

COOK ISLANDS
GOVERNMENT

DEMOGRAPHIC PROFILE

of Cook Islands



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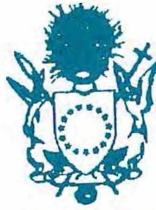
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Abbreviations

ASFR	age-specific fertility rate
CBR	crude birth rate
CDR	crude death rate
GFR	general fertility rate
IMR	infant mortality rate
MAC	mean age at childbearing
TFR	total fertility rate

FOREWORD

Informed decision-making and effective planning - which are based on the availability of good population and other socioeconomic data and information - are essential to good governance, and this has been acknowledged in the region for some time. The South Pacific Commission (SPC) established the positions of demographer and economic statistician in 1967 and 1970, respectively, with the aim of providing planners with adequate demographic information, and advising governments and administrations on the collection and standardization of public statistics.

Since this humble beginning nearly four decades ago, the Demography/Population Programme at SPC (now the Secretariat of the Pacific Community) has continued to assist Pacific Island countries and territories in the population sector. With generous support over the years from bilateral and multilateral donors, most notably AusAID and UNFPA, we have been able to provide assistance on a broad range of demographic issues and activities to our 22 Pacific Island members. In the process, we have established a tradition of providing quality advisory services in a technical discipline, one that most Pacific Island governments still find difficult to address, due to a lack of suitably qualified national staff.

During the 1970s and 1980s our activities concentrated on population censuses and surveys, covering all aspects from design, data collection and processing to analysis (including training and institutional capacity building). While we have maintained this service to our members, since the early 1990s the programme's overall strategic objective has shifted to data utilization, paying greater attention to the interrelationship between population and development. This more applied emphasis emerged in direct response to growing demands from our member countries and territories. Most planners in the region have had no formal training or first-hand experience with population matters; they were therefore neither in a position to

incorporate population considerations into development planning processes, nor able to digest highly technical demographic analyses. The objectives guiding our programme activities over the last decade have been the strengthening of national capacities in the analysis and utilization of population data, and the fostering of greater understanding of, and appreciation by, Pacific Island governments of the interdependence between population dynamics and development.

This Cook Islands demographic profile addresses the second of these objectives, and seeks to make demographic and population data more accessible to planners, policy analysts and decision-makers. The profile is based on the 2001 population census and also draws on recent health administrative records. The profile was prepared by Andreas Demmke, consultant to the SPC Demography/Population Programme, with the assistance of Gerald Haberkorn, Arthur Jorari and Gladys Beccalossi (SPC); guidance was provided throughout by Mrs Taggy Tangimetua, Government Statistician of the Cook Islands.

Gerald Haberkorn
Demographer
Secretariat of the Pacific Community

ACKNOWLEDGEMENTS

It is my privilege to introduce the Cook Islands Population Profile as it relates to the 2001 Census. This report presents the demographic, social and economic characteristics of the Cook Islands. It provides a measure of our country's development at a particular point in its national history and shows its development over time.

This report is an indispensable source of information to keep track of the Cook Islands population size and dynamics and like every tool it is only as good as what we make of it. The challenge for everyone, the policy makers and planners of the Cook Islands especially, is to use the report to sharpen our service to the people we serve.

The Government and people of the Cook Islands acknowledge the invaluable assistance of the Demography/Population Programme of the Secretariat of the Pacific Community (SPC), particularly the assistance provided by Mr Andreas Demmke in producing this profile.

I am confident you will find the profile user friendly, and helpful in addressing the priority issues facing the Cook Islands.

Kia manuia.

Taggy Tangimetua
Government Statistician

SUMMARY

This report provides an analysis of available Cook Islands demographic data. It also identifies the implications of observed demographic levels and trends on cross-cutting issues such as the environment, health, education and economic activity.

The 2001 census total for Cook Islands was 18,027 people, which included 3,010 tourists or other short-term visitors. The resident population, defined as people who are usually resident in the country and who have had an established residence in the country for at least one year, was only 15,017. This compares to 18,071 residents in 1996.

This decline in population equates to an average annual rate of growth of -3.7% and, if it were to continue, it would cause the population to halve every 19 years. Population decline was most noticeable in the Outer Islands, where the population in 2001 was almost 28% less than in 1996.

The decline in population was mainly caused by the departure of many people from the country since 1996, the year the Cook Islands Government introduced its economic reform programme, which led to the loss of many public sector jobs. Another cause was a significant decline in the number of births, resulting both from fewer women of childbearing age living in the country and from decline in fertility, evidenced by a drop in the average number of births per woman.

It has been estimated that almost 4,300 more people left Cook Islands than entered the country during the period from 1996 to 2001 — an average net loss of 860 people per year. At the time of writing (January 2004), net migration continues to be negative, with more people emigrating than immigrating.

The average annual number of births has declined from its pre-1996 level of about 500, to an average of 300 births each year for the three years from 2000 to 2002. Over the same period, average number of births per woman (the total fertility rate, or TFR) has declined from 3.6 to about 2.8.

The fertility estimates presented are mainly based on the number of registered births. Although the registration of births occurring in Cook Islands is regarded as complete, some resident women give

birth overseas and the births are not registered in Cook Islands. However, the “overseas” births are estimated to be less than 5% of total births to women resident in the country.

The level and pattern of mortality in Cook Islands is much more difficult to estimate than the overall population growth rate, fertility or migration. The small size of the population results in a low number of deaths per year and wide fluctuations in annual figures. Furthermore, some residents die overseas, particularly in New Zealand, and their deaths are not registered in Cook Islands. It is not currently possible to estimate the number of such deaths in order to determine a correction factor for the under-registration of deaths, and it is recommended that a special research project investigate this question.

Based on the number of registered deaths, life expectancies at birth are estimated at 68.0 and 74.3 years for males and females, respectively. For the reasons outlined above, these estimates have to be considered absolute maximums: if overseas deaths of Cook Islands residents were included, calculated life expectancies would be lower. It has been estimated that a 10% under-registration of deaths would produce life expectancy figures one year lower.

The infant mortality rate (IMR) has been estimated at 21 per 1,000 for the period from 1996 to 2002 (24 for males and 18 for females). This estimate is considerably higher than the estimate of 16 for the period from 1991 to 1996. This does not necessarily represent an increase in the IMR during the later period, because 1997 saw an unusually high number of infant deaths caused by the devastating effects of cyclone Martin in Manihiki and Rakahanga. Excluding 1997 from the calculations leaves an IMR of only 15.8 for the period from 1998 to 2002. Nevertheless, this is still relatively high, especially when compared to an IMR of 6.1 in New Zealand.

Internal migration continues to be directed from the Outer Islands (rural areas) towards Rarotonga (urban). Rarotonga gained 220 people from the Outer Islands in the 12 months before the 2001 census, and 556 during the five-year period before the census. There was very little movement of people between the Northern and Southern Group islands.

SUMMARY OF MAIN INDICATORS

Indicator	Total	Males	Females
Total enumerated population (December 2001)	18,027	9,300	8,727
Resident population (December 2001)	15,017	7,763	7,254
Rate of annual growth (%), 1996-2001	-3.7		
Rate of natural increase, 1996-2001	1.5		
Crude net migration rate, 1996-2001	-5.2		
Fertility			
Crude birth rate (CBR), 1996-2001	21.6		
Total fertility rate (TFR), 1996-2001	2.9		
Teenage fertility rate, 1996-2001	68		
Completed fertility rate, 2001	4.3		
Child-woman ratio, 2001	455		
General fertility rate (GFR), 1996-2001	91		
Mean age at childbearing (MAC), 2000-2002	28		
Mortality			
Crude death rate (CDR), 1996-2001	6.7		
Life expectancy at birth, 1996-2002	71.0	68.0	74.3
Infant mortality rate (IMR), 1996-2002	21	24	18
Child mortality rate (5q0), 1996-2002	5.5	7.0	3.8
Under-five mortality (4q1), 1996-2002	26.1	31.3	20.8

1. INTRODUCTION

This report provides an analysis of Cook Islands demographic data. It is based on the following source material:

- the Cook Islands 2001 census of population and dwellings;
- vital registration data on births and deaths; and
- the reported number of arrivals and departures of Cook Islands residents.

The objective of the report is to present the major demographic findings of the 2001 census and, where possible, to compare them to earlier censuses. The 2001 census data are compared, evaluated and complemented with the latest available vital registration data. The report also provides population projections covering a 20-year period from 2001 to 2021.

