China: Surplus Labour and Migration

Urban fertility decline in recent decades is now having the beneficial effect of easing entry-level urban employment problems.

By Judith Banister and Jeffrey R. Taylor*

The populations of most developing countries have been growing rapidly in recent decades. During the 1970s and 1980s, the number of persons of working age has often grown even faster than total populations. The struggle to provide enough employment for a burgeoning labour force often fails, resulting in high unemployment plus a large part of the working

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population "visibly underemployed" (working fewer hours or days than they would like) or "invisibly underemployed" (doing work of extremely low productivity for low income or underutilizing skills). 1/

China does not have serious unemployment, because of the commitment to full employment that has been followed for four decades, and because labour underutilization generally manifests itself as underemployment rather than unemployment in a rural economy such as China (Taylor, 1986). In fact, employment participation rates in China are extraordinarily high. According to the 1982 census, of the total population ages 15 and older, fully 86 per cent of men and 70 per cent of women were employed (Census, 1985, 272-281, 384; Arriaga and Banister, 1985, 168-172). "Full employment" is a misleading term, however. In the recently disbanded rural communes, everyone was technically employed, even if the marginal productivity of many farmers was zero. In cities also, a high proportion of men and women are employed, but enterprises are overstaffed; many workers are "employed without work" (Ji Yecheng, 1986, 2; Chen Jiyuan, 1986, 15-16). Underemployment has become evident in the last decade because economic reforms have boosted labour productivity and efficiency. The rural population has greatly benefited from these reforms; real per capita income of China's peasants doubled from 1977 to 1986, for example (Statistical Yearbook 1987, 671). But the number of workers required in farming has declined, and the ranks of underemployed farmers have grown sharply. Increased mechanization of agriculture, removal of marginal land from cultivation, and economizing on labour use across virtually all crops have created a crisis in rural labour utilization, the magnitude of which has only recently become clear (Taylor and Banister, 1988).

Because 67 per cent of China's rural work force is engaged in crop production (see table), estimates of rural underemployment concentrate on this sector. Chinese scholarly and official sources during the 1980s have produced a range of estimates from 60 million to 156 million surplus labourers, out of a total of about 250 million farmers growing crops. The usual estimate of around 100 million surplus rural workers constitutes about 40 per cent of rural employment in farming, or one-quarter of all rural workers. This estimate is derived from comparisons of actual employment to required employment. Required employment is estimated either by applying an aggregate figure for cultivated acreage per worker in some past benchmark year to current cultivated acreage, or by using current survey data on labour requirements per crop, weighted by total acreage of each crop under cultivation (Taylor, 1988, 749-753). The latter technique is the better of the two, but is still fairly crude, and sensitive to assumptions on labour days per year available per worker.2/

What has rendered one-quarter of China's rural work force redundant? First, for decades China's economic strategy promoted relatively capital-intensive heavy industrialization to the detriment of more labour-intensive light industry and agriculture. Services were neglected to the point that many were made illegal. This blocked possibilities for productive employment, and concentrated workers in agriculture where their labour was not needed.

Second, China experienced rapid population growth for several decades. The huge cohorts born in the 1950s, 1960s, and the first half of the 1970s have entered the labour force in succession, swelling the supply of workers without a commensurate increase in employment opportunities.

Third, the policy of closing off urban areas to migration from rural areas forced the countryside to absorb almost all the increased numbers of young adults who had been born there (Li Qingzeng, 1986, 18). In addition, during the Cultural Revolution and its aftermath, 1968-1978, national policy was to export to rural areas urban youth who could not easily be employed in their native cities. China's countryside had to absorb 17 million teenagers and young adults from the cities, and rural villages became the residual population sink for the whole country.

Yet China, even a century before the founding of the People's Republic in 1949, had already been facing severe population pressure on the known resource base, particularly the supply of arable land. Since 1949, rapid population growth in rural areas has contributed to a sharp reduction in arable land per capita. Roads, factories, dams and housing have also encroached on some of the most productive farmland. These forces combined with the "detention" of surplus labourers in the rural agricultural sector (Li Qingzeng, 1986, 18) have resulted in a drop in the arable land per agricultural labourer to only 0.3 hectare (Walker, 1988, table 1).

Leave the land but not the village

In the 1980s, it has become clear that China must move a large proportion of farmers out of crop production, The fact that 254 million workers, two-thirds of the rural work force, are still allocated to crop farming depresses labour productivity, causes many workers to be idle a large part of the year, slows down the adoption of more efficient crop growing methods, and dampens the growth of rural per capita incomes. Yet the Chinese Government believes that it would be disastrous if all underemployed rural labourers moved to urban areas. China's strategy for the transfer of its surplus rural work force out of farming is to keep them as close to home as possible. How is this being done?

Table: China: Employment levels and growth rates, 1978-1987

Sector	Employment at year-end (in thousands)										Average annual growth (per cent)	
	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1952-78	1978-87
Total national employment	398,560	405,810	418,960	432,800	447,060	460,040	475,970	498,730	512,820	527,830	2.5	3.1
Urban and state employment	95,140	99,990	105,250	110,530	114,280	117,460	122,290	128,080	132,920	137,830	5.2	4.1
Rural employment	303,420	305,820	313,710	322,270	332,780	342,578	353,676	370,651	379,898	390,004	2.0	2.8
Agriculture	285,330	285,630	293,570	303,100	311,530	316,451	316,850	303,515	304,679	308,700	1.9	.9
Crop production						282,836	254,969	249,409	253,658			
Other agriculture						33,615	61,881	54,106	51,022			
Non-agricultural	18,090	20,190	20,140	19,170	21,250	26,127	36,826	67,136	75,219	81,304	2.5	16.7
Industry	7,500	8,980	9,160	8,830	8,790	8,730	10,336	27,410	31,393	32,972	2.9	16.5
Township								10,288	11,310			
Village								10,130	11,076			
Below-village								6,814	8,808			
Construction	2,280	2,640	3,100	3,490	3,790	4,825	8,114	11,301	13,086	14,313	3.3	20.4
Transport, post & telecommunications	940	1,050	1,510	1,100	1,150	1,609	3,164	4,341	5,061	5,625	1.4	19.9
Commerce & catering	760	870	1,100	1,260	1,300	2,062	4,217	4,626	5,318	6,069	-6.1	23.1
Health, education & science	4,610	4,680	4,770	3,840	3,580	3,877	4,107	4,455	4,547	4,565	7.5	-.1
Health, and education						3,760	3,987	4,325	4,393	4,409		
Health, sports & social services								1,224	1,246	1,270		

Education, arts & broadcasting								3,101	3,147	3,139	
Scientific research						117	120	130	154	156	
Government	760	750	280	350	340	554	739	809	1,034	1,196	5.0
Other sectors	1,240	1,220	220	300	2,300	4,470	6,149	14,194	14,780	16,564	28.8
Residential, public & household services								887	1,262	1,381	
Banking & insurance								116	142	162	
Other								13,191	13,376	15,021	

Sources: China, State Statistical Bureau, *China Rural Statistics Yearbook, 1985* (in Chinese), *Zhongguo tongji chubanshe*. Beijing, 1985, p.224; He Kang *et al.*, (eds.), *Agricultural Yearbook of China, 1986* (in Chinese), *Nongye chubanshe.* Beijing, 1986, pp.197-*199; Statistical Yearbook 1986,* pp. 124, 145-146; China, State Statistical Bureau, *Statistical Materials on Labour and Wages* (in Chinese), *Zhongguo tongji chubanshe,* Beijing, p.80; China, State Statistical Bureau, *China Rural Statistics Yearbook, 1987* (in Chinese), *Zhongguo tongji chubanshe,* 1987, p.212; He Kang *et al.*, (eds.), *Agricultural Yearbook of China, 1987* (in Chinese), *Nongye chubanshe,* 1987, pp.152-154; China, State Statistical Bureau, *Statistical Abstract of China 1988* (in Chinese), *Zhongguo tongji chubanshe,* 1988, pp.15, 21.

Notes: Total and urban employment figures were reported only to the nearest 10,000 persons, whereas rural employment was reported to the nearest 1,000. Therefore, rural and urban employment may not sum exactly to the national employment figure. Rural employment data underwent a revision in 1985, which moved village-and-below industry from agriculture to industry proper. Revisions also appear to have been made to "other sectors" above. Because of this, time series for rural agriculture, industry and "other sectors" display sudden changes between 1984 and 1985.

First, since the beginning of the rural economic reforms in 1978, crop farmers have been encouraged to work at least part-time in other agricultural pursuits, such as animal husbandry, aquaculture (fish farming), egg production, forestry, or other agricultural sidelines. Such diversification of agriculture can raise rural household incomes because these pursuits are generally more profitable than crop farming. This policy also contributes to greater variety and better nutrition in the diet of the Chinese people, a diet unusually dependent on direct consumption of grains. After the completion of the shift from collective agriculture to household contracts, the number of farmers in crop production declined by 28 million in 1984. The total number of agricultural workers in rural areas stayed constant, however, because these farmers shifted into other agricultural activities (table).

Second, China is promoting a strategy of rural industrialization, in which villages and small towns are encouraged to build small factories to employ rural labourers as they transfer out of agriculture. These factories often serve local needs, producing agricultural machinery, household items, materials for housing construction, or articles for personal use. Sometimes they fill a natural niche by canning, drying, or otherwise processing locally produced foods and other agricultural products. Some of them, especially in coastal provinces, even produce for export. This policy has been successful, and by year-end 1987, there were 33 million workers employed in rural industries (table).

Third, since the rural reforms began in 1978, the Government has followed a policy of loosening prior restrictions on service jobs, including those in retail trade, transport, residential services, repair work, banking and construction. Millions who have left agriculture now provide these services in rural areas.

Leave the land and the village

So far, there are limits to how many workers can be transferred out of crop production into other agricultural or non-agricultural work without moving away from home. Many remain in crop farming for lack of any other local alternative. Many others, though they are still included in the statistical category of a rural agricultural or non-agricultural worker in their native village, have in fact migrated to work elsewhere. For instance, of the 14 million rural construction workers listed in the table, 5 million are in construction teams that work in urban areas. [3/] Many “rural” transport or retail trade workers have migrated to a city or urban town, but have not been granted urban permanent registration, so they are still classified as rural workers.

In assessing the success of China's policy of rural industrial and service sector development, it is important to realize that Chinese employment statistics are somewhat misleading. The statistics in the table indicate that there are 81 million non-agricultural workers in rural areas, yet millions of them have migrated to urban jobs. In addition, "rural" employment in the table includes workers in the nearby suburban districts of cities who are an integral part of the city economy no matter whether their jobs are categorized as agricultural or non-agricultural (Fa Ganlin, 1988, 28). Therefore, China's economic transformation from a primarily rural work force to a primarily urban one may have progressed farther than the data suggest.

Data on migration in China are also confusing and contradictory. Much of the problem is caused by a residual ideological tendency to pretend that a migrant has not really migrated. In addition, different data sets use inconsistent definitions of what a migrant is. The permanent registration system, for instance, ignores all migration that does not involve a change of permanent registration, but includes registration changes over short distances within the same county or city. The 1987 sample census, in contrast, included as migrants those who had migrated without a change of registration, but ignored all moves within the same county or city. It is possible, therefore, that both data sets underestimate the true magnitude of migration for different reasons.

There are severe disadvantages to China's policy of trying to keep rural people where they are. For example, most rural industries involve very little capital investment, use simple technology, take up valuable agricultural land, and have almost no pollution controls. Whereas air and water pollution used to be primarily a city problem, now enthusiastic promotion of rural industrialization is despoiling the environment of villages in many areas (Ma Rong and Jiang Meiqiou, 1988).

Chinese sources are discussing concentrating the industries in a county industrial zone or in urban towns or small cities (Zheng Kunsheng, 1988, 24). Some argue that rural industries waste resources, are inefficient, and will be unable to compete with urban industries once China's transport system improves and urban reforms are implemented (Ke Bingsheng, 1985, 59-62). But others contend that rural industries are very competitive because they involve low capital costs and use cheap labour, and are quick to respond to market signals.

The difficulty of absorbing all surplus farmers locally has prompted China's Government to reconsider its decades-long hostility to rural-to-urban migration. In 1980, the leaders restated their policy of "strictly

controlling the development of large cities", but promoted a new strategy of "rationally developing medium-sized cities, and actively promoting the development of small cities and towns". Consistent with this policy, rural out-migrants have been steered towards the smallest urban places.[4/] For example, in the two-and-a-half-year period from China's mid-year 1982 census to the end of 1984, the 2,505 urban towns counted in the census that were still towns by the end of 1984 grew from a permanent resident population of 55.0 million to 64.6 million. Of this population growth, 81 per cent was accounted for by net in-migration, meaning that there were 7.8 million net permanent in-migrants to those pre-existing towns (Blayo, 1987). Permanent migration from villages to towns was given official national approval only in 1984, when the State Council stipulated:

> All peasants and their family members, who apply for migration to engage in industry, commerce and services in towns, who have a fixed place of residence in towns, who are capable of doing business, and who have worked for a long period of time for some town or township enterprise, should be permitted to register as permanent households by the Public Security Office (Wang Xiang-ming, 1988, 22).

Though we do not yet have enough data to estimate the net permanent in-migration to urban towns since the 1984 regulation was implemented, the numbers surely have escalated since then.

But migration from rural areas to towns that includes a permanent change of registration is just the tip of the iceberg (Goldstein and Goldstein, 1987-88). Probably most actual migrants to urban towns and small cities are not allowed to shift their permanent residence from their village of origin to the urban place. Rather, they take up "temporary" residence in the town or just work and live there without formal documentation, remaining "rural workers" in the statistics.

