

An Overview of South Pacific Population Problems

*The population situation in the widely
scattered Pacific subregion is
marked by great diversity
in demographic indicators*

By Penny Kane and David Lucas*

Population growth rates in the Pacific subregion vary more widely than elsewhere in the ESCAP region. During the period 1976-1983, the annual growth rate was about 4.4 per cent in Wallis and Futuna Islands but 3.2 per cent for Niue during the 1976-1980 period (ESCAP 1985).

Other demographic data also show widely varying patterns. These in-

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clude birth, death and natural increase rates as well as the incidence of internal and international migration. In addition, data on these and other indicators are not entirely satisfactory. In fact, vital statistical data for the majority of the Pacific islands are sparse and unfortunately often less than reliable.

The lack of reliable data is a major problem and makes it difficult to present an accurate picture of the current demographic situation in this sub-region. **Tables 1** and **3** (Lucas, Streatfield and Kane 1985) demonstrate the difficulty of obtaining a reliable time series for crude birth and death rates,

Table 1: Estimates of fertility (around 1970-1983) for selected Pacific island countries

Country/territory	Quality of registration data ^{a/}	Year	Crude birth rate (per 1,000)	Total fertility rate (per woman)
Polynesia				
American Samoa	C	1970	39	6
		1980	34	-
Cook Islands	C	1971	31	-
		1981	21	4
		1982	26	-
Niue	U	1971	37	6
		1973-75		5 ^{b/}
		1976	25	-
		1982	23	-
Samoa	I	1966	44	-
		1971		7
		1976	37	
		1979	37	7
		1982	39	6
		1982	31	
Tokelau Islands	U	1970	31	
		1979	20	
		1981	below 25	
Tonga	U	1976	28-30	4
		1976	32	
		1980	29-30	-
		1982	38	
		1978-79	25	-
Tuvalu	n/a	1979	24	3
		1982	35	-
		1978-79	25	-
Wallis and Futuna (W) (F)	U	1970	43	-
		1975	36(W)40(F)	
		1978	37	
		1978	37	

Table 1: continued

Country/territory	Quality of registration data ^{a/}	Year	Crude birth rate (per 1,000)	Total fertility rate (per woman)
Melanesia				
Fiji	C	1970	29-31	
		1971-73	-	4
		1976	29	-
		1980	29	-
		1982	-	3
		1983	27	-
New Caledonia	U	1975	31	
		1981	26	
Papua New Guinea	U	1971	46	
		1979		7-8
		1983	40	6
Solomon Islands	n/a	1970	41	-
		1976	45	7
		1982	45	7
Vanuatu	n/a	1971-80	41	6
Micronesia				
Guam	C	1970	31	5
		1977	29	4
		1980	30	3
		1981	27-29	-
Kiribati	n/a	1968-73	33	-
		1978	35	-
Nauru	n/a	1976	22	-
		1979	21	-
Trust Territory of the Pacific Islands - Palau - Northern Marianas - Federated States of Micronesia	I	1976	32	-
		1973	40	-
		1978	20	-
		1981	26	-
		1975-79	38	-
		1982(?)	33	-
		1980	34	-

Notes: **a/** C = data estimated to be at least 90 per cent complete;
I = data estimated to be incomplete; and
U = quality and data base not determined,

b/ Three-year moving average.

Source: *United Nations Demographic Year Book, 1982.*

or for total fertility rates, infant mortality rates or expectation of life at birth. Furthermore, because Melanesian countries account for such a large proportion of the total population of the subregion (84 per cent in 1984) data on them tend to give a lopsided view of the overall situation in the Pacific island countries. In view of such factors, this paper attempts to provide a broad review of what is known (or presumed to be known) about the current demographic situation in the Pacific.

In general, fertility rates are high primarily in Melanesia and Micronesia while over the past two decades a decline in fertility has taken place in Polynesia (ESCAP 1985). However, it is difficult to establish the magnitude of declines in reported birth rates among the Polynesian countries because of data inadequacies and because the crude birth rate is a somewhat insensitive measure of change.

The dramatic discrepancy in reported birth rates in 1982 in Samoa is inexplicable. The slight increase in crude birth rates for Tonga and Tuvalu may be indicative of the strenuous efforts of those countries to improve the reporting of births. Quite substantial declines in the birth rate are suggested in Niue and the Cook Islands (as indicated by the low proportion of those under 15 years of age.) The small base population in Tokelau makes it difficult to identify a clear trend. Only modest reductions are indicated in American Samoa, and even less in Wallis and Futuna, both of which have been affected by return migration from New Caledonia (Kane and Lucas 1986).

Population growth rates (shown in **table 2**) are affected by migration rates; for a number of Pacific island countries, low growth rates are more the result of high out-migration than of fertility control. In the context of fertility control, it should be pointed out that available statistics on contraception in the Pacific subregion are of very doubtful quality and are seldom really comparable across countries; thus they should be treated with great caution (Lucas and Ware 1981).

The Melanesian countries of Papua New Guinea, Solomon Islands and Vanuatu appear to have experienced little or no reduction in fertility, in contrast to Fiji and New Caledonia, where crude birth rates (CBR) have fallen below 30 per thousand. The substantial non-Melanesian components of the population in the latter countries have had a depressing effect on the CBR.

In Papua New Guinea, there seems to be a slowly increasing acceptance of family planning. Recent survey data (Ageyi 1984) suggest that as many as 20 per cent of rural, and 31 per cent of urban, eligible women currently practice contraception, although comparison with the recent census results

Table 2: Population (mid-1984) and average annual growth rates

Country/territory	Estimated population	Average annual growth rate	
	mid-1984 (thousands)	1975-1980 (per cent)	1980-1985 (per cent)
Polynesia			
American Samoa	34.7	1.8	1.7
Cook Islands	16.3	-1.4	-2.1
French Polynesia	159	2.1	2.0
Niue ^{c/}	3.3 ^{a/}	-3.2	n.a.
Samoa	162	0.7	0.9
Tokelau	1.6 ^{b/}	0	n.a.
Tonga	106	1.6	2.0
Tuvalu	8.1	3.9	1.6
Wallis and Futuna	12.1	4.1	2.7
Melanesia			
Fiji	686	1.9	2.0
New Caledonia	148	0.9	1.5
Papua New Guinea	3 353	2.7	2.8
Solomon Islands	263	3.4	3.6
Vanuatu	130	2.7	2.7
Micronesia			
Guam	115	0.9	1.6
Kiribati	61.4	1.6	1.6
Nauru	7.7	1.3	1.3
Trust Territories of the Pacific Islands	132.8	2.0	2.0

Notes: ^{a/} Population at the 1980 census

^{b/} Population at the 1981 census

^{c/} Pitcairn had a population of 53 in January 1983 and 64 in July 1983.

Sources: John Connell, *Migration, Employment and Development in the South Pacific. Country Report No. II, Niue*, and No. 15 Pitcairn, SPC/ILO, 1983; *Migration, Employment and Development in the South Pacific, Country Report No. 17, Tokelau*, SPC/ILO, 1983; South Pacific Commission, *South Pacific Economies 1980 Statistical Summary*, August 1982; U.S. Department of Commerce, Bureau of the Census, *World Population 1983 - Recent Demographic Estimates of the Countries and Regions of the World*, Washington, DC., 1983.

indicates that educated women were over-represented in the sample, in which case the proportions are probably too high. Nonetheless, even if a contraceptive prevalence rate of 47 per cent is achieved, Papua New Guinea is expected to add an additional 2 million people to its population between 1980 and 2000 at which time the total population will exceed 5 million. Vanuatu is experiencing a rapid expansion of contraceptive use (Osteria 1984). In Solomon Islands, family planning acceptance is difficult to establish; estimates range from 7 to 23 per cent.

In Micronesia, Nauru has the lowest crude birth rate with declines also being apparent in Palau while Guam and the other Trust Territory of the Pacific Islands, together with Kiribati, have shown little change over the decade. Kiribati has a contraceptive prevalence rate of around 20 per cent owing to government support for family planning. However, Kiribati's family planning programme is said to have weakened during the later 1970s.

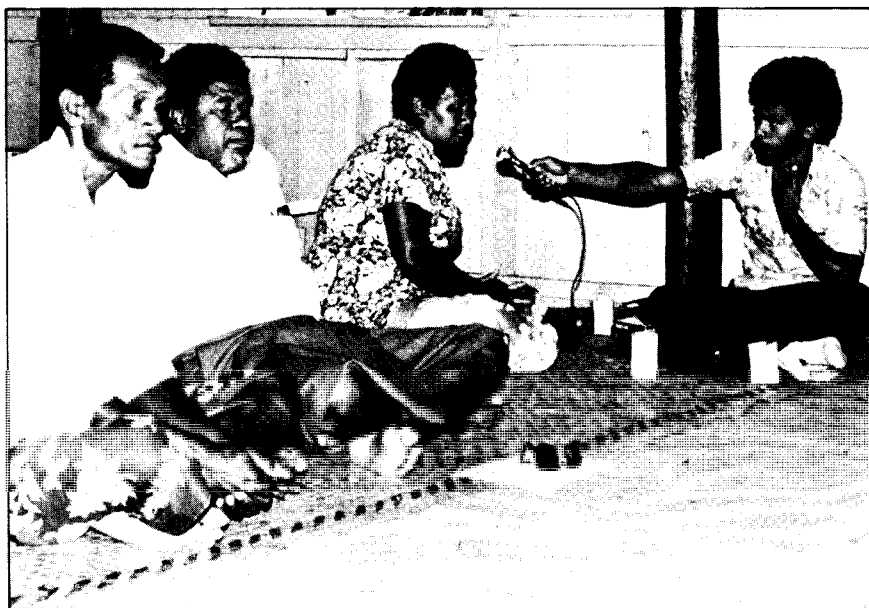
Recent growth rates in Polynesian countries have been comparatively low, largely as the result of migration. Since 1958, Tonga had an active family planning programme with more than a third of its women practising contraception. The result was a decline in fertility during the 1970s; however, practice is said to have declined since (Connell 1983: 18) although the Government had planned to reduce the birth rate to 2.5 per thousand by 1985 through increased contraceptive prevalence. Tuvalu showed an increasing acceptance of family planning with around 28-32 per cent of eligible couples practising contraception at the beginning of the 1980s; Samoa had a contraceptive prevalence rate of around 11-15 per cent in 1979 which was increasing slowly.

Only Fiji among the Melanesian countries has a natural growth rate as low as 2 per cent. However, migration is an important component of the Fijian growth rate. In part, that country's low natural growth rate is a result of more widely practised family planning by the Indian population, which has a prevalence rate of 32 per cent, compared with 11 per cent amongst the Fijians, according to a recent report (Bavadra 1985). However, at the time of the Fiji Fertility Survey in 1974 (Bureau of Statistics 1976), 56 per cent of ever-married women at risk of pregnancy were practising contraception and the programme was regarded as a remarkable success.

While all Pacific island countries have entered the mortality transition (ESCAP 1985), mortality trends vary. Also, estimates of infant mortality and expectation of life at birth (**table 3**) are open to question. Nevertheless, the order of magnitude of the considerable variations in these reflects the discrepancies within the region.

Among the Polynesian countries, only American Samoa and Cook Islands have achieved fairly high levels of life expectancy and substantial reductions in infant mortality. Tokelau's overall crude death rate reflects a high rate of gastrointestinal diseases as well as a growing problem with diabetes. Tonga's comparatively high death rate indicates the continuing importance of some pre-transitional causes of death, especially those associated with nutrition.

The Melanesian countries of Papua New Guinea and Solomon Islands have long been noted for high death rates and low life expectancy among females, although female survival has improved in the latter country. In Papua New Guinea, the national infant mortality rates, as given, disguise the true extent of differentials within that country; for example, in coastal regions the infant mortality rate is below 60 per thousand and in some very remote areas it has been estimated as high as 400 infant deaths for every thousand live births. There too nutrition remains a major problem: nutritional deficiencies are the fifth most common cause of death among infants who are hospitalised. By contrast, Fiji has a very low mortality rate and quite a low infant mortality rate, but there are some differentials between Indians and Fijians.



Fiji has low mortality and infant mortality rates, but there are differentials between Fijians, such as those being interviewed, and others in the population of Indian descent.

Table 3: Estimates of mortality (around 1970-1983) for selected Pacific island countries

Country/ territory	Quality of registration data ^{c/}	Year	Crude death rate (per 1,000	Infant mortality rate (per 1,000 live births)	Expectation of life at birth ^{d/}
Polynesia					
American Samoa	C	1960-70	-	-	(m)65 (f)70
		1968-72	5	-	
		1970	-	27	-
		1980	5	17	-
Cook Islands	C	1910-72	-	43	(m)63 (f)67
		1971	7	-	-
		1981	6	28	(m)65 (f)70
Niue		1982	7	-	-
Samoa		1966-71	-	-	61
		1971-76	-	-	(m)61 (f)64
		1976	7	40	
		1980	8	35	63
		1983	8	42	-
Tokelau	U	1967	-	-	(m)62 (f)63
		1970	8	58	
		1979	9	63	
Tonga	U	1966	14	59	(m)56 (f)57
		1976	-	-	58
		1980	10	-	-
		1982	10	-	-
Tuvalu	n/a	1979	11-15	42	(m)57 (f)60
Wallis and Fatuna (W) (F)	U	1970	11	-	-
		1975	7.5(W) 10(F)	-	
		1974-78	-	45	(m)61 (f)63
Melanesia					
Fiji ^{a/}	C	1966	-	-	(m) 67-65 (f)72-67
		1970	4-5	14-23	
		1976	7	35	62
		1982	4	28	(m)71 (f)75
New Caledonia		1975	7	35	-
		1976	-	-	64
		1980	7	27	-
		1983	6	38 ^{c/}	(m)59 ^{c/} (f)64 ^{c/}
Papua New Guinea		1971	17	106	(m)48 (f)48
		1979	17	131	
		1981	- 124 (R) 102 (U)	^{b/}	
		1983	13	97	(m)54 (f)53

Table 3: continued

Country/ territory	Quality of registration date ^{e/}	Year	Crude death rate per 1,000)	Infant mortality rate (per 1,000 live births)	Expectation of life at birth ^{d/}	
Solomon Islands	n/a	1970	12	73	(m)59	(f) 43)
		1973	-	61	-	-
		1976	12	46	(m) 54	(f) 54
Vanuatu	n/a	1982	12	46	(m)54	(f) 54
		1974-78	10-12	-	-	-
Micronesia						
Guam	C	1975	5	20	-	-
		1977	9	20	-	-
		1976-78	-	-	(m)70	(f)79
		1980	4	16	-	-
Kiribati	n/a	1968-73	17	-	-	-
		1973	-	90	-	50
		1978	14	87	(m)50	(f) 54
Nauru	n/a	1976	5	-	-	-
		1976-81	-	-	(m)49	(f) 62
		1983	10-11	-	-	-
Trust Territory of the Pacific Islands	I	1976	4	-	-	-
- Palau		1973	8	-	-	-
		1978	3	-	-	-
		1980	14	-	-	-
		1981	5	24	-	-
- Marianas		1975-79	5	-	-	-
- Marshalls		1982(?)	2	21	-	-
- Micronesia		1980	5	38	-	-

Notes: **a/** The first figure is for Fijians; the second, for people of Indian origin.

b/ (R) = rural; (U) = urban.

c/ Melanesians only.

d/ (m) = male, (f) = female; single figure = combined sexes.

e/ C = data estimated to be at least 90 per cent complete;

I = data estimated to be incomplete; and

U = quality and data base not determined.

Source: See tables 1 and 2.

The Micronesian countries, except for Guam, have a generally rather unimpressive mortality profile. Kiribati's very high infant mortality rate results partly from even higher mortality in urban South Tarawa than in the rural areas, owing to poorer nutrition and pressure on all resources in that high-density urban area. By contrast, the major causes of death among Nauruans are accidents and injuries related to motor vehicles and industry.

The industrial situation in Nauru contrasts with that of many Pacific island countries which are generally characterized by a low level of industrialization and a high level of out-migration of people looking for work. Ironically, high levels of out-migration coincide with high levels of unemployment or under-employment. These result partly from inadequate or inappropriate educational opportunities and partly from the smallness of many of the countries involved which means that they cannot afford a range of specialised skills (see, e.g. ESCAP 1985).

Seven of the eight Polynesian countries show very high levels of out-migration, with New Zealand as the primary recipient country for Cook Islanders and residents of Niue, Pitcairn and Tokelau. During the first half of the 1970s, emigrants from the Cook Islands were largely male, but since 1977, females have been joining them and there is currently a more balanced age structure among the islanders in New Zealand than there is among those remaining in the Cook Islands.

