help school children with projects leading to improved practices for the home or farm. Village *imams* (Muslim religious leaders) were trained so that they could teach co-operative members and run “feeder schools” for members’ children. Some village women were trained to teach literacy courses.

Women’s Programmes

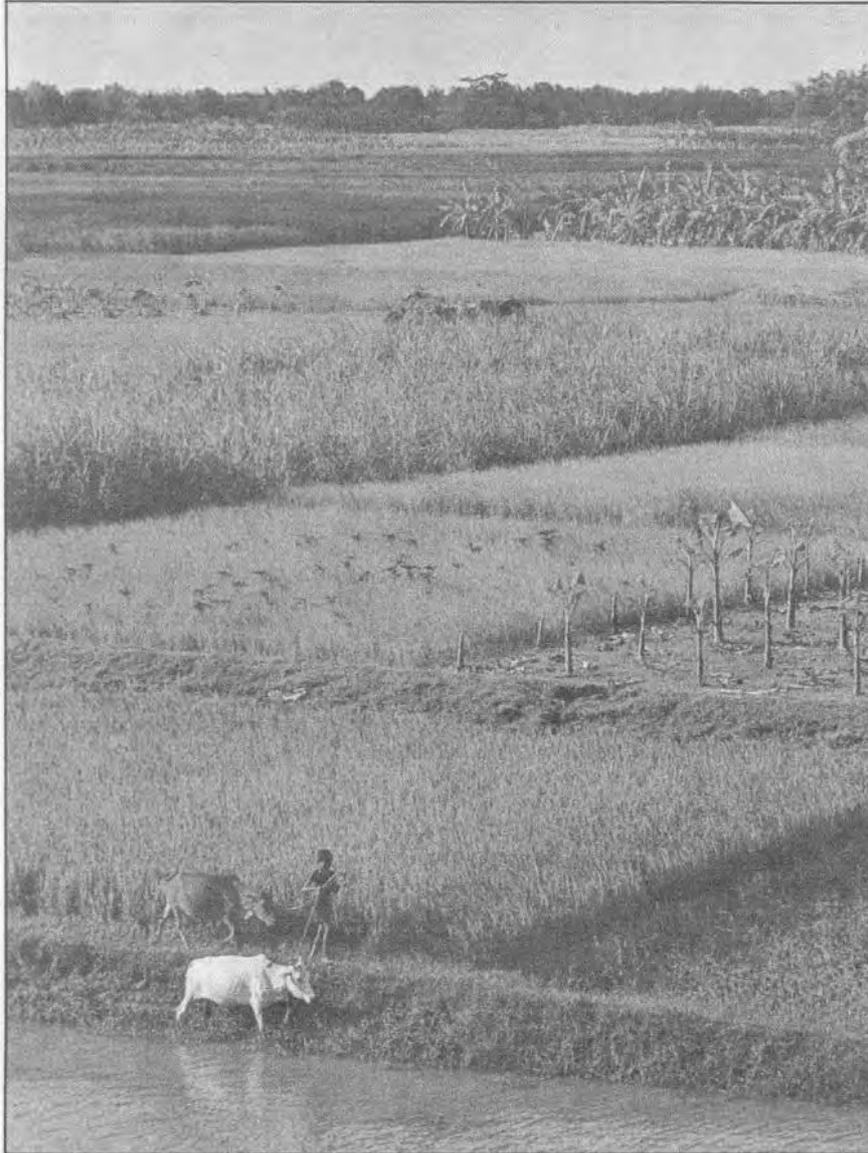
Women were to be trained in home management, modern health practices, vegetable gardening, cottage crafts, basic education and family planning. From 1962, village women were encouraged to elect an organizer, who received training at BARD and then disseminated this information to other women. They were encouraged to join co-operatives, and take out loans for the expansion of productive activities, such as vegetable gardening, poultry and weaving. BARD also trained village midwives.

Family planning

This programme, administered by the BARD faculty and the *Thana* Family Planning Officer, promoted non-clinical distribution of contraceptives. Women organizers who received training at BARD shared this knowledge with others, as well as distributing supplies. Shopkeepers and others became commercial distributors of contraceptives. Efforts were also made to publicize and motivate people to practise contraception,

The BARD impact

The BARD Programme was undoubtedly successful in raising agricultural output. Rice production in the municipal area of Comilla *thana* rose by nearly 5.0 per cent per year on average between 1960 and 1980, more than twice the national average, or Comilla district average growth rates. Much of this increase seems to have come from an increasing use of new high-yielding variety (HYV) rice or irrigated land grown in the *aman* (dry season) crop period. One study showed that per family farm income in Comilla *thana* increased by 210 per cent in the decade of the 1960s compared with 100 per cent in neighbouring *thanas*. Other indicators tell a similar story. BARD seems to have succeeded in achieving significant increases in total (and average) agricultural output in the area. The specific institutional goals also seem to have been achieved. Co-operatives and women’s groups were formed and held meetings; training occurred for village leaders, local school teachers, *imams* and family planning workers; and public



The Bangladesh Academy for Rural Development Programme was successful in raising agricultural production. However, its effect on bringing about a decline in fertility is not so clear. (Photo courtesy of the Bangladesh Agricultural Research Council)

works were launched. Although contraceptives were distributed, family planning was dropped as a programme thrust in 1988, about the time management of the activities were taken over by the local group.

The programme came under criticism since, in its understandable desire to move quickly, it frequently worked through the existing village-level socio-political power structure in the formation of the co-operatives, councils and women's groups. Such steps made the introduction of the new HYV rice strains, chemical fertilizer, electrification, tube wells for better irrigation and improved roads fairly easy. However, the control of the location of and access to these development inputs by the local power elite tended to limit the dispersion of the actual benefits of such programmes among the population as a whole.

The BARD activities came to cover all of the municipal area of Comilla thana, an area of 107 square miles, containing 246 villages. **BARD's** first director, Dr. Akhter Hameed Khan, was a particularly dynamic charismatic leader and the programme flourished in the 1960s. The programme was judged to be such a success that the model was adopted for the nationwide Integrated Rural Development Programme (IRDP) begun in 1971.¹⁰

The BARD programmes area, like all of Bangladesh, suffered from the disruptions, violence and destruction which accompanied the independence struggle in 1971 and thereafter. The administrative and political turmoil persisted into the late 1970s and the BARD programmes lost momentum and confidence. They continue today but many of the original activities have dropped by the wayside. The IRDP effort to replicate the BARD programme on a national level has never been judged successful, yet it continues to limp along.

In all fairness, it is difficult to judge the "what-might-have-been" had there been no civil war in 1971 nor subsequent events. It is possible that the programme could have gone on to modify the local power structure and obtain a more equitable distribution of benefits. But it did not achieve that and has not yet done so.

The Surveys

The Stoeckel-Chaudhry 1967 Survey

The Stoeckel-Chaudhry study was typical of the early generation of RAP surveys undertaken when publicly sponsored family planning programmes were gaining general acceptance in the countries of South and Southeast Asia. It focused on a straight-forward statistical description of a limited number of variables. The results were persuasive and influential in the context of the need for quantitative evaluation of the family planning programmes.

The survey collected data on fertility, infant mortality, knowledge, attitudes and practice of family planning, validity of responses to the questionnaire, socioeconomic factors related to KAP, and norms about family size. Interviews were conducted with 1,600 currently married women in 20 villages in the municipal area of Comilla *thana*.¹¹

The 1985 Survey

In 1985, the same villages used in the 1967 survey were revisited using a modification of the original questionnaire. The fieldwork was carried out during February and April 1985 in the following stages: (a) village household census, (b) wives' and husbands' questionnaires, and (c) collection of community-level data and historical information related to various aspects of village development. The household census covered all households in each of the 20 villages. The basic purpose of the household census was to obtain a count of the village population as well as the necessary information to draw the sample for the second stage of the fieldwork.

In the second stage, a sample of currently married couples was selected. Stoeckel and Chaudhry listed all currently married females in each village and then randomly selected 80 currently married females from each village. The 1985 study followed the same procedure. Unlike in the original study, however, in the present study the husbands of these women were interviewed. In other words, 80 currently married couples from each village, i.e. 1,600 currently married couples from the 20 villages, were interviewed in the present study.

The wives' questionnaire consisted of five sections: (a) background characteristics of the respondents, (b) age at marriage and attitudes towards age at marriage, (c) knowledge of, attitude towards and practice of family planning, (d) cumulative and current fertility and mortality, and (e) attitudinal questions relating to the ideal number of children and the costs and benefits of children. The husbands' questionnaire consisted of four sections: (a) background characteristics of the respondents, (b) household characteristics such as land-holding, income and assets, (c) knowledge of, attitude towards, and practice of family planning, and (d) attitudinal questions relating to the ideal number of children and the costs and benefits of children. The study also collected detailed data on community variables and historical information on various aspects of village development.¹²

Major changes, 1967-1985

The general picture of the demographic situation in Comilla which emerged in 1967 was optimistic or pessimistic depending upon the emphasis one chose to put on various findings. The total fertility rate (TFR) was 6.2,



In the 1960s, Bangladeshi women were characterized by relatively high fertility and low contraceptive use rates. (United Nations Photograph)

but it did appear to have fallen from previous rates as high as 8.0. The infant mortality rate was 139.0 per thousand live births but this was still some 20 per cent lower than a decade earlier. Forty-nine per cent of the women interviewed had heard of family planning and 70 per cent of these respondents (or 35 per cent of the total sample) could list two or more methods of birth limitation (chiefly condoms and forms of sterilization).

About 47 per cent indicated approval of family planning but only 7.4 per cent had ever used any method to prevent births and only 4.1 per cent reported that they were currently practising family planning. Stoeckel and Chaudhry adjusted this 4.1 upwards to 6.1 per cent on the basis of a post-enumeration quality check which showed that there had been roughly a one-third under-reporting of current use by the respondents. They did not adjust upwards the "ever-use" rate, but one presumes this should also have been adjusted upwards to about 10 per cent. The quality check also found an 8 per cent under-reporting of "knowledge" of family planning.

Nearly 60 per cent of the women reported that they wanted an additional child, roughly the same percentage which reported a current family size of three or fewer children. The mean desired family size was 3.8, well under the TFR implied by the current age-specific fertility rates, but above the present mean attained fertility level (the mean age of the women in the sample was about 25 years).

Three indicators of socio-economic status (SES) (husband's education, husband's occupation and land-holding) were also examined to determine if they explained any variation in the reported fertility levels. In general, these SES variables did not explain much. Only when relatively high levels of income were reached did a negative effect on fertility appear; larger land-holding was positively related to fertility and to desired family size, and negatively related to knowledge of, and attitudes towards family planning. However, the respondents in the highest status group, "business and skilled", had consistently higher proportions with knowledge of, favourable attitudes towards and practice of family planning than the other occupational groups.

The only consistent differential revealed was one along religious lines; the Hindu component of the population consistently showed lower fertility and higher contraceptive use rates as well as lower desired family size than the rest of the population. Stoeckel and Chaudhry state that:

The religious differential in family planning knowledge and attitude persisted while controlling (for) social and demographic factors. However, the differential for practice of family planning was not maintained consistently. Muslims and Hindus who are childless, delay marriage until after 15 years of age, are highly educated and members of co-operative societies, show little or no difference in their proportions practicing family planning.¹³

Thus, the picture which emerged in 1967 was of relatively uniformly high fertility and low contraceptive use rates, coupled with high infant mortality and generally large desired family size by most women. However, knowledge and approval of family planning had reached about half the women and perhaps as many as 10 per cent had used some method. The desired family size was on average well below that implied by the then-current natural fertility regime and perhaps this can be taken as the beginning of an attitudinal change. There was, moreover, a clear indication that a modest decline in both fertility and infant mortality had already begun at the time of the survey, even before the programmes sponsored by the Academy had been launched.

The 1985 data indicate that the trends perceived in 1967 had continued. Knowledge of family planning had become almost universal (98 per cent) among village women, and most (8.5 per cent) could name methods; 65 per cent of the women (and 62 per cent of their husbands) approved of family planning; 24 per cent of the women reported current use of contraceptives and 36 per cent reported ever-use of any method. Modern methods accounted for the bulk of both current and ever-use, 22 per cent and 32 per cent, respectively. The total fertility rate, derived from the reported number of births by age of women, was 5.9 and the infant mortality rate 125 per thousand live-births, Thirty-two

per cent of the female respondents indicated a desire for more children. The ideal number of children reported was 3.8, slightly above the mean attained fertility but, as in 1967, well below the current TFR, or the children-ever-born to women completing child-bearing,

Significant relationships were found between the fertility/family planning variables and some of the SES characteristics of the households in 1985. Ever-use and current-use of contraceptives were positively related to education of the woman, even after age was controlled for. A similar relationship was found with education of the husband. Current and ever-use was also positively related to availability of electricity in the household, a variable which may stand for income (since better off households are more likely to have electricity), but also for changing household technologies, attributes and aspirations,

A clear negative relationship was found between female education and fertility, even after controlling for age. Those with no education have on average, one more child than those with primary school education, 1.5 more children than those with secondary school education and 1.7 more than those with post-secondary school education. Land-holding shows a weak U-shaped relationship with fertility. Children-ever-born rises with size of holding at the lower end of the size of holding but falls at the upper end. This suggests a positive but limited wealth effect,

Demographically, the 1967 and 1985 samples were similar. The mean age of the women in 1967 was 25 years and in 1985 it was only slightly lower. Between 1967 and 1985, age at first marriage rose by about six months (i.e. from 14.7 to 15.3 years), well within possible sampling variation. Marriage was nearly universal for women aged 20 to 40 years in both 1967 and 1985. Thus, in terms of the purely demographic factors there seems no reason to doubt that the two samples are comparable.¹⁴

The [table](#) on page 13 presents some key indicators for the 20 villages in the Stoeckel-Chaudhry 1966/67 study and in the present 1985 study. For comparison, we also show estimates of the national averages for the same indicators.