China's economic reforms have once again given towns an economic role by allowing their markets to revive. For this reason, and owing to a loosening of the criteria for establishment of urban towns, new towns have sprung up all over China. They have helped to absorb surplus workers from the surrounding countryside to engage in trade, construction, or industry.

Those who are away from their location of official residence registration, whether for one week or ten years, are officially regarded as the "floating population". While the vast majority of China's people remain geographically immobile, the number on the move increases year

by year. For surplus labourers, travelling around seasonally for work or moving to where there is work can solve their problem of being underemployed in their home village. Chinese sources have recently ventured estimates of the number of people away from their residence location, and in the process highlighted the huge number of "floating" migrants in some places. For instance:

> It is estimated that some 50 million people have been moving around the country to make their fortune since China adopted its economic reform policy in the late 1970s. For example, in Shishi, Fujian Province, a town of 25,000 permanent residents, the floating population reaches 30,000 in the busiest seasons.[5/]

These 50 million or so workers away from their legal home constitute almost one-tenth of China's total employed population (table).

Until recently, there were few usable statistics on the rate of migration out of China's villages to other rural locations or to urban destinations. The 1982 census, for example, asked no questions on migration history of the respondents. Recently, however, Chinese scholars and officials have been trying to fill the void of migration information by using population registration data, migration surveys and several migration questions on the mid-year 1987 nation-wide sample census.

The Ministry of Public Security and other government organizations have begun releasing data on population movement from the systems of permanent and temporary population registration. For example, in 1987 a researcher at the State Planning Commission revealed that already by the end of 1985, there were 30 million people classified as "rural non-agricultural population" who had entered cities and towns with their own supply of food grain (Li Ying, 1987, 54).

Apparently they were all still part of the "floating" population not considered permanent migrants, because they were not included in the official non-agricultural population of 176 million in China's cities and urban towns.

Preliminary information from one large migration survey is now available. The Population Research Institute of the Chinese Academy of Social Sciences co-operated with the State Statistical Bureau to carry out a survey of 74 cities and urban towns during the last half of 1986. Survey results showed that, in general, the smaller the urban place, the higher the proportion of the permanent resident population that comprised recent permanent in-migrants.[6/]

People who had moved to the surveyed urban places during the years 1981-1986 constituted 18 per cent of the 1986 permanent town populations, 14 per cent of the total population in small cities, 10 per cent in medium-sized cities, 11 per cent in large cities, and 8 per cent in extra-large cities (Ma Xia and Wang Weizhi, 1988, table 1, and Chen Yuguang, 1988, table 4).

A separate analysis of the growth of the permanent resident population of all China's cities that had already been established at year-end 1984 showed that the total population of cities grew 1.0 per cent through net permanent in-migration during 1985 (Banister, 1987).

This means that China's cities, the population of which totalled 191,155,000 at the end of 1984, in one year added 1.9 million migrants from rural areas or towns who were allowed formally to transfer their registration to a city. But the cities of the 1986 migration survey counted permanent in-migrants who moved there in 1985 and constituted about 2.0 per cent of the surveyed population.[7/]

The discrepancy may be caused by the fact that the 1986 survey included migrants from one city to another, who may have constituted about one-third of the permanent migrants detected, and because the survey counted long-term "temporary" migrants as permanent migrants. In addition, the survey seems to have estimated gross rather than net migration to each city.

The 1987 sample census produced the smallest estimates of recent rural-to-urban migration so far. Extrapolating from the 1 per cent sample to the whole population, only about 7 million people migrated permanently from rural areas to cities in the five-year intercensal period 1982-1987.

These recent migrants are only 3.6 per cent of the 1987 city population. Another 8.5 million moved permanently from villages to urban towns, constituting 4.3 per cent of the 1987 town population. Of these migrants, in the year before the sample census, 1.6 million migrated from rural areas directly to cities (equivalent to 0.8 per cent of the city population) and 1.8 million from rural areas to towns (or 0.9 per cent of the town population). These are gross migration figures.

Subtracting the migrants from cities to counties and from towns to counties, the sample census reports that from mid-1986 to mid-1987, China's urban population increased by 0.8 per cent through net rural-to-urban migration (Census, 1988, 136-138, 677, 723).

For the period 1978-1986 as a whole, the Ministry of Public Security reports from permanent population registration data that the net in-migration rate to the cities of China has averaged 13.8 per thousand city population per year (Ren Suhua, 1988, 20, 22). That is, China's city population with permanent residence status has increased on average 1.4 per cent a year through net in-migration during the whole reform period.

According to the 1986 migration survey, 3.6 per cent of the total population of these 74 urban places consisted of temporary residents who had been there less than one year. Urban towns had the highest proportion; their "floating" residents of less than one year made up 4.9 per cent of their populations. In the extra-large cities, the proportion was 3.4 per cent. One Chinese author extrapolated from these data to estimate that by 1986 there were 14 million short-term residents of less than one year in China's urban places (Wang Xiangming, 1988, 21). But an additional 6 per cent (which would imply about 23 million 'nation-wide) of the total city and town populations were "temporary" residents who had lived there more than a year. Furthermore, all these estimates of the urban floating population are understated because the survey included only those temporary residents living in a household with permanent residents, excluding those staying at constructions sites, commercial markets, docks, railroad stations, guest houses, or hotels.

Though government policy encourages out-migrants from villages to move to other rural places or to the smallest urban places, many migrants are heading straight for the larger cities, or first to a suburb and then to the city. Big cities have registered big escalations in the size of their "floating" populations, partly because their municipal governments resist granting in-migrants permanent residence status. Wuxi Municipality of Jiangsu province. For instance, recorded 70,000 temporary residents in 1982 and 250,000 in 1987. A 1988 source gave the following figures:

> According to estimates, the floating population averages 10 million persons per day in the 23 cities of one million or larger population. In 1986, the floating population of Shanghai reached 1.34 million persons. In 1987, that of Beijing reached 1.15 million; Canton, one million; Tianjin, 860,000; and Wuhan, 800,000 persons. The size of the floating population is usually equivalent to about one-fifth to one-fourth of the city's *de jure* population (Cheng Ke, 1988,18).

So far, the available data sources do not agree on the size of the recent stream of rural-to-urban migration. China's 1990 census will cover the whole population and include migration questions.

Interprovincial, rural-to-rural and seasonal migration

Most rural-to-urban migration, whether permanent or "temporary", involves movement from a village to a town or city not far away, as confirmed by the Ministry of Public Security:

> Migration to or from China's cities is mainly within provincial boundaries....According to statistics of recent years, regardless of whether it was in- or out-migration, about 78 percent of the migration occurred within provincial boundaries....This shows that population migration occurs mostly within close distances and that the movements...are mostly from rural areas to cities, especially in recent years (Ren Suhua, 1988, 20).

The State Statistical Bureau announced that during 1984, based on its annual survey of population change, 92 per cent of all migrants moved within the same province. [8/] The 1987 sample census reported that from 1982 to 1987, 79 per cent of migrants moved inside the same province (Census, 1988, 770-771). There are practical considerations favouring moves to nearby destinations. Migration is more expensive over longer than shorter distances. China's transport system is weak and slow. Besides, the migrant may depend on his or her family and village social safety net for a regular supply of food grain or for financial assistance to get started in the town or city. The migrant's extended family back in the village may also need help during peak farming seasons or for family occasions.

In addition, official policy is lenient towards moves from villages to the nearest town or small city, but not so accommodating to moves over longer distances which tend to be to big cities. Would-be migrants are still supposed to request permission to move temporarily or permanently to an urban place, and ignoring such rules can add considerable difficulty to an already risky process. In July 1985, China's Public Security Ministry issued rules in an attempt to strengthen information about and control of temporary residents in urban areas. Temporary residence registration is supposed to be carried out for anyone spending three or more days in towns or cities, and "temporary domicile cards" are required for those age 16 or older who stay for more than three months.[9/] Formal permanent registration requires considerably more approval.

Another "temporary" outlet for surplus rural labourers is seasonal employment, even in faraway provinces. Recent loosening of restrictions on movement has increased the likelihood that underemployed peasants will leave their home village in search of seasonal or more permanent employment elsewhere, either in agricultural or non-agricultural tasks. Some localities and provinces are encouraging such out-migration of farmers to

ease their problem of rural surplus labour. For example, since 1980 individual construction workers or teams have been moving each spring from their homes in the east, north-east and south to Gansu, Qinghai, Xinjiang and Tibet in the west, and returning home in October for winter (Deng Quanshi, 1985, 6). Certain provinces seem to specialize in sending out surplus workers to other provinces. In 1987, Sichuan province reported that 1.6 million peasants had left Sichuan to work outside the province.[10/] Fujian province reported in 1988:

> Based on incomplete statistics of Fujian, the number of rural surplus labourers who have left their land and their native places for other provinces totalled about 500,000 persons, constituting one-fourth of those who transferred to non-agricultural pursuits. Among them, more than 300,000 people are with town and township construction teams (Ding Rongfang, 1988, 52-56).

In contrast, some places consistently report receiving migrant workers from elsewhere. For instance, more than a million people from other provinces and other parts of Guangdong have moved to the Pearl River Delta, which "has become China's biggest labour market as a result of its developed processing industry" producing partly for export. The in-migrants have helped to solve a labour shortage in the delta. [11/] Local labour shortages have been reported in agriculture in certain very developed places where most farmers have transferred out of agriculture, for example, in some villages in the Shanghai suburbs (Shanghai Population Information Centre, 1987, l-2). Some developed rural areas in southern Jiangsu province have recruited around 200,000 people from outside areas to work in their town and township enterprises owing to a shortage of labour in their local areas (Jiang Xianggen, 1988, 18).

Sometimes the migration of surplus farm workers and their families from one rural area to another is government planned and sponsored. For instance, in 1982 the State Council decided to move gradually about a million people from some extremely arid parts of Gansu and Ningxia provinces to newly reclaimed irrigated land in the same provinces. By late 1987, over 170,000 had successfully moved, and the relocation was reportedly working well to raise living standards, even though the migrants remained agricultural at their destination.[12/] By the end of 1987, Gansu reported that "altogether, the province sent 1 million surplus labourers, mostly farmers, to other provinces this year."[13/]

The out-migration of surplus workers from impoverished areas is also being tried elsewhere. A 1985 report stated: "Migration of the poor is also under way in Qinghai Province, and Shaanxi Province is also preparing to take part in the programme. Yunnan Province in southwest China has also taken measures to help poor people emigrate."[14/]

Prospects and solutions

Official and academic Chinese sources project that by the year 2000, it will be necessary to transfer out of agriculture not only China's current rural surplus labour force of around 100 million farmers, but also an additional 100 million or more whose work is not expected to be needed in farming in future years.[15/] Some Chinese analysts assume that most of these surplus rural workers can be absorbed by agricultural sideline activities and by non-agricultural enterprises in rural townships.

Others, however, are skeptical of the capacity of the countryside and townships to employ all these workers. They argue that it will be necessary for many of the workers transferred out of agriculture to move to cities and urban towns to find work. There has been a small beginning in recent years. From 1982 through 1987, between 6.3 million and 8.1 million jobs each year were assigned in China's urban areas. In 1982, 10 per cent of the new urban jobs were assigned to rural labourers; the proportion increased to 21 per cent in 1986 and 1987, so that 1.7 million urban jobs went to workers from rural areas in each of those years (Taylor and Banister, 1988, table 5).

Proponents of the policy of minimizing rural-to-urban migration counter that China's urban areas cannot possibly absorb very many rural surplus workers. After all, cities and towns are burdened with underemployment themselves. Visitors to factories in China often notice that for every person actually working, several more are idle. To be sure, much of this inactivity and inefficiency is caused by critical shortages of electricity and raw materials that regularly slow or close down production. Nevertheless, feather-bedding is so bad in Chinese factories that some enterprising new managers, not allowed to fire surplus workers, are continuing to pay them but requiring them to stay away from the factory because their idle presence demoralizes those who are working. [16/] According to statistics compiled from urban departments of labour and personnel nation-wide, there are 20 million people with state or urban jobs but no work to do.[17/] The perceived limits to urban labour absorption in China were expressed in a 1985 article as follows:

> The situation we are facing includes low quality of management and overstaffing of enterprises. Industries in cities are not short of labour. They have even more than they need. Furthermore, there are on average 3.2 million new entrants to the labour force in urban areas each year....City enterprises should fully use the urban population waiting for employment and the surplus personnel from old enterprises. They are unable to absorb too large a number of agricultural labourers (Xu Tianqi and Ye Zhendong, 1985, 18).

In spite of the serious current problem of urban underemployment, other countervailing factors will allow China's cities and towns to absorb many millions of rural surplus workers. First, urban areas have a huge demand for services that is just beginning to be met. Most personal, household, delivery and cleaning services, for example, were forbidden from 1966 to 1977. Although these services have grown rapidly in recent years, wives as well as husbands in urban areas work full time, and there is still a strong unmet need for such assistance.

In addition, China's urban residents are accustomed to comparatively high-status jobs, and are reluctant to take on dirty jobs with long hours at low pay. Peasants from the countryside, however, have shown themselves more willing and able to fill such jobs, so the urban demand for rural labourers is great.

Finally, demographic trends in the urban population of China are favourable for an easing of urban employment problems in the near future, especially in the young working ages. China's urban non-agricultural population experienced a steep drop in fertility from five or six births per woman during the 1950s to three births per woman by 1966 (Fertility Survey, 1984, 162-163). An urban total fertility rate of two births per woman was reached by 1973. By the mid-1980s, smaller cohorts began reaching the working ages, and future cohorts of city-born entrants to the work force will be smaller still.