Migration from Niue, which is largely characterized by the relocation of entire families, intensified from the 1970s and by 1981 there were 8,121 Niueans in New Zealand of whom 4,752 had been born there. By contrast, the remaining population in Niue was 3,296, including 11 per cent of the total who were non-Niueans, mostly New Zealanders, although there has been a significant in-migration of Tongans.

Similarly, there are more people from Pitcairn Island and Tokelau in New Zealand than on the former islands. More than half the population of Wallis and Futuna lives abroad, the majority living in New Caledonia. While statistics for Tongan migration are not good, it has been estimated that probably one out of four Tongans lives abroad, and there are suggestions that the rate of emigration is increasing (Connell 1983: 18).

Remittances give a clue to the distribution of Tongan migrants: 39 per cent of remittances are from the United States of America; 29 per cent from New Zealand and 20 per cent from American Samoa. Samoans, next to Fijians, are thought to be the most widely dispersed people in the Pacific, with 30 per cent of the population living in a variety of destinations. Migration from Tuvalu has been primarily short-term. Until secession, Tuvaluans depended

upon overseas employment in Kiribati. Nauru has been the most important migration destination for men from Kiribati for the past 85 years.

The situation is even more complex in Micronesia. Guam has had a very large influx of foreign workers, especially Asians. Guam also receives people from Palau, from which migration is apparently more extensive than anywhere else in Micronesia. In turn, Palau has seen a doubling of foreign workers, mainly Asians, and the numbers are still growing. Filipinos form the largest immigrant group in the Marianas, where 39 per cent of the labour force is non-Micronesian.

In recent years, there has been increasing emigration from the Trust Territory of the Pacific Islands to Guam and the United States. There has been significant and increasing migration to the Federated States of Micronesia as well, together with increasing out-migration to the United States. The Marshall Islands, which previously did not have much permanent out-migration, is showing signs of an increase in movement to the United States, while alien employment now makes up some 10 per cent of the formal sector. It is not yet possible to assess how the new status of the Federated States of Micronesia, and the Marshall Islands, which in November 1986 were granted by the USA republic status as fully associated states, will affect these trends in migration.

An important part of the labour force in Papua New Guinea comprises Asians who work mainly as skilled tradesmen. Australians and Europeans are still present but their numbers declined by more than half between 1971 and 1981. Expatriates also continue to be prominent in Solomon Islands. Indians have long been a major component of the Fijian population, following the import of indentured labourers between 1879 and 1916. Formerly there was a large influx of people from what was known as the Gilbert Islands (today's Kiribati) to Solomon Islands and by 1976, 41 per cent of people of Gilbertese origin had been born in Solomon Islands. The latter country, in turn, sends skilled workers to Nauru. Elsewhere in the Pacific, there is similar "mixing". In 1983, 43 per cent of New Caledonia's population was Melanesian; 37 per cent, European. A further 8 per cent came from Wallis; 4 per cent, from Tahiti in French Polynesia; and 4 per cent, from Indonesia.

Because of out-migration among labour force age groups, the dependency ratio where a high proportion of the population is under 15 has increased (ESCAP 1982). In addition, high levels of out-migration often result in a disproportionate number of the elderly being left behind in locations within countries from which the economically active have departed. Another indication of a dependency burden, of a sort, is the sex ratio of the islands, especially the number of males to females in the working ages 15-64. In Toke-

lau and Tuvalu, there are 25 per cent fewer men than women in the labour force age groups, while French Polynesia, Guam, New Caledonia and Vanuatu have quite extraordinarily high numbers of extra males.

Not even the most liberal transmission of remittances can fully compensate for the lack of males in the labour force of the sending islands. The negative effect of the lack of males is especially strong in agriculture; it is probably another reason for the existence of nutritional problems in so many of the Pacific island countries (Kane and Lucas 1986).

Out-migration is crucially important to the Pacific islands because of the size of remittances from overseas. The information on remittances is incomplete and not comparable between countries. However, remittances make up 20 per cent of GNP in Cook Islands; remittances to Tonga in the shape of formal transactions (excluding cash sent in letters, and so on) accounted for one third of Tonga's earned income during the 1970s. In Tuvalu, 56 per cent of all households get income from remittances, More than half of the national income of Samoa consists of remittances.

Less is known about remittances in most of the Micronesian countries, with the exception of Kiribati where they have been estimated to comprise about 17.5 per cent of all island income.

Among the Melanesian countries of Fiji and Papua New Guinea remittances play less of a part in the economy because of the low rates of emigration. In Solomon Islands, workers who go to Nauru are obliged to send back one third of their earnings.

The populations remaining in sending countries are disproportionately young and old, and female. Furthermore, there has been a decline in the proportions of people living in distant areas, notably the outlying islands of these countries, and a corresponding increase in the number of those moving to urban areas (ESCAP 1982).

Such internal migration has affected all countries in the Pacific. In part, this is a result of the introduction of a cash economy and a formal employment sector. However, while this does not necessarily imply a high level of urbanisation, in Papua New Guinea, migration is increasingly becoming urban rather than "circular". (See book review on pp. 83-84). Migration in that country is "centrifugal", involving movement from the highlands to the coastal areas; unfortunately, it is leading to a rapid growth in urban problems, especially in Port Moresby (Connell 1983). However, people in Papua New Guinea still consider a rural life as being more "proper" than an urban one, and many eventually return to their villages. Consequently, Papua New Guinea has the smallest pro-

portion of people in towns of any large South Pacific island country, and the numbers are not growing rapidly.

Internal migration in Solomon Islands has been largely to the coasts and the towns; only Honiara shows signs of developing urban problems. Fiji's population is heavily concentrated on Viti Levu where the urban centres are located. Vanuatu has a much smaller urban population; in 1979, 13 per cent of the people were living in the Greater Vila area.

The combination of population pressure on the agricultural capacity of small islands, together with migration to urban areas or to other countries, and changes in attitudes which make farming unattractive and imported goods desirable, has led to serious strains on the food supply in many countries.

This problem with food and agriculture is not new. In his work entitled *An Essay on the Principle of Population*, Malthus (1807) noted that, in the South Sea islands " . . .the average population, generally speaking, presses hard against the limit of the average food". However, he precluded emigration as an effective solution. Today, 179 years later, emigration is generally recognised as the main possibility for reducing the pressure on the resources of the islands in Polynesia and Micronesia.

For those who do not emigrate, the spectre of famine raised by Malthus has faded, since the adverse effects of typhoons and floods can be minimised by prompt emergency food aid. However, malnutrition, perhaps co-existing with the diseases of modernisation, and the resurgence of malaria, still pose threats to the quality of life. The quality of life is adversely affected in other ways too; for example, the prospects for the large numbers of young people in the islands are not encouraging because educational facilities are often lacking and the pattern of employment in the Pacific leaves most local people outside the organised private sector.

Furthermore, the tendency of the development community to concentrate attention on the larger, Asian countries has meant that some of the very real population problems in the South Pacific have been overlooked. While recent political, strategic and economic concerns about the Pacific subregion are helping to bring this vast area into better focus, more attention needs to be devoted to the Pacific's population problems.

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A Review of Health and Nutrition Issues in the Pacific

*Future health improvements will require a sustained,
multisectoral effort, emphasizing
population-based approaches*

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Poor health hampers economic growth in the South Pacific and is reflected in the relatively high mortality rates and short life expectancy found in the subregion.

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Health is an important measure of any society's development progress. Yet improved health does not necessarily accompany economic development, "modernization", or urbanization. Nowhere is this better illustrated than in the South Pacific.

This article reviews the current state of health in five Pacific island countries: Fiji, Samoa, Solomon Islands, Tonga and Vanuatu. It considers some of the underlying causes of poor health, and it recommends alternative strategies for improving health in the context of overall economic development.

In general, the data on health in the Pacific island countries must be viewed with scepticism: they are often incomplete, inaccurate and unreliable, and are almost invariably out of date (Taylor 1985b), although a number of studies have yielded much useful data about specific health problems (Coyne 1984; Taylor et al. 1985).

Two decades of transition

The five Pacific island countries are experiencing massive changes in health in tandem with rapid changes in the environmental, behavioural and in some cases even genetic factors that interact to determine an individual's health status. During the past decade, the transition in morbidity and mortality patterns in the South Pacific has been especially dramatic.

The Pacific island countries remained relatively isolated until after the Second World War. While some other parts of the globe were experiencing rapid technological, social and economic progress, the island countries retained many of their traditional social, economic and cultural features. The war brought the Pacific islands into contact with the Western powers and precipitated several decades of unprecedented change in virtually all dimensions of economic and social life. Pacific populations were exposed to new technologies (including transport, communications and medicine), social values and behaviours. Changes that had occurred over extended periods of time in other settings were introduced within merely a few years in the Pacific (Zimmet 1979).

Since the Second World War, the five island countries have experienced a shift from more rural, structured, homogeneous, village-based (i.e. "underdeveloped") economies to more urban, fluid, heterogeneous, cash-based (i.e. more "modernized") economies. This description belies important differences among the five countries, but it summarizes an overall trend that has its counterpart in health.

Until the 1950s, infectious diseases were the leading causes of illness

and premature mortality in the islands of the Pacific. Many of these diseases, such as measles and influenza, were introduced by slaves and indentured labourers who arrived by the shipload over several centuries (Taylor 1985b). Other diseases, closely associated with inadequate supplies of water and unhygienic waste disposal, or with other characteristics of a rural, subsistence environment (e.g. diarrhoeal disease), were extremely common.

These diseases persist in rural areas and in burgeoning urban areas where attempts to extend and upgrade utilities and basic services could not keep pace with population growth. The introduction of antibiotics and other drugs after the Second World War, public health improvements, such as malaria eradication campaigns and improvements in water supplies, and general socio-economic development resulted in a decline in mortality rates caused by infectious diseases, such as malaria, pneumonia and tuberculosis. These measures improved the overall health status in the islands.

However, in the 1960s, a new pattern of diseases began to emerge in certain Pacific island countries. In contrast to the earlier disease profile which resembled that of other underdeveloped countries, these island groups began to exhibit characteristics more closely associated with “Western” or “developed” countries. That is, non-communicable diseases, and specifically chronic, degenerative diseases such as diabetes, heart disease, cancer, and more recently accidents, suicide and alcoholism, began to dominate the disease picture.

By the mid-1980s virtually all island countries had been affected by this epidemiological evolution and there is currently a perceptible gradient among them from those characterised more by infectious diseases (e.g. Vanuatu and Solomon Islands), to those in which non-communicable diseases prevail (e.g. Fiji, Samoa and Tonga).

Current mortality trends

Mortality rates and expectation of life at birth in the Pacific islands reviewed in this article are generally better than the global average and appreciably better than those of other developing regions (**table 1**). However, the five island countries generally experience a poorer health status overall than is the average among all countries in the South Pacific. For example, the expectation of life at birth in the five countries ranges from 54 and 56 years among men and women, respectively, in Vanuatu to 60 and 66.2 years in Fiji (Ahlburg 1985 and Taylor et al., in press, 1986), while the average combined (male-female) life expectancy throughout Oceania is 74 years. Infant mortality statistics for the five countries show an even wider spread, from 94 per thousand live births in Vanuatu to 33 per thousand live births in Samoa.

Table 1: Mortality and life expectancy
(Adapted from Ahlburg, 1985)

	Fiji	Samoa	Solomon Islands	Tonga	Vanuatu
Crude death rate					
1960	(per 1,000) 13.0	-	-	-	-
1965	6.0	-	13.0	14.0 (1966)	20.0
1970	-	7.7	11.0	-	-
1975	7.8	7.0	12.0	8.10	12.0
1980	(1976) 5-6 (1983)	7.9	(1976) 13.0	(1976) 7.8	(1974-1979)
1975-80	World 11.4	Africa 18.0	South Africa 14.4	Oceania 9.0	
Expectation of life at birth					
	Fiji	Samoa	Solomon Islands	Tonga	Vanuatu
	m f	m f	m f	m f	m f
1960	63.1 65.7				
1965	65.3 68.6	60.2 64.3		56.0 53.0	
1970	66.4 69.9	59.6 63.4	58.0 58.0	56.2 59.3	-
1975	66.4 69.9	61.4 65.2	58.0 58.0	57.3 60.9	-
1980	66.2 69.9	62.2 66.0	57.0 57.0	60.0 61.0	56.0 54.0

1980 (Taylor & Levy)	m	f	m	f	m	f	m	f	m	f
Melanesians	61	64.0	62.0	66.0	54.0	54.0	63.0	56.0	54.0	54.0
Indians	60	62								
		World	Africa	South Africa	Oceania					
1975-80 (total)		57.3	47.6	51.7	74.0					
Infant mortality rate	Fiji	Solomon Islands	Samoa	Tonga	Vanuatu					
(per 1,000 live births)										
1960	65.0	-	-	-	-					
1965	58.0	42.6	52.4	59.0	-					
1970	50.0	47.5	52.4	20.6	-					
1975	43.3	36.0	58.0		-					
1980	54	(1971-1976)								
Indians	54	33.0	53.0	41.0	94					
Melanesians	37									
		World	Africa	South Africa	Australia					
1975-80		88	125	120	11					

Note: m = male; f = female

Source: Taylor and Levy (1986) and Ahlburg (1985) [AID (1985)]; Lucas and McMurray (1985); World Bank (1980); United Nations (1985)].

Modernization, urbanization and health

“Modernization”, “development” and “urbanization” are frequently identified as the causes of contemporary health trends in the South Pacific. However, the definitions of these terms mask a vague series of attributes: each has been used to denote varied complexes of processes and stages. When researchers assert that development, modernization or urbanization are causally related to health problems, such as diabetes or heart disease, it is not always clear exactly which characteristics are the important correlates.

Some research has established causal linkages between migration, accompanying modernization, and chronic disease among migrants from the South Pacific, but no such causal relationships have been demonstrated among modernising populations who experience the modernization process *in situ*, that is, on their native islands within the South Pacific context (Newell 1983; Fianu 1983). Urbanization might denote dense settlement, predominance of wage labour (rather than subsistence agriculture), a relatively higher per capita income than in rural settlements, reasonably convenient access to goods and services (including transport, communications and health facilities), but not necessarily all of these. Or urbanization might denote a process rather than an end state, in which case its relevant components might be “uncertainty”, “dislocation”, “unemployment”, “stress” and conflict between competing rural and urban value systems etc., which might operate through an entirely distinct constellation of variables to influence health. The process of modernization might be linked with a very different set of health outcomes (such as anxiety, depression and violence) than the steady state definition, even though they may share certain health impacts (such as hypertension, coronary disease and accidents.)

Among the crucial socio-economic factors believed to influence the health transition currently being observed in the subregion are:

- A shift from consumption of local foods to imported and processed foods;
- Sedentarism in lieu of regular physical activity (especially among urban migrants and particularly among women);
- Inadequate housing;
- Poor employment opportunities;
- Expenditure of low incomes on goods and services other than food; and
- Emulation of elite, cosmopolitan life-styles (Taylor and Connell 1982).

Apart from the work of Prior and others on Tokelauan migrants to New Zealand (Prior and Davidson 1966; Prior et al. 1978; Prior and Tasman-Jones

1981; Prior 1981), there is scant research scientifically linking socio-economic aspects of "development" in the Pacific with health outcomes. Taylor's preliminary analysis (1985b and forthcoming, 1986) has found a positive correlation between life expectancy, disease-specific mortality in the Pacific 'and particular socio-economic, political and cultural variables, namely:

- Governmental expenditure per capita;
- Foreign aid per capita;
- Imports and exports per capita;
- Proportion of population in urban areas;
- Proportion of school-age children attending school;
- Remaining a territory of a metropolitan country or maintaining strong political ties with a former colonial power; and
- Ratio of physicians to population.

Some of these findings are confirmed by Ahlburg (1985).

Obviously these variables tend to be highly intercorrelated, and are probably only indirect determinants of life expectancy. The underlying determinants of mortality in the region have not been the objects of significant research.

Infectious diseases in the Pacific

Though death and disability owing to infectious diseases have declined considerably in the Pacific island countries during the past two decades, infectious and communicable diseases remain a major problem in most of the five island countries. They are the leading causes of death in Solomon Islands and Vanuatu, where they are responsible for 24.3 per cent and 22.7 per cent of all recorded deaths, respectively (Taylor 1985b).

Of the greatest public health significance are acute respiratory infections (particularly pneumonia and influenza); common childhood diseases (whooping cough, diphtheria, measles and diarrhoea), the effects of which are intensified in undernourished children; and malaria. Other communicable diseases of concern to island health officials are rheumatic heart disease, tuberculosis, leprosy and sexually transmitted diseases.