The table makes it clear that very little relative change has occurred. It is not true that no change has occurred but the changes – a slight decline in both fertility and infant mortality and a fairly substantial increase in contraceptive prevalence – in the 20 villages of Comilla have paralleled the changes in national averages which occurred over the same span of time. In other words, these villages seem to have been responding to whatever basic socioeconomic change was affecting the entire country but no more than that. Evidently the change in the underlying technological relationships in agriculture in the municipal area of Comilla *thana* has not affected demographic behaviour. Fertility, contraceptive

Table: Key demographic and family planning characteristics: Comilla BARD area and Bangladesh as a whole, 1967 and 1985

	1967	1985
Knowledge of family planning		
Comilla sample	48.8 ^a	97.0 ^f
Bangladesh	66.0 ^b	98.6 ^c
Current contraceptive prevalence rate		
Comilla sample	4.0 ^a	22.0 ^b
Bangladesh	3.7 ^b	21.7 ^c
Infant mortality rate		
Comilla sample	139 ^a	125 ^f
Bangladesh	142 ^d	125 ^g
Total fertility rate		
Comilla sample	6.2 ^a	5.9 ^f
Bangladesh	6.4 ^e	5.7 ^g

- Sources:**
- ^a Stoeckel and Chaudhry, *op. cit.*
 - ^b *Report of the National Impact Study Survey*, (Karachi, Government of Pakistan, 1970).
 - ^c Mitra, S.N. and G.M. Kamal, *Key Results - Bangladesh Contraceptive Prevalence Survey - 1983*, (Dhaka, Mitra and Associates, June 1984).
 - ^d A.K.M. Ghulam Rabbani *et al.*, *Levels of Fertility and Mortality* from the National Sample Vital Registration System of the BBS, 1984, (Dhaka, BBS, 1985).
 - ^e Farooqui, M.N.I. and G.M. Farooq, *Final report of the Population Growth Estimation Experiment*, (Karachi: P.I.D.E., 1911).
 - ^f The present study.
 - ^g Planning Commission estimates prepared for Third Five-Year Plan.

prevalence and desired family size are all about at the national average. Thus, the major conclusion of the study may appear to be a negative one: technological change and increased efficiency in agriculture did not lead to a markedly increased motivation to practise family planning or to declining fertility.

The good news seems to be that some fertility/family planning differentials by SES indicators had emerged in the area by 1985. Education is beginning to have an impact and the solidly high fertility among all groups that was found in 1967 has begun to change. Curiously, ideal family size has not changed much, nor has mean attained fertility. However, the desire for additional births is sharply down and the approval of family planning up. All these indicators provide modest hope for further change in the future.

Interpretation and conclusion

There is an obvious interpretation of these results. The benefits of agricultural changes in Comilla have not been widely diffused among the bulk of the rural households. This is a criticism frequently made of the BARD experience. The co-operatives and other farmers' organizations that were created quickly became dominated and controlled by the local village elite, usually the largest land-owners and already prosperous middleclass farmers. While overall output and income in the area rose (average as well as total) these changes were concentrated in only a few large farms while the relative well-being of the small land-owners and the landless actually declined. The women's components, called for in the original approach, appear to have quickly become inoperative and not to have taken root, and the family planning effort was a very narrow contraceptive distribution programme, which was subsequently dropped.

Zaman sums up these problems as follows:

The most important criticism against Comilla is its failure to prevent a skewed distribution of benefits. The program enables greater participation of the rural people in the development process and has enlisted a larger number of small farmers in its co-operative field. Yet, it is the relatively rich and the powerful who eventually prevailed and commanded a greater share of the benefits.¹⁵

Important innovations or technological changes inevitably benefit most of that group already possessing resources, education, local power and social standing. Perhaps it is naive to expect otherwise.

In any case, while the "green revolution" in these 20 villages around BARD had the effect of increasing total output and income, this seems to have caused a perceptible increase in contraceptive prevalence and decline in fertility among only a few households. A lower fertility/higher income group does emerge in the data for 1985 unlike 1966/67 when fertility was almost uniformly high. But insufficient benefits seem to have trickled down to the lower-income groups to cause any widespread change in attitudes, motivation or practice of contraception. Attitudes and aspirations were changed for only a handful of households and, even in these, there were few changes in the role and status of women,

Was development a good contraceptive for rural Comilla in the period 1967-1985? The answer seems to be "no", and yet we must conclude that at least the general proposition needs to be modified to say "equitable, even-handed development" may be a good "contraceptive". But equitable, even-handed development programmes have proved difficult to design and implement, even in a highly favourable controlled experiment such as Comilla. But if this

type of development is so difficult to manage, then it is by no means clear that “development” is really much of a “contraceptive” at all. Family planning programmes in Bangladesh deliver services which do get used by poor as well as well-off households.¹⁶ The distribution of these benefits is probably more equitable than any other single government programme. Attempting to have an effect on development through family planning seems a better strategy in Bangladesh than doing it the other way around.

In a recent paper, Jain sums up the real issue:

Whether development will reduce fertility is perhaps not the issue, The issues are what type of development will reduce fertility, by how much, in what time period, and what governments can do to enhance the fertility inhibiting effect of development.¹⁷

To this, we would add a final issue: “whether those development programmes best calculated to reduce fertility are, in fact, realistic alternatives to family planning programme effort”.

Footnotes

1. Ansley J. Coale and Edgar M. Hoover, *Population Growth and Development in Low Income Countries*, (Princeton, Princeton University Press, 1958). For a review of other later works in this genre, see Geoffrey McNicoll, “Consequences of Rapid Population Growth: An Overview and Assessment”, *Population and Development Review*, vol. 10, No. 2, 1984, pp. 177-240.
2. Bernard Berelson “Prospects and Programs for Fertility Reduction: What? Where?“, *Population and Development Review*, vol. 4, No. 4, December 1978, pp. 378-395.
3. Smithsonian Institute, Interdisciplinary Communications Program, Occasional Monograph Series, No. 2 “The Policy Relevance of Recent Social Science Research on Fertility” (Washington, DC., The Smithsonian Institute, September 1974).
4. United Nations, Department of International Economic and Social Affairs, Population Division, *The Work of the Task Force on Inter-relationships Between Population and Development* (ESA/P/WP 76), November 1981.
5. Robin Barlow (ed.) *Case Studies in the Demographic Impact of Asian Development Projects* (Ann Arbor, Center for Research on Economic Development, 1982); Richard E. Billsborrow and Pamela F. Delargy (eds.) *Impact of Rural Development Projects on Fertility*, Population Studies No. 9, (New York, United Nations Fund for Population Activities, 1985); John Stoeckel and Anrudh K. Jain (eds.) *Fertility in Asia: Assessing the Impact of Development Projects*, (London, Frances Pinter, 1986); Warren C. Robinson (ed.) *The Fertility Impact of Development Programmes in Bangladesh* (Dhaka: Planning Commission, Government of Bangladesh, 1985).
6. George Simmons, Family Planning Programs on Development: “How persuasive is the New Wisdom?” *International Perspectives on Family Planning*, 1979, vol. 5, No. 3, pp. 101-110. Ruth Simmons, Gayle Ness and George Simmons, “On the Institutional Analysis of Population Programs”, *Population and Development Review*, vol. 9, No. 3, 1983.

7. A preliminary report on this survey is contained in: Barkat-E-Khuda, "Agricultural Development and Demographic Change in Bangladesh", in: Warren C. Robinson, (ed.), *op. cit.*, pp. 1-15.
8. John Stoeckel and M.A. Chaudhry, *Fertility, Infant Mortality and Family Planning in Rural Bangladesh*, (Dhaka, Oxford University Press, 1973).
9. An excellent account of the evolution of BARD is found in: Eva Mueller and J. Anderson, "The Economic and Demographic Impact of the Comilla Project in Bangladesh", in: Robin Barlow (ed.) *op. cit.*, pp. 1-53. This study foreshadows the present one, but was based on secondary data and could not make a real comparison of then and now, such as our data allow.
10. See: Wasim A. Zaman, *Public Participation in Development and Health Programs: Lessons from Rural Bangladesh* (New York, University Press of America, 1984); Chapter 3 in on the IRDP experience.
11. Stoeckel and Chaudhry, *op. cit.*, pp. 3-4. The data were collected by interview (administered by 10 female interviewers) of 1,600 currently married women in Comilla-kotwali thana from January to March 1967. A simple two-stage sample design was used. In the first stage, 20 villages were selected from a total of 247 on the basis of probability proportional to size. The second stage consisted of listing all currently married females in each village and then randomly selecting 80 women from each.

Every respondent in the sample was contacted a second time to insure that she had been interviewed. Re-interview of a 25 per cent sample of all respondents was conducted and the responses checked for reliability. In addition, a complete re-coding check was carried out for the entire sample of 1,600.
12. Stoeckel and Chaudhry, *op. cit.*, pp. 152-153. The research team consisted of the first author as the Team Leader, four Assistant Chiefs from the Population and Development Planning Unit (PDPU) of the Bangladesh Government, two representatives of BARD, and 14 field investigators hired from among local students and teachers. The work of the field investigators was continuously supervised by the Assistant Chiefs from the PDPU, two of whom, by rotation, stayed in the study area.

The fieldwork was carried out in a period of just over two months' time; data collection was largely confined to survey methods, which is the main limitation of this study. A balanced methodological approach, combining tools of social surveys with the quasi-anthropological approach of participant investigation, provides a better understanding of the nature of change and of the conditions in at least a few of these 20 selected villages in order to obtain better insights into the mechanisms of change. Such information is vitally important in policy formulation. However, this was not possible owing to time and budgetary constraints.
13. Stoeckel and Chaudhry, *op. cit.*, pp. 153-154.
14. See: Barkat-E-Khuda, *op. cit.*
15. Wasim Zaman, *op. cit.*, p. 64. Mueller and Anderson (*op. cit.*, p. 52) write that: "the large landowners came to be co-operative managers, the largest borrowers and the most frequent defaulters".
16. The evidence that the poor actually have lower fertility and higher contraceptive prevalence is reviewed in: Warren C. Robinson, "High Fertility as Risk Insurance", *Population Studies*, vol. 40, No. 2, 1986, pp. 294-295.
17. Anrudh K. Jain, "How to Enhance Fertility Inhibiting Efforts of Rural Development Projects", unpublished paper, The Population Council, New York, 1989, p. 1.

Age Structure Transition of China's Population: Regional Differentials and Implications for Development Policy

*Age structure can facilitate or impede development
depending on whether the economy can
adjust to conditions generated
by transition*

By Ting Yu*

Increasing attention is being paid to the rapid change of population age structures in developing countries, even though population growth has long been considered as the main issue in those countries. As a result of the consistent decline in fertility over the last two to three decades, the working age population currently claims a large proportion of the total age structure. Soon, however, rapid growth of the elderly population will be one of the most conspicuous characteristics of population change in the developing countries. It is estimated

* The author is an MA candidate, Department of Geography, University of Hawaii, Honolulu, Hawaii, U.S.A. He acknowledges with gratitude the comments of Dr. Gary Fuller on the preliminary drafts of this article.

that currently the total world population increases 1.7 per cent annually, whereas the portions of the population aged 55+ years and 65+ years increase 2.2 per cent and 2.8 per cent, respectively. Eighty per cent of the increase in the 55-t population occurs in the developing countries. In the next three decades, the population aged 65 and over in the developing countries will be twice as great as in the developed countries (Kinsella, 1988).

The theory of demographic transition based on Western experiences describes population change in parallel with modernization. The evidence in the rapidly developing societies of Asia such as Japan, Singapore and Taiwan province of China suggests that demographic transition might facilitate modernization (Freedman and Takeshita, 1969). However, there is no assurance that demographic transitions in all other countries will stimulate the same degree of economic development (Freedman, 1986). Thus, it is easier to predict a drastic transition of population than to expect concomitant economic growth. Because an aging population is more difficult to deal with in the absence of economic growth, those developing countries with rapid age structure transition need to know the implications for economic development.

China is a typical example of a country that is in this situation. After the implementation of its birth control policies, China experienced a rapid fertility decline (Cho, 1989). As a result of this decline, it is foreseeable that China will experience rapid age structure transition early in the next century. The policy question that emerges, then, is: What will the age structure transition mean to China's national economic growth?

This article discusses why age structure transition is an important dimension of population to be considered in national development strategy. Further, it compares the process of age structure transition of China's population with the experience of other Asian countries. It shows regional differentials of age structure transition within China and discusses resulting policy issues.

Population as a factor in China's development policy

China's Government adopted a family planning policy in the late 1970s. The policy is based on two basic concerns:

- a) "Planning both material production and human production": since China has a planned economy, any unplanned rapid population growth adds to the burden of government finance, increases consumption and decreases investment (Xiao, 1988); and
- b) The pressure of population on natural resources: there is increasing awareness of the low ratio per capita of natural resources, arable land, mineral reserves and water (Xiao, 1988).

Growth and total numbers are significant considerations in the goal of national economic development, which is to quadruple the gross national product (GNP) per capita between 1978 and 2000. In 1979, the one-child policy was announced, and family planning was reaffirmed by the State Council in 1981 as the essence of China's development strategy. The more detailed targets of population control were set to emphasize the importance of the fertility rate and of total population (Coale, 1981).

The family planning programme successfully reduced population growth in the past decade, but it did not reduce the immediate growth of the labour force because those currently entering it had already been born. In the short run, family planning could not help to solve the problem of unemployment, neither could it change the situation of lack of raw materials and investment for economic growth.

Aimed at solving these problems and stimulating rapid economic growth, the "Coastal Areas Development Strategy" was proposed in 1988. The proposal points out that the major developed and rapidly developing countries and areas (such as Hong Kong, the Republic of Korea, Singapore and Taiwan province of China) have been readjusting their industrial setup, and moving labour-intensive industries to places where labour costs are low.

China's abundant labour force offers an obvious attraction. The coastal region is very attractive to foreign investment in labour-intensive industries because it has low-paid but fairly skilled labour, good transportation and infrastructure, and a favourable geographic location for market access. Industries that already have access to raw materials and to world markets are especially encouraged to locate in the coastal region to utilize fully the labour force and release the constraint of a raw materials shortage (*Beijing Review*, 1988).

Population is an important factor in this developmental strategy. The proposal presumes that demographic conditions in China are favourable to the development of labour-intensive industries, since it is assumed that there is a large labour supply. However, it is not only the quantity of labour that should be considered but also the age structure of the labour force. A young labour force may be physically more competitive than an old labour force in attracting labour-intensive industries. A population with fewer dependents may be more likely to support fast economic growth because it can generate a higher level of savings, as is the case in some East and South-east Asian economies (Mason, 1988). Given the fact that China's population is in the process of age structure transition, it is important to understand the advantages and disadvantages of the transition to development based on labour-intensive industries.

Age structure transition: opportunity or challenge?

Owing mainly to its efficient programme of family planning during the last decade, China's fertility has declined substantially (table 1). As a result, the age structure change will also be dramatic in the near future (Cho, 1984). As a matter of fact, both fertility and mortality will contribute to the age structure transition of China's population (Yang, 1986). Table 1 compares the total fertility rates (TFRs) and expectation of life at birth in China with those of selected Asian countries.

Detailed projections of age structure transition in China were made by Tian (1984, p. 39) using 1982 census data. He computed three population projections over the period 1978-2070 and pointed out that:

... from now to 2020, the population (in China) will experience a "golden age" with large decline of dependency ratio. It can be further divided into two phases: in the former phases, up to 2000, there will be a tremendous decline in the dependency ratio; in the latter, from 2000 to 2020, the decline will be slower and eventually level off....After 2020, this ratio will begin to rise, and reach the peak in 2040 when the aging population will be most numerous.

By "golden age", Tian means that the population age structure is favourable to economic growth. He maintains that consumption by the young population will decrease faster than the consumption by elderly people will increase. Thus, total consumption will decline and investment will rise (pp. 40-41).