A massive migration stream of young adult workers from rural areas would merely offset the declining numbers of urban-born work-force entrants. For example, if every year about 3 per cent of China's rural population aged 15-29 years shifts to the urban areas, the size of the urban population in that age range will stabilize for the whole 1990s decade (Banister, 1986, 44, table 8, and medium projection). Such a trend would benefit rural areas by employing many of their young surplus workers, and benefit urban areas by steadying the size of the young adult work force.

Another advantage of the migration of entry-level workers into China's cities and towns in future decades will be to help alleviate the severe aging of the urban populations that is likely to follow decades of very low urban fertility in China (Banister, 1988). The young in-migrants can help to expand the financial base for supporting the projected huge urban elderly population. For all these reasons, there is a niche in China's urban economy that can be filled each year by millions of young adult in-migrants from rural areas. The jobs these migrants are willing and able to do are unlikely to be identical to jobs that would be suitable for the current urban surplus labour force.

In conclusion, China's surplus labour force problems are severe but not insoluble. The economic reforms have raised incomes and increased productivity, trends which in turn expand markets for goods and services that current surplus workers could provide. Urban fertility decline in recent decades is now having the beneficial effect to easing entry-level urban employment problems, so that the cities and towns can be expected to absorb a considerable migration stream of workers from the countryside now and in the future.

Footnotes

1. For international definitions of unemployment and underemployment, see International Labour Organisation, 1987, 42, 48-49.
2. For more detail on estimating the size of China's surplus rural labour force, see Taylor and Banister, 1988.
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Strength of Fertility Motivation: Its Effects on Contraceptive Use in Rural Sri Lanka

Rates of contraceptive use are high and indicate that the contraceptive revolution is well on its way to completion

By Robert D. Retherford, Shyam Thapa and Victor De Silva*

Although questions on family size desires have been included routinely in fertility surveys for several decades, questions that attempt to assess the strength of those desires have been much less common. For example, neither the World Fertility Surveys nor the Contraceptive Prevalence Surveys included

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such questions. The on-going round of Demographic and Health Surveys include questions on strength of fertility motivation, but analyses of the effect of strength of motivation on contraceptive use have not yet been reported.

Quite recently, the effects of strength of fertility motivation on contraceptive use have been analyzed by Retherford, Tuladhar and Thapa (1988), based on data from Nepal's 1986 Fertility and Family Planning Survey.

The authors found that after selected demographic and socio-economic characteristics were controlled, the effect of strength of fertility motivation on current contraceptive use was still substantial and highly statistically significant. However, they also found that the background variables largely captured the effect of motivational strength on current use when motivational strength was deleted from the model, inasmuch as measures of global fit declined only slightly as a consequence of the deletion.

The analysis indicated that respondents' demographic and socio-economic background characteristics affect motivational strength, so that motivational strength does not have a large independent effect on use.

Because rates of contraceptive use are very low in Nepal, it is of interest to replicate the Nepal analysis in a population with higher rates of use. In this article, the replication for Sri Lanka is carried out based on data from Sri Lanka's 1985-86 Rural Family Planning Survey.

Essentially the same questions on strength of fertility motivation that were included in Nepal's 1986 Fertility and Family Planning Survey were also included in Sri Lanka's 1985-86 Rural Family Planning Survey.

Data and methodology

Sri Lanka's 1985-86 Rural Family Planning Survey (RFP Survey) was fielded during the period August 1985 to February 1986 by the Family Planning Association of Sri Lanka in collaboration with Family Health International.

The survey utilized a two-stage stratified random sample design with probability proportional to size. Eligible respondents were defined as currently married women under 45 years of age. Ultimately 3,253 interviews were successfully completed.

However, the sample, which covered 30 rural villages, is not completely representative of rural Sri Lanka. Because of political disturbances, it was decided to exclude some districts in the north-eastern part of the country.

Moreover, the sample was limited to Sinhalese, who constitute about three-fourths of Sri Lanka's population.

The sample covered three of the six socio-economic and ecological zones, as defined by the Sri Lanka Department of Census and Statistics (1978), and 17 of the 24 districts of Sri Lanka.

The analysis was limited to currently married women aged 20-44 who were fecund and currently non-pregnant at the time of the survey, including those who were unsure about whether they were pregnant. Fecund women are subjectively defined as those who thought it physiologically possible for them to have another child, as far as they knew. Pregnant women were excluded from the analysis because their strength of motivation to have another child was likely to be influenced by the perception of being already pregnant.

Sterilized women were also excluded, because they were not asked the questions on strength of fertility motivation. The exclusion of sterilized women represents selection on the dependent variable of contraceptive use, which probably biases the results of our analysis. Since women who very strongly do not want another child are especially likely to get sterilized, the nature of the bias is probably to reduce the measured effect of strength of fertility motivation on use of modern contraceptive methods. Therefore, the results reported in this article probably err on the conservative side in terms of magnitude of reported effects.

The sample was further limited by screening for consistency of responses to the question on desire for additional children. Some women whose desired number of children was fewer than or equal to the number of their living children nevertheless said that they wanted more children. And some women whose desired number of children was greater than the number of their living children nevertheless said that they wanted no more children. Women who gave inconsistent responses of this kind, numbering 152, were also omitted. The final sample on which the analysis is based numbers 1,548 women.

The dependent variable in our analysis is current use of contraception, including both modern and traditional methods. The RFP Survey made special efforts to collect data on traditional methods of contraception, because of evidence that traditional methods account for a substantial proportion of contraception in Sri Lanka (see, for example, Caldwell *et al.,* 1986). Traditional use comprises mainly the safe-period method, which is the indigenous version of the calendar rhythm method, and withdrawal. The analysis of current use excludes sterilized women, who were not asked the questions on strength of fertility motivation.

The principal independent variable is strength of fertility motivation. This variable, which is called relative preference intensity (RPI), is based on two questions intended to assess how strongly respondents felt about having or not having another child.

Women who answered "yes" to the question: "Do you want to have any/another child sometime?" were then asked: "Would you say that your desire to have children/more children is not very strong, strong, or very strong?" Women who answered "no" to the first question were asked: "Would you say that your desire not to have any more children is very strong, strong, or not very strong?"

Responses were coded into relative preference intensity scores as follows:

Response	RPI score
Want another child	
Very strongly	+3
Strongly	+2
Not very strongly	+1
Undecided	0
Want no more children	
Not very strongly	-1
Strongly	-2
Very strongly	-3

In our analysis of the determinants of contraceptive use, RPI is only one of several explanatory variables. The multivariate analysis includes additional demographic and socio-economic variables because we wish to know whether RPI contributes to explanation over and above the effect of demographic and socio-economic variables usually considered important in analyses of the determinants of contraceptive use.

The control variables comprise variables known or thought to influence contraceptive use. They include respondent's age, number of living children, marital duration, age at first marriage, work status, a couple wealth index, and an areal measure of the level of economic and social development.

Most of these variables are self-explanatory; however, the couple wealth index and the areal measure of development require further explanation. The couple wealth index is computed as a sum of household amenities, where a given

amenity is scored as 1 if the amenity is present and 0 otherwise. The amenities selected for inclusion in the index are electricity, cement floor, tile/asbestos roof, brick or cement wall, permanent toilet and indoor tap-water. Therefore, the index ranges from 0 to 6. The scores are grouped into low (0,l), medium (2, 3) and high (4, 5, 6). A composite variable was used instead of separate items because of problems of collinearity among the individual items.

The areal development variable refers to a classification of geographic zones, based on multiple socio-economic and ecological characteristics, as defined by the Sri Lanka Department of Census and Statistics (Sri Lanka Department of Census and Statistics, 1978). As already mentioned, the RFP Survey covers three of the six zones of the country, namely Zones 2, 3 and 6. Zone 3 is inland in the southeastern part of the country and is characterized as being low in its level of development. Zone 6 is upcountry in the north-central part of the country and is characterized as at a medium level of development. Zone

Table 1: Mean desired family size by demographic and socio-economic characteristics for currently married, fecund, non-pregnant women aged 20-44 who report relative preference intensity (RPI): Sri Lanka 1985-86 Rural Family Planning Survey

Characteristic	Mean	SD	N
Demographic			
Respondent's age (years)			
20-24	2.8	0.81	246
25-29	3.0	0.95	408
30-34	3.2	1.06	373
35-39	3.3	1.21	320
40-44	3.7	1.43	201
Living children (number)			
0-1	2.5	0.87	349
2	2.8	0.75	486
3	3.3	0.71	334
4	3.9	0.93	182
5+	4.6	1.36	197
Marital duration (years)			
Up to 5	2.7	0.88	383
6-9	3.0	0.86	405
10-15	3.2	1.03	386
15+	3.9	1.35	283

(Table 1 - *Continued*)

Characteristic	Mean	SD	N
Age at first marriage (years)			
Up to 17	3.5	1.29	297
18-20	3.3	1.13	438
21-24	3.1	1.03	485
25+	2.8	0.94	327
Socio-economic			
Respondent's education (years)			
0-5	3.5	1.24	558
6-9	3.1	1.07	509
10+	2.9	0.91	481
Couple's education (years)			
Both 0-5	3.6	1.24	279
Both 6-9	3.1	1.02	255
Both 10+	2.8	0.91	321
Wife < husband	3.3	1.23	392
Husband < wife	3.1	0.99	287
Couple's work status			
Wife-domestic/husband-farmer	3.5	1.22	387
Wife-domestic/husband-non-farmer	3.0	0.99	766
Wife-non-domestic/husband-farmer	3.6	1.22	158
Wife-non-domestic/husband-non-farmer	3.1	1.07	237
Couple's wealth index			
Low	3.3	1.13	884
Medium	3.2	1.11	442
High	2.9	1.04	222
Areal development level			
Low	3.5	1.22	500
Moderate	3.1	1.07	489
High	3.0	1.01	559
Overall	3.2	1.12	1,548

Notes: Numbers of cases (N) for some variables do not add to the total because of missing values;

SD = standard deviation.

2 is coastal in the neighbourhood of Colombo and is characterized as being high in level of development. In this context, low, medium and high are comparative designations, not absolute ones.

In its simplest form, the dependent variable, current contraceptive use, is dichotomous (1 if using, 0 otherwise). Therefore, logistic regression is used to analyze the determinants of overall contraceptive use. In addition, use is subdivided into traditional methods and modern methods, in which case the dependent variable has three categories. For this part of the analysis, multinomial logistic regression is used.

Results

Bivariate analysis

We begin our analysis with an investigation of how desired family size (number of children) varies by respondent characteristics in this data set. Results are shown in table 1, which shows that desired family size increases substantially with age, number of living children and marital duration. Moreover, those who marry earlier tend to desire larger families. The more education a woman has, the lower the desired family size. The tabulations by couple's education, when compared with the tabulations by the woman's education, indicate that the husband's education has only a very small effect on the wife's desired family size. Desired family size decreases with both wealth and the level of areal development.

Table 2 complements table 1 by showing the distribution of the sample on each variable in table 1 as well as on contraceptive method and RPI. The RPI variable is noteworthy in that the category for RPI = 0 contains only 18 cases. These are women who disproportionately expressed fatalistic or "don't know" responses to the questions on strength of fertility motivation.

Table 3 shows contraceptive use rates for broad categories of methods, for the respondent characteristics in tables 1 and 2. Interestingly, overall use (the "traditional or modern" column) varies little by age, number of living children (except for women with 0-1 child, who have a markedly lower rate of use), marital duration and age at first marriage. Education has a larger effect, with those with six or more years of education having markedly higher rates of use than those with five or fewer years of education. Couple's work status has a moderately large effect on use; couples where the husband has nonfarm employment and the wife works outside the home have a markedly higher rate of use than couples where the husband is a farmer and the wife does not work outside the home. Contraceptive use varies little by couple wealth. It varies somewhat more, but irregularly, by level of areal development.

Table 2: Demographic and socio-economic characteristics of currently married, fecund, non-pregnant women aged 20-44 who report relative preference intensity (RPI): Sri Lanka 1985-86 Rural Family Planning Survey

Characteristic	Percentage or mean	N
Demographic		
Respondent's age (years)		
20-24	15.9	246
25-29	26.4	408
30-34	24.1	373
35-39	20.7	320
40-44	13.0	201
Mean (SD)	31.4 (6.3)	
Living children (number)		
0-1	22.5	349
2	31.4	486
3	21.6	334
4	11.8	182
5+	12.7	197
Mean (SD)	2.7 (1.7)	
Marital duration (years)		
Up to 5	24.7	383
6-9	26.2	405
10-15	24.9	386
15+	18.3	283
Mean (SD)	9.7 (6.3)	
Age at first marriage (years)		
Up to 17	19.2	297
18-20	28.3	438
21-24	31.3	485
25+	21.1	327
Mean (SD)	21.3 (4.3)	
Socio-economic		
Respondent's education (years)		
0-5	36.0	558
6-9	32.9	509
10+	31.1	481
Mean (SD)	6.9 (3.4)	

(Table 2 - *Continued*)

Characteristic	Percentage or mean	N
Couple's education (years)		
Both 0-5	18.0	279
Both 6-9	16.5	255
Both 10+	20.7	321
Wife < husband	25.3	392
Husband < wife	18.5	287
Mean for husband (SD)	7.4 (3.2)	
Mean for wife (SD)	6.9 (3.4)	
Couple's work status		
Wife-domestic/husband-farmer	25.0	387
Wife-domestic/husband-non-farmer	49.5	766
Wife-non-domestic/husband-farmer	10.2	158
Wife-non-domestic/husband-non-farmer	15.3	237
Couple's wealth index		
Low	57.1	884
Medium	28.6	442
High	14.3	222
Areal development level		
Low	32.3	500
Moderate	31.6	489
High	36.1	559
Contraception and fertility preference		
Contraception currently used		
None	29.5	456
Traditional	54.5	844
Modern temporary	16.0	248
Relative preference intensity		
-3	24.3	376
-2	15.4	239
-1	8.9	137
0	1.2	18
1	23.8	369
2	15.6	241
3	10.9	168