Malaria

Malaria, a tropical disease of the greatest public health importance in the South Pacific, is found in Vanuatu and Solomon Islands among the five island countries under review. The recent increase in frequency of occurrence

of the especially virulent strain, *Plasmodium falciparum*, has been attributed to a growing resistance of the parasite to chloroquine. Some scientists have speculated that there has also been a change in mosquito behaviour and that this has rendered residual spraying less effective (Taylor 1985b and personal communication). Consequently, residual spraying is currently being combined with other control methods, including biological control of vectors (in Vanuatu), personal protection and large-scale administration of anti-malarial drugs.

Acute respiratory disease

Acute respiratory infections, principally influenza and pneumonia are among the four leading causes of death in every one of the five islands reviewed in this article (see **table 2**). Acute respiratory disease is believed to be the leading cause of death among children under the age of five years in the South Pacific. (This differs from other developing countries where diarrhoeal disease is commonly the leading cause of mortality among children under five years of age). In a prospective, community-based study of children under five years of age in rural Papua New Guinea, approximately one third of all deaths were attributable to acute respiratory disease (Shann 1986; Riley 1983). Acute respiratory infection is endemic in Fiji (Parliament of Fiji 1986). Pneumonia is undoubtedly responsible for a high proportion of death among infants and young children in the "less developed" islands of Vanuatu, Solomon Islands and Samoa, and is also a major cause of morbidity and mortality among children in rural areas of the other island countries.

Death and illness owing to acute respiratory disease may be reduced through general improvements in standards of living, especially less crowded housing which lessens the probability of direct contact for acute respiratory disease transmission (Shann 1986; Riley 1985). Direct measures such as vaccination against respiratory ailments, and immediate, appropriate treatment of cases can reduce incidence of the disease and avert complications (Shann 1986; WHO 1985; Shann 1985).

Diarrhoeal disease and childhood diseases

Data are not readily available on the importance of diarrhoeal disease as a direct or contributing cause of mortality in infancy and childhood in the Pacific island countries. But since diarrhoea has been incriminated as the leading cause of death among children under five years of age elsewhere in the developing world and because diarrhoeal mortality is so easily and inexpensively averted with oral rehydration therapy, it deserves further study in the Pacific subregion.

Monthly statistics are available on other communicable diseases of child-

Table 2: Rank order, proportional morbidity attributed to major causes of death, Pacific islands, 1980, (both sexes)

	Cause of death (proportion of all deaths, per cent)			
Country	Rank1	Rank2	Rank3	Rank4
Fiji				
Melanesians	Cardiovascular (25%)	Respiratory (14%)	Cancer (13%)	Infection (10%)
Indians	Cardiovascular (25%) disease	Accidents (13%)	Perinatal (10%) conditions	Respiratory (4%) disease
Samoa	Cardiovascular (32%) disease	Respiratory (11%) disease	Accidents (11%)	Cancer (10%)
Solomon Islands	Respiratory (25%) disease	Perinatal(25%) conditions	Infection (24%)	Accidents (9%)
Tonga	Cardiovascular (26%) disease	Cancer (18%)	Infection (10%)	Respiratory (8%)
Vanuatu	Infection (23%)	Perinatal(16%) conditions	Respiratory (13%) disease	Cardiovascular(11%) disease

Source: R. Taylor, 1985b.

hood (pertussis, diphtheria and polio). Data from Fiji, for example, indicate that while the incidence of numerous diseases of childhood (as mentioned plus tetanus) fell significantly between 1970 and 1980, the rate of decline was less pronounced for measles (Parliament of Fiji 1986).

Conclusions: infectious diseases

Infectious diseases figure prominently among the leading causes of death in all five countries.

For the immediate future, direct measures as well as indirect improvements in standards of living will be necessary to reduce premature mortality, especially infant and young child mortality, and morbidity resulting from infectious diseases. Within the context of primary health care, which most of the islands have endorsed, the most promising measures are:

- Improved treatment protocols for, and vaccination against, acute respiratory diseases;
- Malaria control through a combination of personal protection, chemoprophylaxis, residual spraying and improved forms of vector control;
- More vigorous and comprehensive immunization of infants and children against childhood diseases;
- National oral rehydration campaigns, if survey data deem them appropriate;
- Continued improvements in water supply and sanitation in unserved rural and dense urban settlements; and
- Promotion of continued breast-feeding and/or adequate supplementation and weaning practices.

Non-communicable diseases in the Pacific

Non-communicable diseases are significant and increasingly common causes of mortality and morbidity in the islands of the South Pacific. The chronic, degenerative diseases of most importance in the Pacific subregion, namely, cardiovascular disease, diabetes, hypertension and cancer, produce debilitating symptoms largely among mature adults, although precursor states may date from childhood.

By contrast, the other category of non-communicable illnesses, "diseases of violence and addiction" (which include suicides, accidents and alcoholism), seems to take a high toll among post-adolescent and younger adults.

Table 3: Diabetes prevalence (per cent), both sexes, urban and rural, Pacific islands

Country	Urban	Rural
Fiji		
Melanesians	6.9	1.9
Indians	14.8	13.3
Samoa	7.0	2.7
Tonga	6.2	3.9

Source: Various studies summarised in Coyne, T., 1984.

Diabetes

Diabetes prevalence rates in the Pacific islands, among the highest in the world, have exploded since the 1960s when diabetes did not constitute a significant problem in the subregion (**table 3**). For instance, there was a ten-fold increase in diabetes prevalence among urban Fijians in just the 10-year period between the late 1960s and the late 1970s (Zimmet and Sloman 1980). Age-specific prevalence rates over time are not readily available, but in Fiji, among the population cohort aged 40-59, mortality owing to diabetes nearly quadrupled from about 40 per 100,000 to nearly 150 per 100,000 per year between 1971 and 1980 (Biumaiwai et al. 1984). Tuomilehto et al. (1985) have suggested that diabetes and cardiovascular disease combined account for more than one third of all deaths in Fiji.

Most of the diabetes observed in the Pacific subregion is adult onset diabetes, i.e. diabetes that appears in maturity (South Pacific Commission 1978). It is infrequent among traditional, rural Polynesian and Melanesian groups except in Tonga (Coyne 1984). For example, it is two to six times as frequent among urbanized Polynesian and Melanesian populations in Fiji and Samoa as among comparable rural populations. But prevalence rates are especially high among Fijian Indians as a group, regardless of whether they reside in rural or urban areas.

The leading causative factors linked with diabetes in the Pacific island countries include heredity, diet, nutritional status (i.e., obesity, adiposity or body mass), and physical inactivity. The starkly differing prevalence rates of diabetes among different ethnic groups in the region have led researchers to postulate the existence of predisposing genetic characteristics. It is believed, for example, that Micronesians and Polynesian are more susceptible to diabetes than other ethnic groups, and that, according to Zimmet, this proclivity is "... unmasked by the change in life-style. . ."occasioned by urbanization (Zimmet 1979).

Obesity is undoubtedly another predisposing variable, though some researchers hypothesize that in itself it is not sufficient to cause diabetes (Zimmet et al. 1983).

Decline in physical activity accompanying a more sedentary, urban life-style may be more strongly correlated with adult onset diabetes in the Pacific. A study in Fiji showed diabetes to be more than twice as common among people who were either sedentary or engaged in light activities than among those who performed moderate or heavy exercise, and this difference prevailed regardless of age, ethnic group, place of residence (rural or urban) or degree of obesity (Taylor et al. 1985b).

The effects of genetic inheritance and sedentarism may be reinforced by a drastic change in the composition of the typical diet, especially in urban areas, from one consisting principally of fresh fish, meat, and local fruits and vegetables high in fibre to a more caloric (and calorie dense) diet of processed and imported items including sugar, rice, tinned meats, fruits and vegetables, soft drinks, beer and white bread (Zimmet 1979 and Taylor 1983).

Quite recent studies by Turtle et al. comparing urban and rural populations of Fijian Melanesians and Indians confirm that there is indeed a genetic predisposition to diabetes among Indians, but that diabetes prevalence rates among both Melanesians and Indians vary directly with degree of "urban life-style", especially diet, e.g. increased caloric consumption and resultant obesity (Turtle, personal communication, 1986).

In short, diet and nutritional status (obesity), life-style (especially exercise) and genetic predisposition, are all potent factors, but no one has thus far quantified the relative weights of these variables. A final variable that may be associated with an increase in the recurrence of diabetes is stress, which appears to contribute to increased rates of diabetes among Tokelauan migrants to New Zealand (Stanhope and Prior 1960; Zimmet 1981).

Diabetes presents a serious public health problem not merely because uncontrolled glucose rates can precipitate death but also because of the high cost of treating the diabetic and averting and/or treating the secondary effects of diabetes, including small-vessel and circulatory disease. These costs are incurred especially in the secondary and tertiary stages of the disease, when symptoms must be treated in the hospital, often on a long-term basis, with the associated costs usually borne by the government.

Cardiovascular disease and hypertension

Cardiovascular diseases are the leading reported causes of death in three of the five Pacific island countries reviewed in this article (Fiji, Tonga and

Samoa, see **table 2**). The two most important cardiovascular diseases are coronary heart disease and hypertension. Hypertension is important both as a disease leading to stroke and cardiovascular or renal failure and as a known risk factor for heart disease (Coyne 1984). Heart disease prevalence rate data are sparse, but available data suggest that rates of diseases in this category, while varying among countries, are on the increase throughout the subregion, as are the known risk factors for heart disease. This may be due to aging of the population, with a commensurate increase in the proportion of the population succumbing to diseases associated with longevity, or to a rise in age-specific rates, or a combination of both. Thus morbidity and mortality from heart disease will continue to rise unless risk factors are reduced (Zimmet 1979).

Little evidence is available on the prevalence of and relative risk from hypertension, genetic susceptibility, and environmental factors (diet, elevated blood lipids, lack of physical activity, smoking and stress), which are the major heart disease risk factors in the Pacific (Coyne 1984). Some inferences can be drawn from closely controlled, prospective studies of Tokelauans migrating to New Zealand among whom elevated blood pressure rates are common (Zimmet 1979; Prior 1979). Based on available evidence subgroups in the Pacific at low risk consist of:

“ . . . small, often isolated traditional societies or subsistence economies where individuals understand their role and where patterns of behaviour are clearly set. A low salt diet is a feature of such groups.” (Prior 1981).

By contrast, urbanization, modernization and rural-urban migration (and the dislocation and change they imply) are associated with high risk for cardiovascular disease (Prior 1981).

Thus in Solomon Islands cerebrovascular disease, angina pectoris, and ischemic heart disease are virtually unknown (Zimmet 1979), even among acculturated groups. Ischemic heart disease and cerebrovascular disease occur infrequently among the urban Melanesian Fijians, but are highly prevalent among Indian Fijians. Blood pressure rates are higher among urban groups in most countries, such as Tonga (Prior et al. 1978) Fiji (Zimmet and Sloman 1980) and Samoa (Zimmet et al. 1980).

Recent research elsewhere indicates that two prime risk factors for cardiovascular disease are physical activity (i.e. sedentary life-styles) and cigarette smoking. The impact of these factors could be minimized through health education aimed at “healthier life-styles” though approaches would be tailored for the South Pacific islands. Other interventions that might be practical for Pacific island populations include reduction of high salt intake, increased use of traditional high-fibre foods in the diet, reduction of smoking, weight control com-

mencing as early as childhood, and maintenance of strong social support networks (Prior 198 1; Coyne 1984).

Cancer

Apart from recent cancer registry statistics, data on cancer in the South Pacific are poor, particularly considering the disease's rank as a cause of mortality. Disease detection and surveillance activities and reporting are frustrated by a lack of facilities and by variations in reporting practices which thwart attempts at cross-national comparisons. Cancer is the second leading cause of death in Tonga (accounting for 16 to 18 per cent of all deaths), the third cause among Melanesian Fijians, and the fourth most important cause of death in Samoa. (See **tables 2 and 4**). Like other chronic, degenerative diseases, cancer rates appear lowest in the "less developed" Pacific island countries and highest among the more "developed" countries. However, the lower rates observed in the less developed Pacific island countries may simply be an artefact of people dying prematurely of communicable diseases there while their more "Westernized" counterparts live long enough to develop and succumb to cancers.

In Vanuatu, cancer of the reproductive system (including breast cancer) accounts for more than 38 per cent of recorded cancer deaths. Among Solomon Islanders cancer of the mouth and liver were most common, perhaps reflecting the prevalence of betel-nut chewing and incidence of Hepatitis B known to be associated with those two forms of cancer respectively (Taylor et al. 1985a). Cancer rates in Fiji are generally substantially lower than (one fourth to one third of) rates in Australia, the United States or New Zealand, but these statistics may underestimate actual prevalence in Fiji. Rates differ significantly between Melanesian and Indian Fijians for reasons unknown.

Many of these cancers can be prevented by averting known risks such as smoking (linked to lung cancer), betel-nut chewing (oral and possibly oesophageal cancer), and Hepatitis B (liver cancer). Bladder, pancreas and kidney

Table 4: Proportion of mortality owing to cancer, Pacific island countries (per cent)

Fiji	
Melanesians	12
Indians	5
Samoa	7
Solomon Islands	0
Tonga	16
Vanuatu	4

Source: South Pacific Commission, *Cancer in Pacific Island Countries*, 1985. Covers years 1980-1982.

cancers, known to be associated with cigarette smoking, could similarly be reduced through a decrease in smoking. Cervical cancer screening has been recommended as a means of reducing mortality from this frequent form of cancer among Pacific island women but implementation would be difficult where basic health services are unavailable.

Diseases of violence and addiction

The most important diseases of violence and addiction in the South Pacific are alcoholism, smoking, accidents (principally motor vehicle accidents) and suicide. With the exception of smoking, these diseases have received considerable attention because of their very rapid and recent increase and, in the case of accidents and suicides, because their occurrence among young males involves dramatic, premature death.

Alcohol-related problems are relatively new to the South Pacific. The data are not reliable but seem to substantiate governmental concern over this growing problem (South Pacific Commission 1986a). Binge-drinking rather than chronic alcoholism, and accidents, domestic violence and even suicide associated with drunkenness are the major concerns today, although the complications of chronic drinking may emerge as problems in future years. Another issue related to excessive drinking is the social and nutritional effect on the family when scarce household cash is used for liquor rather than basic necessities, especially food (Marshall et al. 1982; Richardson 1983). Alcohol-related morbidity and mortality tend to be under-reported: they usually are reflected in statistics on other illnesses or events (e.g. motor vehicle accidents and injuries). Patterns of excessive consumption of alcohol must be traced either through indirect indicators (e.g. volume of alcoholic beverages imported per capita) or through the rare special study (Taylor 1985b).

Estimating the public health significance of motor vehicle accidents in the South Pacific poses similar problems: the data are patchy and probably inaccurate and they have been little analysed. However, a recent review of existing data indicates that motor vehicle accidents are significant problems: when standardized rates for fatalities in various South Pacific island groupings were compared with Australia and New Zealand, fatality rates in the Pacific ranged from two times higher (in Samoa and in the islands overall) to five or six times higher in recent years in Fiji (McLean 1986). Not surprisingly, the more commonly motor vehicles are used for transport in a country, the higher the fatality rate. Vehicle safety and maintenance and driving skill are regulated poorly or not at all. Road upgrading, if unaccompanied by driver education and regulation, may actually increase the fatality rate as vehicles travel at higher speeds. Better data collection and analysis will shed further light on the causes underlying these trends.

A final cause of violent, premature death in certain South Pacific islands is suicide. Recent evidence compiled by epidemiologists points to a startling increase in the rate of accidental and intentional death owing to ingestion of paraquat, a commonly available herbicide (Bowles 1985; Taylor and Goldstein forthcoming 1986). The most pronounced trend is among young (aged 15-25) males in Samoa and Fiji although young Indian females also commit suicide at a high rate using that chemical. (Unlike young Indian males, young women do not appear to ingest paraquat accidentally at all, but rather exclusively with suicidal intent.) These suicides are probably prompted by a complex of social and economic factors such as frustration over limited employment opportunities, friction between children and parents in a cultural setting that scorns intergenerational strife, and intolerable treatment of young Indian brides by their in-laws (Taylor and Goldstein 1986). Solomon Islands appears not to be experiencing the same precipitous rise in suicide rates. Women appear to commit suicide there more often than men, allegedly in response to failed love affairs, family tensions and out-of-wedlock pregnancies, and often through overdoses of chloroquine. One hypothesis is that female suicide is a response to the lack of control and options young women experience (Gegeo and Watson-Gegeo 1985). Many of these suicides may be prevented through better regulation and protection of the herbicide and education aimed at avoiding unintentional poisonings.

Occupational health problems

Not many systematic data are available on occupational health problems in the South Pacific. Even where safety and health standards exist, they are often unimplemented and unenforced (International Labour Organisation 1984). Standards and measures imported from more developed societies are often impractical in the climatic, cultural and economic environment of the South Pacific.