Table 1: Total fertility rates and expectation of life at birth in China and selected Asian countries, 1960-2025

Country	Total fertility rates*				Life expectancy at birth			
	1960-1965	1980-1985	2000-2005	2020-2025	1960-1965	1980-1985	2000-2005	2020-2025
Bangladesh	6.68	6.15	4.30	2.30	40.6	48.6	57.1	65.6
China	5.93	2.36	1.90	1.80	49.5	67.8	73.2	76.8
India	5.81	4.75	3.28	2.07	45.5	55.4	65.2	71.6
Indonesia	5.42	4.10	2.20	2.07	42.5	53.5	63.4	70.5
Japan	2.01	1.76	1.80	1.80	69.0	76.9	79.6	81.3
Malaysia	6.72	3.91	2.27	2.08	55.7	68.0	73.1	76.7
Philippines	6.61	4.74	3.09	2.08	54.5	61.9	68.1	72.7
Republic of Korea	5.40	2.40	1.80	1.80	55.2	67.7	73.0	76.6
Thailand	6.42	3.52	2.07	2.07	53.9	62.7	70.2	74.6

Source: United Nations, *World population prospects*, 1988 (ST/ESA/SER.A/106), 1989.

Note: * Per woman.

Another advantage of the age structure transition to economic development through declining dependency ratios is a better supply of labour to the growing economy. In their research, Ogawa and Tsuya (1988) believe that the “baby boom” in Japan after the Second World War and the resulting reduction of fertility played a positive role in the economic growth during the 1960s:

These large baby boom cohorts entered the labour force in the early 1960s, and contributed to the rapid growth of the Japanese economy as high-quality workers with low wages. Because Japan’s industrialization in the 1960s was still predominantly of the labour-intensive nature, these large cohorts were in great demand in the labour market. (p. 44)

Also implying this “golden age”, Kuroda (1986) compares the age structure transition in China with the Japanese case. He pointed out that the pattern of age transition in China in the next few decades will be very similar to that which occurred in Japan during the 1960s, but will develop about 27 years later. Thus, China will reach its lowest age dependency ratio in the first quarter of the twenty-first century. Referring to the rapid growth of Japan’s economy in the 1960s-1970s period, he asserted that “China will enjoy demographic conditions conducive to rapid, high-level development, which may be achieved if the next several decades are used effectively” (p. 21).

Figure 1 illustrates that, after a drastic decline, the dependency ratio in China nearly reaches the same level that Japan had in the 1960s, and will continue to decline until 2015. The ratio will remain low for about 30 years, which is a little longer than it did in Japan (about 25 years).

Although China’s emerging age structure will resemble Japan’s in the 1960s other conditions in the two countries are dissimilar. In 1960, Japan’s GNP per capita was about \$US2,000, the adult literacy rate was 98 per cent, and the secondary school enrolment rate was 90 per cent, whereas in China in 1980 the comparable figures are \$US300, 66 per cent and 44 per cent. These aspects will make it more difficult for China to achieve the same level of economic growth and modernization as Japan did.

Another difference is that Japan entered the valley of low age dependency ratio in the 1960s when this figure was very high in other Asian countries (see figure 2) and remained high for at least two decades. Shortly after the age structure of China’s population enters its “golden age”, the age dependency ratio of many neighbouring countries will also reach the same low level. Therefore, in considering the integrated market of the Asian and Pacific region, China is likely to face severe competition from these neighbouring countries in attracting investment and developing labour-intensive industries.

Figure 1: Total dependency ratios and old age dependency ratios in China and Japan, 1950-2025

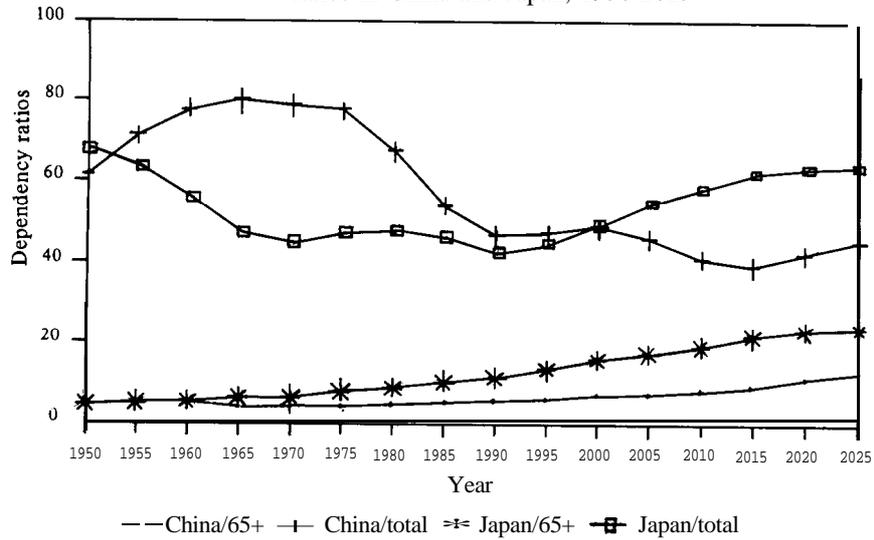
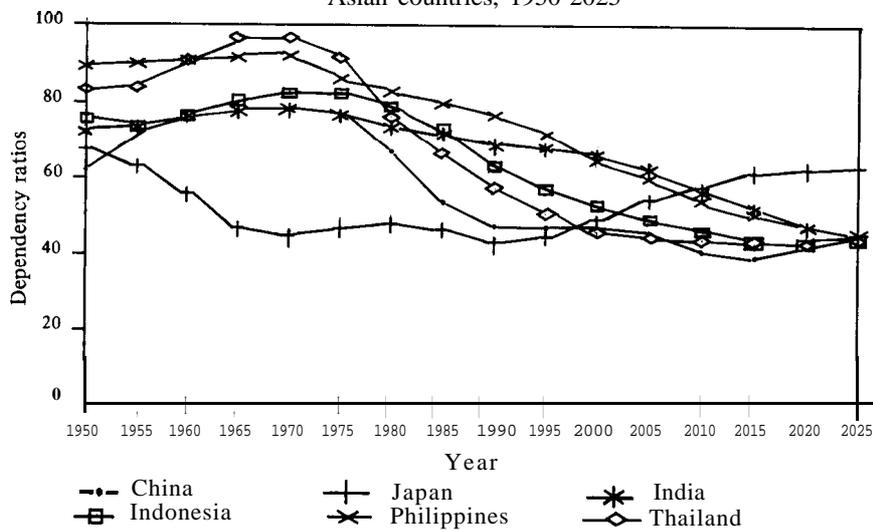
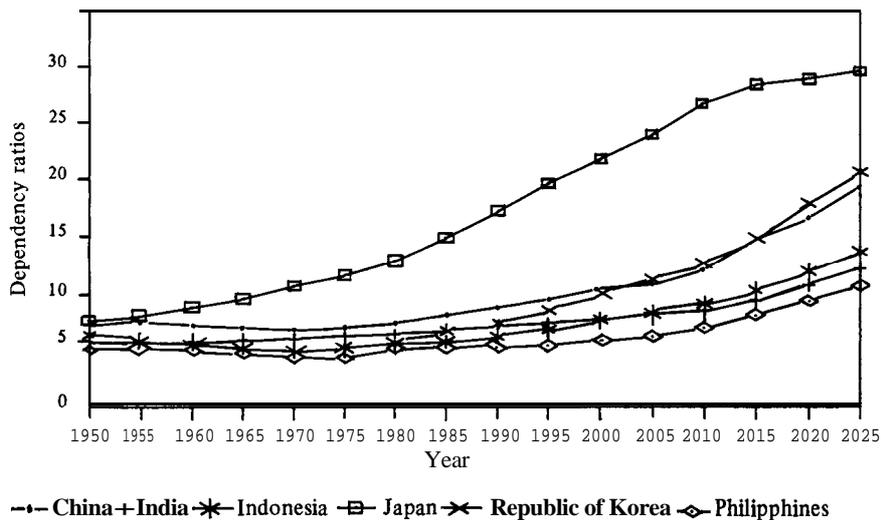


Figure 2: Total dependency ratios in China and selected Asian countries, 1950-2025



Source for both figures: United Nations, *World population prospects, 1988*, (STESA/SERA/106), 1989.

Figure 3: Proportion of population age 60 years and over in China and selected Asian countries, 1950-2025



Source: United Nations, *World population prospects, 1988*, (ST/ESA/SER.A/106), 1989.

China's age structure transition will lead to an aging population, as has been the case in Japan. "Aging of the productive population" has been a matter of great concern in Japan as a potential factor causing social and economic problems (Kuroda, 1986; Ogawa, 1982). This situation will very likely happen in China as well, but at a later time. Figure 3 shows that China will follow the same pattern as Japan. The speed of aging in China will be about the same as in the Republic of Korea, but faster than in most other Asian countries.

Table 2 presents projections made by the International Labour Office. It shows that the age structure of the labour force in China will change rapidly by the turn of this century. If these projections are accurate, China will have a labour force with a greater proportion of older than younger people, which may imply a population structure less favourable to the economy, at least for the needs of labour-intensive industries.

The process and pattern of demographic transition of China's population in the next few decades examined above suggests that the age structure of population will initially be favourable to economic growth in the form of labour-intensive industries. On the other hand, however, there are challenges.

Table 2: Age structure transition in labour force, China, Japan and selected countries and areas in Asia, 1970-2000

Ages/components of labour	China	Japan	Eastern South Asia ^a	Other East Asia ^b
Median age (years)				
1970 Males	35.2	37.3	33.4	34.4
Females	33.0	36.3	31.4	32.6
1980 Males	36.0	39.6	32.9	33.9
Females	33.9	39.5	31.4	32.0
2000 Males	37.7	42.4	34.0	36.2
Females	35.7	42.5	32.8	34.8
Proportion 45+				
1970 Males	28.7	30.6	23.2	24.5
Females	25.3	31.7	20.8	24.2
1980 Males	28.8	36.5	24.1	23.8
Females	24.6	37.7	22.1	24.1
2000 Males	32.0	44.6	21.9	25.9
Females	27.2	45.4	21.5	25.5
Proportion 55+				
1970 Males	13.6	16.0	10.2	10.1
Females	11.1	14.1	8.8	9.7
1980 Males	13.5	16.2	10.0	9.9
Females	10.6	15.9	8.9	9.2
2000 Males	13.0	22.4	9.5	10.0
Females	9.4	20.2	9.0	9.3

Source: Philip M. Hauser, 1983.

Notes: ^a Eastern South Asia includes Brunei Darussalam, Cambodia, Indonesia, Lao People's Democratic Republic, Malaysia, Myanmar (Burma), Philippines, East Timor, Singapore, Thailand and Viet Nam.
^b Other East Asia includes Democratic People's Republic of Korea, Hong Kong, Macau, Mongolia and Republic of Korea.

China will not be as well positioned as Japan was to take advantage of its demographic change, because Japan had fewer competitors and a better starting point. China must take advantage of the next decade or two, when it has a favourable age structure, or run the risk of facing increased competition from other developing countries in Asia. China will lose its demographic advantage sooner than Japan did, and will have to face radically different problems.

This potential crisis cannot be avoided by family planning. As many projections have suggested (Tian, 1984; Ogawa, 1987), fertility control will



Family planning campaigns in China are an important part of the Government's efforts to slow the population growth rate and lower the fertility level. However, fertility control may have some adverse effects on China's labour-intensive industries in the future.

not change the trends of age component change during the first half of the next century. Instead, it may reduce the decline in the total dependency ratio, and in turn close the door on China's demographic window of opportunity.

Regional differentials in age structure transition and implications

Since China is a large country with tremendous regional differentiation in social and economic conditions, the processes of demographic transition are also different among subnational regions. The more developed coastal region has lower fertility, whereas the middle region has higher fertility, and the inland provinces have the highest fertility rates. Almost the same pattern is found with regard to mortality (Hao, Arriaga and Banister, 1988) as illustrated in [table 3](#).

Table 3: Total fertility rates and expectation of life at birth by specific area, 1981

Provinces/cities/regions	Total fertility per woman	Expectation of life at birth	
		Males	Females
Coastal			
Beijing	1.316	70.5	73.5
Tianjin	1.589	69.9	72.0
Hebei	2.650	69.0	71.9
Liaoning	1.773	69.6	71.9
Jiangsu	2.076	67.0	71.3
Shanghai	1.316	-70.3	75.1
Zhejiang	1.982	67.6	71.2
Fujian	2.717	66.1	68.8
Guangdong	3.283	68.1	73.4
<i>Median</i>	1.982	69.0	71.9
Middle:			
Jilin	1.842	68.2	69.7
Heilongjiang	2.062	67.4	69.3
Neimeng	2.621	65.8	67.7
Henan	2.651	67.7	71.4
Hubei	2.445	63.8	67.2
Hunan	2.833	63.9	66.5
Anhui	2.799	67.3	70.7
Jiangxi	2.790	64.1	66.6
Sichuan	2.434	62.3	64.3
Shanxi	2.385	66.5	68.8
Shaanxi	2.394	64.1	65.7
Guangxi	4.103	67.4	70.8
<i>Median</i>	2.533	66.2	68.3
Inland :			
Ninxia	4.120	64.0	65.8
Qinghai	3.927	59.7	61.5
Gansu	2.728	64.8	66.3
Guizhou	4.355	59.6	59.7
Yunnan	3.814	58.8	60.3
Xinjiang	3.883	57.2	58.1
Tibet	-	-	-
<i>Median</i>	3.905	59.7	60.9

Source: Banister, 1987; Hao, Arriaga and Banister, 1988.

Demographic analysis indicates that fertility and mortality characteristics are among the most influential factors of the age component of a population (Coale, 1956). This has also been shown to be applicable in the case of China (Ogawa, 1988). Figures 4 and 5 on page 29 show the regional differentials in the proportion of population aged 65 years and over in the provinces in 1982 and 1987. The difference in age structure transition is partially reflected.

In order to see the whole picture of the age structure transition in the subnational regions, population projections for the coastal, middle and inland regions are made. The basic data of age structure, age-specific fertility rates, and expectation of life at birth at the provincial level are from the third census (Chinese Academy of Social Science, 1985) China's One-per-Thousand Sample Fertility Survey in 1982, and relative estimations (Coale and Chen, 1987; Ogawa, 1988; Hao, Arriaga and Banister, 1988; Tian, 1984).

The TFRs and expectation of life in the projection period are largely based on the estimation made by Ogawa (1988). According to his medium variant, the TFR of the whole country is assumed to decline linearly from 2.40 in 1987 to 1.80 in 2000, and return to 2.10 in 2050.