The political and administrative status of the Cook Islands population as New Zealand citizens makes it extremely difficult to keep track of the current size of the resident population. Carrying a New Zealand passport, Cook Islanders are allowed to travel freely to and from New Zealand. Today, about three to four times as many Cook Islanders live overseas (mainly in New Zealand) as in Cook Islands.

Pacific Island populations, particularly throughout Polynesia, have always been highly migratory. This has intensified in modern times because frequent air transport enables people to travel back and forth with ease. It is not possible to make easy distinctions between permanent residents, temporary residents and visitors, and this makes it very hard to track demographic developments.

Another difficulty is the very small population size of the country. High random fluctuations of vital statistics mean that it is difficult to calculate meaningful indicators such as rates, ratios or percentages on an annual basis, let alone quarterly or monthly. Examples are infant mortality, birth and death rates, and even the total population growth rate.

In this context, five-yearly census figures are an indispensable source of information to keep track of the Cook Islands population size and dynamics.

2. POPULATION GROWTH

Population dynamics are the processes in a population that lead to its growth or decline. The three demographic components of population dynamics are fertility, mortality and migration, all of which counterbalance one another. While fertility increases population, mortality decreases it. Migration can be a growth factor or, as in the case of Cook Islands, can lead to a slower rate of growth or even a decline.

The most basic way of describing population growth is simply to calculate the difference in population size at two different points in time.

The total enumerated population of Cook Islands decreased during the 1996–2001 intercensal period by 1,076 (or 5.6%), falling from 19,103 to 18,027. This represents an average annual rate of growth of –1.2%. However, the total enumerated population included a large number (3,010) of temporary residents, such as tourists or other short-term visitors.

The resident population of Cook Islands (those whose usual residential address had been in Cook Islands for at least one year) was 15,017 at the time of the 2001 census — a decline of 3,054 people since the 1996 census (Table 1). This was a decline of 16.9%, with an average annual rate of growth of –3.7%.

All islands showed a declining population between 1996 and 2001; however, the population of the Outer Islands decreased the most. Islands such as Penrhyn, Rakahanga and Atiu lost more than one-third of their populations, with an average annual rate of growth between –9% and –10%. Rarotonga's population declined the least, with an annual growth rate of –1.9%.

The population growth rate measures the change in a country's population as the result of births, deaths and migration.

Natural increase is population growth resulting from births and deaths, with growth occurring in a given period when births exceed deaths. If deaths exceed births, growth is negative and the population declines:

Natural increase = births – deaths

In Cook Islands, however, the population growth rate is primarily determined by migration, which is a major contributing factor to a country's population dynamic. Migrants are those people who come into the country to settle or seek residency (the immigrants), and those who leave the country to seek residency in a foreign country (the emigrants). *Net migration* refers to the number of immigrants minus the number of emigrants.

TABLE 1 Resident population change between 1996 and 2001

Island/region	Population size		Population change		Average annual rate of growth (%)
	1996	2001	No.	%	
Rarotonga	10,374	9,451	-923	-8.9	-1.9
Southern Group	5,258	3,777	-1,481	-28.2	-6.6
Aitutaki	2,272	1,743	-529	-23.3	-5.3
Mangaia	1,083	739	-344	-31.8	-7.6
Afiu	942	600	-342	-36.3	-9.0
Mauke	643	469	-174	-27.1	-6.3
Mitiaro	318	226	-92	-28.9	-6.8
Northern Group	2,439	1,789	-650	-26.7	-6.2
Palmerston	49	48	-1	-2	-0.4
Pukapuka	778	662	-116	-14.9	-3.2
Nassau	99	72	-27	-27.3	-6.4
Manihiki	656	497	-159	-24.2	-5.6
Rakahanga	249	158	-91	-36.5	-9.1
Penrhyn	604	351	-253	-41.9	-10.9
Suvarrow	4	1	-3	-75	-27.7
Cook Islands	18,071	15,017	-3,054	-16.9	-3.7

In what is commonly referred to as the *balancing equation*, overall population growth, is summarised as:

Population growth = natural increase + net migration (immigration – emigration)

In Cook Islands, a total of 1,787 births and 557 deaths were registered in the five-year intercensal period from 1996 to 2001. It is assumed that almost all were births and deaths of Cook Island residents because few visitors have a baby or die in Cook Islands. However, it is known that Cook Islands permanent residents travel to hospitals overseas, especially in New Zealand, to give birth or for special health care. Births or deaths overseas are not registered in Cook Islands, which means that not all births and deaths of Cook Islands residents appear in the registered figures.

By subtracting the number of deaths from the number of births, the total natural increase is obtained: $1,787 - 557 = 1,230$.

This means that the resident population of Cook Islands has shown a natural increase of 1,230 between the two censuses, and the resident population in 2001 would have been about 19,301 (18,071 + 1,230) if there had been no migration. The natural increase in the preceding five years (1991 to 1996) was much higher (2,077).

Despite this natural increase, the resident population decreased from 18,071 to 15,017 between the 1996 and 2001 censuses, giving a net decline of 3,054.

The balancing equation can be used to arrive at a crude estimate of net migration during the intercensal period, simply by applying the known elements (1996–2001 overall population growth, plus the actual natural increase in Step 1), and by isolating net migration to solve the equation (Step 2).

Step 1:

Population growth = natural increase + net migration (immigration – emigration)

$$-3,054 = +1,230 + \text{net migration}$$

Step 2:

$$\text{Net migration} = -1,230 - 3,054$$

$$\text{Net migration} = -4,284$$

In other words, between 1996 and 2001, about 4,284 more Cook Island residents left the country than arrived, resulting in a net migration rate averaging –857 persons per year (Table 2).

TABLE 2 Number of registered births and deaths, estimated net migrants and overall population change for the intercensal periods 1991–1996 and 1996–2001

	Total no.		Average annual no.		Rate ^a		
	1991-1996	1996-2001	1991-1996	1996-2001	1991-1996	1996-2001	
Births	2,630	1,787	526	357	29.6	21.6	CBR
Deaths	553	557	111	111	6.2	6.7	CDR
Net migrants	-1,524	-4,284	-305	-857	-1.7	-5.2	Migration rate
Overall change	553	-3,054	110	-611	0.6	-3.7	Average annual rate of growth

CBR = crude birth rate; CDR = crude death rate

^a Based on respective mid-period population size

Source: Statistics Office, Ministry of Finance and Economic Management, Cook Islands

The most basic demographic measures of births and deaths are the *crude birth rate* (CBR) and the *crude death rate* (CDR). They refer to the number of births and deaths in a given year for every 1,000 people, and are normally calculated simply by dividing the number of births or deaths in a given year by the total midyear population multiplied by 1,000. For small populations such as that of Cook Islands, it is advisable to use multi-year averages, as the random fluctuations of annual events can be quite considerable with such small numbers.

Cook Islands CBR and CDR for the 1996–2001 intercensal period are calculated as follows:

$$\begin{aligned} \text{Mid-period population} &= [\text{resident population (1996)} + \text{resident population (2001)}] \div 2 \\ &= (18,701 + 15,017) \div 2 \\ &= 16,544 \\ \text{CBR} &= (\text{average annual births} \div 16,544) \times 1,000 \\ &= (357 \div 16,544) \times 1,000 \\ &= 21.6 \\ \text{CDR} &= (\text{average annual deaths} \div 16,544) \times 1,000 \\ &= (111.4 \div 16,544) \times 1,000 \\ &= 6.7 \end{aligned}$$

By subtracting the CDR from the CBR, the *rate of natural increase* is obtained:

$$\begin{aligned} \text{Rate of natural increase} &= \text{CBR} - \text{CDR} \\ &= 21.6 - 6.7 \\ &= 14.9 \text{ per thousand, or } 1.49\% \text{ per year} \end{aligned}$$

This means that without any migration the population would have grown by its natural increase of 1.49% annually, at which rate it would double in about 46 years.

The intercensal growth rate of the resident population between 1996 and 2001 was –3.7% and the averages of the CBR and CDR for the intercensal period were 21.6 and 6.7 (per 1,000), respectively. By applying these rates in the balancing equation, we obtain the *crude net migration rate* (immigration – emigration):

$$\begin{aligned} \text{Net migration rate} &= \text{growth rate} - \text{rate of natural increase} \\ &= \text{growth rate} - (\text{CBR} - \text{CDR}) \\ &= -3.7 - (21.6 - 6.7) \\ &= -5.2, \text{ or } 52 \text{ per } 1,000 \end{aligned}$$

Since the 2001 census, a further 317 births and 102 deaths were registered in 2002, and 294 births and 82 deaths in 2003.¹ This would have led to an increase of 427 people if there were no migration. However, the latest data of the Cook Islands Statistics Office show that despite its natural growth, the resident population has further declined throughout 2002 and 2003, pointing to continued negative net migration that counterbalances the natural growth of the population.