Provisions for maternity leave and child care are one occupational health and industrial measure that might have a very significant effect on infant health in the Pacific. By encouraging longer breast-feeding they would promote better infant nutrition and could avert the frequent diarrhoeas that often accompany early cessation of breast-feeding and introduction of breast-milk substitutes and/or solid foods.

Conclusions: non-communicable diseases

Non-communicable diseases are on the increase in the South Pacific: in several of the five island countries extremely high rates of diabetes and heart disease have already been observed, and certain cancers are also excessively frequent. It is likely that these rates will continue to rise and that these patterns will be replicated in other islands unless immediate measures are taken.

To some degree, the increased proportion of deaths attributable to non-communicable diseases is due to the diminution of infectious diseases throughout the Pacific. But this explanation cannot account entirely for the dramatic rise in their incidence and prevalence: non-communicable disease rates are extremely high even when compared with Western, industrialised countries.

Research in other settings has demonstrated that rates of the leading non-communicable diseases in the Pacific island countries can be lowered substantially with appropriate public health interventions. For most diseases, these interventions are well-known and have been endorsed by the World Health Organization (Taylor 1983 and WHO 1978,1979,1980,1980a,1982).

WHO has recently urged that since some non-communicable diseases, such as coronary heart disease, can take years – even decades – to manifest themselves in higher mortality rates, less developed countries should act immediately to avert and/or lower the known risks with which they are associated. WHO recommends a population-based rather than a high-risk oriented programme (Dodu 1984). This approach would complement the current “primary prevention” approach, which emphasizes reduction and/or modification of “. . . the risk factors that are already present in individuals and the community and thus forestall the development of overt disease ” (Dodu, 1984). The principal difference between the two approaches is that the latter is based on reducing risk already present; the former would operate at an even earlier stage in the etiology of non-communicable diseases by averting risk factors. “Primordial prevention” has another advantage in developing countries such as those in the Pacific in that it is entirely consistent with the “primary health care” approach already embraced by the island Governments which offers them a mechanism for encompassing their communicable and non-communicable disease objectives within a single conceptual strategy.

Among the measures that could be promoted to reduce mortality and morbidity from non-communicable diseases in the Pacific Island countries are:

- Identification and control of cases of clinical hypertension (though this implies continuous patient compliance with drug therapy);
- Promotion of moderate levels of physical activity, especially among the totally inactive;
- Promotion of consumption of less salt and animal fats and more dietary fibre; lower total caloric intake among populations with predilections for obesity;
- Discouraging smoking and betel-nut chewing;
- Introduction of comprehensive cervical and breast cancer screening.

- Educational campaigns against excessive drinking and irresponsible driving; and
- Regulating the sale and handling of poisons such as paraquat.

Health, development and women in the Pacific

Women as a group have special health needs and priorities, some of which were brought to light in the two surveys of women's health conducted thus far in the South Pacific, in Niue (South Pacific Commission 1985) and the Marshall Islands (forthcoming).

Cervical and breast cancer together account for up to 40 per cent of female cancer mortality in the island countries. In Fiji, cervical cancer rates exceed those found in Western countries. But cancer detection may not be easy to implement where health services are poor. By contrast maternal malnutrition, including anemia, which may be a significant determinant of birth-weight and therefore infant mortality levels, could be attacked through improved prenatal care and education. The survey of women's health in the Marshall Islands uncovered an extraordinary level of latent demand for contraception, probably attributable to a combined dearth of information on and access to alternative family planning methods (S. Levy, personal communication, 1986). Education on child spacing and better access to modern means of contraception could improve both maternal and child health. Similarly, efforts aimed at improving maternal and child nutrition, women's mental health, and the educational and economic status of poorer women could have a significant effect on mothers as well as their children.

Malnutrition: nutritional disorders, deficiencies and surfeit

Malnutrition, which comprises undernutrition, overnutrition and poor nutrition, is a major health problem in the South Pacific and is a factor that underlies and contributes to the other principal health problems in the sub-region.

Historical evidence suggests that adults in the Pacific island countries suffered neither nutritional deficiency nor surfeit and consumed a healthful diet low in fat, high in fibre (though also high in carbohydrates) and adequate in protein. Infants were traditionally breastfed to two years of age or until the mother's next pregnancy. Malnutrition was probably common, however, in infancy and childhood from about seven months of age onwards when breast-milk intake decreased and traditional foods were inadequate for the child's

needs and widespread famines exacerbated their conditions (Coyne 1984; Darnton-Hill et al. 1985).

Traditional food habits have recently given way in urban areas (and less so in rural areas) to a diet heavily reliant on processed and imported foods (Thamann 1982; Parkinson 1982; Coyne 1984). These foodstuffs have the advantage of often being more accessible, more convenient to prepare and consume, and cheaper. From a nutritional standpoint, however, the contemporary diet contains excessive animal fat, salt and calories. High-fibre root vegetables (taro, sweet potatoes and yams) are replaced by less beneficial bread, rice, and tinned meats and fish. Food imports accounted for one fifth of total imports throughout the Pacific in 1978; in Tonga they comprised nearly 28 per cent of imports (Harris 1984; see **table 5**).

Recent studies have demonstrated a serious decline in nutritional status in cities and towns and in overall nutrition status compared with two or three decades earlier (Coyne 1984; Darnton-Hill et al. 1985). For example, a 1980 survey in Fiji revealed that 7.9 per cent of Fijian children and 24 per cent of Indian children under the age of five experienced protein energy malnutrition (Darnton-Hill et al. 1985). Moreover, among the adult population of Fiji, 40 per cent of males, 20 per cent of Indians of both sexes, and 80 per cent of Melanesian women in Suva are obese. A 1982 national nutrition survey in Vanuatu revealed a 23 per cent prevalence of protein energy malnutrition among children under five years of age (Darnton-Hill et al. 1985). Surveys of birthweight as an indicator of maternal nutritional status and the primary predictor of infant mortality have demonstrated low birthweights among certain population subgroups, such as poorer rural areas of Vanuatu and Fiji, among Indian Fijians, and in areas where malaria is endemic (Darnton-Hill et al. 1985).

Among women, both malnutrition (especially in Melanesia) and obesity (more characteristic of Polynesia and Micronesia), as well as anemias caused

Table 5: Food imports, Pacific island countries, 1978

	Food imports/ total imports (%)	Food imports per capita (\$A)
Fiji	15	110
Samoa	21	77
Solomon Islands	11	31
Tonga	24	73

Source: Connell, 1984, p. 5.

by malaria and/or iron deficiencies, jeopardise pregnancy outcomes and neonatal health. Anemia is also reported to be severe among children in Fiji, Solomon Islands and Vanuatu.

Breast-feeding duration is on the decline, and malnutrition correlates with early weaning among children in Samoa and Solomon Islands. Bottle-fed Samoan children are hospitalized more frequently for gastroenteritis; malnutrition occurs more frequently among bottle-fed Fijian children; and there is a lower incidence rate of infections among Polynesian children breast-fed for longer periods (Darnton-Hill et al. 1985).

On the other end of the spectrum, obesity, once regarded as a desirable attribute and common mostly among chiefs and wealthier islanders, is now routine. As previously noted, obesity has been associated with diabetes and hypertension.

Determinants of malnutrition

The relatively recent shift in dietary patterns coinciding with “modernization” is the major factor underlying poor nutritional status in the region. But, as noted, malnutrition in children, and sometimes among women of fertile age in certain subgroups, predated the transition and is probably caused by other factors. The factors that influence these patterns are complex, and suggest that introducing more healthful nutrition habits will be a multidisciplinary and difficult task. One researcher has suggested that taste, cost and convenience, in that order, are the principal factors influencing diet in the region (Connell, personal communication, May 1986).

Urbanization and modernization have involved relocation to urban areas and that has meant that:

- Food must be purchased and traditional foodstuffs are not easily available (or are extremely expensive compared with alternative foods, including imports);
- Families become reliant on wages and no longer cultivate rural lands, cutting off traditional subsistence foodstuffs;
- Foods are processed using “modern” techniques employing various additives, notably salt and sugar, but are nutritionally inferior to traditional foods (e.g. lower in fibre and complex carbohydrates);
- Women do not understand the nutritional qualities – or lack of them – of the convenient, but costly and nutritionally deficient processed foods, and thus are unable to compose satisfactory diets for their families;
- Men have migrated temporarily or permanently from rural areas to

urban centres or overseas and have abandoned agriculture entirely. Their families live in part on remittances (in part on cash crop earnings etc.) and thus effectively have an “urban” dietary pattern albeit while residing in a rural area; and

- Nutritionally vapid and expensive imported foods enjoy high status (are associated with an elite, modern, sophisticated lifestyle) and their short-comings are little emphasised in educational activities (Darnton-Hill et al. 1985; Connell 1981; Taylor 1983).

Other factors contributing to a decline in nutritional status in the five island countries are late introduction of nutritionally valuable weaning foods, low protein diets among children under two years of age, and more closely spaced births resulting from disuse of traditional birth-spacing methods (Darnton-Hill et al. 1985).

Improving nutrition in the Pacific

Numerous measures have been suggested for improving nutrition in the island countries, some more practical than others. Some are reminiscent of a return to a more pastoral, labour intensive, subsistence agricultural lifestyle and are probably unrealistic. Assuming that a trend towards urbanization continues, measures that may improve nutrition include:

- Governmental awareness of nutrition problems (e.g., completion of national nutrition surveys and specialised studies where warranted);
- Formulation of national nutrition policies to ensure co-ordinated, adequately financed nutrition programmes (Tonga and Fiji have well-established National Food and Nutrition Committees);
- Stimulation of increased production, healthful processing and consumption of local foods (e.g. through intensified agriculture techniques, more efficient and competitive local transport and marketing systems; governmental research into traditional crops; and development of guidelines on appropriate food-processing);
- Decreased reliance on imported foods where economically and politically practical;
- Enhanced nutritional awareness on the part of the population through nutrition education in schools and communities, or via mass media including responsible advertising; and
- Training of indigenous nutrition experts, some at a paraprofessional level, to become staff members of nutrition education programmes.

A mix of production, marketing and promotional strategies will be necessary in each setting, and these must address realistically issues such as food

imports and continued consumption of monetarily costly and nutritionally undesirable but very convenient, processed imported foods (Harris 1984).

Health and health-related services in the Pacific

Lack of information and analysis

The extensive documentation summarised in this article is indicative of the relative abundance of demand-side data, particularly clinical data, on health problems among the five island countries. Less well documented and analyzed are supply-side factors.

Health policies of Pacific island countries

Policies

All five island countries endorse direct investments in health, and all are in principle committed to primary health care. Only Solomon Islands has no recent health sector policy, although preparatory work for a policy began in 1985. Tonga adopted the primary health care approach in 1979 and Fiji in 1980 in its Eighth Development Plan covering the period 1980-1985. Fiji also endorses the goal promulgated by WHO of "Health for All By the Year 2000". Samoa has similarly endorsed the notion of universal primary health care at the village level.

Among the five countries, Tonga's policy is most multisectoral; it presumes that "health for all" can be achieved only through advances in health, education and family planning and by increasing "equity" and "efficiency" in health services. Most of the countries evince strong commitments to improving access to safe water and sanitary waste disposal.

Performance

Most of the island countries have embarked on a course of augmenting scarce health personnel – particularly for village-level care – with village health workers, and seem committed to this orientation. Most count on "community participation" in health care, though the interpretation of this concept varies from women's committee management of village health activities (Samoa) to financial payment for health services (Fiji).

Satisfaction with existing policies varies, and at least two countries, Fiji and Vanuatu, have acknowledged the need to interpret fairly general pro-

public health care policies in the form of more specific policies, plans, strategies and assessments; both of them found in mid-term policy reviews that current measures had little impact on the leading health sector problems (Parliament of Fiji 1986; Republic of Vanuatu 1986).

Budgets and expenditures

Information on health expenditures shows a considerable degree of variation among the five island countries. Again, data are inadequate to permit specific recommendations in such critical areas as pricing and subsidies, for they comprise government expenditures on health but ignore the considerable level of expenditures for private health care, including modern medicine, traditional remedies and self-care such as available through over-the-counter medications. However, levels of government expenditure generally compare favourably with other less developed countries. Most of the island countries in theory allocate between 11 per cent (Vanuatu and Tonga) and 15 per cent (Samoa) of government expenditures to health (South Pacific Commission 1986b), a generous allotment relative to other less developed countries. However, as Ahlburg (1985) has suggested, there is a distinct urban bias in the distribution of health facilities and personnel, and this is sustained by an inherent bias in health funding in favour of urban areas.

However, mid-term assessments have indicated that in recent years actual allotments for the health sector have fallen substantially short of more optimistic projections, but accurate data on actual government expenditures are less easy to obtain.

In many cases the health sector is simply underfunded – i.e. given too little money to achieve the objectives in its plans. In some instances foreign donors' funds are used to breach the gap.

Virtually no information was available on new proposals or experiments to increase revenue for the health sector. In Fiji, nominal fees are charged at most levels of the health system, but services are heavily subsidized and all children under 15 years of age – 37 per cent of the population – are provided free services (Fiji's Eighth Development Plan 1980). In Tonga, there is acknowledgement that the health, water supply and sanitation programmes are grossly underfunded (Kingdom of Tonga 1985), but there is no mention of alternative avenues of increasing revenues.

In most developing countries such as those in the South Pacific, the greatest proportion of governmental health budgets is reserved for payment of salaries and benefits (representing 60 per cent or more of total budgets); the remainder is divided among other operating expenses including drugs, petrol and, if possible, maintenance. Little money remains for expansion or

innovation within the health sector, or for increased attention to rural health needs, and for these South Pacific Governments are heavily dependent on foreign aid.

There are promising indications that Pacific island countries are genuinely concerned about poor financial planning in the health sector.

Personnel and facilities

A persistent theme among the five island countries is the scarcity of suitably trained personnel at all levels of the health system, but especially in mid- and higher level planning, management, data analysis, health services research, and evaluation.

Several of the countries suffer acute shortages of physicians. The ratio of population to physicians and nurses is undoubtedly a concern to the entire subregion. Lower ratios of population per physician in the five countries covered in this review are associated with lower infant mortality and crude death rates, a relationship observed among other South Pacific island countries as well (Ahlburg 1985). But more doctors are not a cost-effective means of improving mortality outcomes for, as this review has shown, many of the determinants of poor health and premature mortality are due to factors other than medical care. Ahlburg (1985) found what Vanuatu similarly concluded: population growth and the consequent demand for health services are far outstripping growth in gross national product, government expenditure and foreign aid. Thus more efficient and equitable distribution of existing resources, including greater reliance on non-medical, paraprofessional workers (e.g., primary health care workers) may be the only practical means of improving the population/trained health worker ratio.

Health services issues

The least well-documented and analyzed - yet most crucial - aspect of the health sector in the Pacific island countries is health services. The five countries vary considerably in the structure and organization of their health services systems, coverage of the population, the ratio of public to private service providers, the emphasis the government places on public health measures (such as water and sanitation) versus personal, medical care, policies with regard to fees, and reliance on auxiliary health workers. The level of economic development, the medical and public health heritage bequeathed by colonial regimes, and population density and ease of access to cities and towns are among the many factors that account for the distinctive development of the health sector in each country.

Statistics on facilities, consultations, and coverage were available in some

instances, but it was impossible to gauge from them the quality of services and the extent of population coverage. However, the development plans and reviews offer some clues and insights into health services constraints and issues. According to these plans, virtually all of the countries are in need of improved planning, administration and evaluative research (Fiji 1985; Kingdom of Tonga 1986; Republic of Vanuatu 1986).

Health-related facilities and services

Water supply and sanitation

Because poor water supplies and sanitation are linked with morbidity and mortality from infectious diseases, it is not surprising that those countries the populations of which have poorest access to these amenities (Solomon Islands and Vanuatu) also have the highest infant mortality rates in the sub-region. Like all other health indicators, access to adequate water supplies and excreta disposal differs between rural and urban areas. While representatives at the 1986 South Pacific Regional Meeting of Heads of Health Services emphasized the lack of these facilities in rural areas, the potential for communicable disease transmission among dense urban populations can be much greater than among rural groups.

Ahlburg (1985) has suggested that continuing urban population growth, in the absence of expanded water supply and sanitation facilities in urban centres, inevitably spells a decline in overall urban access to adequate amenities. Tonga has acknowledged this dilemma and Samoa has identified improvements in Apia's water and sewerage system as a major means of combatting diarrhoeal disease (Samoa 1985). Tonga's water supply and sewerage administration may be illustrative of problems throughout the region: it is underfunded, with technical and management deficiencies in various administrative bodies, and with a pricing system that generates insufficient routine operating funds, let alone money to expand and upgrade the system in tandem with accelerating growth in urban areas (Kingdom of Tonga 1985).