Notes: In the couple work status variable, "domestic" means "housewife" or "working in the home", numbers of cases (N) for some variables do not add to the total because of missing values; SD = standard deviation,

Table 3: Percentage of women currently using contraceptive methods by demographic, socio-economic and fertility preference (characteristics): Currently married, non-pregnant, fecund women aged 20-44, Sri Lanka 1985-86 Rural Family Planning Survey

Characteristic	Tradi-tional	Modern temporary	Tradi-tional or modern	No method
Demographic				
Respondent's age (years)				
20-24	54.9	13.8	68.7	31.3
25-29	49.3	21.1	70.3	29.7
30-34	51.2	17.2	68.4	31.6
35-39	60.6	12.8	73.4	26.6
40-44	61.2	11.4	72.6	27.4
Living children (number)				
0-1	48.4	10.9	59.3	40.7
2	55.8	19.6	75.3	24.7
3	59.0	16.5	75.5	24.6
4	57.1	15.9	73.1	26.9
5+	52.3	15.7	68.0	32.0
Marital duration (years)				
Up to 5	50.7	16.7	67.4	32.6
6-9	55.1	15.8	70.9	29.1
10-15	57.8	16.1	73.8	26.2
15+	55.1	15.6	70.7	29.3
Age at first marriage (years)				
Up to 17	56.6	17.9	74.4	25.6
18-20	52.3	16.2	68.5	31.5
21-24	51.8	18.4	70.1	29.9
25+	59.9	10.7	70.6	29.4
Socio-economic				
Respondent's education (years)				
0-5	50.5	15.6	66.1	33.9
6-9	55.6	18.9	74.5	25.5
10+	58.0	13.5	71.5	28.5

(Table 3 – *Continued*)

Characteristic	Tradi-tional	Modern temporary	Tradi-tional or modern	No method
Couple's education (years)				
Both 0-5	50.9	15.4	66.3	33.7
Both 6-9	58.4	18.8	77.3	22.8
Both 10+	58.3	12.8	71.0	29.0
Wife < husband	52.0	16.3	68.4	31.6
Husband < wife	54.7	16.7	71.4	28.6
Couple's work status				
Wife-domestic/husband-farmer	50.9	15.5	66.4	33.6
Wife-domestic/husband-non-farmer	55.2	16.2	71.4	28.6
Wife-non-domestic/ husband-farmer	55.1	15.2	70.3	29.8
Wife-non-domestic/ husband-non-farmer	57.8	16.9	74.7	25.3
Couple's wealth index				
Low	52.8	17.2	70.0	30.0
Medium	55.9	16.3	72.2	27.8
High	58.6	10.8	69.4	30.6
Areal development level				
Low	52.4	13.2	65.6	34.4
Moderate	53.4	20.9	74.2	25.8
High	57.4	14.3	71.7	28.3
Fertility preference				
Relative preference intensity				
-3	54.8	16.5	71.3	28.7
-2	61.5	15.9	77.4	22.6
-1	64.2	14.6	78.8	21.2
0	50.0	0.0	50.0	50.0
1	58.0	19.2	77.2	22.8
2	47.7	15.4	63.1	36.9
3	38.7	11.9	50.6	49.4
Overall average	54.5	16.0	70.5	29.5

Note: Number of cases (N) for some variables may not add to the total because of missing values.

Use shows greater variation by RPI. If one ignores the category for which RPI equals zero, use remains high at 71-78 per cent for RPI values ranging from - 3 to +1, and then drops off to 63 and 51 per cent for RPI values of 2 and 3, representing a desire for another child that is either strong or very strong. As mentioned previously, the category of RPI equals zero contains only 18 cases. These are disproportionately women who gave fatalistic responses regarding desire for another child. It is therefore not surprising that contraceptive use is comparatively low for these women. This category of women also showed a comparatively low rate of contraceptive use in the Nepal study cited previously (Retherford, Tuladhar and Thapa, 1988).

The separate columns for traditional methods and modern temporary methods in table 3 are interesting in that they show that the overall increase in contraceptive use that occurs with more education and wealth is due to an increase in the use of traditional methods, not modern methods. Use of modern temporary methods actually decreases as education and wealth increase. Of course, these are bivariate relationships that may not hold up when other variables are controlled, a question that will be returned to later.

Table 4: Zero-order correlations between current contraceptive use (dependent variable) and demographic, socio-economic and fertility preference characteristics (independent variables): Currently married, non-pregnant, fecund women aged 20-44, Sri Lanka 1985-86 Rural Family Planning Survey

	Current contraceptive use		
Independent variable	**Traditional**	**Modern temporary**	**Traditional or modern**
Respondent's age	.079**	-.063**	.036
No. of living children	.036	.009	.046*
Marital duration	.046*	-.025	.030
Age at first marriage	.027	-.058*	-.017
Respondent's education	.0.51*	-.007	.050*
Couple wealth index	.043*	-.053*	.004
Areal development level	.042*	.010	.054*
Relative preference intensity	-.090***	-.012	-.108**

Notes: * denotes p < .05; ** denotes p <.01; and *** denotes p <.001.

The independent variables were all treated as continuous for purpose of calculations.

Table 4 extends the bivariate analysis by showing bivariate correlation coefficients between contraceptive use and each of the independent variables included in the previous tables. (For purposes of computing correlations, all variables are treated as continuous, which means, for example, that the couple wealth variable takes on possible values of 1, 2, or 3.) A striking aspect of this table is that for five out of the eight independent variables, there appears to be a trade-off between modern temporary methods and traditional methods. For example, age is positively related to use of traditional methods, but negatively related to use of modern temporary methods. A similar pattern is apparent for marriage duration, age at first marriage, education and the couple wealth index.

Another striking feature of this table is that the correlations are very low, reinforcing the impression of a remarkable uniformity in contraceptive use across demographic and socio-economic characteristics, already apparent from table 3. Of the independent variables considered, RPI shows the highest correlation with contraceptive use, at about 0.11 for all methods combined. Interestingly, table 3 shows that most of the systematic variation in use with RPI is due to traditional methods, not modem methods.

Table 5 shows the bivariate correlation matrix for the independent va-

Table 5: Zero-order correlations between demographic, socio-economic and fertility preference characteristics (independent variables): currently married, non-pregnant, fecund women aged 20-44, Sri Lanka 1985-86
Rural Family Planning Survey

Variable	AGE	LVC	MRD	AFM	EDU	CWI	DEV	RPI
AGE	1.000	.522***	.746***	.336***	-.038	.183***	.170***	-.434***
LVC		1.000	.716***	-.288***	-.264***	-.073**	-.095***	-.576***
MRD			1.000	-.320***	-.215***	.042	-.058***	-.477***
AFM				1.000	.286***	.202***	.282***	.098***
EDU					1.000	.386***	.238***	.077**
CWI						1.000	.248***	-.035
DEV							1.000	-.073**
RPI								1.000

Notes: * denotes p < .05; ** denotes p < .01; and *** denotes p <.001.

Age = respondent's age; LVC = number of living children; MRD = marital duration; AFM = age at first marriage; EDU = respondent's education; CWI = couple's wealth index; DEV = areal development level; RPI = relative preference intensity. The variables were all treated as continuous for purposes of calculating correlations.

riables. Age, number of living children, and marital duration correlate in the range of 0.5 to 0.7. RPI correlates with age, number of living children, and marital duration in the range of -0.4 to -0.6. The other correlations in the table tend to be considerably lower.

Multivariate analysis

The multivariate analysis begins with an analysis of contraceptive use without distinguishing particular methods. Thus, the dependent variable is 1 if using any method of contraception, and 0 otherwise. An appropriate statistical model is logistic regression.

The results of this analysis are shown in tables 6 and 7. In table 6, the number of living children, number of living children squared, age at first marriage, and woman's education are entered as continuous independent variables. The quadratic term for number of living children is included because previous studies have indicated that the relationship between contraceptive use and number of living children often resembles an inverted U. All remaining independent variables are treated as categorical and are represented in the underlying logistic regressions by sets of dummy variables. Age and marital duration are excluded from the models because of collinearity with number of living children.

Table 6 includes two alternative models, Iabelled Model 1 and Model 2. Model 1 omits relative preference intensity (RPI), whereas Model 2 includes it. The remaining independent variables, treated here as control variables, are included in both models. The two-model design enables one to address the question of whether the control variables capture the effect of motivational strength on current use of contraception when motivational strength (RPI) is deleted from the model.

Table 6: Logistic regression estimates of odds ratios for current use of contraception, by demographic and socio-economic characteristics of women: Sri Lanka 1985-86 Rural Family Planning Survey

Characteristic	Model 1	Model 2
Number of living children	1.590 (5.22)	1.376 (3.15)
Number of living children squared	.954 (-4.51)	.967 (-3.23)
Age at first marriage	.986 (-0.99)	.983 (-1.13)
Woman's education	1.043 (2.20)	1.042 (2.08)

(Table 6 – *Continued*)

Characteristic	Model 1	Model 2
Couple work status		
Wife domestic, husband farmer	1.000	1.000
Wife domestic, husband non-farmer	1.118 (0.76)	1.132 (0.82)
Wife non-domestic, husband farmer	1.184 (0.80)	1.420 (1.62)
Wife non-domestic, husband non-farmer	1.358 (1.56)	1.424 (1.77)
Couple wealth index		
Low	1.000	1.000
Medium	.957 (-0.31)	.961 (-0.28)
High	.804 (-1.21)	.840 (-0.94)
Areal development level		
Low	1.000	1.000
Medium	1.502 (2.72)	1.596 (3.06)
High	1.268 (1.57)	1.213 (1.25)
Relative preference intensity		
-3		2.025 (2.98)
-2		2.683 (3.96)
-1		2.887 (3.73)
0		.762 (-0.52)
1		3.206 (5.59)
2		1.542 (2.06)
3		1.000
R^2	.013	.031
-2 log likelihood		
Model containing intercept only	1874	1874
Full model	1827	1783
Difference	47	91
Degrees of freedom	11	17
p-value for difference	.000	.000

Notes: Sterilized women are excluded from the regressions. Odds ratios are calculated as exp(b), where B is the corresponding logistic regression coefficient. (In the case of living children, however, exp(B) in the table is not interpretable as an odds ratio, because of the quadratic term, as explained in the text.) t-ratios are shown in parentheses after odds ratios. (The t-ratios actually pertain to the logistic regression coefficients that underlie the odds ratios.) The R^2 statistic is somewhat similar to R^2 ordinary least squares multiple regression, but it is calculated quite differently, and it cannot be used in tests of significance like an ordinary R^2 (Harrell, 1983). The p-values in the bottom row of the table indicate that each model differs very significantly from a model containing only the intercept term. The two models also differ significantly from each other, at $p < .001$, as explained in the text.

Table 6 presents odds ratios instead of the underlying logistic regression coefficients, because odds ratios are easier to interpret. (Odds ratios are calculated from the underlying coefficients, B, as exp(B).) For example, the odds ratio of 1.043 for woman's education means that the odds of using contraception are increased by a multiplicative factor of 1.043 with each additional year of education. The odds ratio of 0.986 for age at first marriage means that the odds of using contraception are decreased by a factor of 0.986 with each one-year increase in age at first marriage. From these examples, it is evident that, for continuous variables, an odds ratio is interpreted as the multiplicative effect of a one-unit increase in the variable on the odds of using contraception, holding constant other independent variables included in the model.

The interpretation of the table entries for number of living children is different, because of the squared term. If the woman has, say, one living child, the effect of a one-child increase in the number of living children is to increase the odds of using contraception by a factor of $(1.590)\ (0.954)^{(2)(1)} = 1.447$. If the woman has five living children, the effect of a one-child increase in the number of living children is to decrease the odds of using contraception by a factor of $(1.590)\ (0.954)^{(2)\ (5)} = 0.993$.

In the case of a categorical variable, the reference category has an odds ratio of 1.000, corresponding to an underlying logistic regression coefficient of zero. For example, in the case of the couple wealth index, the reference category is "low". The "medium" category has an odds ratio of 0.957, meaning that the odds of current use for those with medium wealth are 0.957 of the odds of current use for those with low wealth in the reference category. Similarly, the "high" category has an odds ratio of 0.804, meaning that the odds of current use for those with high wealth are 0.804 of the odds of current use for those with low wealth in the reference category.

Quantities in parentheses following the odds ratios are t-ratios. They are calculated from the corresponding underlying logistic regression coefficients and their standard errors, which are not shown. A t-ratio greater than about 2 indicates that the odds ratio differs significantly from unity at the 5 per cent level of significance.

The R^2 statistic in table 6 is somewhat similar to R^2 in ordinary least-squares multiple regression, in that it has a lower bound of zero and an upper bound of one. However, its sampling distribution is unknown, which makes tests of its statistical significance impossible. The log likelihood statistics, to which we shall return later, are used instead for significance testing.

We are primarily interested in Model 2 in table 6, since it includes RPI, which is our principal explanatory variable. Relative to the reference category

of RPI = 3, it is seen that the effect of smaller values of RPI on the odds of contraceptive use is large. For RPI values of 1, -1, -2 and -3, the odds of use are multiplied by factors ranging between 2 and 3. These are net effects after controlling for the other independent variables in the model.

The category for RPI = 0 is an outlier with a very low odds ratio, which, however, is not statistically significant, owing to the very small number of cases, only 18 women. Despite the lack of statistical significance, a low odds ratio is expected, given that women in this category disproportionately give fatalistic responses to questions on fertility motivation. A very low odds ratio for the RPI = 0 category was also found in the Nepal study cited previously (Retherford, Tuladhar and Thapa, 1988).