The expectation of life at birth for males is assumed to increase from 66.43 years in 1981 to 74.54 years in 2025 and 77.45 years in 2050. For females the values are 69.35 years in 1981, 80.18 years in 2025, and 82.94 years in 2050. The regional differences in the indices for TFR and expectation of life at birth among the subnational regions are assumed to follow the pattern existing in 1982; interregional migration is assumed not to exist. The projection is by five calendar years from 1982 to 2052.

The result of the projections show that the coastal region will have a faster age structure transition than the national average. The proportion of population aged 65 years and over will exceed 8 per cent (the United Nations criterion for a country with an aging population) by the end of this century, which is about one decade earlier than the national average, according to the United Nations medium variant projection (United Nations, 1989).

The middle region will approximate the national average. In the inland region, the proportion of population 65 years of age and over will not reach 8 per cent until the third decade of the twenty-first century, and will remain at about this level thereafter (figure 6).

The total dependency ratio (TDR) also declines earlier in the coastal region. A drastic decrease is found from now until the first decade of the next

China by names of provinces

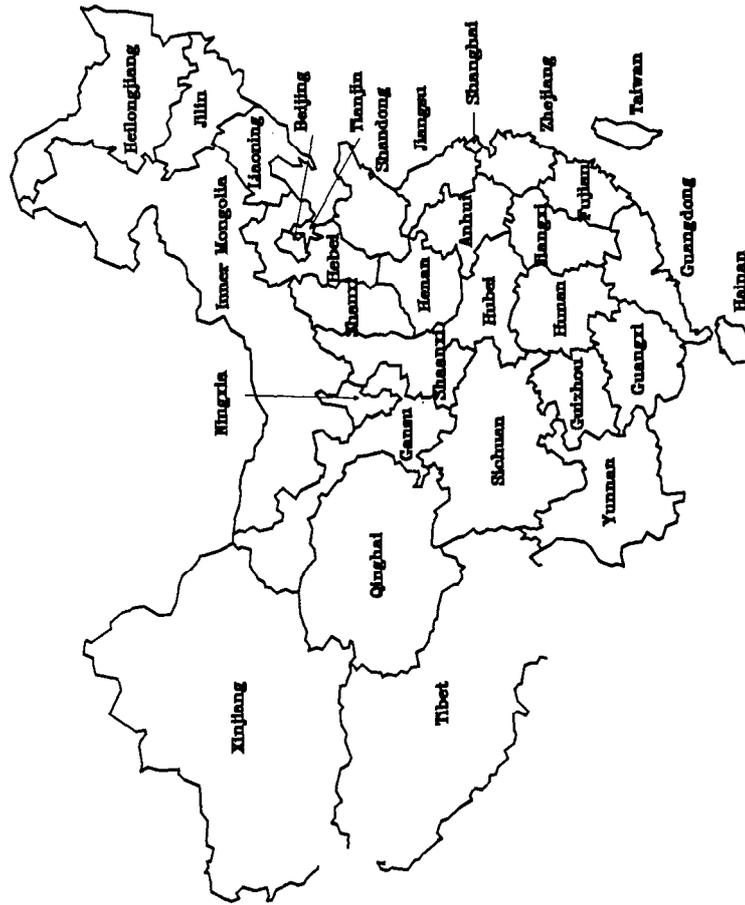
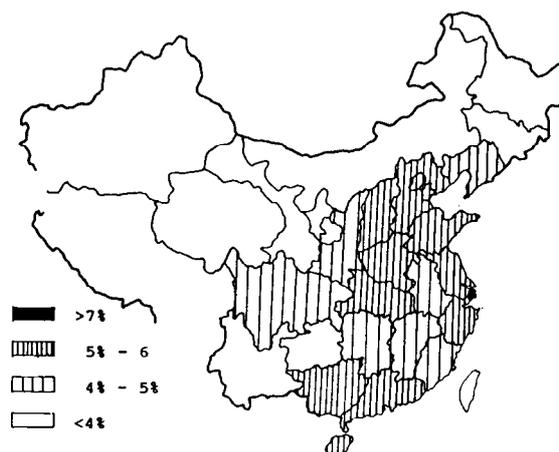
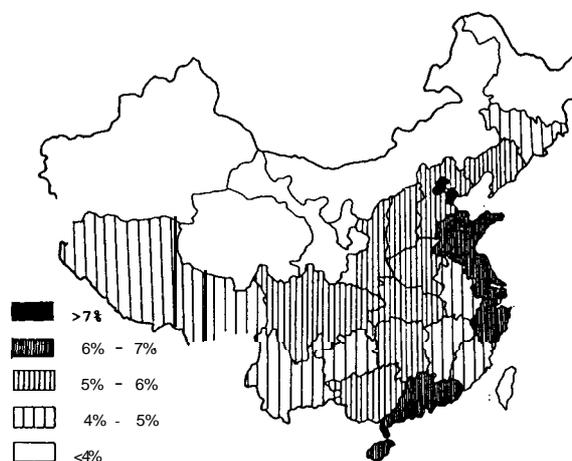


Figure 4: Proportion of population aged 65 and over in the provinces in China, 1982



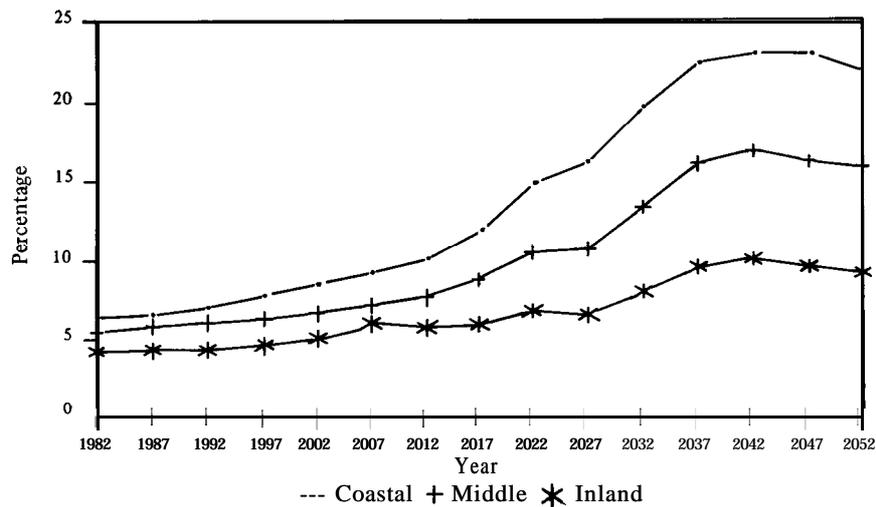
Source: Chinese Academy of Social Science, 1985.

Figure 5: Proportion of population aged 65 and over in the provinces in China, 1987



Source: The State Bureau of Statistics, 1988.

Figure 6: Proportion of population aged 65 years and over in three regions of China, 1982-2052



century (figure 7). Figure 8 decomposes the TDR into young dependency ratio (population 0-14 years old/population 1564 years old) and elderly dependency ratio (population 65 years old and over/population 1564 years old). It indicates that the decline of TDR, at first, is caused mainly by the decline of the young dependency ratio, and later, the TDR will be pushed up by the increase in elderly dependency. In the second decade of the twenty-first century, the elderly dependency will, for the first time, outweigh young dependency in the coastal region, which will need both economic and institutional development to meet the needs of this portion of the population (Cho, 1989).

The change in TDR in the middle region follows that in the coastal region with about five years' delay (figure 7). Because elderly dependency will not be higher than young dependency, the problem of population aging in the middle region will not be as severe as in the coastal region. Meanwhile, the TDR will be slightly lower in the middle region than in its coastal counterpart after 2032.

The inland region will not have such a drastic transition in age structure as the rest of the country. The TDR will remain mostly above 50 per cent, and the proportion of population aged 65 years and above will be not more than 10 per cent. If the TFR is at the same level as we assume in this

Figure 7: Total dependency ratios in three regions of China, 1982-2052

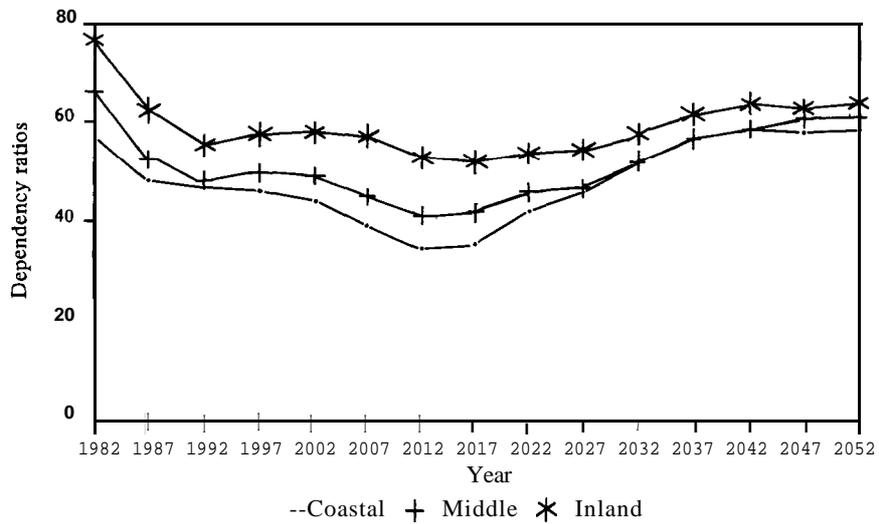
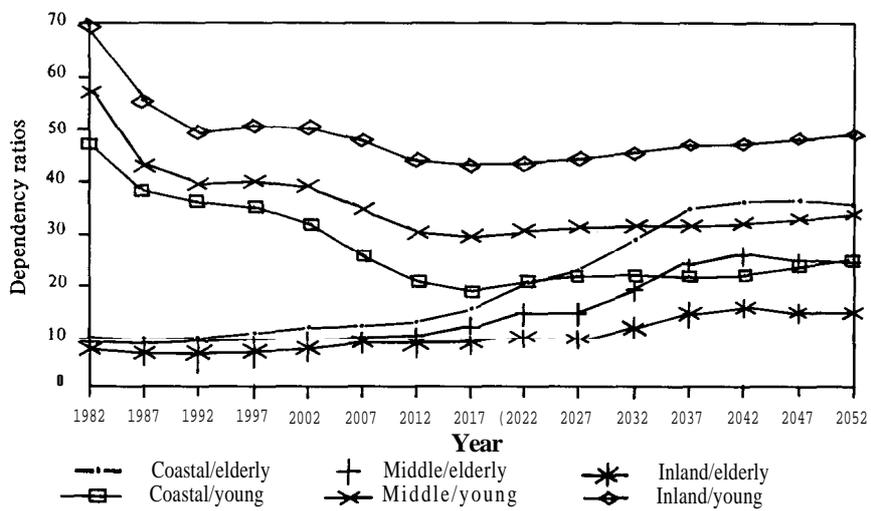


Figure 8: Young and elderly dependency ratios in three regions of China, 1982-2052



projection, i.e. 2.86-3.58, the “golden age” will not actually occur in the inland region.

This differentiated process of age structure transition in the subregions of China might suggest that differentiated developmental policies should be implemented in the coastal, middle and inland regions. In the 1980s the age structure in China’s coastal region was almost identical to that of Japan in the 1960s. In 1987, the TDR in this region was 47.7, and the percentage of elderly (65 years of age and over) was 6.4; whereas in Japan in 1965, the comparable numbers were 47.3 and 6.2, respectively (United Nations, 1989). This would mean that the “golden age” has already occurred in coastal China. Therefore, instead of waiting until the next century, as suggested by the national average data, effort should be made immediately in the coastal region to attract foreign investment and to develop labour-intensive industries. Thus, “The Coastal Area Development Strategy” proposed in 1988 should be implemented as soon as possible to utilize fully the favourable demographic condition. Since the dynamics of demographic transition suggest that China will not have a favourable condition for a very long period, the country can hardly afford to lose this opportunity.

The projection indicates a rapid aging of the population in the coastal region during the second decade of the next century. In 2017, the proportion of population aged 65 years and above will be 11.75 per cent, which is a little more than that of Japan in 1990. Similarly, the age structure of population in the coastal region will be less favourable to an increase in labour-intensive industries, as is the case in Japan now. However, the middle region could be a potential supplier of labour to the coastal region, since the age structure transition there will be later than in the coastal region. Because of its good facilities, convenient access to markets, and traditional relations with foreign investors, the coastal region may still remain attractive for foreign investment. Thus, it is more likely that labour from the middle region will migrate to the coastal region and work in labour-intensive industries. This phenomenon has already occurred since the mid-1980s. It has been reported that, in Shanghai where the population aged 65 years and over reached 8.5 per cent of the total population in 1987, a significant portion of textile workers are migrants from the middle region of the country. In southern Guangdong province, many factories, especially those that are using cheap labour and whose supply of raw materials and where products are in demand by the international market, are hiring workers from the provinces in the middle region of the country (*People’s Daily*, 1989). Since permanent migration is severely restricted in China, temporary migration is much more common. Because temporary migrants usually create problems involving social welfare, security and administration, corrective policy measures are urgently needed (*People’s Daily*, 1989).

The regional adjustment of labour supply, however, is limited in the long-run because the population in the middle region will also be aging rapidly (figure 7). The inland region could be an area for establishing labour-intensive industries, but such steps may not be so beneficial to the economy because the age structure of the population will not be as favourable. Figures 7 and 8 illustrate that the TDR will not be lower than 50 per cent in the inland region because high fertility will keep the young dependency ratio high. Considering the future development of both the national economy and the economy of the inland region, a further birth control policy might be worthwhile. It could enable the inland region to be better positioned either to accept those labour-intensive industries which are no longer suitable for the coastal and middle regions, or to be a source of labour-force migration. It would more fully benefit the regional economy and enable the national economy to have more time for obtaining investment and for enjoying rapid economic growth.

Conclusion

Age structure transition is a new way of looking at population change, and it offers considerable promise for aiding economic development and general planning. Age structure can facilitate or impede development depending on whether the economy can adjust to the conditions generated by transition. In the case of China, the strategy of developing labour-intensive industries, for example, must be assessed in the light of age structure transition so that the timing and location of labour supply is properly considered. The spatial variation of age structure transition may suggest different developmental strategies and influence the regional sequence of economic development. In China, this is particularly important because of the enormous variation in age structure transition among the sub-national regions.

Future research on the issue of age structure transition in relation to economic development in China may also include the employment of the elderly population, and the reform of the retirement and social security system. Interregional migration caused by the spatial variation of age structure transition may be another interesting theme for the future study of migration in China. More detailed and updated projections of age structure transition at the provincial level would be valuable for future planning.