Education

Poor understanding among Pacific islanders of the causes and means of preventing disease and malnutrition is a serious obstacle to improving the health profile of the region. But low levels of educational attainment among women in particular are another factor rarely considered in health sector planning.

Preceding sections of this review have documented the importance of behavioural factors underlying leading health problems in the Pacific. Health and nutrition education can effectively change many of these behaviours. However, in developing countries (as in modern settings) health behaviours

are part of an ingrained and complex system of values, beliefs and attitudes that govern individual and collective behaviour in all spheres. In these circumstances, discrete behaviours may defy the most systematic, well-intentioned attempts to introduce change.

The effectiveness of health education in the region has been little studied, but the work of Thomas in Samoa provides some insight into the practical difficulties of reaching the most disadvantaged groups with nutrition education (Thomas 1985; Hill and Thomas 1986). Much of the formal and non-formal nutrition education is irrelevant to local circumstances, is presented in incomprehensible language and disregards gender roles.

Yet health education, or communication, can be effective and compatible with the socio-cultural environment. Promoting behavioural change leading to altered lifestyles among those at risk from diabetes, heart disease, strokes and cancer is virtually untried in developing countries but has proven challenging even in Western nations where the mass media are sophisticated, omnipresent and well-funded.

Promoting higher levels of female education – formal schooling as well as improved, more relevant, and culturally appropriate non-formal health and nutrition education – could contribute significantly to improved health in the Pacific subregion.

Conclusions: health and health-related services in the Pacific

The effectiveness of programmes to stem rising rates of non-communicable disease and diminish infant and child mortality resulting from infectious disease depends in part on the availability of effective, accessible, acceptable and affordable health and health-related services. Absent quantitative and qualitative appraisals of health systems in the subregion make it difficult to identify appropriate health system investments for the Pacific countries or external donors, or to gauge the islands' absorptive capacity. Information on non-health sector resources which impinge on health is even more limited: a complete appraisal of health sector needs and options must look well beyond the Ministry of Health's purview. Nevertheless, a number of health services constraints are shared by Fiji, Samoa, Solomon Islands, Tonga and Vanuatu: insufficiently developed health sector policies, strategies and plans; a lack of trained staff at all levels, especially clinical and administrative; poor management information systems (especially health utilization data); general underfunding of the health sector with little attention to increasing revenue and efficiency in the sector; and a lack of intersectoral co-ordination with some few exceptions (e.g. certain nutrition activities).

Recommendations for strengthening health services

Probably the most appropriate and useful recommendations at this time are suggestions on how to fill the health services information gap so that policy formation and programme planning can proceed on firm ground. Immediate measures include:

1. Identification of the immediate, proximate and underlying causes of poor health, including “intersectoral” factors (education, food production/pricing etc.)
2. Review of all existing sources of health funding, including public sector expenditures and private expenditures (on private physicians, non-medical healers, drugs etc.) “Demand for health” studies, carried out in numerous developing countries recently, have been helpful in establishing total expenditure levels, patterns, price elasticity and provider preferences.
3. Analysis of health (epidemiological) profiles on a regional or district basis to determine where additional resources are most needed.
4. Task-based assessments of workforce performance and hence training and recruitment requirements.
5. Diagnosis of logistics and support (supervision) weaknesses.
6. Inventories of planning, management and financing skills, and identification of hiring and training needs.
7. Review of the appropriateness of current medical “technologies”, including use of medical versus non-medical personnel and relative emphasis on preventive versus curative care.
8. Experimentation with and comparison of alternative modes of health care delivery to improve relevance, cost-effectiveness, sustainability and quality of care.

Conclusions

Fiji, Samoa, Solomon Islands, Tonga and Vanuatu are emerging from an era of epidemiological transition. They retain the health characteristics of developing countries – relatively high infant mortality and incidence of communicable diseases – while exhibiting some of the most extreme rates of chronic, degenerative disease found anywhere in the world. Health investments in the region can be justified on humanitarian and human capital grounds, and should accommodate the peculiar balance between diseases of underdevelopment and diseases of “Westernization” found in each island country. Progress in the health sector is hindered by general underfunding, concentra-

tion in urban areas and on end-stage diseases, and by a dearth of adequately trained personnel, especially in health services planning, management and administration.

Future health improvements will require a sustained, multisectoral effort, probably in concert with external donors. Population-based approaches emphasizing preventive and promotive (i.e. life-style or behavioural) activities are most likely to influence morbidity and mortality patterns, though certain medical and public health measures (notably childhood immunization, malaria control and increased access to health care, safe water and sanitation) remain priorities. Finally, improvements in health sector management, planning and financing are required to ensure efficient use of meagre resources.

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Interregional Demographic Aging and Migration of the Elderly in New Zealand

*Identifying the demographic factors responsible
for the migration of the elderly to
certain regions of the country*

By L.D.B. Heenan and Kevin Moffat*

Elderly people (those 65 years of age or older) comprise one of the largest and most rapidly expanding minorities in New Zealand. Since 1945, their number has more than doubled, from 147,219 to 316,197 (*de facto* definition) in 1981.

In 1945, 8.6 per cent of New Zealand's population was classified as elderly; by 1981 the proportion had risen to 10 per cent. These increases, both numerical and relative, have been brought about on one hand by a decline in the national birth rate and on the other by a lengthening of the ex-

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Table 1: Per cent growth of New Zealand total population in selected age groupings, 1945-1981

Age grouping	Intercensal period						
	1945-51	1951-56	1956-61	1961-66	1966-71	1971-76	1976-81
0-14	24.4	19.7	16.9	9.2	4.3	2.0	-8.6
15-64	8.7	8.5	9.0	12.4	8.1	12.5	4.6
65-74	17.0	3.6	0.3	6.7	13.3	16.6	11.9
75+	29.8	25.8	18.9	7.3	3.2	10.6	15.4
65+	20.5	10.2	6.7	6.9	9.4	14.5	13.1
Total	13.9	12.1	11.1	10.8	6.9	9.3	1.5

Source: New Zealand Census of Population and Dwellings.

pectation of life at birth, between 1950-1952 and 1980-1982, for males from 68.3 years to 70.4 and for females from 73 years to 76.4. The birth rate fluctuated between 24 and 27 per thousand annually between 1945 and 1961, after which it fell more or less progressively to 15.7 in 1983. At 1.9, the total fertility rate is now at the sub-replacement level.

The number of elderly New Zealanders increased more quickly over the years from 1961 than did the total population and, in particular, persons aged 0-14 and 15-64 years (**table 1**). The size of the 0-14 age group was eroded by two influences, in part by net emigration from New Zealand during most years since the early 1970s, but mostly by a decline in annual births from a post-1945 peak of 65,476 in 1961 to 50,779 in 1981. The two trends culminated in an absolute decrease in the size of the childhood cohort (0-14 years) between 1976 and 1981, to give a smaller number of children at the end of the period than at any census since 1961.

The longer term trend among elderly New Zealanders has been for those 75 years of age and over to expand more rapidly than those aged 65-74 years (**table 1**). The disparity is effectively documented by index numbers of intercensal numerical change using 1945 (=100) as the base year (**table 2**). Thus, while the number of 65-74-year-olds (the "young elderly") did not quite double between 1945 and 1981, those 75 years of age and over (the "older elderly") became 2.75 times more numerous; however, most of the increase in the 75-year-old and over group occurred before, rather than after, 1961. The older elderly who were alive at the 1981 census were, of course, survivors of the

Table 2: Numerical change for New Zealand total population and selected age groupings by index numbers, 1945-1981 (1945 base = 100)

Age grouping	1945	1951	1956	1961	1966	1971	1976	1981
0-14	100.0	124.4	149.0	174.2	196.2	198.3	202.4	185.0
15-64	100.0	108.7	118.0	128.6	144.5	156.1	175.5	183.7
65-74	100.0	117.0	121.2	121.6	129.8	147.0,	171.4	191.9
75+	100.0	129.8	163.2	194.2	208.2	214.9	237.8	274.3
65+	100.0	120.5	132.8	141.7	151.5	165.9	189.9	214.8
Total	100.0	113.9	127.7	141.9	157.3	168.2	183.8	186.6

Source: New Zealand Census of Population and Dwellings.

comparatively large birth cohorts produced in the late nineteenth and early twentieth centuries, augmented over the years by immigrants from the United Kingdom of Great Britain and Northern Ireland and elsewhere.

Another notable characteristic of older New Zealanders is that; like persons of similar age in Australia (Murphy, 1979), the United States (Wiseman, 1980) and the United Kingdom (Warnes, 1983), they change residence much less frequently than do people in younger age groupings. For instance, during the period 1976-1981, the most recent period for which statistics are available, 74,889 elderly people made at least one change of usual place of residence within New Zealand. This represented only one in four of all persons their age at the 1981 census, however, and was a much smaller proportion than that for New Zealanders aged 5-64 years (45.6 per cent) and even smaller than figures for those in their early twenties (70.6 per cent) and late twenties (73.6 per cent) where the propensity to migrate was, in the period 1976-1981, higher than at any other age.

Although numerous studies on the spatial distribution and migration of elderly New Zealanders have been completed (e.g. Jones, 1984; Middlemiss, 1976), these are mostly local studies (exceptions are Heenan, 1980a; Heenan and Moffat, 1986), which reveal nothing about the broader national scene.

This article seeks to repair this gap in knowledge by documenting the way in which the increased number and proportion of the elderly evident at the national level has been manifested among major regions of the coun-

try and by identifying demographic factors which have been responsible for the regional differences which occur. Particular attention is focused on inter-regional migration. This is partly because this aspect of spatial behaviour among older New Zealanders has been very little researched, and partly because residential change appears to be a factor of some importance in determining their regional location.

Regional age group growth

Neither of the two systems of regions currently used for general population purposes in New Zealand provides a satisfactory geographic framework for the analysis of patterns and trends in age structure and other demographic variables. The system of 13 statistical areas used in this article constitutes a rather coarse division of area (**figure 1**), but one which makes possible an analysis of regional age structure change from 1961. The alternative system of 22 administrative regions proclaimed by the Local Government Commission represents a much finer area matrix than does the statistical areas. Unlike the latter, however, the administrative regions do not allow longitudinal study of population change simply because 1981 was the first time that they had been adopted by the census.

Statistical areas then, provide a framework for exploring two dimensions of regional age structure, namely the differential growth of and changing relationships among selected broad age groupings over the 20 years from 1961. To this end, the panel of index numbers in **table 3** (cols. 1-6) indicates that growth in the size of each of the five age groupings represented has been much stronger in the North Island than in the South Island, and also that substantial differences between regions occur across each age grouping. Index numbers consistently peak among the three northernmost statistical areas of Northland, and Central and South Auckland (**figure 1**), from where steep gradients lead to low points in East Coast and Taranaki in the North Island and, in the South Island, in the West Coast and Otago regions.

Average index number rankings calculated for the four age groupings from 0-14 to 75 and over (**table 3**, cols. 1-4 and 7) summarise the growth experience of each statistical area since 1961. On a scale of 1 to 13 (the number of statistical areas), the smallest figure denotes the highest rank and therefore the strongest expansion over the spectrum of age groupings, and vice versa. In the order shown, South and Central Auckland, bracketed with Northland, Marlborough and Hawkes Bay, comprise a clearly defined echelon of high rank. These regions, and in particular the first three, consistently recorded very strong, if not the strongest, growth for each age grouping; equally consistently, the weakest growth/lowest rank occurred in Otago, East Coast or West Coast.

Figure 1: Map of New Zealand showing statistical areas in the North (top) and South (bottom) Islands.

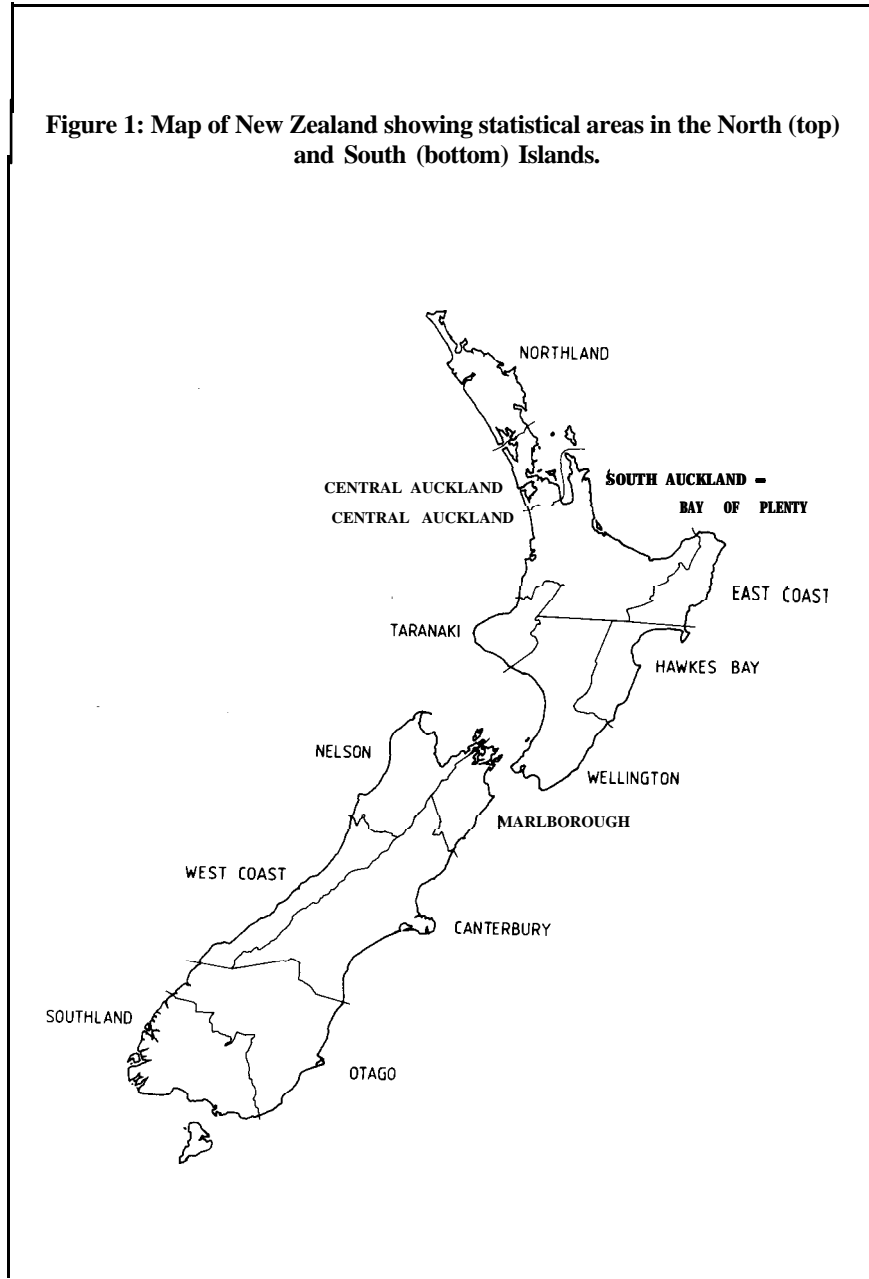


Table 3 : Index numbers of regional population growth by age grouping, 1961 (= 100) to 1981

Region	Col:	Age grouping				Total	Average rank*	
		0-14	15-64	65-74	75+			
		(1)	(2)	(3)	(4)	(5)	(6)	(7)
Northland		97	157	204	171	191	132	3.5
C. Auckland		140	172	166	156	162	161	2.2
S. Auckland		107	157	213	181	202	141	1.5
East Coast		77	123	131	106	121	105	11.7
Hawkes Bay		107	140	157	138	150	129	4.5
Taranaki		83	116	139	126	134	105	10.2
Wellington		103	133	141	134	139	124	7.2
North Island		112	150	165	149	159	138	
Marlborough		101	141	181	147	168	130	4.0
Nelson		94	135	160	138	152	123	6.0
West Coast		72	103	142	93	123	95	11.7
Canterbury		98	134	145	132	140	123	7.0
Otago		82	113	132	111	124	104	12.0
Southland		94	125	143	122	135	115	8.7
South Island		93	127	144	125	137	117	-
New Zealand		106	143	158	141	152	132	-

* Note: Average rank across ages 0-14, 15-64, 65-74 and 75+.

Source: New Zealand Census of Population and Dwellings.