The effect of the control variables on the odds of contraceptive use do not differ much between Models 1 and 2, and they are mostly consistent with the simple bivariate findings examined previously in table 3. Number of living children tends to increase the odds of use, at least at lower numbers of living children. Age at marriage has a very slight negative effect, which is statistically non-significant. Woman's education has a positive effect which is statistically significant at about the 5 per cent level. Couple wealth appears to reduce the odds of contraception, but the effect is statistically non-significant. The level of economic and social development of one's geographic zone of residence tends to increase the odds of use, but the effect is statistically significant only for medium relative to low level of development.

Table 7, which is calculated from Model 2 in table 6, has the advantage of being easier to interpret than table 6. Table 7 shows estimates of the probability of using contraception by each independent variable, controlling for

Table 7 : Logistic regression estimates of the probability of using contraception by demographic and socio-economic characteristics of women: Sri Lanka 1985-86 Rural Family Planning Survey (probabilities expressed as adjusted percentages)

Characteristic	Adjusted percentage
Number of living children	
0	60.1
1	66.7
2	71.3
4	75.8
6	75.1
8	68.8

(Table 7 – *Continued*)

Characteristic	Adjusted percentage
Age at first marriage (years)	
15	73.7
20	72.1
25	70.3
30	68.5
Woman's education (years)	
0	65.6
2	67.4
4	69.1
6	70.9
8	72.5
10	74.1
Couple work status	
Wife domestic, husband farmer	68.4
Wife domestic, husband non-farmer	71.1
Wife non-domestic, husband farmer	75.5
Wife non-domestic, husband non-farmer	75.6
Couple wealth index	
Low	72.4
Medium	71.5
High	68.7
Areal development level	
Low	67.0
Medium	76.4
High	71.1
Relative preference intensity	
-3	70.5
-2	76.0
-1	77.3
0	47.4
1	79.1
2	64.5
3	54.1

Notes: Adjusted values of the probability of use, P (expressed as a percentage), were calculated from a multivariate logistic regression equation with independent variables specified as in table 6. The effects of any given independent variable on use were computed by holding the other independent variables constant at their mean values in the entire sample.

the remaining independent variables by holding them constant at their mean values in the sample. The estimated probabilities are presented in the form of adjusted percentages, where "adjusted" means that remaining independent variables are held constant at their means.

Table 7 shows that number of living children tends to increase contraceptive use up to about four living children and to decrease it at higher numbers of living children. These effects are highly statistically significant, as seen previously in table 6. Thus, the results show the inverted U-shaped pattern found in many earlier studies (see, for example, Cleland, Little and Pitaktepsombati, 1979). The causation underlying this pattern is unclear for the women with higher numbers of living children. Because these women are nearing the end of their reproductive age, they may perceive themselves as no longer fecund. They may also be more traditional in their views and may be more likely to view contraception as inappropriate behaviour.

Table 7 shows that age at first marriage has a very small negative effect on contraceptive use, seen previously in table 6 to be statistically non-significant. Woman's education increases contraceptive use, from about 66 per cent for women with no education to about 74 per cent for those with 10 years of education. Couple work status tends to increase contraceptive use, but the effects are statistically non-significant, as seen previously in table 6. Couple wealth tends to reduce use, but again the effects are statistically non-significant. A medium as opposed to a low level of areal development boosts use from 67 to 76 per cent.

The contrasts are greater by level of RPI, the main variable of interest here. For RPI categories with adequate numbers of cases, use varies from 54 per cent for RPI = 3 (very strongly wants another child) to 79 per cent for RPI = 1 (not very strongly wants another child). Use levels are rather similar for RPI values of 1, -1, -2 and -3. As mentioned previously, the category for RPI = 0, which is based on only 18 cases, is an outlier, with a use rate of 47 per cent.

We now return to the question of whether Models 1 and 2 in table 6 differ significantly from each other. This test is based on the -2 log likelihood statistic. The difference between the two models in this statistic is distributed as chi-square with degrees of freedom equal to the difference between the two models in the number of coefficients to be estimated. We see that 1,827 - 1,783 = 44 with 17 - 11 = 6 degrees of freedom differs significantly from zero at $p < .001$, which is highly significant. Thus the effects of RPI on contraceptive use are not captured to any great extent by the background variables when RPI is deleted from the model. R^2 is very low in both models, reflecting the fact that contraceptive use tends not to vary much across the independent variables.

Table 8: Multinomial logistic regression coefficients and p-values for choice of contraceptive method: Sri Lanka 1985-86 Rural Family Planning Survey

Characteristic	Contraceptive method	
	Modern	**Traditional**
Number of living children	.668 (3.66)	.253 (2.44)
Number of living children squared	-.081 (-3.52)	-.026 (-2.48)
Age at first marriage	-.047 (-2.15)	-.009 (-0.56)
Woman's education	.047 (1.71)	.041 (2.03)
Couple work status		
Wife domestic, husband farmer	0.	0.
Wife domestic, husband non-farmer	.112 (0.53)	.117 (0.74)
Wife non-domestic, husband farmer	.282 (0.91)	.387 (1.71)
Wife non-domestic, husband non-farmer	.366 (1.32)	.318 (1.52)
Couple wealth index		
Low	0.	0.
Medium	-.137 (-0.69)	-.007 (-.047)
High	-.590 (-2.08)	-.084 (-0.44)
Areal development level		
Low	0.	0.
Medium	.889 (4.16)	.328 (2.05)
High	.310 (1.38)	.134 (0.83)
Relative preference intensity		
-3	.556 (1.58)	.751 (3.00)
-2	.688 (1.86)	1.065 (4.08)
-1	.666 (1.60)	1.160 (3.92)
0	–	–
1	1.151 (3.69)	1.164 (5.30)
2	.388 (1.19)	.440 (1.97)
3	0.	0.

Notes: The reference category for the dependent variable is non-use of contraception. In the body of the table, numbers in parentheses are t-ratios. There is no entry for RPI = 0, because this cell contained only 18 cases, none of whom used modern methods. Because no one used modern methods, MLOGIT would not run. Our solution to this problem was to omit the 18 cases for whom RPI = 0 and rerun MLOGIT without the category for RPI = 0.

Tables 8 and 9 extend Model 2 of the logistic regression analysis to a multinomial logistic regression analysis of the determinants of three categories of contraceptive use: modern, traditional and no method. Because odds ratios are less meaningful in multinomial logistic regression than in simple binary logistic regression, table 8 presents multinomial logistic regression coefficients instead of odds ratios. Also shown are t-ratios, which provide an indication of level of statistical significance. Table 9, which is derived from table 8, shows expected probabilities of use of each method by each independent variable, again controlling for the other independent variables in the model by setting them at their means. We shall restrict discussion to table 9, since it is easier to interpret than table 8.

In table 9, use of modern methods tends to rise with number of living children, then to fall at larger family sizes. But use of traditional methods increases at least up to eight children, which is the largest family size considered in the table. This finding supports the earlier hypothesis that older women tend to be more traditional than younger women in their attitudes about contraception.

Earlier, in the binary logistic regression analysis, the effects of age at marriage on use were found to be statistically non-significant. In the multinomial logistic regression analysis in tables 8 and 9, however, age at first marriage has a statistically significant negative effect on use of modern methods and a statistically non-significant positive effect on the use of traditional methods. This anomalous finding indicates that women who tend to be more modern in their marriage behaviour, by marrying late, tend to be more traditional in their use of contraception.

Table 9 : Multinomial logistic regression estimates of the probabilities of using specified methods of contraception: Sri Lanka 1985-86 Rural Family Planning Survey (probabilities expressed as adjusted percentages)

Characteristic	Contraceptive method		
	Modern	Traditional	No method
Number of living children			
0	8.2	51.9	40.0
1	12.3	54.3	33.4
2	16.1	55.4	28.6
4	19.5	56.5	24.0
6	15.7	58.9	25.4
8	7.9	59.9	32.2

(Table 9 – *Continued*)

Characteristic	Contraceptive method		
	Modern	Traditional	No method
Age at first marriage (years)			
15	19.2	54.6	26.2
20	16.2	55.8	28.0
25	13.6	56.7	29.7
30	11.3	57.2	31.4
Woman's education (years)			
0	13.7	51.5	34.8
2	14.2	52.9	32.9
4	14.7	54.2	31.0
6	15.2	55.5	29.3
8	15.7	56.7	27.5
10	16.3	57.9	25.9
Couple work status			
Wife domestic, husband farmer	14.9	53.6	31.5
Wife domestic, husband non-farmer	15.4	55.6	29.1
Wife non-domestic, husband farmer	15.2	60.7	24.2
Wife non-domestic, husband non-farmer	16.9	58.2	24.9
Couple wealth index			
Low	17.0	55.3	27.7
Medium	15.2	56.3	28.4
High	10.7	57.8	31.5
Areal development level			
Low	12.0	55.3	32.7
Medium	21.0	55.4	23.6
High	14.6	56.3	29.1
Relative preference intensity			
-3	14.8	55.5	29.7
-2	13.8	62.0	24.2
-1	12.7	64.3	22.9
0	–	–	–
1	19.1	59.7	21.2
2	15.1	49.1	35.9
3	13.2	40.6	46.2

Notes: Adjusted values of the probability of use, P (expressed as a percentage), were calculated from multinomial logistic regression equations with variables specified as in table 8. The effects of any given variable on method-specific use were computed by holding the other independent variables constant at their mean values in the entire sample. The category for RPI = 0 was omitted from the MLOGIT run for this table; see note to table 8.

This pattern is not observed, however, in the case of education. The more education a woman has, the more likely she is to use both modern methods and traditional methods. However, the positive effect of education on use of modern methods is not statistically significant at the 5 per cent level, whereas the positive effect of education on use of traditional methods is statistically significant.

The anomalous finding for age at marriage reappears in the case of couple wealth. Couple wealth has a statistically significant negative effect on use of modern methods, and a statistically non-significant positive effect on use of traditional methods. By contrast, level of areal development has an erratic effect on use of modern methods and only a small, statistically non-significant positive effect on use of traditional methods.

The effect of RPI, controlling for the other independent variables, is greater for traditional use than for modern use. Indeed, the effect of RPI on modern use is statistically significant only for RPI = 1, as shown in table 8. In contrast, the effects of RPI on traditional use tend to be considerably larger and highly statistically significant. In table 9, which shows this pattern more clearly than does table 8, rates of use of modern methods by RPI range from 15 to 19 per cent, whereas rates of use of traditional methods by RPI range from 41 to 64 per cent. As in the binary logistic regressions, the percentage using traditional methods tends to be comparatively low, at 40-49 per cent for RPI values of 3 and 2 and considerably higher, at 56-64 per cent for RPI values of 1, -1, -2 and -3. The category RPI = 0 is omitted from this analysis for reasons explained in the footnote to table 8.

Conclusion

The picture that emerges from this analysis is that this comparatively homogeneous rural Sinhalese sample shows remarkably uniform rates of contraceptive use across demographic and socio-economic variables. Rates of contraceptive use are high and indicate that the contraceptive revolution is well on its way to completion. Rates of contraceptive use would be even higher had it been possible to include sterilized women, who were excluded because they were not asked the questions on strength of fertility motivation. Uniformly high rates of contraceptive use towards the end of fertility transition are not unexpected in culturally homogenous populations. Such populations tend to show a convergence of differential fertility towards the end of the fertility transition (Retherford, 1985).

The analysis shows that neither the strength of motivation variable (relative preference intensity, or RPI) nor the control variables account for much of the variability in contraceptive use. The effects of RPI on contraceptive use are nevertheless substantial and statistically significant. Rates of contra-

ceptive use are uniformly high among women who either do not want another child or who want another child but do not feel very strongly about it. They are considerably lower, but still fairly high, among those who feel strongly or very strongly that they want another child. The effects of RPI are stronger for use of traditional methods of contraception than for use of modern methods of contraception. The fact that the rates are still fairly high for those who strongly want another child indicates widespread use of family planning for birth spacing. The effects of the RPI variable hardly change when demographic and socio-economic background variables are controlled, indicating that the effect of RPI on contraceptive use operates largely independently of the background variables.

The exclusion of sterilized women from the analysis introduces some selection on the dependent variable of contraceptive use. This exclusion introduces bias, but the bias is conservative in that the effects of RPI on use of modern methods of contraception would probably have been larger had it been possible to include sterilized women. Presumably, most of these women feel very strongly that they do not want another child.

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Trends in Fertility and Mortality in Fiji Based on the 1986 Census

Fiji has undergone a ripid transition in fertility and mortality over the last two decades

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Fiji is made up of about 332 islands in the south-west Pacific. About a hundred of the islands are usually inhabited; most of the remaining islands are used for temporary residence and for occasional plantation. Fiji has a long history of census taking: although the first census was taken in 1879, it was only a very rough head count. A more comprehensive census was taken in 1881;

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this census, in fact, inaugurated the series of decennial censuses which continued until 1921, after which there was, however, a break in this series. The next census was not conducted until 15 years later, in 1936. From then on the censuses have been conducted every 10 years; the last census took place in 1986.

According to the 1986 census the population of Fiji was 715,375. It consists of two major ethnic groups, the indigenous Melanesian population, referred to in this article as Fijians, and the population who are of Indian origin, referred to as Indians. Apart from Fijians and Indians, there are Europeans, Chinese and other Pacific islanders, who form a small proportion of the total population. The 1986 census indicated that 48.7 per cent were Indians, 46 per cent Fijians, with the remaining 5.3 per cent comprising other groups. The 1976-1986 intercensal rate of population growth was 2 per cent per annum, with Fijians increasing at 2.4 per cent and Indians increasing at 1.8 per cent.