1. 2003 vital statistics are preliminary.

3. FERTILITY

Fertility refers to the reproductive behaviour of a population, and relates to the number of live births women have had.

The demographic indicator most commonly used to describe a country's fertility situation is called the *total fertility rate* (TFR). This measure is an indication of the average number of children women would give birth to during their reproductive life (15–49 years of age) if they were subject to the present fertility level and pattern during their entire reproductive lives. The TFR is calculated from the number of live births by women of given ages in a given year — the *age-specific fertility rates* (ASFRs). Data needed are the total number of births of women, by age, in a given time interval (usually a calendar year) and the total number of women in each age group.

Data from the vital registration system (from the Cook Islands Justice Department and/or health statisticians at the hospital) and data gathered during the census are compared and evaluated against each other.

During the 2001 census, all women older than 15 years were asked:

- how many live births they had ever had;
- how many of those were still living at the time of the census;
- their age at the birth of their first child; and
- the date of their last birth.

On the question of live births, 4,863 resident women aged 15 years and over reported a total of 14,113 children; 3,500 women (72%) reported having had at least one child, while 1,363 (28%) had not yet had a child. Based on the number of childless women aged 50 years and older, childlessness was about 10% (Table 3).

Of all women who had children, most had one, two or three children. Four per cent, or 205 women, had more than 10 children. Two women reported having borne 18 children. The average number of children ever born to all women (average parity) was 2.9 per woman. The average parity increases with the age of women. While the 15–19-year-old women had on average only 0.1 children (every tenth woman had one child), women aged 45–49 had 3.8 children, and women older than 65 years of age had an average of 6 children. The average parity of women older than 49 years is also called the *completed fertility rate* (a cohort measure demonstrating how many children a certain cohort of women who completed their childbearing actually produced during those years).

During the one-year reference period before the 2001 census (December 2000 to November 2001), resident women reported a total of 323 births — a considerable drop from the number of births (493) recorded in the year preceding the 1996 census.

TABLE 3 Female resident population 15 years and older, by number of children ever born alive, 2001

Age of women	No. of women	Number of children ever born											Average parity	
		0	1	2	3	4	5	6	7	8	9	10+		Total
15-19	656	594	55	7	0	0	0	0	0	0	0	0	69	0.1
20-24	492	242	153	68	23	6	0	0	0	0	0	0	382	0.8
25-29	524	131	120	118	93	39	19	2	2	0	0	0	912	1.7
30-34	542	109	77	106	100	63	47	27	12	1	0	0	1,330	2.5
35-39	524	65	58	88	100	89	60	27	23	9	4	1	1,631	3.1
40-44	447	49	54	65	87	61	59	32	19	12	5	4	1,500	3.4
45-49	353	38	16	55	56	67	41	39	20	6	5	10	1,343	3.8
50-54	293	20	24	39	41	38	42	33	17	21	4	14	1,267	4.3
55-59	298	35	18	23	38	38	27	28	31	17	11	32	1,437	4.8
60-64	265	20	13	27	30	19	32	20	34	21	14	35	1,438	5.4
65+	469	60	31	37	24	37	30	34	41	32	34	109	2,804	6.0
Total	4,863	1,363	619	633	592	457	357	242	199	119	77	205	14,113	2.9

Source: Cook Islands Census of Population and Dwellings 2001, Main Report

3.1 Age at birth of first and last child

The average age of women at the birth of their first child has been calculated at 21.9 years. 1,249 women had their first child when they were still teenagers (younger than 20 years); that is, 26% of all women 15 years and older. Twenty-four women had their first child when they were younger than 15 years, and 13 when they were older than 40 years.

The average age of women at the birth of their last child has been calculated at 30.7 years.

3.2 Age-specific fertility rates, total fertility rate and mean age at childbearing

Based on the reported number of births by age of mother born during the year before the census, the ASFRs, TFR and mean age at childbearing (MAC) can be calculated (Table 4).

Although most babies were born to the cohort of 524 women aged 25–29 years (80), relatively more were born to the 492 women aged 20–24 (79). This is expressed in the second group's higher ASFR of 0.161, which means that 161 births would have been expected from 1,000 women in that age group. Thirty-one children were born to the 656 women aged 15–19 years, resulting in a teenage fertility rate of 47 (47/1,000).

Based on the ASFRs, a TFR of 3.1 has been calculated, and a MAC of 28.9 years. This compares to a TFR of 2.9 based on a calculation using the registered number of births for 2001. The difference is explained by the fact that the registered number of births for 2001 was, at 315, slightly lower than the 323 children reported to have been born during 12 months before the census (1 December 2000 – 30 November 2001). The true age of women at the birth of their child as stated in the census was on average six months younger, which might have a slight effect on the calculated ASFRs.

TABLE 4 Reported number of children born during 12 months before the 2001 census, age-specific fertility rates, total fertility rate, and mean age at childbearing

Age of women	No. of women	No. of children born during year prior to the census	Age-specific fertility rates
15–19	656	31	0.047
20–24	492	79	0.161
25–29	524	80	0.153
30–34	542	66	0.122
35–39	524	49	0.094
40–44	447	18	0.040
45–49	353	0	0.000
Total	3,538	323	0.616
Total fertility rate			3.1
Mean age at childbearing			28.9

Source: Cook Islands Census of Population and Dwellings 2001, Main Report

Fertility indicators derived from census data need to be cited with caution, as they are based on information from only one year (which in Table 4 is 2001). For a small country such as Cook Islands, annual indicators can fluctuate widely, and multi-year averages should be taken into account to calculate more robust indicators.

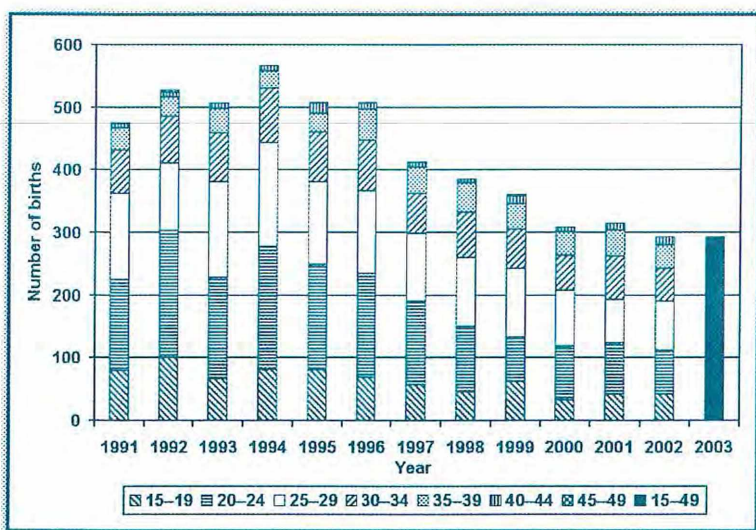
However, the above fertility indicators clearly point to a significant fertility decline of the resident population during the 1996–2001 intercensal period. The exact

nature of this decline needs to be studied using vital registration data, especially the number of registered births by age of mother during the last five years before the census.

The 315 registered births in 2001 were slightly fewer than the 323 children reported to have been born in the 12 months before the 2001 census by all women 15–49 years of age, and also fewer than the 330 children who were counted in the census as being under one year of age. The Cook Islands system of registering the number of births seems fairly complete and reliable, and a more in-depth analysis of the level and pattern of fertility could be based on its data. However, some resident women give birth overseas, and the births do not get registered in Cook Islands. The proportion of “overseas births” out of the total number of births is estimated to be 5% or less.

Since 1996, the annual number of births declined rapidly, from more than 500 during the period 1992–1996 to below 300 in the years 2002 and 2003 (Figure 1).

FIGURE 1 Number of registered births by age of mother, 1991–2002



Note: Data for 2003 are preliminary, and only total number of births is available
 Source: Registration of births by age of mother, Statistics Office, Rarotonga, Cook Islands

Based on the enumerated number of women by age group in the 1991, 1996 and 2001 censuses, the number of women by age of each intercensal year can be estimated (by interpolation of the different birth cohorts of women). Consequently, the calculation of ASFRs and TFRs are straightforward.

Figure 2 compares the average ASFRs of the period 1992–1996 with the period 1997–2001. It becomes clear that there was a fertility decline mainly among younger women, especially those aged 20–24 years. Fertility rates of women aged 35 years and older remained virtually unchanged. While women aged 20–24 years had the most children during the period 1992–1996, women aged 25–29 did so during the period 1997–2001.