Of the three broader age bands (0-14, 15-64, 65 plus) represented in **table 3** (cols. 1,2 and 5), the oldest group displays the highest index number and therefore the strongest growth in every region apart from Central Auckland where it was superseded by the 15-64-year-old age grouping. Without exception, however, growth in the number of persons aged 65 years and over peaked among the younger (65-74-year-olds) rather than older elderly (75 years and over) (**table 3**, cols. 3-4). Nevertheless, expansion of the young elderly and older elderly has been most marked, in three well-defined parts of New Zealand: from Northland through Central to South Auckland in Hawkes Bay, and in Nelson-Marlborough at the northern end of the South Island. At the other extreme, growth of the elderly fraction of the population has been

weakest in North Island's East Coast region, again coupled with Otago and West Coast in the South Island.

In retrospect, the period 1961-1981 was one of increasing differentiation in the pattern of regional change in the number of elderly New Zealanders (table 4). As expressed by the growth index (1961=100), the disparity between regions of strongest and weakest expansion widened appreciably so that over time a few statistical areas have come to dominate the process. This trend, most obvious during the 1970s, was mainly a result of sustained rapid increase in the northern part of the North Island occupied by Northland and Central and South Auckland. In the meantime, Marlborough too emerged as a fourth region of burgeoning growth sufficient to lift it from eighth (1961-1966) to

Table 4: Regional growth of elderly population (65 years of age or over) by index numbers 1961 (=100) to 1981

Statistical area	Col:	1961	1961-66	1966-71	1971-76	1976-81	Average
		(1)	(2)	(3)	(4)	(5)	rank*
Northland		100	112	128	160	191	2.0
C. Auckland		100	110	122	141	162	3.5
S. Auckland		100	114	133	167	202	1.0
East Coast		100	100	106	112	121	12.2
Hawkes Bay		100	108	117	134	150	4.8
Taranaki		100	102	108	121	134	9.8
Wellington		100	106	114	127	139	6.8
North Island		100	108	120	139	159	-
Marlboro		100	104	116	144	168	5.0
Nelson		100	106	117	133	152	5.0
West Coast		100	100	99	114	123	12.2
Canterbury		100	106	113	125	140	7.0
Otago		100	101	106	116	124	11.0
Southland		100	102	110	123	135	9.0
South Island		100	104	111	124	137	
New Zealand		100	107	117	134	152	-

* Note: Average rank across columns 2-5.

Source: New Zealand Census of Population and Dwellings.

third (1976-1981) index number rank (table 4 cols. 2 and 6) ahead of Central Auckland. Throughout the period, however, index numbers remained lowest in the same three regions, these being East Coast, West Coast and Otago.

Regional differences in the growth of the elderly population documented above have been accompanied by a long-term shift in their relative importance among the 13 statistical areas. The proportion of all older New Zealanders living in regions in the South Island, at 33.0 and 29.8 per cent in 1961 and 1981, respectively, diminished in favour of the North Island where the proportion increased from 67.0 to 70.2 per cent over the same period. South Auckland (10.0 to 13.3 per cent), Central Auckland (24.4 to 26.1 per cent), and Northland (2.7 to 3.4 per cent), each claimed a larger share. Of the remaining 10 regions, however, only two (Hawkes Bay, 4.8 per cent in 1961 and 1981; Marlborough 1.2 to 1.3 per cent) managed to hold the *status quo* leaving eight to register a decline in the proportion of the country's elderly claimed by each of them.

Changing relationships between age groupings

A further outcome of population growth over the 20 years to 1981 was a substantial change in relationships between paediatric (0-14 years), mediatic (15-64 years) and geriatric (65 years and over) age groupings both within and between statistical areas (tables 5 and 6). A general aging of population occurred in all regions, but this was most evident in the period 1971-1981. The trend was manifested in a widespread decline in the proportion of children in concert with an increase in the percentage of persons aged 15-64 years and 65 years or older (table 5). These changes produced a rise in the aged/child ratio in each statistical area (table 5), while, in addition, all regions except Central Auckland recorded a higher ratio of elderly to younger adults (table 6, PD (part dependency) ratio) in 1981 than in either 1971 or 1961.

The most remarkable expression of the aging trend was a sharp reduction in the so-called economic dependency (ED) ratio (table 6, ED ratio), a change caused by several factors. One, as noted previously, was the decline since 1961 in the number of children, but this influence was partly nullified by growth in the elderly section of the population. Much more important was the aging into and through the 15-64-year-old age grouping of survivors of:

- (a) The large birth cohorts produced between 1945 and the early 1960s; and
- (b) Immigrants who arrived in New Zealand during the same period.

The aging trend developed unevenly among the regions, however, and

Table 5 :Per cent of persons in each region aged 65 years or older and 0-14 years, and number of persons aged 65 years or older per 100 aged 0-14 years (the aged/child ratio), 1961,1971 and 1981

Region	65 years on older (per cent)			0-14 (per cent)			Aged/child ratio*		
	1961	1971	1981	1961	1971	1981	1961	1971	1981
Northland	6.6	7.6	9.5	40.0	36.3	29.4	16	21	32
C. Auckland	10.0	8.9	9.9	29.9	30.4	25.0	33	29	38
S. Auckland	6.0	6.6	8.9	38.5	36.1	29.4	16	18	29
East Coast	7.6	7.9	8.8	40.6	37.0	30.1	19	21	29
Hawkes Bay	8.8	8.9	10.3	35.3	34.0	29.1	25	26	35
Taranaki	7.9	8.4	10.1	36.4	33.9	28.7	22	25	35
Wellington	8.6	8.4	9.6	31.4	30.7	26.1	27	27	37
North Island	8.3	8.2	9.6	33.7	32.5	27.3	25	25	35
Marlborough	8.8	9.0	11.5	33.6	31.8	26.3	26	28	44
Nelson	9.3	10.0	11.5	33.3	30.5	25.5	28	33	45
West Coast	8.6	9.3	11.1	32.9	29.6	25.0	26	31	45
Canterbury	9.8	9.6	11.1	30.8	29.3	24.5	32	33	46
Otago	9.9	10.1	11.8	31.2	29.1	24.5	32	35	48
Southland	7.7	7.5	9.0	34.5	33.2	28.2	22	23	32
South Island	9.4	9.4	11.1	31.8	30.0	25.1	30	31	44
New Zealand	8.6	8.5	10.0	33.1	31.8	26.7	26	27	37

* Note: Number of persons aged 65 and over per 100 children aged 0-14 years.

Source :New Zealand Census of Population and Dwellings.

in a somewhat contrary spatial pattern (**tables 5 and 6**).In particular, those North Island regions which experienced the strongest 'growth in the number of elderly over the years 1961-1981 record proportions of older persons not only lower than the national average at the end of the period (1981), but also well below the percentage for most statistical areas in the South Island. Moreover, between 1961 and 1981, the percentage of elderly in Central Auckland and Wellington shrunk from points above to below the New Zealand average. By 1981, demographic aging was, with the exception of Southland, most advanced in South Island regions, several of which have experienced weak recent growth in the number of elderly.

Table 6: Number of persons in each region 65 years or older per 100 persons aged 15-64 years (part dependency (P.D.) ratio), and number of persons 0-14 and 65 years or older per 100 aged 15-64 (economic dependency (E.D.) ratio)

Region	P.D. ratio ^{a/}			E.D. ratio ^{b/}		
	1961	1971	1981	1961	1971	1981
Northland	12	13	16	87	78	64
C. Auckland	15	15	16	66	65	56
S. Auckland	11	12	14	80	75	61
East Coast	15	14	14	93	81	64
Hawkes Bay	16	16	17	79	75	65
Taranaki	14	15	16	80	74	63
Wellington	14	14	15	67	64	56
North Island	14	14	15	72	69	58
Marlborough	15	15	18	74	69	61
Nelson	16	17	18	74	68	59
West Coast	15	15	17	71	64	57
Canterbury	17	16	17	68	64	55
Otago	17	17	19	70	64	57
Southland	13	13	14	73	69	59
South Island	16	16	17	70	65	57
New Zealand	15	14	16	72	68	58

Notes **a/** Part dependency ratio: number of persons aged 65 years and over per 100 aged 15-64 years.

b/ Economic dependency ratio: number of persons aged 65 years or older and 0-14 years per 100 aged 15-64 years.

Source: New Zealand Census of Population and Dwellings.

Processes generating regional age structure differences

Regional disparities in age structure, and specifically in the proportion of elderly, are produced by age-related differences in migration, by spatial variation in birth rates as well as by “aging-in-place” among the residentially immobile, and its sequel, “dying-in-place.” Of these processes, the first three appear to be the most influential, but their impact and relative importance

vary from region to region. The more advanced stage of demographic aging found over most of the South Island is for the most part induced by depressed levels of fertility, especially in the north and east (Heenan, 1977; 1967); by outward net migration dominated by young adults moving to the North Island or overseas (Heenan 1979; 1983a); by very small net gains of elderly in the case of Nelson, Marlborough and Canterbury; and by aging-in-place, a phenomenon which “denotes the process of cohort transition to increasing age and residential inertia” (Graff and Wiseman, 1978).

For some decades outward net migration among the young and the elderly has been a feature of demographic trends in several South Island regions, notably but not only, Otago and West Coast. This association implies that aging-in-place accentuated by low fertility (especially in Otago) is responsible for the high frequency of elderly found in both regions. A different combination of factors prevails in Southland where many more elderly leave the region than are attracted to it. This was so in the period 1976-1981 when the ratio of in-migrants per 100 out-migrants was 46.3, an imbalance evidently sufficient to offset the aging tendency induced by a persistent net outflow of Southlanders younger than 65 years of age.

Demographic aging in North Island regions, generally during the 1960s and 1970s, was much more restrained than in the South Island. This is indicated in **table 5** by the proportions of elderly and children mostly either below or slightly above the New Zealand mean, respectively; by below-average part dependency ratios (**table 6**); and by comparatively higher economic dependency ratios (**table 6**). For South and Central Auckland, in particular, but also Northland and Hawkes Bay, this situation is somewhat paradoxical because between 1961 and 1981 these regions experienced the strongest growth in the number of older adults (**table 3**).

The paradox does not end there, however, for the two Auckland regions with Northland and Hawkes Bay were, in the period 1976-1981, net recipients of elderly migrants, but their impact on the aging trend was negated by other factors. One of these, the growth and relative importance of the 0-14-year-old age grouping (**tables 3 and 5**), derives from the high fertility of local Maori and (mainly in Central Auckland) Pacific island Polynesian ethnic minorities, as well as from the addition of children of in-migrants to the regions concerned. Two of these, namely South and Central Auckland, over recent years have been by far the predominant destinations of persons in all age groupings who move between regions or who arrive as immigrants (Roseman and Crothers, 1984). Most internal and external migrants are aged 15-34 years (Heenan 1980b; 1983a), and so in major receiving regions such as South and Central Auckland they represent a weighting factor which induces a younger rather than an older age distribution.

Age selective out-migration appears to be the dominant factor accounting for the slow growth and low proportions of elderly found in the remaining North Island regions. Each of the three, Wellington, Taranaki and East Coast, in the 1970s experienced a relatively large net outflow of older persons. The greatest exodus was from Wellington which is the major source of older persons who participate in interregional migration.

Migration of older New Zealanders

The changing regional location pattern of elderly New Zealanders, then, is accounted for by a number of processes acting together in different combinations. Given the large size of the area population units defined by statistical areas in the context of a low rate of interregional mobility among the elderly, it appears that the migration of younger sections of the population and aging-in-place are two important – if not the most important – demographic processes determining the relative importance of the elderly in different regions. Nevertheless, as observed on several occasions during discussion on regional age structure differences, significant migration flows occur among the elderly and play a part in moulding their geographical pattern of distribution.

Statistics on migration among elderly New Zealanders used in the present study are from the censuses of 1976 and/or 1981. As with its two predecessors, the 1981 census defined migration using the approach of fixed date in the past – in this case, five years earlier (and in 1981 and 1971 also one year before). This method, as Shryock and Siegel (1976) observe, has a number of deficiencies but despite these it is arguably the most effective means of gathering data on internal migration in large population surveys, such as the census. These statistics, then, are the basis of the following discussion in which attention is first given to more or less static aspects of interregional migration of the elderly during the periods 1971-1976 and/or 1976-1981. This section is followed by an examination of flows between regions of origin and destination as revealed by the 1981 census for the years 1976-1981.

The 1976 and 1981 censuses divided the elderly population into four groupings based on statements of place of residence at the beginning and end of each intercensal period. These comprised persons who did not shift (residence unchanged), those who did so but stayed within the same statistical area i.e. intraregional migrants), the elderly who migrated between regions (interregional migrants) and immigrants.

The first category, residence unchanged, had by far the largest membership nationally and in every region. This category accounted for 72.9 and 74.6 per cent of all elderly New Zealanders in 1976 and 1981, respectively,

with both figures being much higher than that for persons 5-64 years of age (1981: 45.6 per cent). Regionally the proportion who did not change residence ranged in the period 1971-1976 from 68.7 per cent (Marlborough) to 82.2 per cent (West Coast, and in the period 1976-1981 from 72.7 per cent (Central Auckland) to 82.6 per cent (West Coast).

Thus the figures on residence unchanged confirm that aging-in-place is not only widespread but also the predominant process affecting the regional distribution of older New Zealanders. Its impact is strongest in the West Coast and East Coast statistical areas, in both of which the percentage of all elderly who did not change residence was conspicuously higher in the periods 1971-1976 and 1976-1981 than in other regions, more particularly South and Central Auckland where the proportion was smallest.

Of the three categories of migrants, the one containing intraregional movers was the most important. It accounted for a fifth of all elderly people in both 1976 and 1981; four of every five elderly migrants in most statistical areas were intraregional movers. The frequency of movement was lowest on the West Coast where the proportion of all older persons in this category was 12.9 and 13.4 per cent in 1976 and 1981, respectively.

Relatively large differences exist among statistical areas in the share of local elderly who were interregional migrants, rankings being similar in 1976 and 1981. For instance, in 1981 the highest proportions were recorded by Marlborough (8.1 per cent), Northland (7.6 per cent) and South Auckland (7.5 per cent); the lowest, in Wellington and Southland, each with 2.7 per cent. Expressed in geographical spread, the frequency of interregional migrants among all elderly people peaks in Northland and South Auckland, in Hawkes Bay, and in Marlborough and Nelson, while the deepest troughs occur in Wellington and in statistical areas occupying the central and southern part of the South Island.

Elderly immigrants have little impact on the number and location of people of their age in New Zealand. They accounted for only 1.2 per cent of older New Zealanders at the 1981 census, and in both an absolute and relative sense their importance declined sharply between 1976 (4,985, or 6.9 per cent of all migrants during the period 1971-1976) and 1981 (3,534, or 4.3 per cent of all migrants during the period 1976-1981). Their geographical pattern of distribution follows closely that of their relatives among a much larger group of younger immigrants who arrived in New Zealand in earlier years. Accordingly, older persons who arrived as immigrants in the period 1976-1981 gravitated towards Central Auckland (42.4 per cent), South Auckland (13.7 per cent) and Canterbury (10.5 per cent).

Spatial pattern of interregional migration

Older persons who changed residence within New Zealand during the decade 1971-1981 comprised the same small proportion, 5.9 per cent, of all internal migrants in the periods 1971-1976 and 1976-1981. Meanwhile, their number expanded by 12.1 per cent, this being twice the rate (5.8 per cent) for migrants 5-64 years of age but well short of the increase of 17.1 per cent for the total elderly population.

The difference in rates of growth for migrants younger and older than 65 years of age was undoubtedly influenced by age-selective external migration. The net outflow from New Zealand to Australia and elsewhere recorded during most years over the decade 1971-1981 was dominated by persons from 15 to about 35 years of age (Heenan 1983a). Had they not emigrated, many of those young adults might have been expected to change residence within New Zealand, thereby expanding the number of internal moves recorded for their age grouping at the 1981 census.

Interregional migrants accounted for less than one in five (17.9 per cent) of all elderly persons who changed residence internally between 1971-1976 (66,834) and 1976-1981 (74,889). Thus the predominant form of movement during both periods was intraregional, but with the number of interregional migrants expanding at much the same rate (12.4 per cent, from 11,930 to 13,404) as did those who began and ended their shift in the same region (12.0 per cent, from 54,904 to 61,485).

Table 7 ranks statistical areas according to the number of elderly out- and in-migrants recorded by each in the period 1976-1981. The same four regions dominate as senders and receivers of migrants, accounting for two thirds of outward and 70.0 per cent of inward moves. Wellington is unchallenged as the major source region while the principal recipient is Central Auckland, closely pursued by South Auckland, with Wellington ranked a distant third. Central and South Auckland absorbed almost half of all interregional movers. Wellington, however, lost twice as many elderly as it gained in the period 1976-1981, a relationship which reaffirms the role of outward net migration in accounting for the region's low proportion of older persons.

In- and out-migration rates presented in **table 7** show wide differences as separate distributions and when paired against individual regions. For both in- and out-migration the highest regional rate is about three times larger than the lowest. Moreover, while regions of net gain have higher in- than out-migration rates, the reverse characterises regions of net loss.