The main objective of this article is to present the estimates of fertility and mortality based on the 1986 census of Fiji. In some instances, comparative estimates from the 1966 and 1976 censuses are also presented.

The population of Fiji comprises two major ethnic groups, the indigenous Melanesians and those of Indian origin, such as these women waiting for service at a family planning clinic. (Photograph courtesy of the Fiji Ministry of Information)

Methodology

In the Fiji censuses, direct data on deaths of individuals have not been collected, so it is not possible to compute the crude death rate and age-specific death rates from the census data.

However, alternative data are gathered in the censuses which allow the application of indirect techniques to estimate infant and child mortality, adulthood mortality and the construction of life tables. For example, the reporting of children ever born and surviving by age of women has been used to estimate infant and child mortality by Brass-type methods.

Similarly, information on survivorship of respondent's father and mother at the time of enumeration has been used to estimate the adult survivorship probabilities of males and females respectively. Linkages of information on childhood and adulthood mortality, in turn, have been employed by means of the Brass logit linkage method to construct life tables for males and females.

Unlike mortality, the current fertility measures are directly obtained from information on the date of birth of the last child to women aged 15 years and over. In addition, the Fiji censuses also gathered information on the relationship of mothers with their own children.

These data provided a unique opportunity to estimate fertility trends for the past 15 years preceding the census by the application of the own-children method (Cho, 1973).

The estimated fertility and mortality rates based on census data are compared with the corresponding data obtained from the Ministry of Health and Vital Registration. Since most of the fertility and mortality rates are indirectly estimated, it is important to know the quality of census data used for the purpose of this article, because the estimates obtained from indirect techniques are subject to the quality of age reporting.

The quality of the Fiji census data has been evaluated and it was found that for the 1986 census data the Myers' Blended Index was 1.4, Whipple's Index was 105 for males and 106 for females and the United Nations Age-Sex Accuracy Index was well below 20. These indices indicate that the age-sex data collected in the Fiji censuses are highly accurate (Bureau of Statistics, 1989).

The following sections will present the estimates of mortality and fertility based on the indirect techniques. (Methodologies employed for estimating the mortality and fertility rates are discussed in Bureau of Statistics, 1989).

Results

Mortality

Crude death rate

It was stated previously that the census data do not provide information on deaths; however, deaths registered by the Registrar General and Ministry of Health independently provide annual crude death rates. It should be noted that the death rates obtained from the Registrar General are based on date of registration of events while those of the Ministry of Health are based on date of occurrence. However, both of these sources reveal that the crude death rate in Fiji has reached a fairly low level. The rates based on the registration data tend to fluctuate between 4.6 and 6.6 per thousand during the period 1980-1985, while the rates given by the Ministry of Health have shown a fairly regular decline, from 5.7 in 1980 to 5.2 in 1984 (Bureau of Statistics, 1985 ; Ministry of Health, 1984).

Infant and child mortality

Infant and child mortality rates are obtained by applying Brass (1975) and Trussell (1975) methods to data on children ever born and surviving by age of women. It is important to note that these methods of estimating childhood mortality are based on the assumption that fertility and child mortality have remained constant for the recent past. The fact that fertility and childhood mortality have in fact been declining in Fiji may present biased estimates. The modification of this method, whereby it can be applied to a population experiencing a linear decline in mortality, has been presented by Feeney (1976; 1980). For the purpose of this article, the Brass, Trussell and Feeney methods have been applied to child survivorship data for Fijians, Indians and for the total population of Fiji. Coale and Demeny West Model Life Tables have been used to select the appropriate multipliers (Coale and Demeny, 1966). Alternatively, infant mortlaity rates obtained from deaths registered by the Registrar General and Ministry of Health and those estimated from the life tables based on the Brass method of linkages between childhood and adult mortality are also presented for comparison.

Table 1 presents the probabilities of dying before reaching exact childhood ages for Fijians, Indians and the total population by males and females; these estimates are based on the Brass and Trussell methods. Also shown are infant and child mortality rates corresponding to the childhood mortality rates estimated by the Trussell method and calendar year referring to the rates. It can be seen from this table that except for the estimates based on the age group 15-19 years, all other estimates provided by the Brass and Trussell methods are close to each other.

The infant mortality rates based on the age group 15-19 are known to be biased for two basic reasons. First, these methods assume that the risk of a child dying is invariant to a woman's age or child's birth order. In practice, however, children born to women of 15-19 years of age experience higher mortality than the average. Second, the number of children born and dead pertaining to this age group is usually small and rates estimated are subject to random fluctuations. For these reasons, infant mortality estimates based on the 15-19 age group of women are generally disregarded.

Since the Brass and Trussell estimates of childhood mortality are close to each other, the Trussell estimates are considered for converting childhood mortality into infant mortality rates. The infant mortality rates thus estimated are also associated with calendar years. There has been a continuous decline in infant mortality rates over the years and this decline has been experienced by the Indians and Fijians. It is also apparent that the higher male than female infant mortality rates observed in this table conform with the general pattern of sex differentials in infant mortality. Indians, in general, are also found to have higher infant mortality than Fijians, a finding that accords with the results of the Ministry of Health. According to the Ministry of Health, the higher infant mortality rate among Indian children, particularly during the neonatal period, is associated with the high incidence of low birth weight (Ministry of Health, 1984).

Trussell's estimates of infant mortality rates corresponding to the year 1984 are 31 per thousand for males and 27 per thousand for females, but it will be shown that these rates are, in fact, overestimations of the rates prevailing in the country. It has been observed that, in the case of declining mortality, the Brass-type methods tend to overestimate the current mortality levels (Kraly and Norris, 1978, 551).

Table 2 depicts infant mortality rates estimated by the Feeney method based on the 1986 census data. It shows a continuous fall in infant mortality over the years. In addition, the trends in infant mortality estimated by the Feeney method derived from the 1976 and 1986 census data are plotted in figures 1-3. It is evident that, irrespective of sex and ethnic origin, infant mortality has experienced a continuous decline over the past 20 years between the 1960s and 1980s.

It should be noted, however, that the rates estimated by the Feeney method are well below those estimated by the Trussell method. For example, the infant mortality rates for Fiji for the period 1984 are 24 for males and 20 for females. It is therefore suggested that in the case of declining childhood mortality, the Trussell method tends to overestimate the level of child mortality currently prevailing in the country. In view of the observed trends in infant

Table 1: Infant (IMR) and childhood mortality by ethnic origin, sex and method based on 1986 census of Fiji

Age of women (years)	X	Males				Females			
		Brass	Trussell			Brass	Trussell		
		qx	qx	IMR	Year	qx	qx	IMR	Year
Fijians									
15-19	1	0.0296	0.039	0.039	1985	0.0197	0.020	0.020	1985
20-24	2	0.0325	0.033	0.030	1984	0.0334	0.033	0.030	1984
25-29	3	0.0324	0.032	0.028	1982	0.0301	0.029	0.026	1982
30-34	5	0.0393	0.039	0.031	1980	0.0328	0.033	0.027	1980
35-39	10	0.0457	0.046	0.034	1977	0.0410	0.041	0.031	1977
40-44	15	0.0568	0.057	0.039	1975	0.0482	0.049	0.034	1975
45-49	20	0.0680	0.068	0.042	1972	0.0592	0.059	0.037	1972
Indians									
15-19	1	0.0363	0.038	0.038	1985	0.0342	0.047	0.047	1985
20-24	2	0.0366	0.036	0.033	1984	0.0270	0.027	0.025	1984
25-29	3	0.0401	0.039	0.033	1982	0.0339	0.033	0.029	1982
30-34	5	0.0516	0.051	0.040	1980	0.0422	0.041	0.033	1980
35-49	10	0.0704	0.070	0.049	1977	0.0517	0.051	0.037	1977
40-44	15	0.0791	0.079	0.051	1974	0.0598	0.059	0.040	1974
45-49	20	0.0848	0.084	0.050	1971	0.0661	0.065	0.040	1971

Total									
15-19	1	0.0341	0.039	0.039	1985	0.0263	0.022	0.022	1985
20-24	2	0.0340	0.034	0.031	1984	0.0295	0.029	0.027	1984
25-29	3	0.0366	0.037	0.032	1982	0.0317	0.031	0.027	1982
30-34	5	0.0458	0.045	0.036	1980	0.0374	0.037	0.030	1980
35-39	10	0.0579	0.058	0.041	1977	0.0461	0.046	0.034	1977
40-44	15	0.0678	0.068	0.045	1974	0.0533	0.053	0.036	1974
45-49	20	0.0762	0.076	0.046	1971	0.0618	0.062	0.038	1971

Table 2: Infant mortality rates (IMR) by ethnic origin and sex using Feeney Method based on 1986 census of Fiji

Age of women (years)	Fijians				Indians				Total			
	Male		Female		Male		Female		Male		Female	
	IMR	Year	IMR	Year	IMR	Year	IMR	Year	IMR	Year	IMR	Year
20-24	23	1984	24	1984	26	1984	18	1984	24	1984	20	1984
25-20	20	1982	19	1982	25	1982	21	1982	23	1982	19	1982
30-34	23	1980	18	1980	30	1980	24	1980	27	1980	21	1980
35-39	21	1977	18	1977	36	1977	24	1977	28	1977	21	1977
40-44	25	1974	20	1974	38	1974	27	1974	32	1974	23	1974
45-49	29	1971	24	1971	37	1971	27	1971	33	1971	25	1971

Figure 1: Infant mortality trends by sex based on Feeney Method applied to 1976 and 1986 censuses, Fijians, Fiji

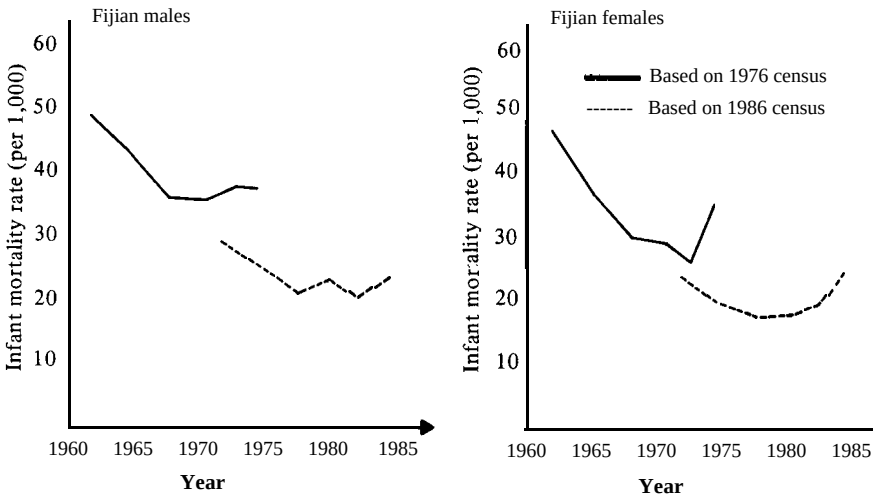


Figure 2: Infant mortality trends by sex based on Feeney Method applied to 1976 and 1986 censuses, Indians, Fiji

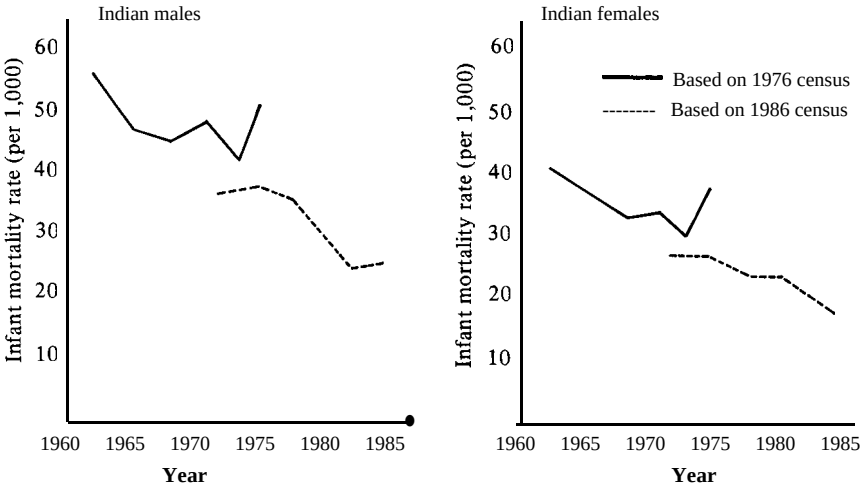
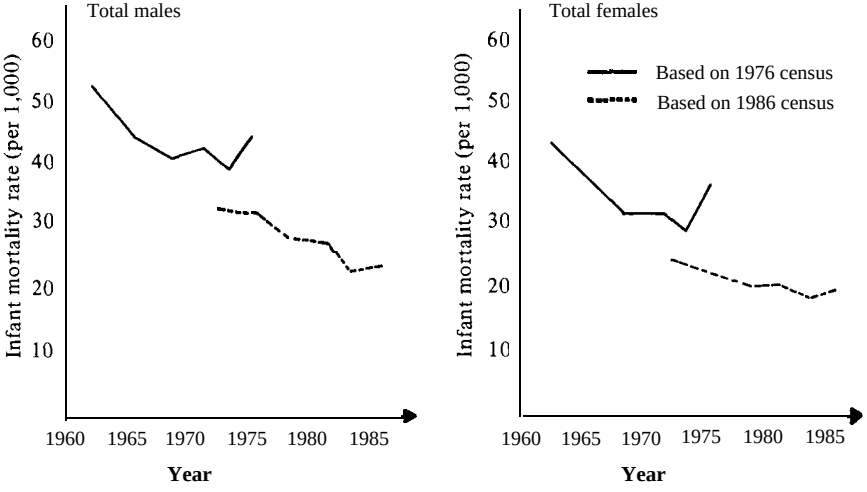


Figure 3: Infant mortality trends by sex based on Feeney Method applied to 1976 and 1986 censuses, Fiji



mortality, it seems reasonable to infer that the rates estimated by the Feeney method are a closer approximation of the infant mortality rates for Fiji.