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Micro-consequences of Low Fertility in Singapore

The rapid aging of the population and the shortage of younger workers in the next 20 years are major demographic challenges

By Paul P.L. Cheung*

The fertility decline of Singapore is often cited as a success story of a developing country's effort to balance population growth with economic development. Since achieving nationhood in 1965, Singapore's fertility has fallen by almost 70 per cent in about 20 years: the total fertility rate (TFR) dropped from 4.66 in 1965 to a historic low of 1.44 in 1986, after breaking through the replacement level in 1975. The size of successive birth cohorts

* The author of this article is Director of the Population Planning Unit, Ministry of Health, and Senior Lecturer, Department of Social Work and Psychology, National University of Singapore. This article is based on a paper presented at the Annual Meeting of the Population Association of America, 3-6 May 1990, Toronto, Canada.

also fell by about one-third, even though the number of married women of reproductive ages increased by more than 70 per cent. After 15 years of below-replacement fertility, Singapore can be characterized truly as a low-fertility society.

Over the same period when fertility declined rapidly, industrialization and national development were proceeding at an unprecedented pace. From 1965 onwards, high growth in gross domestic product (GDP) was achieved year after year, except for the two recessionary periods of 1973/74 and 1985/86. As a result, the value of manufacturing output at standardized market prices increased by more than seven times. Non-manufacturing sectors, especially finance and commerce, also expanded rapidly. By 1989, the per capita income had risen from \$US1,600 in 1965 to \$US15,000, and unemployment fell from 9 per cent to 3 per cent. Singapore is now widely regarded as having become a “newly industrialized” country.

In the initial years of nationhood, the fall in fertility and cohort size provided some critical “breathing space” for economic development. Having just separated from Malaysia, Singapore was trying hard to gain a firm economic footing. This was not easy as the withdrawal of British military bases from Singapore further aggravated the unsettled economic base. However, falling cohort size helped to ease the economic burden of carrying a large dependent population. The bulk of available economic resources was able to be used for developmental projects.

As Singapore developed, the need to control its population growth to meet resource constraints became less critical. The expanding economy could clearly support a larger population base. Also a number of programmes to maximize water and land resources have been successfully implemented. In the past few years, persistent labour shortages have raised the question of whether Singapore should increase its population at a faster pace to facilitate economic growth and whether recent cohort sizes were too small for the manpower needs of a diversified economy. The long-term implications of persistent below-replacement fertility have now been widely discussed. The rapid aging of the population and the shortage of younger workers in the next 20 years are recognized as major demographic challenges for Singapore. Realizing the adverse implications of continuing fertility decline, the Government decided in 1987 to reverse its anti-natalist policy and announced a package of incentives to promote higher births. Since then, the TFR has rebounded to about 1.8 children per woman in 1989 and the cohort size increased correspondingly.

The consequences of the dramatic fall in Singapore’s fertility go beyond the distortions in age structure. The impact on the social and economic structures is evident and no less significant. This article is an attempt to

describe and discuss some of the changes that have occurred in both the family and the occupational structure. Its premise is that the immediate impact of fertility decline on the socio-economic structure is largely mediated through major changes in the roles of women and the restructuring of their life course. The effects of such changes on the family and the occupational structure are discussed. The case of family-owned small businesses serves as an illustration.

Fertility decline and the family

The rapid fall in Singapore's TFR is due to two factors: the decline in female marriage rates and the reduction in average family size. As would be expected in an urban society, both factors play equally important roles in the fertility decline. The impact of these two factors on the family is discussed in this section.

Singlehood in Singaporean society

Changes in Singapore's nuptiality pattern have been swift in both the delay in marriage timing and the rise in celibacy. In both instances, the same effect occurs: the distribution of unmarried females by age increased rapidly over time. The extent of the changes is shown in [table 1](#). The share of the unmarried among females aged 30-34 years increased from about 10 per cent in 1970 to about 20 per cent by 1989. For the age group 35-39 years, the percentage increased from 5 to 12 per cent during the same time-frame. The period average age at marriage has also risen over time: from 23.7 years in 1970 to 26 years in 1989.

In the context of Singapore, a delay in marriage results directly in a delay in the departure of daughters from the parental home in the Chinese

Table 1: Proportion of single women by age group, 1970-1989

Age group (years)	1970	1980	1989
15-19	95.2	97.7	98.9
20-24	64.6	73.8	82.8
25-29	22.6	34.0	43.0
30-34	9.6	16.7	19.8
35-39	5.1	8.5	12.0
40-44	3.3	6.0	7.2

Note: Data for 1970 and 1980 include non-residents; data for 1989 are for residents only.

and Indian communities. For the Malays, co-residence of the unmarried daughters with their parents remains the culturally accepted practice. In the “worst-case” scenario of celibacy, Chinese or Indian unmarried daughters may never get to establish an independent household. Two forces are at work here. First, it is culturally unacceptable for unmarried daughters to live outside of the parental home, unless they are staying in approved quarters, such as university hostels. This practice has enabled parents to retain a high degree of control over their daughters’ conduct. Second, in Singapore, where 85 per cent of the households live in government-built apartments, an unmarried person is not entitled to buy or rent such an apartment. Thus, for a single woman to live outside of the parental home would mean having to rent a room or purchase an expensive private apartment, both of which are undesirable choices to many.

As the co-residence rate of parents-daughters rises in Chinese and Indian households, there are two interrelated consequences. First, the unmarried daughters (or sons) have displaced the married sons in the right to share the parental home. For the married sons, the obligation to stay with the parents is therefore waived. As new housing is easy to come by, there is no incentive for the married son to remain in the parental home upon marriage. Second, the unmarried daughters now have to bear a greater burden in the care of the parents, thereby substituting the role traditionally performed by daughters-in-law. In past years, a number of complaints have been voiced in the press about the obligatory role of being the parents’ keeper which is imposed on unmarried daughters.

With the female celibacy rate projected to be about 15-20 per cent in each cohort, the prevalence of singles may profoundly change the normative rules governing the pattern of co-residence and parent-daughter relationships. Several changes may occur. First, the inheritance pattern of giving the largest share to the sons in these communities may change. The unmarried daughters may inherit a share of the parental home and other assets since they have neither left the parental home nor achieved “independence”. The rules governing patrilocal residence may have to be adjusted to meet demographic reality. Second, the parent-child relationship is likely to change. Having contributed substantially over the years to the family budget, the daughters are likely to be against continued parental control. Third, the lack of choices available to single women may lead to social demands for enhanced flexibility in the provision of social services and greater appreciation of alternative lifestyles.

Family vs. work: changing priorities?

The fall in family size by cohort is shown in [table 2](#). For married women born during the period 1936-1940, their completed family size was close to

Table 2: Mean number of children ever-born by birth cohort at various ages

Period	30-34	35-39	40-44
1956-1960	1.81	–	–
1951-1955	1.95	2.24	–
1946-1950	2.25	2.48	2.62
1941-1945		3.15	3.21
1936-1940	–	–	3.95

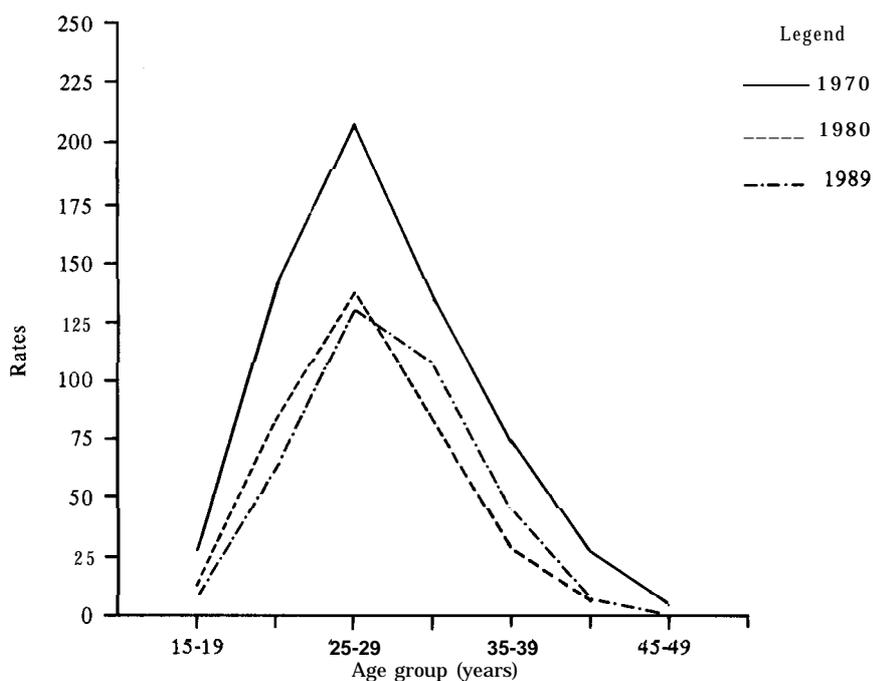
four children. For the women born 10 years later, the family size had dropped by almost one and one-half to 2.6 children. The fall is clearly related to a systematic downward adjustment in desired family size and the easy availability of contraceptive technology.

Declining family size reduces proportionately the parents' child-rearing responsibilities. It also means that the portion of a woman's life course devoted to child-bearing is considerably shortened. In Singapore, the reduction has occurred at both ends. The period average age at first birth has been rising steadily to about 28 years in 1989. Concurrently, the desired age at last birth has fallen steadily and currently is an average of about age 35. [Figure 1](#) illustrates the contraction of the child-bearing period over time through the changes in the age-specific fertility rates.

Changes in the family size and the timing of births are linked to rapid increases in female labour force participation rates. The delay in marriage and child-bearing, for example, has helped to increase the participation rate of women in the age group 25-29 years from 30.8 per cent in 1970 to 74.1 per cent in 1989. The increases were also substantial in the older age groups. For the age group 40-44 years, the rates increased from about 18 to 50.2 per cent over the same period. Overall, the female participation rate increased from 29.5 per cent in 1970 to 44.25 per cent in 1980 and to 48.4 per cent in 1989 ([figure 2](#)). It is very likely that within the next few years, the rate would exceed the 50 per cent mark.

The increased involvement in the labour force is in part a response to the opportunities available to the women and in part a function of their rising educational attainment. Working outside the home has now become the norm rather than an exception among younger women. The rise of the dual-career families over these two decades has led to several changes within the family. Two major aspects are discussed here: the rising demand for alternate child-care arrangements and changing husband-wife relationships.

Figure 1: Age-specific fertility rates, 1970, 1980 and 1989

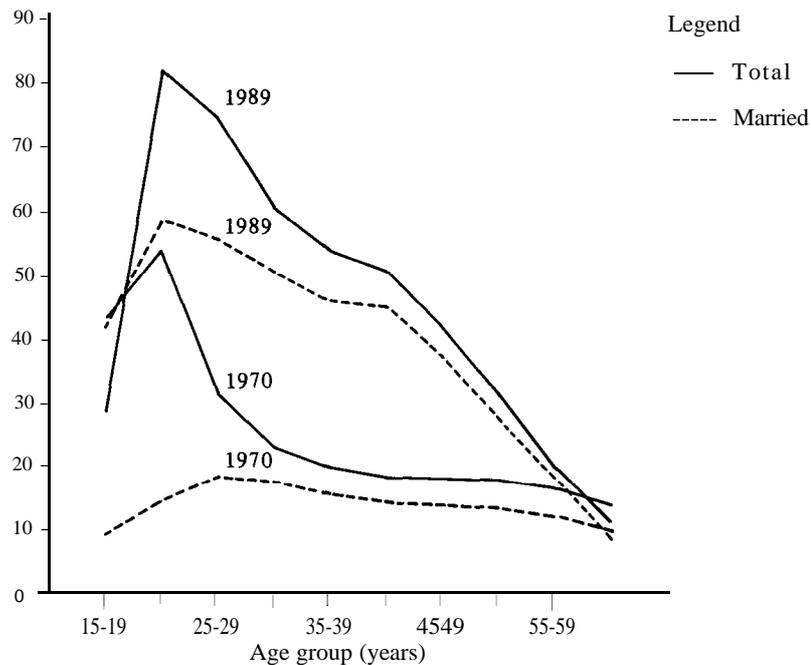


As in other countries, the demand for alternate child-care arrangements rises proportionately with increases in the female labour force participation rates. In an Asian society, the need to find a substitute for family care is imperative as the family has always been the predominant care-giver. In Singapore, three alternative arrangements have gained prominence as the young mothers are remaining at work in large numbers.

First, the use of grandparents and relatives as child-minders has become more common, although this practice is limited by the fact that some grandparents or relatives themselves are now working. A 1989 survey showed that 30 per cent of households with young children used the grandparents or relatives as child-minders. In 1983, the corresponding figure was only 23 per cent. This arrangement is a logical extension of family care. Helping out with child-care is considered an older person's contribution to family welfare and such chores have helped to reinforce family ties and reciprocal obligations.

Second, the demand for day-care centres has exploded during the past

Figure 2: Age-specific female labour force participation rates, 1970 and 1989



10 years. Long waiting lists were common in most centres, and the supply of child-care centres has not kept up with the demand. In 1980, there were only about 2,000 child-care centres. In 1989, this figure increased by six times to over 12,000 such places. The expansion of child-care services could be even faster if not for the shortage of child-care teachers, as their wages are not competitive *vis-a-vis* other industries and services. In any event, the acceptance of centre-based care for preschoolers among the local population has been quick and uneventful. The transition is apparently facilitated by the belief among parents that such facilities provide their children with a head start in a competitive educational environment. To them, formal education would start as early as when their children are two years old. Since Singaporeans of Chinese extraction comprise the majority of the population and are highly concerned about educational achievement, it follows that they are also the principal users of such centre-based facilities.

Third, middle-class families are recruiting foreign domestic servants to help in household and child-care chores. With the availability of cheap labour

from neighbouring countries, the number of such workers has increased by more than five times in the past nine years. Currently, the number of domestic servants is estimated to be about 50,000 or about 7 per cent of all households. Concerns have been raised about the desirability of these workers as socialization agents; however, in most households, the arrangement seems to have worked out well.

Apart from child-care arrangements, changes in husband-wife relationships have come about with the increased participation of women in the labour force. There is greater appreciation that the pooling of two incomes provides the family with the greatest opportunity to move ahead. A husband would now expect his wife to work even after marriage, rather than being dependent on him as the sole income earner. In exchange, a husband is more likely to assist in household chores or in caring for young children. The traditional lopsided division of household labour seems to have given way to a more equalitarian relationship.