FIGURE 2 Age specific fertility rates — multi-year averages for the periods 1992–1996 and 1997–2001

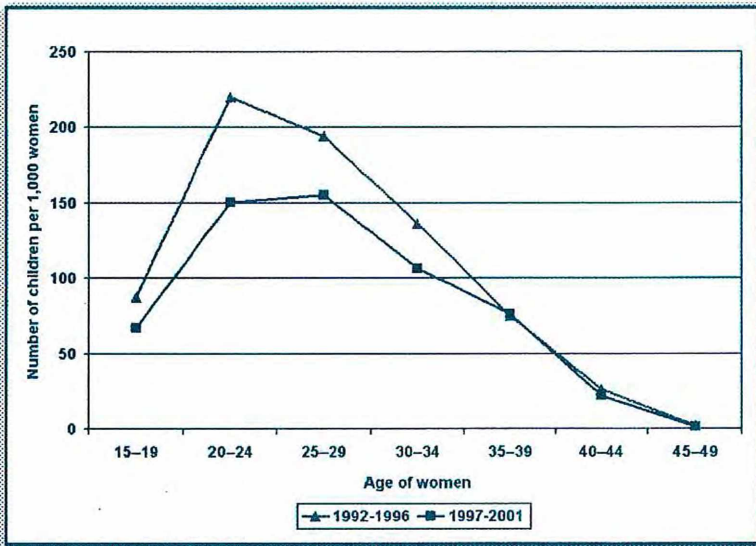
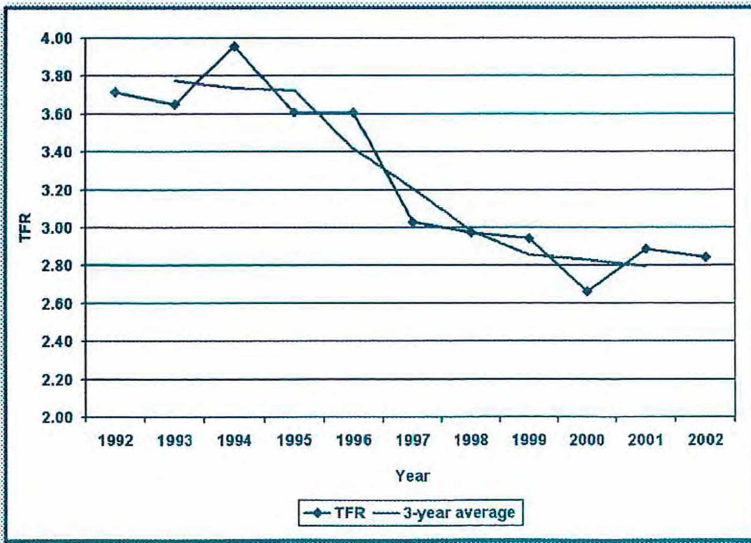


FIGURE 3 Total Fertility Rate (TFR), 1992–2002

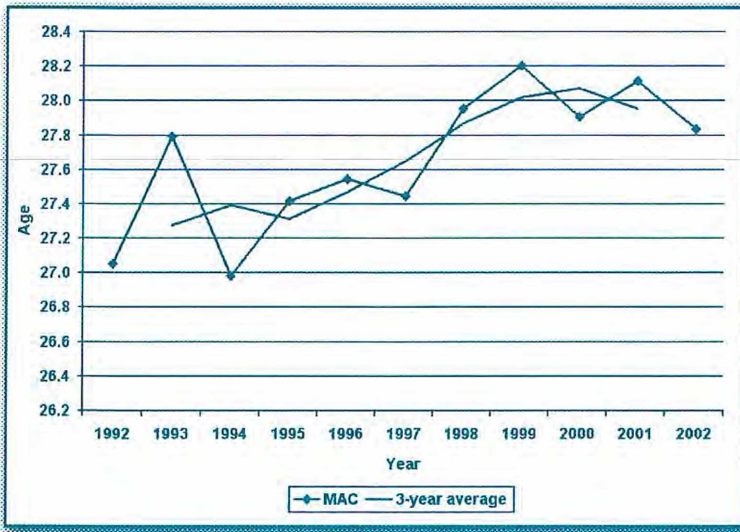


The TFRs for the period 1992–2002 are shown in Figure 3. Before 1996, the average number of children per woman was well above 3.6. Since then, the TFR has declined sharply, to below three children per woman.

The average TFR of the 1996–2001 intercensal period has been estimated at 2.9 (Appendix, Table A1). The three-year average TFR for the years 2000–2002 was only 2.8. However, the preliminary count of births for 2003 was 283 (according to the Ministry of Justice) or 294 (according to the Ministry of Health) — about the same as in 2002 (293). This might point to a stabilisation of the recent decline of births.

In conjunction with decreasing fertility rates, the average age at childbearing increased by about half a year during the period 1992–2002 (Figure 4). While the MAC stayed below 27.5 years during the years 1992–1995, it increased to about 28 years during the years 1999–2001. As shown above, younger women in particular postponed their childbearing, resulting in the increased average age at childbearing.

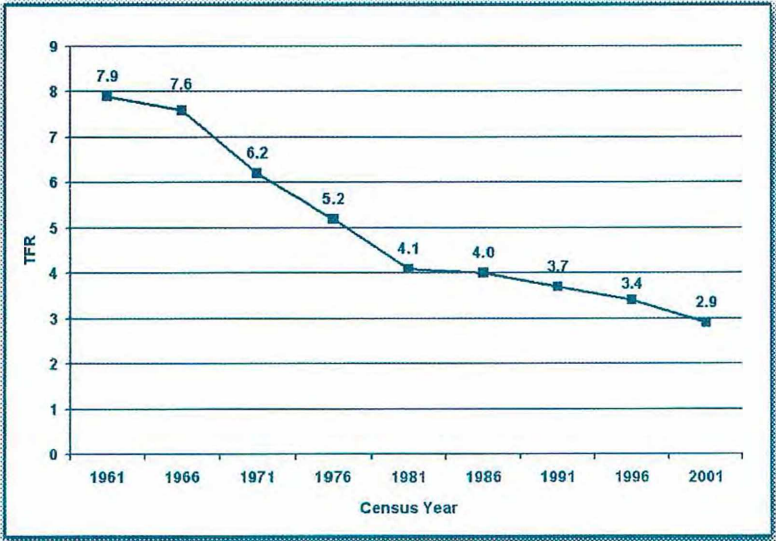
FIGURE 4 Mean Age at Childbearing (MAC), 1992–2002



The estimated TFR, based on the 1996 and 2001 census data and using the Trussell P/F ratio technique, confirms the decline of the TFR in Cook Islands. Both the ARFE-2 procedure of the United States Census Bureau’s PAS software package and the FERTPF procedure of the United Nations’ software package MORTPAK confirm this finding (Appendix, Tables A2 and A3). This estimate is based on the 1996 and 2001 census data on the reported number of children ever born and the reported number of children born during the 12 months before the 1996 census. It is fairly consistent with the directly calculated TFR of 2.9.

Unfortunately, the only information available on past trends and levels of fertility are those for the years 1961–1981 (Figure 5), and then from 1996 onwards. These data point to a rapid decline between 1961 and 1981. The pace of decline since then seems to have slowed until 1996, when the TFR again dropped considerably.

FIGURE 5 Estimated Total Fertility Rate (TFR), 1961–2001



Note: Values for 1986 and 1991 are linear interpolations of the 1981 and 1996 values.

4. MORTALITY

The incidence of death reveals a lot about a population's standard of living and its general state of health. For example, *infant mortality* and *life expectancy at birth* are widely used as indicators of the overall development status of a country.

The *mortality* of a population depends on various factors, including:

- the demographic composition of the population (ie the age and sex distribution);
- quality and utilisation of health and medical services such as immunisation programmes, maternal and child health care, primary health care etc;
- environmental conditions and availability of infrastructure such as housing, water supply, sanitation and waste disposal;
- exposure to risk factors, such as abuse of alcohol and tobacco;
- work-related dangers;
- exposure to events outside individual control, such as natural disasters or war; and
- socio-economic status.

The only question that relates to mortality in the 2001 census was the question on the number of children ever born and still alive.

Of all children who were ever born to women 15 years and older (14,113), 95% (13,403) were still alive, and 710 children had died (Table 5). The proportion of surviving children decreases with the age of women. While all children who were ever born to women 15–19 years (at the time of the census) were still alive, only 98% of children born to women aged 45–49 were still alive, and only 88.4% of children born to women aged 65 years and older survived.