The infant mortality rates estimated indirectly from the Trussell and Feeney methods are compared with those estimated from the life tables constructed using the Brass method of linkages between child survivorship probabilities. These are set out in table 3. The detailed methodologies for the life table construction are contained in Bureau of Statistics, 1989.

It should be noted that the infant mortality rates estimated by the Trussell and Feeney methods presented in this table are based on the reporting of children ever born and surviving to women aged 20-24 years; these rates, therefore, refer to about 2.5 years before the census. Also presented for comparison are infant mortality rates obtained from deaths registered by the Registrar General and Ministry of Health.

It can be seen from this table that the infant mortality rates based on life table methods are only a few points lower than those of the Feeney method. It is also encouraging to note that the estimates based on the Feeney and life table methods are remarkably close to the rates obtained from the Ministry of Health. Additionally, the rates obtained from deaths registered by the Registrar General are also not too far off the other estimates.

Table 3: Trends in infant mortality rates (IMR)[a/, b/, c/] by ethnic origin and sex estimated by various methods

Ethnic origin and sex	1966		1976			1986			1984	
	T[f/]	F[g/]	T[f/]	F[g/]	LT[h/]	T[f/]	F[g/]	LT[h/]	MOH[d/]	RG[e/]
Fijians										
Male	–[i/]	–	46	38	36.8	30	23	19.6	–	17.7
Female	–	–	41	35	28.2	30	24	18.8	–	13.0
Total	58	50	–	–	–	–	–	–	22.1	–
Indians										
Male	–	–	59	50	41.3	33	26	23.0	–	22.1
Female	–	–	46	38	32.6	25	18	19.6	–	16.2
Total	79	69	–	–	–	–	–	–	22.7	–
Total										
Male	–	–	54	45	–	31	24	22.7	–	19.0
Female	–	–	45	37	–	27	20	19.1	–	14.2
Total	71	61	–	–	–	–	–	–	22.5	–

Notes:
- a/ IMRs for the Trussell and Feeney methods are based on the reporting of children ever born and surviving to women aged 20-24 years.
- b/ IMRs by males and females could not be estimated for 1966 census because questions on children ever born and surviving were not asked for boys and girls separately.
- c/ IMRs obtained from registration data are based on infant deaths registered in 1984.
- d/ MOH: Ministry of Health.
- e/ RG: Registrar General.
- f/ T: Trussell Method.
- g/ F: Feeney Method.
- h/ LT: life table method.
- i/ –: Estimates not available.

However, the fact that the rates are calculated on the basis of the date of registration of events rather than the date of occurrence makes the estimates highly questionable, because some of the infant deaths registered in a given year may have occurred in the same year and some in the preceding years. For these reasons, infant mortality rates obtained from the Registrar General cannot be taken as authentic. Thus, the infant mortality rates estimated either by the Feeney or life table methods or those provided by the Ministry of Health would closely represent the rates prevailing in Fiji. Hence, on the basis of this evidence we may conclude that there has been a substantial decline in the infant mortality rate in Fiji, both among Fijians and Indians, between 1966 and 1986. The infant mortality rates for Fiji around the period 1984 are below 25 per thousand live births, with slightly higher rates among Indians than among Fijians.

Adult mortality

In the preceding section, infant and childhood mortality rates were estimated indirectly by using data on survivorship of children by age of women. Similarly, indirect estimates of adulthood survivorship probabilities can be made if the data on survivorship of fathers and mothers by age of respondents are collected in the census. In the 1986 Population Census of Fiji, questions were asked about each member of the household on the survival status of real father and mother at the time of enumeration. The method derived by Brass and Hill (1973) converts the proportion of respondents with surviving father or surviving mother to yield a plausible estimate of adulthood survivorship probabilities. This method has been applied to the 1986 census data to estimate the adulthood survivorship probabilities for males and females separately for Fijians and Indians. The results are presented in table 4. (See United Nations, 1983 for elaboration of the method and Bureau of Statistics, 1989 for application of the method.)

The estimated probabilities of surviving presented in table 4 reveal that females, in general, have higher probabilities of surviving than males; this pattern is followed for both Fijians and Indians. It is also apparent that the mortality level corresponding to different age groups of respondents is not constant. The higher the age group of respondents used for estimating survivorship probabilities, the earlier is the time referring to these estimates. Apparently, adulthood mortality rates have been shown to be continuously declining over time, so it becomes necessary to affix the time to which these estimates refer.

A method proposed by Brass and Bamgboye (1981) has been employed to estimate the actual time to which each estimate refers (see United Nations, 1983 for elaboration of the method). The results are presented in table 4. It is evident from this table that the level of mortality has been increasing over time

Table 4: Estimates of conditional adult survivorship probabilities by ethnic origin and sex based on 1986 census of Fiji

Age group (years)	N	Paternal mortality				Maternal mortality			
		Proportion with father alive	1 (35+N) 1 (32.5)	Mortality level	Ref. date	Proportion with mother alive	1 (25+N) 1 (25)	Mortality level	Ref. date
Fijians									
15-19	20	0.9110	0.8775	20.45	1977	0.9559	0.9497	20.42	1977
20-24	25	0.8456	0.7917	19.62	1976	0.9210	0.9156	19.75	1976
25-29	30	0.7506	0.6660	18.52	1974	0.8709	0.8654	19.00	1974
30-34	35	0.6344	0.4899	16.64	1973	0.7894	0.7846	17.83	1973
35-49	40	0.4803	0.2916	14.13	1971	0.6767	0.6654	16.33	1972
40-44	45	0.3298	0.1409	12.76	1970	0.5389	0.5193	15.09	1971
45-49	50	0.2073	0.0437			0.4095	0.3603	14.32	
Indians									
15-19	20	0.8908	0.8147	16.96	1977	0.9673	0.9572	21.05	1977
20-24	25	0.8058	0.6993	15.37	1975	0.9363	0.9186	19.95	1976
25-29	30	0.7015	0.5747	14.71	1973	0.8764	0.8534	18.37	1974
30-34	35	0.5996	0.4094	13.15	1972	0.7977	0.7671	17.02	1973
35-39	40	0.4748	0.2822	13.64	1970	0.6952	0.6513	15.79	1972
40-44	45	0.3669	0.1311	12.11	1969	0.5766	0.5148	14.92	1971
45-49	50	0.2514				0.3067	0.3524	13.98	

Total									
15-19	20	0.9007	0.8460	18.67	1977	0.9616	0.9534	20.73	1977
20-24	25	0.8240	0.7435	17.42	1975	0.9291	0.9180	19.91	1976
25-29	30	0.7241	0.6160	16.48	1974	0.8741	0.8599	18.71	1974
30-34	35	0.6159	0.4516	15.01	1972	0.7944	0.7763	17.42	1973
35-39	40	0.4802	0.2790	13.47	1971	0.6883	0.6596	16.11	1972
40-44	45	0.3507	0.1351	12.38	1969	0.5607	0.5199	15.11	1971
45-49	50	0.2313	0.0353			0.4287	0.3572	14.18	

Table 5: Expectations of life at birth by ethnic origin and sex, Fiji, 1976-1986

Sex	1976		1986		
	Fijians	Indians	Fijians	Indians	Total
Male	60.7	59.5	63.1	59.6	61.0
Female	63.9	62.4	65.3	65.1	65.2

Note: The 1976 estimates are obtained from: Zwart, F.H.A.G., *Report on the Census of the Population 1976, Volume II: Demographic Characteristics*, Parliament of Fiji, Parliamentary Paper No. 43, Bureau of Statistics, Suva, 1979.

Fijian farmers at work – male adulthood mortality among the Melanesian population is substantially lower than among those of Indian background.

which means that adulthood mortality has been declining. This table also suggests that there is not any meaningful difference in female adulthood mortality between the Fijians and Indians, but male adulthood mortality is substantially higher among Indians than among Fijians. This means that a lower proportion of Indian than Fijian males survive to adult ages.

Expectations of life at birth

Expectation of life at birth is one of the most important indices of mortality which reflects the overall health standards of a given population. It is generally estimated by constructing life tables, for which age-specific death rates or the probabilities of surviving by age are the basic data required. Age-specific death rates are commonly obtained from the vital registration data while the probabilities of surviving by age can be estimated through indirect means. In the case of Fiji, although age-specific death rates are available from deaths registered by the Registrar General, for the aforementioned reasons, these data are not very reliable for constructing the life tables. An attempt was made, however, to construct life tables based on these age-specific death rates, but the expectations of life at birth derived from these data were unbelievably high. This also gives an indication of under-registration of deaths. An alternative method was to estimate expectations of life at birth indirectly. One of the indirect ways often used to construct life tables is through the intercensal survival method, which is strictly limited to closed populations with accurate censuses taken five or ten years apart. In the case of Fiji, although the censuses can be considered to be fairly accurate, the assumption of a closed population does not hold. The population of Fiji, especially that of Indians, has been substantially

affected by migration; hence, the application of this method to construct life tables was ruled out.

It was then finally decided to apply the Brass method of linkages of child survivorship probabilities with conditional adult survivorship probabilities to construct life tables. This method not only has advantages in constructing life tables but also has a built-in procedure to graduate the range of survivorship probabilities (United Nations, 1983). For this purpose, child survivorship probabilities, 1(2), 1(3) and 1(5) estimated by the Trussell method were linked with conditional adult survivorship probabilities to construct life tables for males and females separately for Fijians, Indians and the total population (Bureau of Statistics, 1989).

Table 5 presents the expectations of life at birth estimated from the 1986 census; also shown are the estimates based on the 1976 census report (Zwart, 1979). This table reveals that the overall expectation of life at birth for Fiji reached 61 years for males and 65.2 years for females in 1986. The expectations of life at birth are somewhat higher for Fijians than for Indians; this is much more evident for males than for females. The Fijian life expectancy at birth increased from 60.7 years in 1976 to 63.1 years in 1986 for males, while for females it increased from 63.9 years to 65.3 years during the same period. In contrast, there appears to be very little increase in the expectation of life at birth for Indian males, which increased from 59.5 years in 1976 to 59.6 years in 1986*, but for Indian females it increased relatively more, from 62.4 to 65.1 years during the same period,. In general, it can be inferred that the health standards of Fiji, as measured by the expectations of life at birth, improved significantly between 1976 and 1986.

Fertility

Crude birth rate

Crude birth rates are calculated from the information on births to women aged 15 years and above during the year preceding the 1986 census; these rates are presented in table 6. Also presented are crude birth rates obtained from the censuses of 1966 and 1976 and those obtained from the Registrar General and the Ministry of Health. According to the 1986 census, the crude birth rate for Fiji is 27 per thousand population, with the Fijians having higher crude birth rates at 30 per thousand than the Indians at 24.3 per thousand. The rates obtained from the Registrar General for the year 1985 are 27.9 for Fiji as a whole, 29.2 for Fijians and 26.7 for Indians. The Ministry of Health's figure for Fiji is 30.0 per thousand pertaining to the same year; and the rates

* It is difficult to explain the ethnic differentials in mortality between Fijians and Indians; however, one can speculate that part of the variance may be due to different dietary habits, life-styles and related socio-cultural factors among the two ethnic groups.

Table 6: Crude birth rates by ethnic origin and source, Fiji, 1966-1986

Source	Year	Fijians	Indians	Total
Population Census	1966	39.3	39.9	
Report 1976[a/]	1976	31.6	30.9	
Ministry of Health[b/]	1976	31.2	30.0	30.3
" " "	1985	33.5	27.2	30.0
Registrar General[c/]	1985	29.2	26.7	27.9
Census[d/]	1986	30.0	24.3	27.0

Sources: a/ Zwart, F.H.A.G., *Report on the Census of the Population 1976, Volume II: Demographic Characteristics*, Parliament of Fiji, Parliamentary Paper No. 43, Bureau of Statistics, Suva, 1979;
b/ Ministry of Health and Social Welfare, *Annual Report for the Year 1984*, Parliament of Fiji, Parliamentary Paper No. 1 of 1986;
c/ Bureau of Statistics, *Vital Statistics in Fiji (Statistics of Births, Deaths and Marriages), A Report for the Year 1985*, Suva, 1986; and
d/ Current estimates based on 1986 census.

are 33.5 and 27.2 per thousand for Fijians and Indians, respectively. It is also noteworthy that the crude birth rates estimated from the 1976 census and Ministry of Health for the period 1976 are close to each other.

Table 6 also presents the trends in crude birth rate, and shows that there was a faster decline in crude birth rate among both the Fijian and Indian populations between 1966 and 1976. During this period, the Fijian crude birth rate declined from 39.3 to 31.6 per thousand while the corresponding decline for Indians was from 39.9 to 30.9 per thousand respectively. However, between 1976 and 1986, the Fijian crude birth rate declined very little, from 31.6 to 30 per thousand, while the Indian crude birth rate declined from 30.9 to 24.3. It is clear that the Indian crude birth rate was consistently declining from 1966 to 1986, while there has been a slow-down in recent years in the pace of decline in the crude birth rate among Fijians.