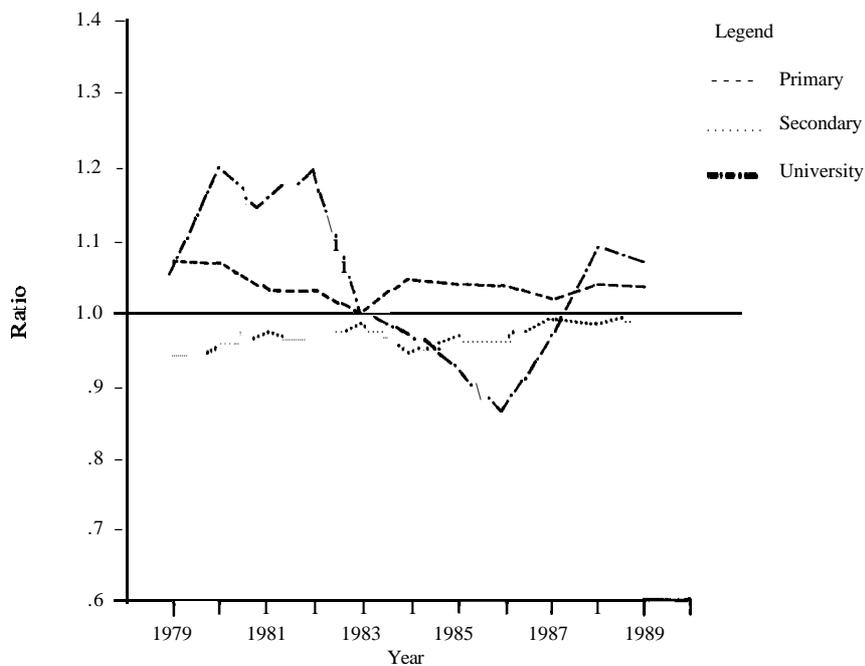
In the context of changing husband-wife relationships, the locus of fertility decisions has shifted from the husband to the wife. Recent studies have shown that a working wife has more or less the final say in whether to have another child, particularly if the family already has two children. It is common that, although the husband may want to have another child, the wife would make the final decision depending on her employment conditions.

Changing valuation of daughters

The fall in family size is generally expected to have a positive impact on the allocation of familial resources per child. In an affluent society, the per-child share is further enhanced by the availability of resources. In a society where sons and daughters are traditionally not considered equal in allocational decisions, these two factors may have an important equalizing impact. Discrimination against daughters is reduced as the "pie" is bigger and there are fewer sons to compete with. In addition, a daughter is now expected to work as soon as she is ready to join the labour force and develop a career just as a son would do. The economic returns of a daughter are therefore expected to be about the same as those of a son.

The rising status of daughters in Singapore is borne out by the fact that female educational attainment has improved dramatically over time and the average years of schooling may have even surpassed those of males. In 1970, the percentage of females aged 25-29 years with secondary or higher education was 26 per cent. This rose to 39 per cent in 1980, and to 61 per cent in 1989. [Figure 3](#) shows the sex ratio of graduating primary and secondary students over the past 10 years. For the primary school graduates, the sex

Figure 3: Sex ratio of graduating class at primary, secondary and university levels, 1979-1989



ratio was slightly over 1, and clearly, allowing for a positive sex ratio at birth, the girls were not disadvantaged. For the secondary school leavers, the sex ratio has been in favour of the girls, and the sex ratio has remained below 1 for the decade. This occurs because more boys were being channelled into vocational school as a result of poorer educational performance with regard to language requirements. At the university level, the sex ratio has been in favour of the girls since 1983, although the ratio has risen above 1 in the past two years.

Changes in the occupation structure

The chronic labour shortage that Singapore has experienced in the past 15 years is not exactly a result of falling fertility, as the job entrants during this period were born in the “baby-boom” years. The entry of these cohorts has actually helped to increase labour supply. The shortage arose principally from the rapid expansion of an economy supported by a small population base. As a result, foreign workers were brought in and they constituted about 10-15 per cent of the total work-force at any one time. In the past, they were allowed only in selected industries, such as manufacturing, construction and hotel

services, provided that they did not exceed 50 per cent of the work-force. Foreign domestic servants were also allowed. In 1990, the recruitment of foreign workers was allowed for all other sectors, with the maximum share fixed at 40 per cent for traditional “receiving” industries and 10 per cent for all others.

To deter over-reliance on foreign workers, a levy for each foreign worker employed was introduced to reflect the true cost of labour. In 1990, the levy is \$280 for all foreign workers, except for domestic servants, for whom it is \$250. In addition, programmes were introduced to ensure fuller utilization of the domestic work-force through greater automation, greater participation of women and the elderly, and flexible work arrangements.

The increase in the participation of women in the labour market definitely helped to ease the shortage of workers. Between 1980 and 1989, while the participation rate increased from 44.3 to 48.4 per cent, the number of female workers jumped from about 383,000 to 513,000, a 34 per cent increase. However, the increase in the distribution of female workers by occupation is by no means uniform, reflecting a unique response to emerging employment opportunities as well as traditional work preferences. [Table 3](#)

Table 3 : Percentage distribution of female workers by occupation

	1970	1980	1989	% change 1970-1989*	% change 1980-1989*
Professional, technical and related workers	39.0	39.1	39.3	174.8	61.2
Administrative, managerial and executive workers	5.7	15.6	24.5	3 613.2	194.7
Clerical and related workers	30.9	60.6	71.3	429.8	35.8
Sales workers	15.6	28.6	33.8	215.8	37.3
Service workers	40.4	44.4	55.7	164.0	90.1
Agricultural, animal husbandry, forestry workers and fishermen	18.4	17.7	17.9	-67.2	-56.3
Production and related workers, transport equipment operators and labourers	18.6	29.5	29.6	179.5	3.1
Others	1.9	6.2	1.2	47.2	-83.1

Note: *refers to percentage increase in absolute numbers.

**Table 4: Projected population aged 15-29,
1985-2030**

(Number in '000s)

Year	Total		15-19		20-24		25-29	
	Number	Index	Number	Index	Number	Index	Number	Index
1985	816	100.0	235	100.0	286	100.0	295	100.0
1990	142	90.9	223	94.9	234	81.8	285	96.6
2000	619	15.9	206	87.7	191	66.8	222	75.3
2010	662	81.2	232	98.7	225	78.1	205	69.5
2020	635	77.8	193	82.1	211	13.8	231	78.3
2030	566	69.4	189	80.4	185	64.7	192	65.1

shows that the largest increase in absolute numbers over the period 1970-1989 and 1980-1989 has been in the administrative, managerial and executive occupations. This is followed by the clerical occupations and the professional and technical occupations. However, in terms of the share of female workers in these occupations, clerical occupations show the largest increase, i.e. from 31 per cent in 1970 to about 71 per cent in 1989. The concentration of women in the lower-level white-collar jobs is due to a steady influx of female secondary school leavers who generally prefer office work. In comparison, men of equal education tend to enter technical and skilled occupations.

The rapid fall in cohort sizes during the past 20 years will make its impact felt in the next two decades. The shrinkage in the number of new entrants is made worse by the increase in the average years of schooling. Table 4 shows the projected cohort size of younger age groups for the next four decades. Using 1985 as the base year, the table shows that the size of the 20-24-year-old age group will drop by about 33 per cent by 2000. It then recovers slightly before declining again.

The competition for new entrants will be intense across industries. Whether an organization will be successful in recruitment will depend on whether it can offer a competitive wage relative to others; the perceived attractiveness of the occupation and the industry would be an important deciding factor as well. The shift from production to sales, service and commerce occupations has already occurred. Limited by their lower wages and unpleasant work environment, labour-intensive manufacturing industries currently face no alternative but to rely more on foreign workers, or eventually move their operations to labour-rich neighbouring countries.

Family-owned small enterprises comprise the group probably most severely affected by the labour shortage. These businesses are unable to offer attractive wages because of their small-scale and small profit margins. This

is compounded by the fact that their turnover rate is traditionally high, as the non-family workers find it difficult to integrate into the running of the organization. Enterprising workers tend to feel alienated because decision-making authority in family-owned businesses tends to be concentrated among the family members. While external recruitment poses problems, internal labour sources are also drying up. Family members, particularly daughters, are also looking for better opportunities. Failure to recruit and retain family and non-family workers makes it very difficult for these businesses to expand, improve, or indeed sustain their operations. Very often, these organizations are run by the aging parents themselves with a number of loyal long-time workers.

A number of strategies have been employed to cope with the labour shortage. Many such businesses simply continue their operations with marginal additional labour input until such time when it becomes profitable to sell out. This normally occurs when the aging parents decide to quit or have fallen sick. Temporary part-time help from children in between studies provides an important source of labour. Whether the children are recruited to continue the family business seems to depend on the profitability of the business and whether they are successful in school. The family business has become in many ways a fall-back option if the children fail to make it to more respected occupations. Traditionally, the daughters fill many key positions of a family business; they manage the accounts, handle sales, or help in the production line. However, with better education and wider career choices, the daughters may not be easily persuaded to stay back.

Conclusion

This article has briefly sketched some of the socioeconomic changes arising from the dramatic fall in fertility. Some of these ideas are currently being pursued in a number of research projects. Although the Government's population policy has been revised and may eventually lead to higher fertility, the socioeconomic impact of declining family size described above is unlikely to be altered. The roles of a Singaporean woman have been restructured in the modernization process. It would not seem possible to persuade the women to give up what they have achieved and revert back to a lower socioeconomic status. The success of the new population policy would therefore depend to a large extent on the willingness of women to accommodate their career with a large family size. This article points to the need for the Government to give special consideration to the needs of the unmarried in a family-oriented society. It also highlights the importance of the female work-force in Singapore's economy. Programmes for skill training and career development should adjust their male-dominated focus to take into consideration the special needs of the female work-force.

A Decomposition Analysis of Recent Fertility Decline in Fiji*

The population of Fiji¹ consisting of two major ethnic groups, the indigenous Melanesian population referred to as Fijians and the population who are of Indian origin referred to as Indians, has gone through significant demographic changes in the recent past. These were revealed in the two latest publications on Fiji (Bureau of Statistics, 1989; Gubhaju and Navunisaravi, 1989). The demographic change with which this note is mainly concerned is the decline in fertility of Fijians and Indians over the past two decades, 1966-1986.

Table 1 shows that the Fijian total fertility rate declined by 26 per cent over the past two decades, from 5.58 children per woman in 1966 to 4.14 in 1986, while the Indian total fertility rate declined by 50 per cent, from 5.5 1 children per woman to 2.77 during the same period.

The fertility decline of 2.7 children per woman observed among Indians, as compared with 1.4 children per woman among Fijians over the past two

* The authors of this note are Bhakta Gubhaju, Research Fellow, and Md. Shahidullah, M.Sc., Graduate Student, Graduate Programme in Demography, National Centre for Development Studies, Australian National University, P.O. Box 4, Canberra ACT 2601, Australia. The authors acknowledge with gratitude the valuable suggestions of Hari Narayan Shankar, Acting Government Statistician, Bureau of Statistics, Fiji; and the comments of Lorraine Corner and Chris McMurray of the Graduate Programme in Demography on an earlier draft of this note.

**Table 1: Age-specific and total fertility rates (per thousand)
by ethnic origin, Fiji, 1966-1 986**

Age group	Fijians			Indians		
	1966 ^a	1976 ^a	1986 ^b	1966 ^a	1976 ^a	1986 ^b
15-19	55	42	62	95	53	62
20-24	287	237	211	329	244	207
25-29	323	257	227	299	218	162
30-34	238	174	171	203	113	80
35-39	148	99	106	122	49	29
40-44	59	37	40	48	14	10
45-49	7	4	11	6	1	5
TFR	5.58	4.25	4.14	5.51	3.46	2.77

Sources: ^a Zwart, F.H.A.G. (1979).
^b Bureau of Statistics (1989).

decades, is by no means small. It is also noteworthy that the 1966-1976 decade was marked by a much faster decline in fertility of both groups. However, the fertility of Indian women seems to have continued to decline during the 1976-1986 decade, while that of Fijian women has virtually stabilized.

Factors that resulted in the fertility decline among Fijians and Indians in Fiji between the decades 1966-1976 and 1976-1986 are of considerable interest. There are sophisticated techniques available to decompose fertility into its major proximate determinants (Bongaarts, 1978). However, owing to data limitations, the present note aims to decompose the changes in the total fertility rate observed between Fijians and Indians over the past two decades into marital structure and marital fertility by means of a simple decomposition technique.

Method and materials

The total fertility rate (TFR) is decomposed by means of a technique previously developed by Kitagawa (1955) and later adapted by Retherford and Ogawa (1978)²

The data required for the decomposition exercise were obtained from the 1966, 1976 and 1986 censuses of Fiji. The age-specific fertility rates were obtained by the application of the ownchildren method to the 1976 and 1986 censuses of Fiji (Bureau of Statistics, 1989). The data on age in the Fijian censuses were assessed to be of very high quality and so were the estimated age-specific and total fertility rates. It is to be noted that the age-specific and

total fertility rates estimated by the own-children method closely corresponded with estimates provided by the Ministry of Health and Vital Registration (Bureau of Statistics, 1989).

Table 2: Decomposition of the changes in the total fertility rate by ethnic origin, Fiji, 1966-1986

Ethnic origin	All ages	15-19	20-24	25-29	30-34	35-39	40-44	45-49
Fijians, 1966-1976								
Marital structure	-0.20	0.00	-0.02	-0.02	0.00	0.00	0.00	0.00
Marital fertility	-1.13	-0.01	-0.03	-0.05	-0.06	-0.05	-0.02	0.00
Total	-1.33	-0.01	-0.05	-0.07	-0.06	-0.05	-0.02	0.00
TFR declined by 1.33, from 5.58 to 4.25								
Fijians, 1976-1986								
Marital structure	-0.18	0.00	-0.02	-0.01	-0.01	0.00	0.00	0.00
Marital fertility	0.07	0.02	-0.01	-0.02	0.00	0.01	0.00	0.01
Total	-0.11	0.02	-0.03	-0.03	0.00	0.01	0.00	0.01
TFR declined by 0.11, from 4.25 to 4.14								
Fijians, 1966-1986								
Marital structure	-0.40	0.00	-0.04	-0.03	-0.01	0.00	0.00	0.00
Marital fertility	-1.04	0.01	-0.04	-0.07	-0.06	-0.04	-0.02	0.00
Total	-1.44	0.01	-0.08	-0.10	-0.07	-0.04	-0.02	0.00
TFR declined by 1.44, from 5.58 to 4.14								
Indians, 1966-1976								
Marital structure	-0.49	-0.03	-0.04	-0.02	0.00	0.00	0.00	0.00
Marital fertility	-1.56	-0.02	-0.05	-0.06	-0.09	-0.07	-0.03	0.00
Total	-2.05	-0.04	-0.09	-0.08	-0.09	-0.07	-0.03	-0.01
TFR declined by 2.05, from 5.51 to 3.46								
Indians, 1976-1986								
Marital structure	-0.06	0.00	-0.01	0.00	0.00	0.00	0.00	0.00
Marital fertility	-0.63	0.01	-0.03	-0.05	-0.03	-0.02	0.00	0.00
Total	-0.69	0.01	-0.04	-0.06	-0.03	-0.02	0.00	0.00
TFR declined by 0.69, from 3.46 to 2.77								
Indians, 1966-1986								
Marital structure	-0.54	-0.03	-0.05	-0.02	-0.01	0.00	0.00	0.00
Marital fertility	-2.20	-0.00	-0.07	-0.12	-0.12	-0.09	-0.04	0.00
Total	-2.74	-0.03	-0.12	-0.14	-0.13	-0.09	-0.04	0.00
TFR declined by 2.74, from 5.51 to 2.77								

Results

Table 2 shows that, of the decline in the total fertility rate of 2.7 children per woman among Indians over the past two decades, a decline of slightly over two children occurred during the decade 1966-1976 and a decline of less than one child occurred during the decade 1976-1986. Similarly, of the decline in the total fertility rate of 1.4 children per woman among Fijians during the same period, almost all of the decline occurred during the earlier decade while the 1976-1986 decade witnessed only a negligible decline. In both ethnic groups, women in the age groups 20-34 contributed most to the decline in the total fertility rate over the past two decades.