TABLE 5 Female resident population 15 years and older, by number of children ever born, number of children still alive and number of children dead, 2001

Age of women	No. of women	No. of children ever born	No. of children still alive	No. of children dead	Proportion still alive
15-19	656	69	69	0	100.0
20-24	492	382	379	3	99.2
25-29	524	912	899	13	98.6
30-34	542	1,330	1,295	35	97.4
35-39	524	1,631	1,588	43	97.4
40-44	447	1,500	1,468	32	97.9
45-49	353	1,343	1,316	27	98.0
50-54	293	1,267	1,201	66	94.8
55-59	298	1,437	1,361	76	94.7
60-64	265	1,438	1,349	89	93.8
65+	469	2,804	2,478	326	88.4
Total	4,863	14,113	13,403	710	95.0

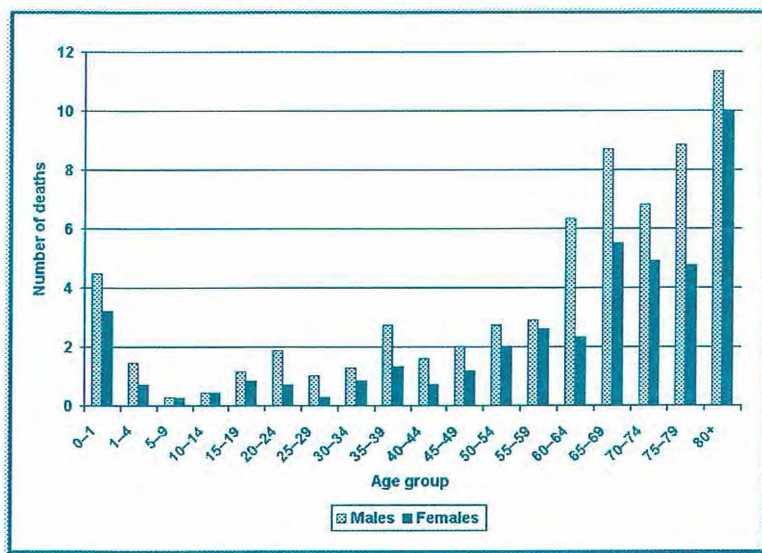
Source: Cook Islands Census of Population and Dwellings 2001, Main Report

The proportion of surviving females was higher than that of males. While 95.6% of all female children ever born were still alive, only 94.3% of all male children had survived.

In general, the proportion of surviving children decreases continuously by age of mother, but the Cook Islands dataset is too small to allow the calculation of reliable infant and child mortality indicators. As a consequence, mortality estimates have to rely on the country's vital registration system, which records deaths by age and sex.

These data can be used to directly calculate a life table from data of deaths by five-year age groups. Because the possibility of random fluctuations is very high when dealing with very small numbers, as is the case with the Cook Islands data, it is imperative to work with multiyear averages to spell out meaningful indicators.

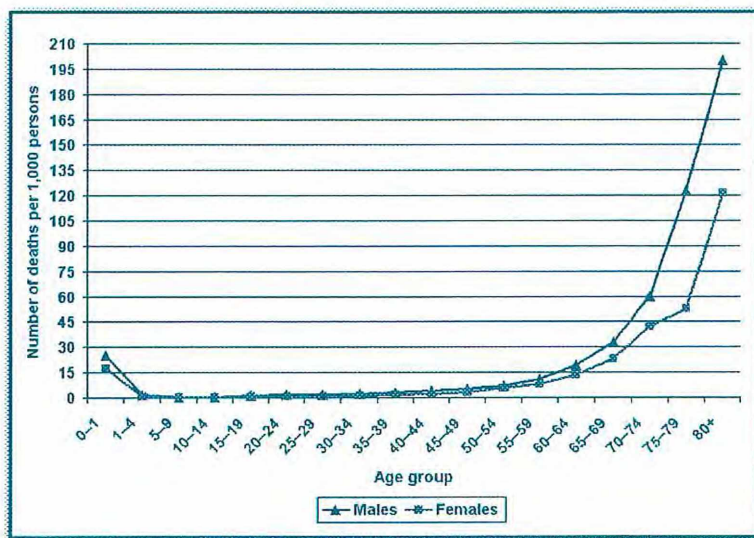
FIGURE 6 Average annual number of registered deaths, by age and sex, 1996–2002



Source: Registration of deaths by age and sex, Statistics Office, Rarotonga, Cook Islands

Figure 6 and Appendix Table A4 show the registered number of deaths by age and sex for the period 1996–2002. From these data, the average number of deaths by age and sex have been calculated and applied to the estimated intercensal (1996–2001) mid-period population (1999) by age and sex (Appendix Table A5), and age-specific central death rates ($M(x)$) have been calculated (Figure 7). These $M(x)$ values were used to calculate life tables for Cook Islands resident males and females (Appendix Tables A6 and A7). The LTPOPDTH procedure of the US Census Bureau’s PAS program was used for the calculations of the respective life tables.

FIGURE 7 Estimated age specific central death rates [M(x)], 1999

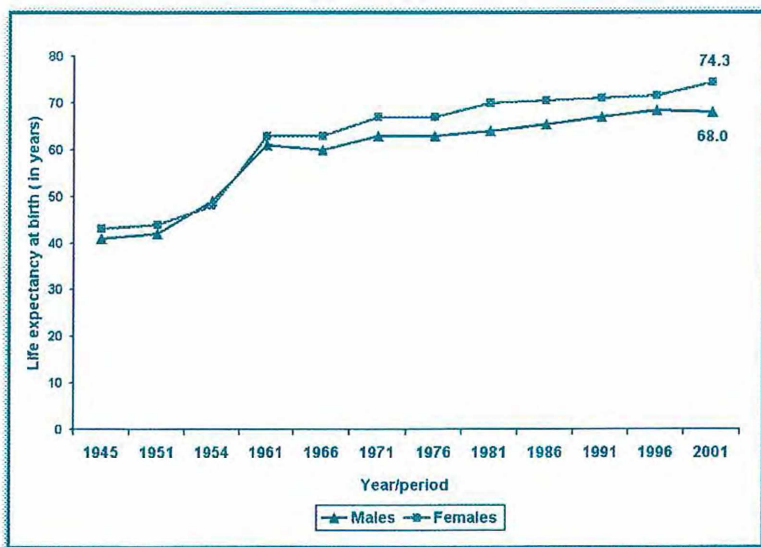


Life expectancy at birth for males and females has been estimated at 68.0 and 74.3 years, respectively (Figure 8). However, the calculated life expectancies have to be considered absolute maximums, because they are based solely on the number of deaths registered in Cook Islands. As mentioned above, some Cook Islands residents die overseas, and their deaths are not registered in Cook Islands. If all deaths of residents who die overseas were included in Cook Islands death registrations, life expectancies for males and females would be lower than given in the life tables presented here. It has been estimated that for every 10% of under-registration of deaths, life expectancies would be approximately one year less.

The difference in life expectancy of more than six years in favour of females is consistent with the fact that 55% more male than female deaths have been reported for the period 1996–2002 (during this period 464 male deaths were registered, compared to only 300 female deaths).

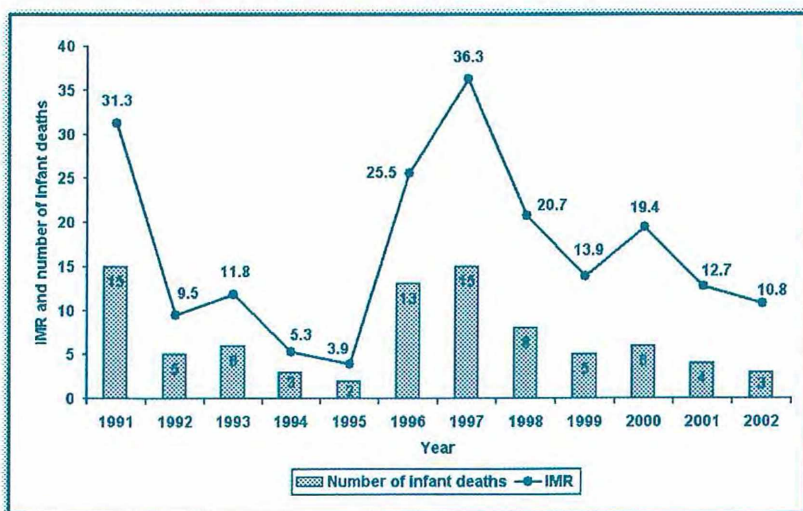
The difference is also consistent with the considerably higher number of widowed females aged 65 years and older compared to male widowers (during the 2001 census 21% of all males 65 years and older were widowed, compared to 50% of females of the same age group).