Unusually high rates of outward movement associate with two contrasting groups of region. One features statistical areas affected by a relatively

**Table 7 : Interregional migration of persons aged 65 and older,
by region, 1976-1981, and per cent of New Zealand total elderly
population in each region, 1981**

Region	No. of elderly migrants	Per cent of elderly migrants	Per cent of region's elderly*	Per cent of N.Z. elderly*
<i>Out-migration</i>				
Wellington	3 048	22.7	5.8	17.8
C. Auckland	2 394	17.8	3.0	26.8
S. Auckland	2 037	15.2	5.3	13.0
Canterbury	1 317	9.8	2.9	15.3
Otago	909	6.8	4.6	6.7
Northland	747	5.6	8.0	3.2
Hawkes Bay	705	5.3	5.0	4.8
Southland	525	3.9	6.0	3.0
Taranaki	492	3.7	4.9	3.4
Nelson	474	3.6	5.8	2.8
East Coast	309	2.3	9.0	1.3
Marlborough	279	2.0	7.9	1.2
West Coast	174	1.3	7.9	0.7
<i>In-migration</i>				
C. Auckland	3 357	25.0	4.3	26.8
S. Auckland	3 048	22.8	7.9	13.0
Wellington	1 545	11.5	2.9	17.8
Canterbury	1 434	10.7	3.2	15.3
Hawkes Bay	924	7.0	6.5	4.8
Northland	762	5.6	8.1	3.2
Otago	588	4.4	3.0	6.7
Nelson	573	4.3	7.0	2.8
Taranaki	405	3.0	4.0	3.4
Marlborough	300	2.2	8.5	1.2
Southland	243	1.8	2.8	3.0
East Coast	150	1.1	3.8	1.3
West Coast	81	0.6	4.1	0.7

* Note: Elderly population at end of period, i.e. 1981.

Source: New Zealand Census of Population and Dwellings.

large net outflow, as was the experience of Southland, West Coast and East Coast. In the second group are several regions (notably Marlborough, Nelson and Northland) distinguished by a net gain of elderly migrants, this being the difference between a high level of outward migration coupled with a higher rate of inward movement. In other words, much of the potential aging impact of the latter is largely dissipated by the strength of the counterstream.

Also intriguing but difficult to resolve are the low rates of inward and outward migration recorded for Central Auckland. It is the smallest region in area but the largest in proportion of total population (26.2 per cent) and of all elderly New Zealanders (26.8 per cent). In the period 1976-1981 too, Central Auckland held first and second rank by volume as, respectively, a receiver and sender of older migrants (**table 7**).

Interregional migration among older New Zealanders in the period 1976-1981 featured a limited number of major destinations and several minor ones supported by a larger set of source regions. For example, 11 of the 13 statistical areas accounted for a proportion of all out-migrants, which was larger than their percentage share of all elderly New Zealanders (**table 7**). Among in-migrants, however, this was so in only five regions: South Auckland, Hawkes Bay, Northland, Nelson and Marlborough.

Regions of net inward and outward migration in the period 1976-1981 are more clearly identified in **table 8**. In this, flows are expressed as number of in-migrants per 100 out-migrants for persons 5-64 years of age and for four age groupings of older New Zealanders. Seven regions emerge as net receivers of elderly migrants 65 years of age or older (**table 8**, col. 4). By far the largest surplus of arrivals over departures occurred in South and Central Auckland, each being the only two regions to record a gross exchange of more than 5,000 elderly migrants in the period 1976-1981. The small size of transactions involving a second category, namely Hawkes Bay and Nelson, tends to obscure what were in relative terms (**table 8**) quite strong inward net flows. This leaves a third category, comprising Northland, Marlborough and Canterbury, each of which recorded a narrow excess of inward over outward elderly migrants.

The remaining six statistical areas were net senders of older migrants in the period 1976-1981. Southland, Wellington, the West Coast and East Coast regions had the largest exodus, each gaining 50 or fewer people for every 100 who moved to another region (**table 8**).

With few exceptions, for example persons 75-84 years of age in Marlborough (**table 8**, col. 2) the regional pattern of net movement for all elderly migrants is consistent across each of the three age groupings from those 65-74 years of age to 85 years and over. Moreover, in all but two regions the domi-

nant direction of movement was the same for persons younger and older than 65 years of age (table 8, cols. 4-5). The exceptions were Canterbury and Hawkes Bay, both of which in the period 1976-1981 had a net loss of 5-64-year-olds partly offset by a net gain of older people. Generally among the regions, however, ratios of net gain and of net loss of elderly by way of migration tend to be higher and lower, respectively, than matching ratios for younger migrants.

Recent studies by McCracken (1985), and Longino and Biggar (1982) among others, have demonstrated that effective service provision and programme development with regard to the elderly requires that they be disaggregated in terms of demographic and associated socio-economic parameters. Migration is one such parameter, and data from the 1981 census indicate the presence of age-related differences among elderly New Zealanders who had changed

Table 8: Number of in-migrants per 100 out-migrants for four age groupings of elderly and for persons aged 5-64 years, 1976-1981

Region	In-migrants per 100 out-migrants					
	Cal:	65-74 (1)	75-84 (2)	85+ (3)	Total 65+ (4)	Total 5-64 (5)
Northland		97	109	112	102	118
C. Auckland		144	130	141	140	133
S. Auckland		156	139	133	150	111
East Coast		51	54	20	49	84
Hawkes Bay		146	109	100	131	97
Taranaki		88	77	75	82	81
Wellington		44	69	64	51	82
North Island		104	106	102	104	104
Marlborough		120	80	200	108	107
Nelson		124	118	100	121	115
West Coast		39	56	33	47	82
Canterbury		112	101	107	109	94
Otago		67	55	73	65	83
Southland		39	74	67	46	74
South Island		88	85	92	88	91

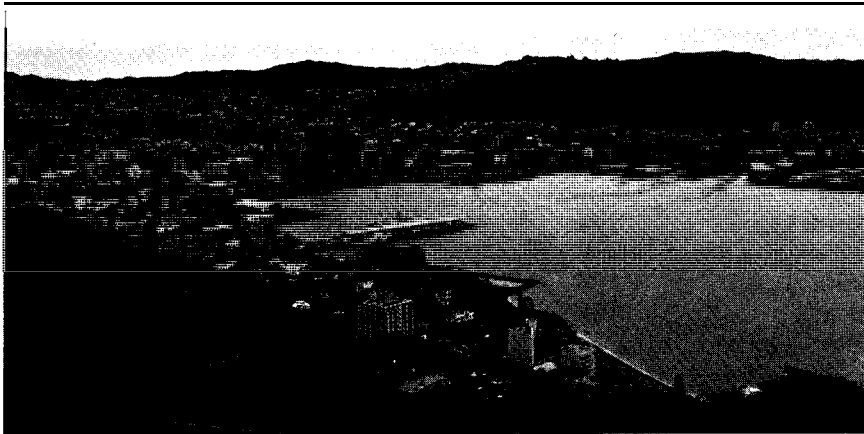
Source: New Zealand Census of Population and Dwellings.

residence between regions over the previous five years. Firstly, the frequency of interregional migration diminishes and that of more localised (i.e. intra-regional) shifting rises with advancing age. Thus the percentage of interregional migrants among all elderly persons who moved declined in the sequence 19.2, 16.5 and 13.5 among the young, middle-aged and old elderly, respectively.

Also, rates of interregional migration (that is the proportion of all older people who moved between regions) for the age groupings 65-74 years of age (5.9 per cent), 75-84 years of age (3.8 per cent) and 85 years of age or older (4.7 per cent) form a shallow U-shaped curve. In other words, among the elderly there are primary (early) and secondary (late) movement peaks separated by a phase of relative stability. The early peak appears to be associated with migration at or during the first years of retirement, whereas the second arises from movement to alternative independent living arrangements or perhaps to institutional or family care in another region.

Elderly migration as a spatial process

Migration among older New Zealanders is more circumscribed geographically than is movement among younger persons. The friction of distance effect is such that the elderly are much less likely to move from one region to another and between North Island and South Island. Thus, in the period 1976-1981 a higher proportion, 82.1 per cent, of older migrants began and ended their change of residence in the same region than did migrants 5-64



Picturesque Wellington is a net sender of older people to other parts of New Zealand. Some of the migrants are seeking the milder climate of northern parts of the country while others want to be closer to their children and relatives working in the Auckland area.

Table 9 : Gross migration flows of persons aged 65 years and older (specified cases only), and total in- and out-migration for statistical areas, 1976-1981

From:to	Northland	C. Auckland	S. Auckland	East Coast	Hawkes Bay	Taranaki	Wellington	Marlborough	Nelson	West Coast	Canterbury	Otago	Southland	Total To From (Rows) (cols.)
Northland	453	432	129	15	21	18	93	6	3	0	27	12	6	747
C. Auckland		-	1 203	78	150	123	885	15	48	6	267	102	27	3 357
S. Auckland	159	1 143	-	84	195	174	948	30	66	9	165	57	18	3 048
East Coast	9	27	36	-	24	6	39	3	0	0	3	0	3	150
Hawkes Bay	21	117	141	69	-	18	447	6	21	3	42	30	9	924
Taranaki	15	87	87	3	18	-	147	6	6	3	18	9	6	405
Wellington	48	318	285	39	216	126	-	42	93	12	228	96	42	1 545
Marlborough	6	15	6	6	9	0	60	-	39	12	99	33	15	300
Nelson	9	42	33	0	18	3	99	51	-	33	189	69	27	573
West Coast	0	6	6	0	0	0	6	6	15	-	33	6	3	81
Canterbury	21	141	87	12	39	15	252	93	156	87	-	369	162	1 434
Otago	6	51	18	0	12	6	60	15	21	9	183	-	207	588
Southland	0	15	6	3	3	3	12	6	6	0	63	126	-	243

Source: New Zealand Census of Population and Dwellings.

Figure 2: Gross migration of elderly between Central Auckland and other statistical areas, 1976-1981.

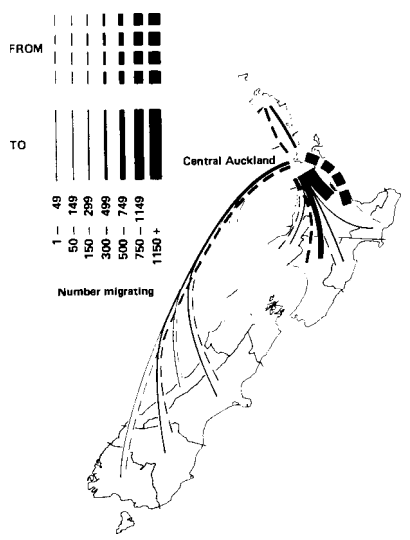


Figure 3: Gross migration of elderly between Otago and other statistical areas, 1976-1981.

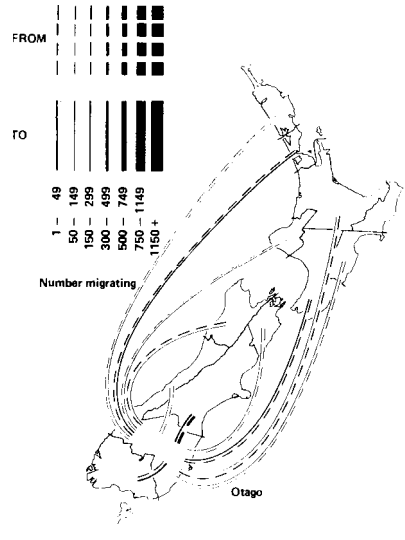


Figure 4: Gross migration of elderly between Canterbury and other statistical areas, 1976-1981.

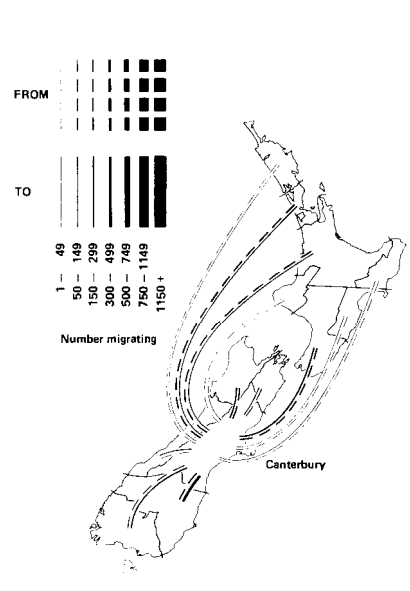
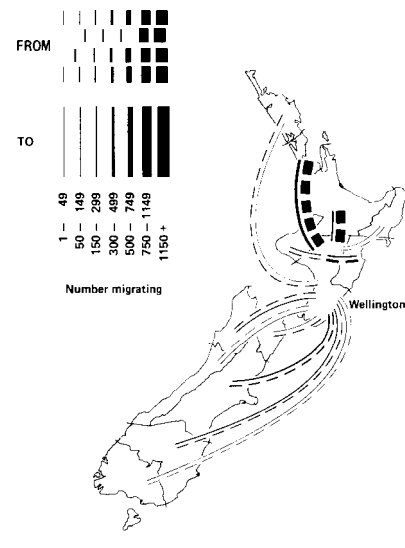


Figure 5: Gross migration of elderly between Wellington and other statistical areas, 1976-1981.



years of age (74.1 per cent). Similarly, of the elderly and younger persons who moved interregionally, four fifths and 74.1 per cent, respectively, completed their change of residence in the island of origin.

Migration among older New Zealanders, therefore, confirms the inverse relationship between distance and frequency of movement documented in New Zealand (Heenan 1979) and overseas studies (Shaw 1977, Murphy 1979). In the context of interregional migration, this means that, generally, the pathways most frequently followed by elderly migrants link adjacent or nearby regions (**table 9**). So, whereas flows to and from Northland in the period 1976-1981 were dominated by Central Auckland, the latter region and South Auckland featured the largest volume of movement between any pair of regions (**figure 2**), and the principal connections of the East Coast and Hawkes Bay bracketed with Taranaki were with South Auckland and Wellington, respectively.

In the South Island, Otago was the most preferred destination among older migrants from Southland, and the largest contingent from Otago went to Canterbury (**figure 3**) which was also the location most favoured by those who left the West Coast, Nelson and Marlborough (**table 9**). For both Canterbury and Wellington, however, the relationship between migration and distance is less relevant (**figures 4 and 5**). Each maintains strong ties with adjacent regions, but the principal outflow from Canterbury ends in Wellington, while most of those who leave Wellington terminate their shift in either South or Central Auckland.

Nevertheless, despite a predominance of localised interregional shifting among older New Zealanders, a small number and proportion do make journeys which must be classified as long distance moves in terms of the geographical scale of New Zealand society. For instance, over the period 1976-1981, migrants moved between statistical areas at either end of the country (**table 9**). Moreover, movement between North Island and South Island accounted for one in five of all interregional migrants 65 years of age or older, but the proportion (33.7 per cent) of South Islanders who shifted to the North was double the percentage (15.2) who moved in the opposite direction. These figures imply that in the period 1976-1981 North Island was more attractive as an alternative destination for elderly South Islanders who moved interregionally than was the South Island for North Island interregional migrants at the same stage of the life cycle.

Table 9 presents, for the period 1976-1981, a region-to-region origin-destination matrix based on the migration of 13,404 interregional migrants. From these data and the region-to-region net figures they yield, it is possible to derive several further generalisations about the process of elderly inter-

regional migration. Perhaps the most obvious is that, like younger persons, the elderly are net contributors to the “northward drift” which has re-shaped the map of population distribution in the twentieth century (Roseman and Crothens 1984; Heenan 1979; Heenan 1983b). The “northward drift” has resulted in a continuing concentration of population in the North Island and mainly in Central Auckland (26.2 per cent of the New Zealand total in 1981) and South Auckland (15.4 per cent), which together contained, in 1981, two of every five New Zealanders.

The 1976-1981 intercensal period witnessed a net redistribution of 459 elderly and 7,803 younger persons (5-64 years of age) from the South Island to the North Island. Nevertheless, the general northward movement of older New Zealanders was largely controlled by three regions in the North Island, these being South and Central Auckland as the country’s major receivers with net gains of 1,011 and 963, respectively, and by Wellington (- 1,503) unrivalled as the main region of outward net migration. The largest net losses from Wellington were directed northwards, principally to South (663) and Central (567) Auckland followed by Hawkes Bay (231).

Table 9, supported by maps depicting interregional flows to and from four selected statistical areas (**figures 2-5**), indicates that in a broad sense the northward displacement of elderly New Zealanders described earlier proceeds in a stepwise manner. For the period 1976-1981 then, the general sequence for most statistical areas was to draw in migrants from regions to their south while at the same time yielding a net loss to others further north. Most such stepwise streams ultimately converge on South and Central Auckland but with a minor diversion to Hawkes Bay.