The changes in marital fertility during the decade 1966-1976 among Indians contributed most to the decline in the total fertility rate while changes in marital structure had very little effect. However, during the 1976-1986 decade, the contribution of marital fertility in reducing the total fertility rate was much less than its contribution in the earlier decade. The changes in marital structure, although slight, contributed negatively to the changes in the total fertility rate. The decline in marital fertility was more pronounced among women in the older age groups (30-39) during the earlier decade, whereas women in the age group 25-29 contributed most to the decline in marital fertility during the latter decade.

During the decade 1966-1976, the changes in Fijian marital fertility contributed most to their observed decline in the total fertility rate, along with changes in marital structure to some extent. By contrast, during the 1976-1986 decade, changes in marital fertility, although very small, contributed to a rise in the total fertility rate but were more than counterbalanced by the negative influence of the changes in marital structure. There has been a shift in the relative contribution of marital fertility among Fijians to the changes in the total fertility rate between the 1966-1976 and 1976-1986 decades. Like Indian women, marital fertility decline was contributed mostly by women in the 25-39 age groups during the earlier decade, while an increase in marital fertility is attributed to the increase in fertility of women in the younger and older age groups.

Discussion and conclusion

It is clear from the results of the decomposition of age-specific and total fertility rates that the decline in marital fertility made the greatest contribution to the decline in the total fertility rate of both ethnic groups during the decade 1966-1976. During the decade 1976-1986, marital fertility declined very little among Indians, and increased slightly among Fijians. The changes in marital structure have also played important roles: they tended to reduce total fertility among Indians during the 1966-1976 decade, but their effect was almost nil

Table 3: Percentage currently married among women in the reproductive age groups and singulate mean age at marriage (SMAM) by ethnic origin, Fiji, 1966-1986

Age	Fijians			Indians		
	1966	1976	1986	1966	1976	1986
15-19	9.9	9.6	9.9	22.3	15.7	15.9
20-24	56.3	52.2	48.1	77.3	66.4	64.4
25-29	81.6	77.4	73.6	92.9	86.1	85.0
30-34	88.0	86.3	83.3	94.5	91.6	89.6
35-39	88.1	87.7	85.9	94.2	90.2	89.7
40-44	86.4	86.2	87.3	90.9	87.6	86.8
45-49	82.8	82.3	84.0	83.2	81.1	82.2
SMAM	22.4	22.1	23.4	20.3	21.1	21.6

Source: Bureau of Statistics (1989).

during the 1976-1986 decade. The negative impact of marital structure on the total fertility rate of Fijians was much more apparent in 1976-1986 than in the earlier decade. This is explained by the fact that while the mean age at marriage of Indian women increased from 20.3 years in 1966, to 21.1 years in 1976 and 21.6 years in 1986, among Fijian women the mean age at marriage fell from 22.4 years in 1966 to 22.1 years in 1976 and then rose to 23.4 years in 1986 (table 3).

Table 4: Marital age-specific fertility rate (per thousand) by ethnic origin, Fiji, 1966-1986

Age	Fijians			Indians		
	1966	1976	1986	1966	1976	1986
15-19	556	438	626	426	338	390
20-24	510	454	439	426	367	321
25-29	396	332	308	322	253	191
30-34	270	202	205	215	123	89
35-39	168	113	123	130	54	32
40-44	68	43	46	53	16	12
45-49	8	5	13	7	1	6
MTFR	9.88	7.93	8.80	7.89	5.76	5.20

Source: Calculated from tables 1 and 3.

The result of the decomposition of total fertility is supported by the data presented in table 5. The values of the index of overall fertility (I_f)³ and the index of marital fertility (I_g)⁴ reveal that in both ethnic groups overall and marital fertility declined sharply between 1966 and 1976. However, among Fijians the index of overall fertility and the index of marital fertility declined very little between 1976 and 1986. On the other hand, Indians continued to show some decline in both indices between 1976 and 1986. This table also shows that among Fijians the index of proportion married (I_m)⁵ declined from 0.65 in 1966 to 0.61 in 1976 and 0.60 in 1986. Among Indians, the value of I_m declined from 0.74 in 1966 to 0.67 in 1976, and rose to 0.70 in 1986. This explains why the negative impact of the changes in marital structure on fertility among Fijians during 1966-1976 also persisted during 1976-1986. Among Indians, changes in marital structure contributed less to the fertility decline during 1976-1986 than during 1966-1976.

The Coale-Trussell (1974) index of control of marital fertility (m)⁶ presented in table 5 also supports the result of the decline in marital fertility among Fijians and Indians during the two decades. Among Fijians, the value of m increased from 0.70 in 1966 to 0.95 in 1976 and then declined to 0.80 in 1986. This is basically the reason why the changes in marital fertility contributed negatively to the fertility decline during the earlier decade and positively during the later decade. On the other hand, among Indians the value of m increased sharply from 0.76 in 1966 to 1.42 in 1976 and increased negligibly to 1.48 in 1986. This explains the larger contribution of marital fertility to the decline in total fertility during 1966-1976 and a very small contribution during 1976-1986.

The data on the family planning acceptance rate presented in table 5 further support our result. In Fiji, the family planning programme was officially started in 1962 by the introduction of family planning activities in 12 health centres. In 1963, this activity was extended to all health centres and nursing stations. In the same year, the Family Planning Association of Fiji was founded and engaged in a publicity campaign through the press, radio, posters and pamphlets (Medical Department, 1968). The number of family planning acceptors increased sharply. There are, however, no reliable data on family planning before 1972 from which to calculate the family planning acceptance rate.

Estimates based on sales, attendance, loop insertions and information provided by private pharmacists roughly indicate a family planning acceptance rate of around nine per cent for Fiji. It was also suggested that Indians had a somewhat higher acceptance rate than Fijians, because

Indians were more and more convinced of the wisdom of having small, healthy and well educated family but the same cannot be said as yet of the Fijians (Medical Department, 1968, p. 13).

**Table 5: Selected socioeconomic and demographic indicators
by ethnic origin, Fiji, 1966-1986**

Indicators	Fijians			Indians		
	1966	1976	1986	1966	1976	1986
Index of overall fertility (I_f) ^a	0.44	0.34	0.32	0.43	0.30	0.23
Index of marital fertility (I_g) ^a	0.79	0.56	0.53	0.58	0.44	0.33
Index of proportion married (I_m) ^a	0.65	0.61	0.60	0.74	0.67	0.70
Coale-Trussell index of control of marital fertility (m) ^a	0.70	0.95	0.80	0.76	1.42	1.48
Expectation of life at birth (years) ^b						
Males		60.7	63.1		59.5	59.6
Females		63.9	65.3		62.4	65.1
Infant mortality rate (per thousand) ^{b/}						
Males		36.8	19.6		41.3	23.0
Females		28.2	18.8		32.6	19.6
Literacy rate (per cent) ^b						
Males	89	89	94	67	79	85
Females	83	84	92	45	63	74
Economically active population (per cent) ^b						
Males	91.6	86.0	85.6	89.3	83.4	86.2
Females	8.1	21.1	27.8	4.7	11.6	17.9
Family planning acceptance rate (per cent)	9.0 ^c	15.0 ^{d/}	18.7 ^{e/}	9.0 ^{e/}	28.1 ^{d/}	35.6 ^e

Sources: ^a Calculated from the 1966, 1976 and 1986 censuses of Fiji.
^b Bureau of Statistics (1989).
^c Estimated by Medical Department (1968) at around 9 per cent for Fiji, with slightly higher rates for Indians.
^d Bavadra and Keirski (1980).
^e Figures provided by the Ministry of Health, Suva, Fiji.



The use of contraceptives such as IUDs is somewhat higher among Fijians of Indian background than the rest of the population. The overall family planning acceptance rate for Fiji is about 9 per cent. (United Nations photograph)

The family planning acceptance rate reached 15 per cent among Fijians and 28.1 per cent among Indians in 1976. This is undoubtedly an impressive increase in the family planning acceptance rate in only one decade, which explains the faster decline in fertility between 1966 and 1976 among both Fijians and Indians. However, the family planning acceptance rate did not rise as much during 1976-1986 as in the earlier decade; reaching only 18.7 per cent among Fijians and 35.6 per cent among Indians in 1986. The family planning acceptance rate among Indians was almost twice as high as among Fijians, which is why the Indian fertility in 1986 had fallen sharply to 2.8 children, as compared with 4.1 among Fijians.

This raises questions. Why have Fijians not been motivated to accept family planning as much as Indians? Are their lower acceptance rates related to the educational differentials, the mortality differentials or to differences in economic activity?

In fact, none of these factors seems likely to explain the differences in the family planning acceptance rate, because Fijian women are more literate, more economically active and above all, have higher life expectancies and lower infant mortality than those of Indian women (table 5). Therefore, it is puzzling that, in spite of all these positive factors in the Fijians' favour, they do not seem to be

sufficiently motivated to adopt family planning. Here, it is worth noting the remarks of Bavadra and Keirski (1980). They held the view that the low use of contraception among Fijians might be due to a negative attitude towards family planning, based on the mistaken belief that plentiful land is still available; fear of political domination by immigrant Indians, who outnumber indigenous Fijians; and the Roman Catholic Church's opposition to artificial means of contraception (Bavadra and Keirski, 1980, p. 22). These remarks gain some support from the empirical findings of the Fiji Fertility Survey 1974, which reported that 38 per cent of Indians, as opposed to 27 per cent of Fijians, wanted to limit their families to two children. Data from this survey revealed that the practice of contraception was greater among Fijian Methodists than among Catholics, whereas there was no difference in this respect between Hindu and Muslim Indians. Furthermore, a greater proportion of Fijian women than Indian women said they relied on traditional methods. The Fiji Fertility Survey also reported that 20 per cent of all Fijian current users were practising a traditional method, as opposed to only 11 per cent of Indian current users (Bureau of Statistics, 1976).

Motivational factors, rather than socioeconomic factors, seem to have played important roles in the differentials in contraceptive use and fertility among Fijians and Indians. There is, therefore, a pressing need for further research that properly addresses the motivational, cultural, religious and behavioural aspects of fertility and family planning among Fijians and Indians in Fiji.

Footnotes

1. According to the 1986 census, the population of Fiji was 715,375, of whom 48.7 per cent were Indians, 46.0 per cent were Fijians and the remaining 5.3 per cent comprised other groups.
2. The total fertility rate can be written $TFR = 5 \sum f_i$; also, $TFR = 5 \sum M_i \cdot F_i$, where f_i is the age-specific fertility rates in the age group i , M_i is the proportion of women married in the age group i , and F_i is the age-specific marital fertility rate of married women in the age group i . The changes in TFR can then be decomposed into components according to the formula given by Retherford and Ogawa (1978) as follows: $\Delta TFR = 5 \sum F_i \cdot \Delta M_i + 5 \sum M_i \cdot \Delta F_i$, where the symbol Δ denotes changes and F_i and M_i are average values over the period, obtained by summing the beginning and end values and dividing by two. From the above equation, we obtain a sum of two components of changes in TFR: the first on the right hand side of the equation is the contribution of the changes in TFR due to changes in marital structure and the second indicates the changes in TFR due to changes in marital fertility. Each of the two components can also be broken down by five-year age groups.
3. The index of overall fertility (I_f) indicates the extent to which the women in a given population approach the number of births they would have if they were subject to the age-specific fertility rates of married Hutterite women. Precisely, $I_f = B / \sum W_i F_i$, where B is the actual total births to the population in question in a given year, W_i is the number of women in each five-year age group from 15 to 49 years, and F_i is the marital fertility of Hutterite women in each age group.

4. The index of marital fertility (I_m) indicates the extent to which the married women in a given population approach the number of births they would have if they were subject to the age-specific fertility rates of married Hutterite women, and can be expressed as $I_m = BL / \sum M_i F_i$, where BL is the number of legitimate births, and M_i is the number of married women in each five-year age group from 15 to 49 years.
5. The index of proportion married (I_m) indicates the extent to which marriage contributes to the achievement of the highest potential of fertility of the population in question. It shows the number of births that would occur if married women experienced the Hutterite fertility schedule relative to the number that would occur if all women experienced that fertility rate. It can be calculated as $I_m = \sum M_i F_i / \sum W_i F_i$.
6. Coale and Trussell (1974) observed that, in a controlled fertility population the ratio of marital fertility $r(a)$ at any age "a" to the corresponding value from a schedule of natural fertility $n(a)$ is given by the following relationships: $r(a)/n(a) = M \cdot e^{m \cdot v(a)}$, where $r(a)$ is the age-specific marital fertility rate of a given population aged "a", $n(a)$ is the age-specific marital fertility rate at age "a" under natural fertility, $v(a)$ is the assumed age pattern of fertility control, M is the scale factor expressing the ratio $r(a)/n(a)$ at age group 20-24, "e" is the exponential factor, and "m" is the factor expressing the degree of departure of fertility from natural fertility of the measure of extent of fertility control within marriage.

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Further Evidence of the Onset of Fertility Decline in Nepal*

Until recently, it was believed that fertility in Nepal has persisted at a very high level with a total fertility rate (TFR) of around six children per woman. In a recent article, Tuladhar (1989, pp. 15-30), using the birth history data from the 1986 Fertility and Family Planning Survey, obtained a TFR of 5.61 children per woman for the period 1980-1985. This rate was obtained without any adjustment to the raw data. He cautiously concluded that Nepal may be on the verge of the onset of fertility decline. Except for this publication, the author knows of no other studies so far which address the issue of fertility decline in Nepal. Therefore, the aim of this note is to use village-level data to contribute to the on-going debate about the onset of fertility decline in Nepal in general and the study population in particular.

* The author of this note is Bhanu B. Niraula, Sociologist, Agricultural Projects Services Centre, Kathmandu, Nepal. He is currently on leave to pursue Ph.D. studies in demography at the Australian National University, Canberra. This note is based on one of the chapters of his forthcoming thesis entitled "The Socioeconomic Context of High Fertility in Rural Nepal". The author acknowledges with gratitude the assistance of B.B. Gubhaju and the helpful comments of D. Lucas, A. Coles and M. May as well as the United Nations Population Fund (UNFPA) Nepal for its partial funding of the field study.