FIGURE 8 Life expectancy at birth, 1945–2001



Note: Values for 1986 and 1991 are linear interpolations of the 1981 and 1996 values.

FIGURE 9 Number of registered infant deaths and Infant Mortality Rate (IMR), 1991–2002



Source: Registration of deaths, Statistics Office, Rarotonga, Cook Islands

The *infant mortality rate* (IMR) is the most common and basic measurement of early age mortality. IMR measures the number of deaths of children under one year old per 1,000 births in a given time interval (usually a calendar year). During the period 1996–2002, 54 infant deaths were recorded (Figure 9). During the same period, 2,572 births were registered. Dividing the number of infant deaths (54) by the number of births (2,572), results in an average IMR of 21 for the period (Table 6). Male infant mortality, at 24 per 1,000, was considerably higher than female infant mortality (18 per 1,000 live births). The very high number of infant deaths in 1997 was the result of the devastating effects of cyclone Martin in Manihiki and Rakahanga on 1 November 1997, when several infants died. Excluding 1997 from the calculations would give an IMR of 15.8 for the period 1998–2002, which is about the same as for the period 1991–1996.

Child mortality — the probability of dying between the ages of one year and exactly five years — was estimated at about 5.5 per 1,000 children in that age group. Between 1996 and 2002, 15 deaths of children aged between one and four years were recorded: 10 boys and 5 girls. The indicators for Cook Islands child mortality can be found in Tables A6 and A7 (Appendix) in the column “nqx” for the 1–4-year age group. They were 7.0 and 3.8 for males and females, respectively.

As shown in Section 2, the average *crude death rate* (CDR) for the Cook Islands resident population has been calculated at 6.7 for the 1996–2001 intercensal period. This compares to a CDR of 6.2 for the period 1991–1996.

Sometimes mortality indicators can be estimated by calculating the proportion of persons, by sex and age group, who survived from one census to the next (cohort survival). In a population such as that of Cook Islands that is influenced by a significant amount of migration, the available methodologies are not suitable, as it would be impossible to establish whether a person has died or emigrated.

Unfortunately, the only information available on past trends and levels of mortality are those for the years 1945–1981, and 1996–2001 (Figure 8 and Appendix Table A8). These data show a fast increase in the life expectancies of males and females (by 20 years between 1945 and 1961) and a decrease in IMRs (from 152 in 1951 to 44 in 1961). During the 20-year period 1961–1981, life expectancies have improved only slowly, especially for males. The IMR has declined from 44 to 28.5. During the period 1981–1996, male life expectancy increased by about 4.4 years, while that of females increased only by 1.5 years. The IMR declined from 28.5 in 1981 to 15.9 for the period 1991–1996.

During the five-year 1996–2001 intercensal period, male life expectancy more or less stagnated at 68 years, while female life expectancy increased by 2.8 years. As shown above, the IMR has been estimated at 21 for the period 1996–2002.

At first, this seems to be a significant increase in the number of infant deaths, but 1997 included a number of infant deaths caused by cyclone Martin. In any case, an IMR in the 15–21 range is relatively high, particularly when compared to an IMR of 6.1 (in the year 2000) in New Zealand.

TABLE 6 Mortality indicators of the resident population of Cook Islands, average of the period 1996–2002

Indicator	Total	Males	Females
Life expectancy at birth, $e(0)$	70.7	68.0	74.3
Infant mortality rate (IMR)	21.0	24.0	18.0
Child mortality rate (4q1)	5.5	7.0	3.8
Under-five mortality (5q0)	26.1	31.3	20.8

Source: Registration of deaths by age and sex, Statistics Office, Rarotonga, Cook Islands

5. MIGRATION

Migration is the movement of people across a certain boundary for the purpose of establishing a new permanent residence. When this boundary is a national border, this movement is referred to as *international* migration, and the people involved are referred to as migrants. Immigration is the movement of people into a country (*immigrants*), and emigration is the movement of people out of a country (*emigrants*).

When the movement of people occurs within a country (between islands or villages, for example), it is referred to as *internal* migration; the migrants are referred to as *in-migrants* and *out-migrants*.

Apart from this spatial consideration, *time* plays a major role in the analysis of migration. Someone coming for a short visit is not a migrant — he or she is a visitor.

Intent is also of crucial importance, as a visitor can turn into a migrant if they decide to stay for a longer time, for example if a sudden job opportunity emerges. Along the same line, a person intending to migrate may turn into a visitor if, for example, the expected job opportunities did not materialise and the person decides to return to their place of departure.

This highlights one of the key problems concerning migration. Whether or not a particular person qualifies as a migrant can only be established after a certain period of time, usually at least a year, shows whether they are a visitor or a migrant.

5.1 Internal migration

Internal migration — the movement of people from one island of Cook Islands to another — can be estimated by comparing the different intercensal growth rates per island or region, comparing the number of people born on certain islands to the number who actually live there, and/or by comparing the place of residence one or five years ago with the place of residence during the census enumeration. All this information was made available in the 2001 census.

During the year before the 2001 census, Rarotonga had a net gain of 220 migrants from all the other islands, and 556 migrants during the five years before the census. Most came from the Southern Group islands (Table 7).

The population of the Southern Group had net losses of 128 and 404 persons during the one year and five years before the census, respectively. Almost all of them went to Rarotonga.

The Northern Group population was not affected as much by net migration as the Southern Group islands, although its migration was also negative and directed towards Rarotonga. The Northern Group islands experienced a net loss of 92 and 152 persons during the one year and five years before the census, respectively. Population movement between the Northern and Southern Group islands was only minimal.

TABLE 7 Interregional migration during one year and five years before the 2001 census

Island or region	In-migrants		Out-migrants		Net migrants	
	< 1 year	< 5 years	< 1 year	< 5 years	< 1 year	< 5 years
Rarotonga	343	721	123	165	220	556
Southern Group	69	104	197	508	-128	-404
Northern Group	68	98	160	250	-92	-152

Source: Cook Islands Census of Population and Dwellings 2001, Main report (resident population by island and usual residential address one and five years ago)

Data on lifetime migration (number of persons by place of residence and place of birth) again show that the direction of internal migration flows was mainly towards Rarotonga (Table 8). Of the people born in the Northern or Southern Group islands, 1,987 now live in Rarotonga, while only 932 people born in Rarotonga have moved to the Northern or Southern Group islands.

Residents of the Northern or Southern Group islands who were not born there totalled 691 in the Southern Group 345 in the Northern Group. More than twice as many in-migrants have left: 1,545 and 546 people who were born in the Northern or Southern Group islands, respectively, did not live there anymore.

However, some care is advised when interpreting migration flows based on place of birth data, as many mothers from the Northern or Southern Group islands visit Rarotonga's hospital for only a short time for the delivery of their babies. These children technically qualify as "in-migrants" because they are born in Rarotonga and "move" to the Outer Islands, where they then live permanently with their parents. Therefore, the number of "in-migrants" in the Northern or Southern Group islands, and the number of "out-migrants" in Rarotonga, include many children born in Rarotonga's hospital.

TABLE 8 Interregional lifetime migration, Cook Islands, 2001

Island or region	In-migrants	Out-migrants	Net migrants
Rarotonga	1,987	932	1,055
Southern Group	691	1,545	-854
Northern Group	345	546	-201

Source: Cook Islands Census of Population and Dwellings 2001, Main report (resident population by place of birth and place of residence)

As has been shown above, the migration rates can be estimated by subtracting the natural growth rate from the overall population growth rate. While this is only a rough estimation of the level of migration, it is a clear indicator of the difference and magnitude of levels of migration of the different islands and regions. For simplicity, it has been assumed that the natural growth (births minus deaths) was the same for the whole of Cook Islands (1.5% per year). Although migration was negative in all regions of Cook Islands, it was most pronounced in the Southern Group (-8.1% per year), followed by the Northern Group (-7.7). Rarotonga has shown the lowest rate of migration, of only -3.4% per year (Table 9).

With no region in Cook Islands having recorded a positive net migration, it is evident that the overall migration flow is to overseas destinations.

TABLE 9 Estimated net migration rate by regions, Cook Islands, 1996-2001

Island/region	Resident population size		Population growth rate	Assumed natural growth rate	Estimated net migration rate
	1996	2001			
					1996-2001
Rarotonga	10,374	9,451	-1.9	1.5	-3.4
Southern Group	5,258	3,777	-6.6	1.5	-8.1
Northern Group	2,439	1,789	-6.2	1.5	-7.7
Cook Islands	18,071	15,017	-3.7	1.5	-5.2

Source: Cook Islands Census of Population and Dwellings 2001, Main report

5.2 International migration

As mentioned above, international migration refers to people who move to another country and thereby change their permanent residential address. The net migration of a country during a certain period consists of those who arrive in the country (immigrants) minus those who depart (emigrants).