The sharpest definition of the northward stepwise pattern of movement occurs in the southern part of the South Island. From Southland, during the period 1976-1981, net flows of elderly migrants were dispersed to all other regions except the East Coast, in which case departures matched arrivals. The largest outflows from Southland were to Otago (81) and Canterbury (99). Otago in turn drew a small net inflow from Southland and an even smaller one from the West Coast, but both of these were overshadowed numerically by net losses to Canterbury and to all other statistical areas. Several different permutations of the process occurred in central New Zealand but there too the prevailing pattern of movement remained stepwise and northward to South and Central Auckland. Northland also attracted small net flows from a number of other regions while gaining fewer migrants from Central and South Auckland than it sent to them. South Auckland recorded one region-to-region net loss, north to Central Auckland, which emerged in 1981 as the only statistical area which did not have a net loss of elderly to at least one other region during the period 1976-1981.

Summary and conclusion

The present phase of demographic aging in New Zealand began in the early 1960s. The trend first became evident in a decline in the number of children at age 0 and then progressively in the age groupings 1-4, 5-9 and 10-14 years. Meanwhile the aging of survivors of earlier birth and immigrant cohorts increased the size and proportion of middle-aged and older persons. Over the 20 years 1961-1981, the elderly comprised the most rapidly expanding major age grouping, their growth being strongest in Hawkes Bay and in regions in the northern part of the North Island and the South Island. However, the percentage of elderly in North Island regions tends to be lower than the New Zealand average, whereas in five of the six South Island regions the proportion is above the national mean.

The high proportions of non-migrants among the elderly living in every region indicates that aging-in-place and associated dying-in-place are the principal processes affecting the broad geographical distribution of elderly New Zealanders.

Thus differences in their relative importance between statistical areas is brought about by region-to-region variation in other demographic factors, most notably in combinations of age-selective migration. In this, movement among the elderly plays a part and examination of their pattern of migration reveals distinctive features which are highlighted when the elderly are compared with migrants 5-64 years of age.

For the elderly, the overall rate of migration is much lower than for younger persons, while the higher frequency of movement among the young elderly (65-74 years of age) and old elderly (85 years of age and over) gives a U-shaped curve. Short distance shifting predominates among elderly migrants as it does among those of younger age but the friction of distance exerts a stronger influence on the former.

The elderly, like younger migrants, are net contributors to the "northward drift", the predominant general migration flow within New Zealand. Thus, except for two regions (Canterbury and Hawkes Bay, each with a net gain of elderly), net recipient and net sending regions are the same for both younger and older interregional movers. The "northward drift" and overall pattern of region-to-region migration is expressed in a stepwise net flow of elderly (and younger persons) from the South Island to the North Island where movement is dominated by exchanges between the country's one really large donor region (Wellington) and the two principal destination regions, namely Central and South Auckland.

The attraction of Central and South Auckland to elderly and younger



Retirement provides the opportunity for travel for this retired couple and their children from the South Island of New Zealand. The richly carved Maori gateway at Whakarewarewa in Rotorua is a popular tourist attraction.

interregional migrants derives from different sets of stimuli. Employment-related factors predominate among younger migrants, for together the two regions comprise the country's principal area of economic growth and activity. Among the elderly, however, inward movement is stimulated by a mix of personal (including health), social and amenity values. In particular, elderly migrants to the larger Auckland region, to Hawkes Bay and Nelson-Marlborough are relocating to some of New Zealand's most desirable residential locations in terms of human comfort.

There is little doubt that climate ranks among the most compelling attractions, for these regions are blessed with a comparatively large number of sunshine hours and/or a regime of relatively high summer and mild winter temperatures. Overseas studies have shown that climate is a significant determinant of destination among elderly migrants, especially those moving longer distances (Murphy 1979). For example, higher temperatures have their own appeal but "they also mean lower heating and clothing costs and, for some people, a healthier climate" (Murphy 1979).

Past migration and mobility experiences are also relevant to an understanding of current (1976-1981) interregional migration among older New Zealanders. Some, no longer tied locationally by employment considerations, are drawn northward to the Auckland region by a desire to be nearer to offspring who earlier had moved in the same direction in pursuit of career-related goals. Another important link in elderly interregional migration is the concentration in Wellington, the capital, of government administration and headquarters of many corporate organizations which often have satellite offices in other parts of the country. Career pathways followed by many corporate employees recruited from outside Wellington lead sooner or later to the capital. Over a five-year period, a proportion of such career transients who retire move to another region, hence Wellington's status as a major source region of elderly migrants. Most of those who leave choose a destination in Central or South Auckland, being attracted there by family connections or in response to direct experience gathered during their working life through visiting, holidaying or job-related mobility.

Apart from intrinsic academic worth and interest, a primary justification for research on the geographical location and migration of the elderly is relevance in terms of the provision of services and programmes designed to satisfy the needs of older people. Judged by this last criterion the present study would be of marginal value. A fundamental deficiency is that the lack of locational specificity in the data base severely limits the utility of observations recorded because they apply to a coarse regional network in which boundaries bear little relationship to coherent local communities. This weakness is compounded by another, namely that statistical areas are devoid of any administrative function. They have no formal validity in the sphere of local government, in social welfare provision, or in any domain other than the purely statistical. These deficiencies are remedied, to a considerable extent, by substituting local government regions as the area framework used in analyses. By definition, administrative regions are limited functional entities, while their more localised geographical scale appears to offer a more relevant approach in further research currently being undertaken on the regional distribution and migration of older New Zealanders.

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Aging

Most countries in the Asia-Pacific region have experienced a rapid decline in mortality accompanied by a decline in fertility during the past three decades. Thus, in quite a few of those countries, there has been a change in the population structure resulting in a substantial increase in the number and proportion of the aged population.

Unlike many of the Western developed countries where the aging process took almost a full century before a rise from 5 to 15 per cent in the proportion of the aged persons was experienced, the same rise in some Asian and Pacific countries took fewer than 50 years to occur.

Thus, aging is no longer a Western issue and this phenomenon has become more widely recognized. The Third Asian and Pacific Population Conference held at Colombo, Sri Lanka, in 1982 urged countries of the region to investigate the implications of the increasing numbers and proportions of the aged in this region. Also in that year, the World Assembly on Aging adopted the Vienna International Plan of Action which gives high priority to research related to developmental and humanitarian aspects of aging. The Plan of Action specifically recommended that "international exchange and research co-operation as well as data collection should be promoted in all fields having a bearing on aging, in order to provide a rational basis for future social policies and action."

The International Conference on Population held at Mexico City in 1984 noted that the aging of population has become an emerging issue in those

developing countries which had experienced declines in fertility in the recent past. The Conference, therefore, recommended that efforts should be made to analyse the issue of aging, particularly its implications for overall development, social services, medical care and other related fields.

The ESCAP Committee on Population meeting at its fourth session in August 1985 recommended that the secretariat should provide assistance to different countries in reviewing the situation of the aged and undertake inter-country studies on the socioeconomic implications of aging aimed at developing policies and programmes for achieving a better and longer life for the aged.

In view of such strong mandates on this matter, the ESCAP secretariat, with financial support from the United Nations Fund for Population Activities, initiated a study in 1986 to analyse the emerging issues of population aging. As part of this project, a meeting on this topic was held at Bangkok from 22 to 26 September 1986.

Representatives from Malaysia, Republic of Korea and Sri Lanka presented statements about the situation regarding the aging of population in their respective countries. Representatives from Australia, Hong Kong, Japan and the Philippines presented background papers focusing on methodological and substantive issues relevant to the development of a study design.

Outlook

Except for some South Asian countries, the majority of the Asian countries will experience a doubling of their aged population by 2025. While the world as a whole is expected to gain some 149 million elderly during the period 1980-2000, three quarters of this increment will be contributed by third world countries. Over 40 per cent of this gain will come from China and India alone.

A significant by-product of the demographic transition in the Asian countries where it has occurred, most notably Japan, is that the expectation of life at birth has exceeded that of some European countries.

This is having an effect on the elderly in some countries of the Asia-Pacific region. While all countries in the region share a tradition of a close-knit family structure, declining family size means fewer potential caretakers for the elderly. In addition, the increasing tendency for married women to participate actively in the labour force restricts their availability to care for the elderly.

Thus, programmes for the elderly have been initiated in some countries within the framework of national development plans, and cover health, housing

financial support and recreation. A review of the situation in some of the countries concerns the relevant trends and measures being adopted to deal with them.

Malaysia

Malaysia's fertility has declined over the years, although at a gradual pace. The crude birth rate has dropped from 40.3 in 1961 to 32.4 in 1980 and it is projected to decline further to 24.0 in the year 2000. The crude death rate has also declined from 8.7 in 1961 to 7.5 in 1980 and is expected to drop to 4.4 in 2000. In 1980, life expectancy was 68 years for males and 72 for females.

As a result of demographic changes, the number of elderly people in the population has correspondingly increased. For example, in 1970, they represented 5.2 per cent of the population; the proportion is expected to be around 7.4 per cent and 15.5 per cent by 2000 and 2030, respectively.

With land ownership vested largely with the elder members of typical extended family households, the elderly have had considerable authority and status. However, as the family structure has begun to shift to a more nucleated form, living in modern type housing with limited space, the older generation no longer has the same stature nor means of support as previously.

Public assistance is available to those without any means of livelihood, but, as it is limited by budgetary constraint, the coverage is somewhat restricted. Furthermore, the Government does not plan to increase the number of old persons' homes in an effort to emphasize family care of the elderly;



Medical facilities in Malaysia emphasize maternal and child health care; they are without geriatric units.

the care of the destitute elderly would have to be dealt with at the community level, which is being encouraged through voluntary organizations.

In terms of health care, although free medical facilities are available, these are without specialized geriatric units. However, a private health insurance scheme has been introduced and this could alleviate the health care needs of the elderly as long as they join the scheme before they reach the age of 60.

Republic of Korea

Life expectancy in the Republic of Korea reached 65 years for males and 71 years for females in 1985 and is projected to reach 70 years for males and 77 years for females in the year 2000. The proportion of elderly people in the population will reach more than 6 per cent in the year 2000 compared with 4 per cent in 1985.

A recent survey on the elderly in the Republic of Korea reveals the following findings:

- A very low level of education among the elderly;
- Only 7 per cent of the elderly were being supported by the Government;
- The majority (60 per cent) of the elderly had no work;
- More than 70 per cent of the elderly suffered from diseases; and
- The mean desired retirement age was 65 for males and 63 for females.

Since the beginning of the decade the Government has passed various laws regarding the elderly. Its welfare pension programme, which provides income security for the elderly, currently covers 15 per cent of the elderly population and is scheduled to cover 50 per cent from 1989. Medical insurance will be extended to all persons from the current level of approximately 50 per cent beginning from 1988.

Sri Lanka

In Sri Lanka, the birth rate has dropped from 36.6 in 1945 to 24.8 in 1984; the crude death rate, from 21.9 to 6.5 during the same period. Life expectancy increased from 47.8 years for males and 44.8 years for females in 1945 to 66.1 years for males and 70.2 years for females in 1979. In 1963, those 65 years of age and over represented 3.6 per cent of the population, increasing to 4.3 per cent in 1971; in 1981, the proportion was still 4.3 per cent.

The Government of Sri Lanka has fixed the optimal age of retirement



Elderly farmers in Sri Lanka as in many other Asian countries must face the future without insurance and pension schemes.

at 55 years for males and 50 years for females with 60 and 55 years of age being compulsory for the retirement of males and females, respectively.

While the elderly are still highly respected in Sri Lanka, there has been some breakdown of the extended family system with the emergence of the nuclear family. Also, with the rapid development of education, there have been some changes in the role of parents in addition to those resulting as a consequence of younger husbands and wives taking employment.

Although formal policies, especially for the elderly, are nonexistent in Sri Lanka, certain government policies cover those who had been employed in the public sector. However, 70 per cent of the population is agricultural and the elderly in this sector have no insurance against illness or accidents and no old age pension etc.

Other matters

Also discussed at the meeting were papers on the “implications of the aging of population for socio-economic development and national plans and policies,” “roles of the aged, families and communities in the context of an aging society,” and the “nature and adequacy of formal and informal support programmes to deal with the problem of the aged.”

In addition, the meeting considered the design of country studies proposed to be conducted in China, Malaysia, the Republic of Korea and Sri Lanka. Once those country studies are completed, an intercountry comparative analysis will be undertaken by the secretariat in order to synthesize, from a regional point of view, the findings of the ESCAP country studies and related studies by the Association of South-east Asian Nations and the World Health Organization. The goal is to develop a set of policy and programme recommendations useful to Governments in the region.

Mortality

Over the past three or four decades, most countries in the Asia-Pacific region have achieved steady decreases in mortality, but many problem areas remain (see vol. 1, No. 2 of this Journal, pp. 57-59). Mortality rates in rural or certain geographical areas are much higher than the national averages. Death rates for infants, children and women of child-bearing age frequently remain unacceptably high. In some countries, the pace of mortality decline has slowed long before low rates of mortality have been achieved.

In recognition that health policies and programmes as well as other development policies must be altered or expanded in order to reduce mortality to low levels among all segments of national populations, ESCAP in co-operation with the Institute of Population Research of the People's University of China organized the Seminar on Mortality and Health Issues, which was held at Beijing from 22 to 27 October 1986. Financial support was provided by the United Nations Fund for Population Activities (UNFPA).

The meeting was part of the ESCAP project entitled "Analysis of Trends and Patterns of Mortality in the ESCAP region". Six countries in the region were selected for in-depth study of their transition from high to intermediate and low levels of mortality: Bangladesh, China, Indonesia, the Republic of Korea, Pakistan and Thailand. Those studies reviewed current levels of mortality, rural-urban differentials, variations of mortality within the countries, development of health care services and health infrastructure, food supply and the nutritional situation, and so on.

The six country studies contain many findings of value for health and

population policy makers in the region. The purpose of the Seminar was to provide an opportunity for policy makers from several countries to consider the findings in detail.

At the conclusion of the Seminar, the participants issued 30 Recommendations, which will be published as part of the report of the Seminar in one of the issues of the Asian Population Studies Series. The following provides a brief summary of those recommendations.

General

1. Governments should pursue an integrated development approach to the achievement of the goals of "Health for All by the Year 2000".

Population to be served

2. Population structure and distribution should be the basis for plans for equitable health development.
3. Governments should explore ways to identify and meet the basic health needs of disadvantaged groups of the population.
4. Governments should attempt to develop new support systems to replace traditional life-styles and structures affected by socio-economic development.
5. Where health insurance or similar schemes exist, they should be extended to the entire population.
6. Resource allocation for the health of women and children should reflect their predominance in the population.

Health care management

7. Alternative health care systems, such as family or domiciliary care, should be assessed and promoted.
8. Immunization programmes should stress the importance of the full schedule of immunization to combat infections.
9. The feasibility of nutritional supplements should be examined in countries with nutritional problems and high levels of maternal and infant mortality.
10. and 11. Family planning programmes should be enhanced and should emphasize the health benefits of child spacing.
12. The leadership and management of health development should be enhanced at all levels.
13. More resources should be devoted to the training and supervision of paramedics.
14. Health strategies and programmes should address major inter-related health problems concurrently.
15. Environmental deterioration requires legislation and its enforcement,

- as well as community participation in environmental protection.
16. Industrial safety should also be promoted by legislation which is strictly enforced.
 17. Legislation on the production and provision of medicines and food should be enforced and consumer protection organizations encouraged.
 18. There should be stricter control of pharmaceutical markets to monitor distribution and limit over-prescribing.
 19. The positive contribution of traditional medical practitioners should be integrated into health delivery systems and any harmful practices eliminated.

Community involvement

20. Public information programmes focusing on child spacing and child care and nutrition should be government priorities.
21. Increased health, nutrition and population education, in the school curriculum, through mass media, and to families, should be promoted.
22. Governments should provide better quality health programmes and improved public health education, and be responsive to consumer health demands.
23. Where mortality is declining, the health education emphasis should move to identifying harmful life-styles associated with chronic diseases.
24. Co-ordinated national action for integrated rural development is required to deal with agricultural and nutritional problems resulting from rural-urban migration.
25. Specific health programmes, and educational and vocational training should be provided to address the problems of women left behind in the development process.
26. Local practices, beliefs and taboos relating to common foods should be identified so that suitable nutrition education can be provided.

Health Financing

27. Additional funding should be provided for social development including health services to ensure a population well-fitted for development efforts.
28. The allocation of funds between infrastructure, manpower and primary health care services requires review.
29. Data collection procedures should be established to monitor the progress of the health status of the population.
30. There should be evaluation of existing community involvement efforts, and an exploration of new approaches.