Method, materials and quality of data

Data for the present study come from a village study conducted between August 1988 and January 1989 in Benighat Village Panchayat. Benighat Village Panchayat is one of the village panchayats (village councils) in Dhading district in the central hills of Nepal and is about 75 kilometres south-west of Kathmandu.

Two sets of questionnaires were developed to collect socio-economic and fertility data: a household survey questionnaire and a fertility and family planning questionnaire. Apart from collecting socioeconomic information on the household, the household questionnaire obtained detailed information on the size of the family, including age, sex and relationships of family members to the household head. The fertility and family planning questionnaire was designed for interviewing individual women. Ever married women aged 15-55 years were identified from the household questionnaire and were asked fertility and family planning questions. The information collected on fertility included birth history data and number of children ever born.

For the purpose of this note, the own-children method of fertility estimation is applied. Details of the method are reported elsewhere (Cho *et al.*, 1986; Retherford *et al.*, 1979; Ogawa, 1980). It is a survey or census-based reverse survival technique for estimating age-specific fertility rates. For this purpose, women aged 15-64 and children aged 0-14 are reverse survived for 15 years preceding the survey to estimate the number of births and person-women lived in each year. This method uses the relationships of mothers with their children. All children aged 0-14 years are matched with mothers aged 15-64 years who are living in the same household. All matched children are referred to as own-children and the remaining unmatched children are referred to as non-own children. All such unmatched children are distributed to mothers of matched children on the assumption that the age distribution of unmatched children to their mothers is identical to that of children whose mothers were identified.

Although the method provides age-specific fertility rates for each of the 15 years preceding the survey, in the present application the rates are calculated for each of the previous 2-13 years. This is done to minimize the effect of under-enumeration of children aged 0 and 1, which, if included in the estimates, may indicate a spurious fertility decline during those two years (Retherford *et al.*, 1979, p. 9). Similarly, estimates for the distant past (14 and 15 years) have been disregarded because the estimates are based on a relatively small number of cases. Furthermore, in doing so, the effect of out-migration of children for study or otherwise on the fertility estimate is minimized. Schroeder and Retherford (1979) used this approach to estimate fertility in a Nepalese village. The method further assumes that appropriate

life tables are available for the study of the population for the period 1.5 years before the survey date. The reliability of the method is enhanced if the following conditions are met: accurate age classification, low migration rates, clearly specified kin relationships, a low proportion of non-own children and low levels of mortality (Cho *et al.*, 1986, pp. 1-7; Retherford *et al.*, 1979, pp. 4-9; Schroeder and Retherford, 1979, p. 248; Ogawa, 1980, pp. 65-66).

Although there is a heavy preference for digits ending with 0,5 and, to a lesser extent even numbers, the age reporting seems to be improving. This is evident from the fact that in the 1976 Nepal Fertility Survey, only 13.4 per cent of ever married women were able to report their date of birth. This figure rose to 29.8 per cent in the 1986 Nepal Fertility and Family Planning Survey (HMG, 1987, pp. 40-51). Some of the factors responsible for this improvement are rise in literacy rate, requirement of proof of age at the time of schooling of children, requirement of citizenship certificate which documents age and is used for legal and financial transactions, introduction of vital registration and participation in elections. Age heaping of children rather than of the mother is of more serious concern in the application of this method (Schroeder and Retherford, 1979; Retherford *et al.*, 1979) and because the events are more recent, children's ages are reported more accurately. Furthermore, the quality of age data in this village study is not a serious problem as maximum effort was made to solicit the correct age of mother and children. Local enumerators were used to collect information and in cases where the age of a person was doubtful, further probing was used.

Detailed information was obtained on age, sex and relationships with the household head, and based on these relationships, children were matched



For the village study, detailed data were collected about the households and based on these relationships, children were matched with their mothers.

Table 1: Number of women and children matched by age of women, Benighat, 1988

Age of women (years)	No. of women	No. of own children (aged 0-14 years)
15-19	58	25
20-24	118	206
25-29	144	375
30-34	110	360
35-39	105	282
40-44	80	175
45-54	104	90
55+	48	1
Total	767	1514
No. of non-own children		51
Total children		1 565
Percentage of unmatched children		3.3

Source: Benighat Survey, 1988.

with their own mothers. Table 1 gives the distribution of the number of women and children used in the application of the own-children method of fertility estimation for Benighat. There was only a small proportion of children (3.3 per cent) who were unmatched or non-own children.

Migration is also not a serious problem for this study, as migration is mostly seasonal and male selective. The construction and operation of a highway connecting the village, and the intensification of horticultural and vegetable cropping has created employment opportunities, thereby reducing the need for permanent migration.

Levels of mortality are not adequately known for the study population. Although a low mortality level is desirable, the level of mortality is not a serious problem in the application of the method, as it has been contended that the own-children method is fairly robust with regard to errors in mortality estimation (Schroeder and Retherford, 1979, p. 250). In 1981, the estimated expectation of life at birth for males was 54.8 years and for females 51.4 years (CBS, 1985, pp. 79). Therefore, an average life expectancy of 52 years has been assumed and Coale and Demeny Model West life tables have been used for generating reverse survival ratios.

Results and discussion

Although the method produces age-specific and total fertility rates from 1974 to 1988, for reasons previously discussed, only the rates for 2-13 years (based on children aged 2-12 years) preceding the survey are considered here. To minimize the effect of age heaping on fertility estimates discussed previously, this note uses a 3-4 year moving average for the estimates obtained for each year. The results are shown in [table 2](#).

This table shows that the age-specific and the total fertility rates have declined in recent years. Between 1976/79 and 1980/82, the TFR declined from 6.4 to 5.8 children per woman, a decline of 9 per cent. The TFR shows a further decline of 8.5 per cent between 1980/82 and 1983/86, from 5.8 children in 1980/82 to 5.3 children in 1983/86.

The age-specific fertility rates shown in [table 2](#) show a similar trend although the fertility of women aged 15-19 years and 20-24 years seems to have increased somewhat during the period 1976/79 to 1980/82. A slightly higher fertility of younger women can be credited to better nutritional standards

Table 2: Age-specific and total fertility rates for Benighat, 1976/79 to 1983/86

Age group (years)	Age-specific fertility rates			
	Years			% Change 1976/79-83/86
	1976/79	1980/8	1983/86	
15-19	223.8	231.5	231.1	+ 3.3
20-24	308.2	329.5	263.7	- 14.4
25-29	276.1	244.3	241.4	12.6
30-34	249.6	172.4	152.4	- 38.9
35-39	167.4	157.1	133.7	- 20.1
40-44	52.4	21.4	35.0	- 33.2
45 +	0.0	0.0	0.0	0.0
	1 277.5	1 156.1	1 057.3	
Total fertility rate	6.39	5.78	5.29	
Percentage change between periods	9.0	8.5	17.2	

Source: Benighat Survey, 1988.

brought about by the enhanced economic opportunities in the village. This is consistent with the findings of the Nepal Fertility and Family Planning Survey (HMG, 1987). The result also shows that there has been some change in the age pattern of child-bearing during the study period. The trends in age-specific fertility rates are plotted in the accompanying figure. The age-specific fertility rates reveal that in 1976/79, age-specific fertility of women aged 30-34 ranked third in its contribution to TFR. In 1983/86, however, the 30-34 age group was replaced by the 15-19 age group in third place. Thus, the highest age-specific fertility rate pertains to the 20-24 age group, followed by the 25-29 and the 15-19-year-old age groups.

Table 2 also shows that the largest decline in age-specific fertility occurred among women in the older age groups. During the period 1976/79 and 1983/86, the age-specific fertility rate of the 30-34 and 40-44 year-old age groups declined by 38.9 per cent and 33.2 per cent, respectively.

The decline in fertility in Benighat is supported by table 3 which shows the contraceptive prevalence rate of 17 per cent. As can be seen in table 3, there is a gradual increase in the current use of contraception among women in the older age groups. Therefore, the fertility decline observed among women in the older age groups is explained by the rise in the contraceptive prevalence rate by age. The study village has a health post. Besides providing preventive and curative health facilities, the health post is also responsible for publicising



Village health workers publicise contraceptives as well as provide health services.

Figure: Age-specific fertility rate for Benighat,
1976/79-1983/86

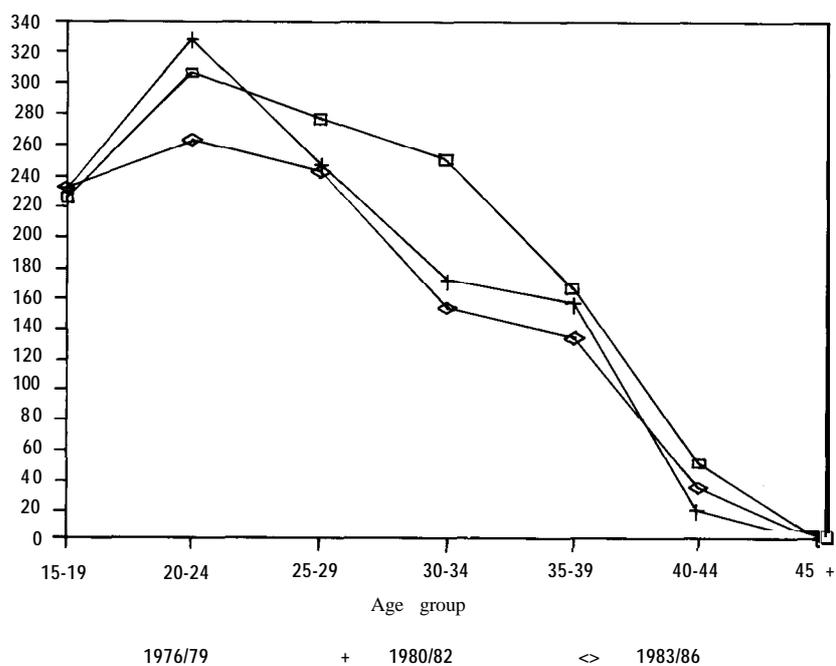


Table 3: Current use of contraceptives by current age
of women, Benighat, 1988

Current age (years)	Total number of women in the age group	Users (%)
15-19	58	6.9
20-24	118	10.2
25-29	144	16.0
30-34	110	20.9
35-39	105	26.6
40-44	80	27.5
45 +	104	11.5
Total	719	17.2

Source: Benighat Survey, 1988.

contraceptives and meeting the minimum targets for contraceptive distribution and use, including terminal methods. It was also found that a large majority of current users were sterilization acceptors and adopting a permanent family planning method is probably the best way to stop child-bearing for those who have achieved their desired family size. The current contraceptive use rate of 17.2 per cent is close to the national figure of 15 per cent. The 1986 Fertility and Family Planning Survey (HMG, 1987, table 10.18) similarly reported current contraceptive use rates as high as 24.6 and 22.3 per cent among women aged 30-34 and 35-39 years, respectively.

There are some other factors which have also contributed to this decline in fertility in Benighat. There has been a shift in the occupational pattern of Benighat as only 60 per cent of the population were found to be involved in agricultural pursuits. In Nepal, 91 per cent of the population are involved in agriculture (CBS, 1987, table 9.14). It should also be noted that the Government has intensified the production of commercial crops and integrated the Benighat village economy with the national and international economy. It has been argued that the transformation of the agricultural sector to the modern sectors reduces the labour value of children and makes a large number of children undesirable because of the cost of bringing up a child (Caldwell, 1976; IUSSP, 1976). It is this transition that the people of Benighat are beginning to experience.

There is further evidence to support this transition. The mean age at marriage is 13.5 years for women who were married for 25 years and longer; it has increased to 17.5 years for those women who married recently (marriage duration 0-4 years). One of the contributing factors to this transition is the rise in the literacy rate, especially that of women. In the present study, around 11 per cent of women aged 15-55 years were found to be literate. A further breakdown of this figure shows a substantial improvement in the literacy rate for women of the younger age groups. The literacy rate of women who are under the age of 25 years is 19.6 per cent compared with 5.3 per cent for women aged 26 years and above. Evidence from a large number of countries that have participated in the World Fertility Survey indicates that education has a positive effect on age at marriage (McDonald *et al.*, 1980, pp. 77-126). Similarly, there is evidence of an increased number of children attending school. In Benighat, about 60 per cent of children aged 6-14 were found to be attending school. The importance of education is being increasingly felt and the demand for establishing new educational institutions in the village is rising. Therefore, the improvement in literacy is not only manifested by enrolment figures but also by the increased number of educational institutions in the village. Schooling makes children's time for labour in the household economy less valuable and their upbringing becomes costly. This tends to reduce the demand for children for labour.

Summary and conclusion

In this note, fertility estimates obtained from the own-children method for the periods 1976/79, 1980/82 and 1983/86 clearly correspond with the estimates obtained from the 1976 Nepal Fertility Survey (HMG, 1977), the 1981 census (CBS, 1987) and Tuladhar's estimates (1989). The total fertility rate obtained from this study for the period 1976-1979 of around 6.4 children per woman corresponds with the TFR of 6.3 obtained from the 1976 Nepal Fertility Survey. The 1981 census estimates of the TFR for Nepal of around six children per woman (CBS, 1987, table 11.11) also matches with the estimates of a TFR of 5.9 children obtained from this study for the period 1980/82. Finally, Tuladhar's estimate of TFR of 5.6 children per woman for the period 1980/85 is also not far off the estimate of 5.3 TFR for the period 1983/86 for Benighat. Although the estimates of fertility from various sources are not strictly comparable owing to differences in reference periods and methods of estimation, there is now at least some evidence to support the fact that fertility has begun to decline in Nepal.

The decline in fertility is supported by an increase in contraceptive use, literacy rate and mean age at marriage. Increases in the literacy rate, contraceptive use and mean age at marriage are not confined only to the study population. The overall literacy rate for the country has increased from 14.3 per cent in 1971 to 23.5 per cent in 1981. The female literacy rate during the same period increased from 3.7 per cent to 11.5 per cent (CBS, 1987, table 6.1). The singulate mean age at marriage has increased from 16.7 years in 1971 to 17.2 years in 1981 (CBS, 1987, table 5.17). Infant mortality, which is one of the causes of the persistence of high fertility, has been declining. The infant mortality rate is estimated to have come down from around 156 per thousand in 1970/74 to 99 per thousand live births for the period 1982/85 (Gubhaju, 1984; Thapa and Retherford, 1982; HMG, 1987). There has also been a shift in occupational structure from agriculture to other sectors of the economy. The percentage of population involved in agriculture declined from 94.4 per cent in 1971 to 91.4 per cent in 1981 (CBS, 1987, table 9.14).

Judging from the consistency of estimated fertility obtained from various sources, it can, therefore, be concluded that fertility has started to decline in the study village and probably has done so in other parts of rural Nepal. All these factors give credence to the fact that Nepal has reached an important point in its demographic history and is beginning to experience the onset of fertility decline. However, there is a need for further research to identify the sub-groups in the population which have already experienced the decline so as to help in the formulation and implementation of family planning, population and development programmes to continue the current decline in fertility.

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