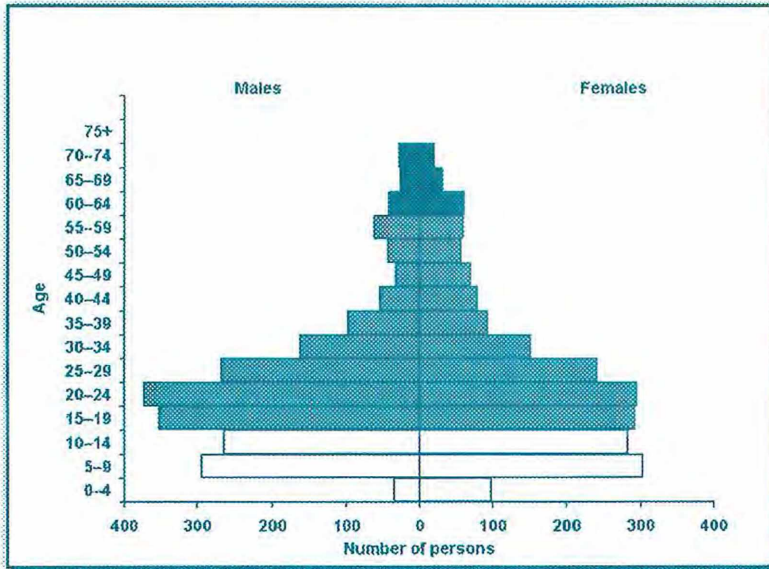
To the census question asking where they resided one year ago, 732 persons (5% of the resident population one year and older) answered that they then lived overseas. To the question asking where they lived five years ago, 1,278 persons (10% of the resident population five years and older) replied that they then lived overseas. Unfortunately, it is impossible to determine from these data how many of these people were former residents who had returned, and how many were first-time residents (newcomers).

From the question on a person's place of birth, it was found that almost 19% (2,788) of the resident population had been born overseas.

In Section 2 of this document it was estimated that between 1996 and 2001 about 857 more residents left Cook Islands than arrived each year. Assuming that the 1,278 people who lived elsewhere five years before the census entered (immigrated to) Cook Islands during the intervening five years, annual immigration can be estimated at +256 people. With annual net migration earlier estimated at -857 people, this means that, on average, 1,113 people must have departed Cook Islands each year during this period.

By comparing the 1996 and 2001 census populations by five-year cohorts and taking the registered number of deaths by age and sex into consideration, it has been found that it was particularly the 15-24-year-old population that left Cook Islands (Figure 10 and Appendix Table A9). Exactly half (2,141) of all migrants were between 15 and 34 years old and another 30% were children aged 0-14 years. The 15-19-year-olds have finished their education and are looking for further education or employment opportunities overseas. People 20 years and older include many parents moving with their young children (0-14 years of age), highlighting the significance of family migration. There were nearly equal numbers of male and female migrants.

FIGURE 10 Population pyramid of net migrants, 1996–2001



- Annual migration statistics, 2001–2003

Estimates on the annual number of migrants for the period after the last census in 2001 can only be based on the recorded number of arrivals and departures, by simply subtracting all departing passengers from those who have arrived.

Since 1997, Cook Islands has had a complete and very timely registration system in place. It records all arriving and departing passengers at Rarotonga International Airport according to date of arrival or departure, age and sex, and whether the person arriving is a permanent resident of Cook Islands or a visitor.

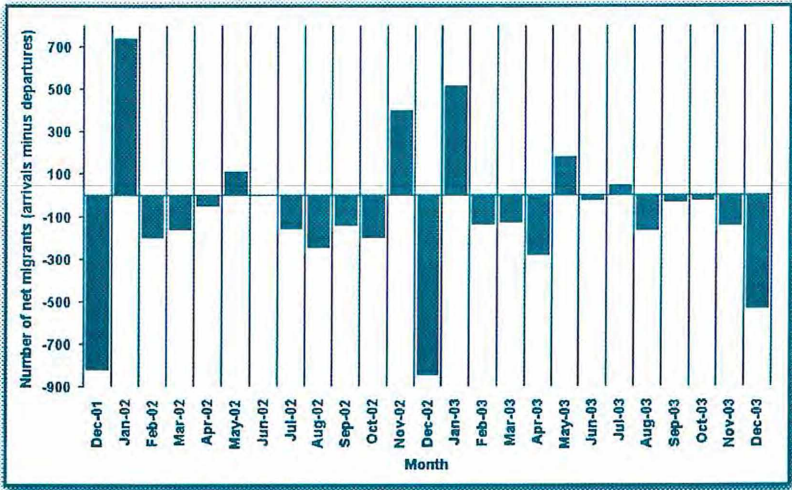
A Cook Islands resident is defined as a person whose usual place of residence has been in Cook Islands for at least one year (regardless of ancestry or citizenship); a visitor is a person who usually lives overseas.

However, the political and administrative status of the Cook Islands population as New Zealand citizens makes it extremely difficult to keep track of the current size of the resident population. It is almost impossible to distinguish between permanent and temporary residents, and it is equally complicated to establish the true size of the visitor population, as some may have become residents after entering the country. People who intend to stay only for a relatively short time and classify themselves as “visitors” on their arrival card may change their status from visitor to resident after entering the country and deciding to stay. On the other hand, Cook Islanders who usually live overseas and visit their families in Cook Islands may classify themselves as residents. It always will be difficult to distinguish “true” residents from “true” visitors.

Data on arrivals and departures of Cook Islands residents show that, since December 2001, Cook Islands has suffered a net loss of more than 2,000 people (Figure 11 and Appendix Table A10). The past two years showed that December continued to be the time of the year when people leave to spend their holidays overseas, and January and May are the months when people return from their Christmas or Easter holidays. However, fewer people return in January than leave in December. February–April and August were also periods when more residents leave than arrive, resulting in negative net migration.

The average annual numbers of net migrants for 2002 and 2003 were 727 and 703 persons, respectively.

FIGURE 11 Recorded monthly net migrants (arrivals minus departures) of Cook Island residents, December 2001 to December 2003



Source: Statistics Office, Ministry of Finance and Economic Management, Cook Islands

6. POPULATION PROJECTIONS

In formulating socio-economic development plans, population variables have to be considered in conjunction with economic and social conditions. For governments to cater effectively for the specific needs of different population groups at different points in time, it is important that planners and policy-makers gain an idea of how their population might look in the future. The appropriate method to do this is to provide a series of population scenarios, in order to anticipate the changes in population size and characteristics.

The starting point for any projection is a reliable age–sex distribution of a population. In the case of Cook Islands, this is the 2001 census age and sex distribution of residents, and information on fertility, mortality and migration.

The *cohort-component method* was used to compute the population projections presented here. This procedure simulates population changes as a result of changes in the components of growth: fertility, mortality and migration. Based on past information, assumptions are made about future trends in these components of change. The assumed rates are applied to the age and sex structure of the population in a simulation that takes into account that people die according to their sex and age, that women have children, and that some people change their residence. The cohort-component method of projecting a population follows each cohort of people of the same age and sex throughout their lifetime, according to their exposure to fertility, mortality and migration.²

The key to making meaningful projections lies in the choice of assumptions about future population developments. These assumptions concern possible future birth, death and migration rates.

The projections presented were prepared for the Cook Islands resident population only, as estimates on the level of fertility and mortality of short-term visitors are very hard, if not impossible to make, because visitors give birth overseas and are usually overseas when they die.

Given recent and ongoing high levels of negative net migration — that is, far more Cook Islands residents leave Cook Islands each year than move/return to Cook Islands — that are not sustainable in the long run, much care is advised when interpreting these population projections. It is important to stress that population projections are not forecasts suggesting what is going to happen in the future, but provide policy-makers and planners with “*what-if scenarios*” — that is, information about what the country’s population might look like, if specific fertility, mortality

2. Eduardo E. Arriaga, *Population Analysis with Microcomputers, Volume I, Presentation of Techniques*, Bureau of the Census, Department of Commerce, USA, pp 309–310.

and migration trends prevail in the coming years. While fertility and mortality are relatively stable, which means that dramatic changes usually do not occur overnight, migration patterns and trends can change quite suddenly and dramatically; this has serious implications for the reliability of population projections in countries exposed to high levels of migration, such as Cook Islands.