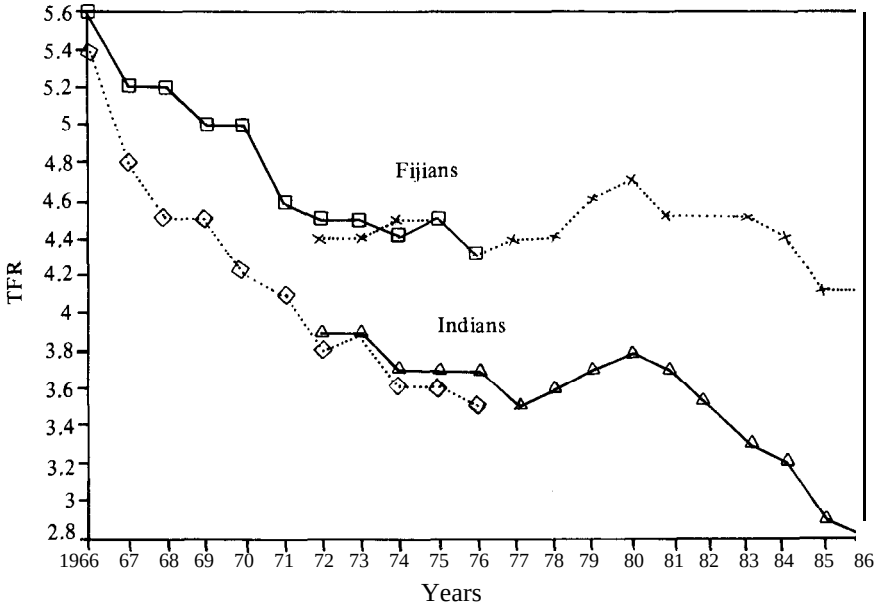
Age-specific and total fertility rates

The preceding section examined the fertility level of Fiji in terms of crude birth rate. Because of its limitation, i.e. the rates are subject to changes in age structure of the population under study, a more refined measure of fertility is warranted to depict the true level of fertility. The age-specific and total fertility rates are the most practical measures of current fertility. These

rates are readily obtained from the information on live births which occurred during the year preceding the census. The rates, therefore, represent the period immediately preceding the census. Alternatively, the age-specific and total fertility rates can be estimated indirectly for the 1.5 years preceding the census, provided the census collects additional information on the relationships of mothers with their own children. Fortunately, Fiji made an effort in the census to collect data on the relationships of mothers with their own children; this facilitated the application of the own-children method to estimate fertility trends in Fiji for the 15 years preceding the census.

The input data required for the application of the own-children technique is the single-year age distribution of population under 16 years of age by the age of their own mothers; these are tabulated in the 1986 census report (see Bureau of Statistics, 1988). Based on this method, the age-specific fertility rates are estimated by reverse projection of enumerated children to the time of their birth and the female population to each of the years pre-

Figure 4: Trends in total fertility rate (TFR) based on own-children method by ethnic origin, 1966-1986



Notes: □ , ◇ = Based on 1976 census;
X , △ = Based on 1986 census.

Table 7: Trends in total fertility rates (TFR) by ethnic origin and source, Fiji, 1976-1986

Year	Fijians				Indians				Total		
	Own child. 1976[a/]	Own child. 1986[b/]	Vital reg. [c/]	Census 1986 [d/]	Own child. 1976[a/]	Own child. 1986[b/]	Vital reg. [c/]	Census 1986 [d/]	Own child. 1986[b/]	Vital reg. [c/]	Census 1986 [d/]
1966	5.6				5.4						
1967	5.2				4.8						
1968	5.2				4.5						
1969	5.0				4.5						
1970	5.0				4.2						
1971	4.6				4.1						
1972	4.5	4.4			3.8	3.9			4.1		
1973	4.5	4.4			3.9	3.9			4.2		
1974	4.4	4.5			3.6	3.7			4.1		
1975	4.5	4.5			3.6	3.7			4.1		
1976	4.3	4.3			3.5	3.7			4.0		
1977		4.4				3.5			3.9		
1978		4.4				3.6			4.0		
1979		4.6				3.7			4.2		
1980		4.7				3.8			4.2		
1981		4.5				3.7			4.1		
1982		4.5				3.5			4.0		
1983		4.5				3.3			3.8		
1984		4.4				3.2			3.7		
1985		4.1	3.4			2.9	2.8		3.4	3.1	
1986		4.1		3.9		2.8		2.6	3.4		3.2

Notes: a/ Zwart, F.H.A.G., *Report on the Census of Population 1976, Volume II: Demographic Characteristics,* Parliament of Fiji, Parliamentary Paper No. 43, Bureau of Statistics, Suva, 1979.
b/ Current estimates based on own-children method.
c/ Bureau of Statistics, *Vital Statistics in Fiji (Statistics of Births, Deaths & Marriages): A Report for the Year 1985,* Suva, 1986.
d/ Current estimates based on births occurring during one year preceding the census.

ceding the census. For the purpose of the reverse projection of enumerated children to the time of their birth and the female population, the life tables constructed from the 1986 census have been used (Bureau of Statistics, 1989).

The advantage of this method is that it does not depend upon any assumption about fertility trends and is not very sensitive to assumptions about recent changes in the level of mortality (United Nations, 1983). Therefore, only one set of mortality levels has been used in the reverse projection of the population and mortality is assumed to have remained constant during the period studied.

Detailed outputs of age-specific and total fertility rates for the period between 1972 and 1986, obtained by using the software package, EASWESPOP: Fertility Estimates Program (East-West Center, 1987), are contained in Bureau of Statistics (1989) while the summary results are presented in table 7 and displayed in figure 4. The fertility trends based on the own-children method applied to the 1976 census (Zwart, 1979) are also presented for comparison.

The results show that these two data sets present remarkably close estimates and they almost overlap for the period 1972-1976. Among Fijians, the trends in fertility reveal that the total fertility rate was 5.6 in 1966; it experienced a continuous decline and reached 4.3 in 1976. It then slowly increased up to 4.7 in 1980, remained constant at 4.5 between 1982 and 1984 and declined steadily to 4.1 in 1986. The rates estimated by the own-children method are also compared with those obtained from other sources. The total fertility rate of 3.4 for 1985 obtained from the Registrar General is lower than other estimates. For example, the total fertility rates estimated by the own-children method and the one obtained directly from the census data, both referring to the year 1986, are 4.1 and 3.9, respectively.

It can also be seen from this table that compared with Fijians, Indians have experienced a much faster decline in fertility. The total fertility rate of 5.4 observed among Indians in 1966 declined to 3.8 in 1972; it then remained almost unchanged, or fluctuated between 3.5 and 3.9 during the period 1972-1981 ; it was not until after 1981 that Indian fertility resumed its pace of decline. The total fertility rate has now come down to less than 3 children per woman. The other estimates also tend to put the Indian total fertility rate between 2.6 and 2.8 for the year 1986.

It is also apparent from the above trends that the Fijian and Indian fertility rates were both high and similar in 1966: the total fertility rates were 5.6 for Fijians and 5.4 for Indians. Both ethnic groups experienced a decline in fertility over time, but it was much more noticeable among Indians than Fijians, with the result that the gap in fertility between Fijians and Indians started

Figure 5 : Age-specific fertility rates (ASFR) per thousand Fijians, 1966 -1986

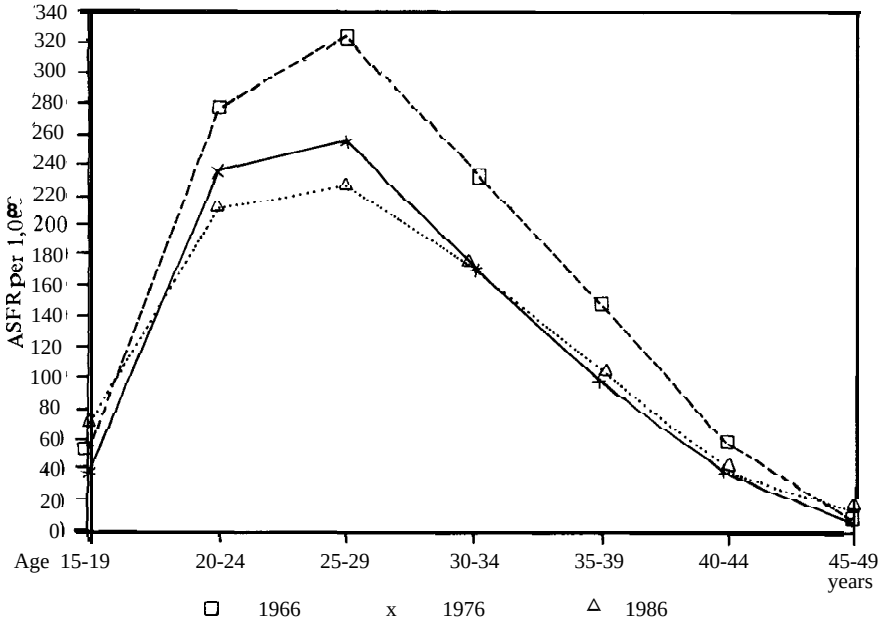


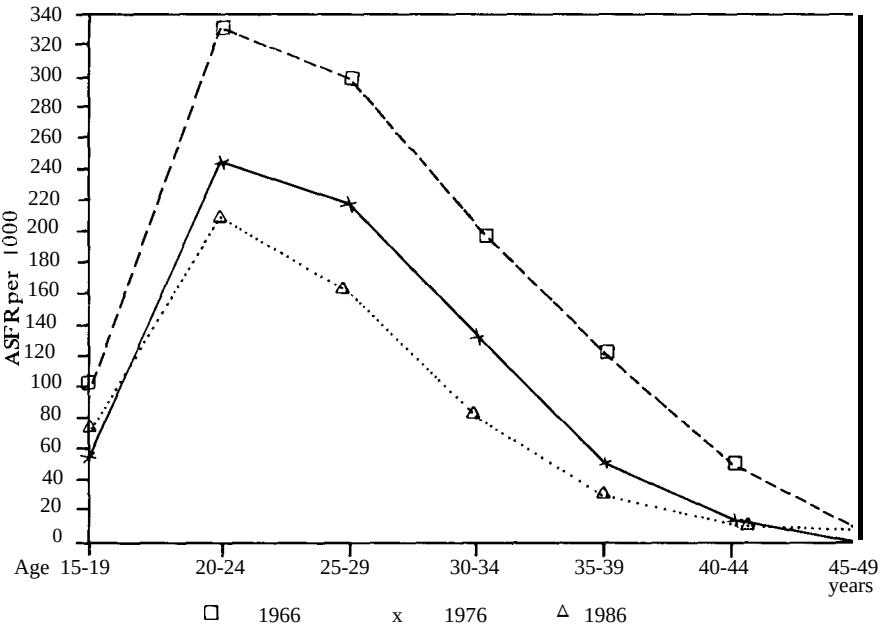
Table 8: Age-specific fertility rates (per thousand) by ethnic origin, Fiji, 1966-1986

Age group (years)	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

Notes: a/ Zwart, F.H.A.G., *Report on the Census of the Population 1976, Volume II: Demographic Characteristics*, Parliament of Fiji, Parliamentary Paper No. 43, Bureau of Statistics, Suva 1979; and

b/ Current estimates based on own-children method.

Figure 6: Age-specific fertility rates (ASFR) per thousand Indians, 1966-1986



widening. Eventually in 1986, the Fijian total fertility rate was 4.1 as opposed to 2.8 for Indians, a difference of more than one child between Fijians and Indians.

It is not only the total fertility rate but also the age pattern of fertility that is different between Fijians and Indians. Table 8 and figures 5 and 6 present the age-specific fertility rates for Fijians and Indians for the 1966, 1976 and 1986 censuses. Apparently, the fertility decline was observed for every age group between 1966 and 1976 for both the Fijians and Indians.

It is interesting that fertility among Fijians seems to have gone up between 1976 and 1986 in the younger age group, 15-19 years, and the older age group, 35-49 years. It is only the middle age group, 20-34 years, which appears to have experienced some decline in fertility between these periods. But in contrast, among Indians – except for the age groups 15-19 and 45-49 years – all age groups of women experienced a noticeable decline in fertility. The pattern of fertility shows that among Fijians, peak fertility occurred among women aged 25-29 years, while among Indians the peak occurred among women aged 20-24 years. These patterns prevailed during all the censuses of 1966, 1976 and 1986.

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Population Conference

The International Union for the Scientific Study of Population (IUSSP) held its Twenty-first International Population Conference at New Delhi from 20 to 27 September 1989. The Conference, which was organized at the invitation of the Indian Association for the Study of Population (IASP), was opened by India's Prime Minister Rajiv Ghandi.

The numerous papers presented at the Conference were published under various headings in three volumes. Volume 1: patterns of fertility change in Asia, demography of China, data collection systems in South Asia, population growth policies in South-east Asia, social structure and fertility change, emerging issues in fertility control, fertility analysis, the conditions of child survival, and biomedical and demographic aspects of health. Volume 2: non-traditional approaches to demographic data collection; indirect methods of demographic analysis; international migration systems, processes and policies; megacities: trends, issues and policies; changing patterns of migratory flows; population and rural development; population and long-term perspectives in pre-modern economic development; and changing family structure and labour markets in industrialized countries. Volume 3: demographic aspects of planning for health, education and employment; aging: economic and social aspects; changing family structures and life courses; marriage systems and demographic trends in developed countries; demographic issues in developed countries; case studies in anthropological demography; peopling of the continents; and priority needs for the development of the discipline of demography.

In addition to the many papers that were presented at the Conference, new members of the Council of the Union were selected for the period 1989-1993. Among them were Massimo Livi-Bacci of Italy who replaces William Brass as President; John C. Caldwell of Australia as Vice-President; and Allen G. Hill of the United Kingdom of Great Britain and Northern Ireland replacing Georges Tapinos as Secretary General and Treasurer. New members of the Council are Dragana Avromov of Yugoslavia, J.A. Magna de Carvalho of Brazil, Monica Das Gupta of India, Charlotte Hohn of the Federal Republic of Germany, Jacques Legare of Canada, John H. Pollard of Australia, Roland Pressat of France and Saw Swee-Hock of Singapore.