6.1 Projection assumptions

In order to have a clearer understanding of the Cook Islands population situation in the future, several projections have been prepared, covering the period 2001–2021.

Preparing meaningful assumptions for Cook Islands is particularly difficult because of extreme variations in its migration levels in recent years, ranging from around –300 people per year during the period 1991–1996, to around –860 people per year during the period 1996–2001. In order to cover possible reasonable developments, three different migration assumptions have been prepared. The following demographic input was used for the projections.

- **Base population**

The 2001 census age and sex distribution of the resident population is used (Appendix Table A11).

- **Fertility**

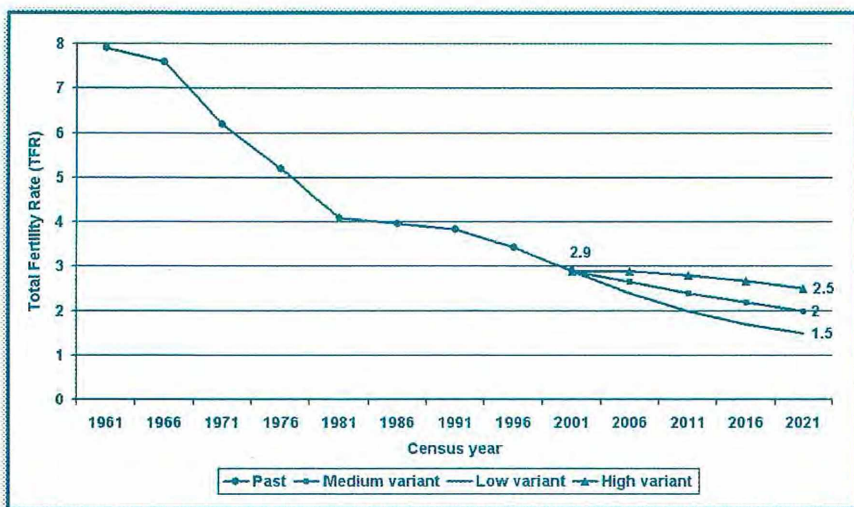
The fertility pattern (the ASFRs) together with a TFR of 2.9 is used as the starting level of fertility for the projections in 2001 (as described in Section 3). From the estimated level of fertility (TFR of 2.9) in 2001, three different fertility assumptions are made, as illustrated in Figure 12:

Assumption 1: high fertility — initially, fertility remains at its current level before it decreases slightly to a TFR of 2.5 in 2021

Assumption 2: medium fertility — fertility decreases to 2.0 in 2021, exactly the intermediate level between the high-fertility assumption and the low-fertility assumption

Assumption 3: low fertility — fertility decreases to 1.5 in 2021, based on the assumption that fertility initially decreases at its most recent (1996–2001) pace until 2006, before its pace of decrease slows.

FIGURE 12 Fertility assumptions for projections, 2001–2021



• Mortality

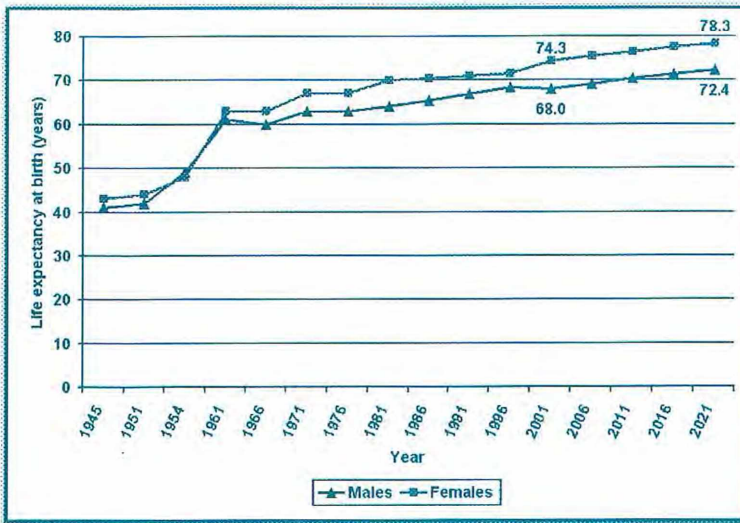
Life expectancy at birth $e(0)$ of 68.0 years and 74.3 years for males and females respectively is used as the starting point for the projections in 2001. These estimates are based on the number of registered deaths by age and sex for the years 1996 to 2002 (see Section 4). Again, it needs to be mentioned that an unknown number of deaths of residents overseas were not included in the death statistics. Therefore, the estimated life expectancies have to be considered as an absolute maximum.

The population projections all assume the same rising trend in life expectancy for males and females according to the medium variant of the United Nations working model for mortality improvement.³ The reason for this is that assumed differences in mortality usually have only a minor impact on the final projection results and furthermore require the production of too many different scenarios that would only complicate the presentation of results.

Moreover, it is thought that under normal circumstances (meaning the absence of catastrophes like wars, epidemics and major natural disasters) the health situation in Cook Islands and mortality levels will continuously improve throughout the projection period. Therefore, it was decided to use only one mortality assumption for the projections. According to this procedure, life expectancy in 2021 would be 72.4 years and 78.3 years for males and females, respectively (Figure 13).

3. As described in *World Population Prospects*, United Nations, 1995, p 144.

FIGURE 13 Mortality assumption (life expectancy at birth) for projections, 2001–2021⁴



Note: Values for 1986 and 1991 are linear interpolations of the 1981 and 1996 values.

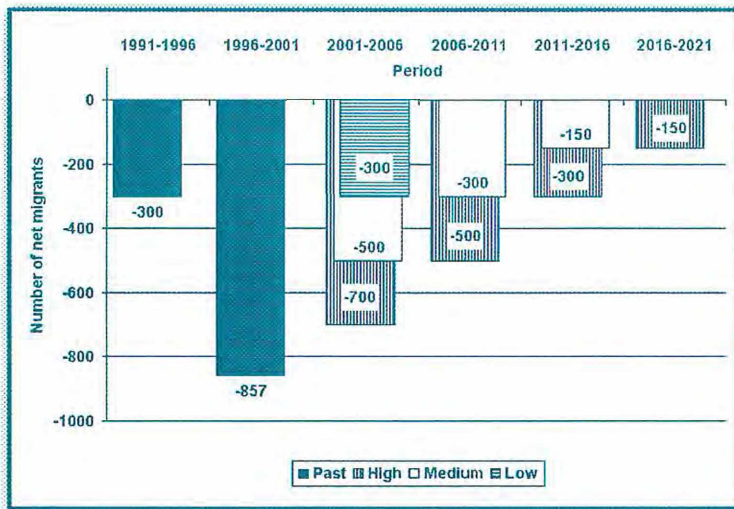
• Migration

Making assumptions about migration provides the greatest difficulty because the level and pattern of Cook Islands resident migration has changed dramatically after the implementation of the Cook Islands Government's economic restructuring programme. While there were only –300 net annual migrants during the period 1991–1996, from 1996 to 2001 about –4,284 more people left Cook Islands than arrived, resulting in an annual average net migration of –857 (see sections 2 and 5.2). It seems clear that this high level of emigration is not sustainable — in just a few years, nobody would be left in Cook Islands to emigrate. Therefore, the question seems to be when this high level is going to decrease, and to which level.

The estimated pattern (percentage distribution by age and sex) of net migrants in the resident population of the 1996–2001 intercensal period has been used as the base for the projection scenarios (see Figure 10 in Section 5.2, and Appendix Table A9). The level, however, differs among the different projections. Three different migration assumptions have been prepared (Figure 14):

4. According to the UN's software package MORTPAK3.0 (procedure COMPARE), the Far East Asian Model of the United Nations' model life tables is most similar to the observed mortality pattern (although the West model of the Coal & Demeny life tables is also similar to the observed female mortality pattern). This model is characterised by relatively low infant and child mortality and a high level of adult mortality, especially for males.

FIGURE 14 Migration assumptions for projections, 2001–2021



Assumption 1: high migration

Normally, the preferred option would be simply to assume a constant high level of migration, as estimated for the period 1996–2001. This assumption, however, is not possible because there would not be enough people (at least in some age groups) left to migrate. Therefore, it is assumed that the high level of negative net migration of 1996–2001 will gradually decline from an annual level of –700 persons during the period 2001–2006 to the pre-1996 level of –300 people during the period 2011–2016, and to –150 people annually towards the end of the projection period (2021).

Assumption 2: medium migration

For the first five-year projection period, the medium migration assumption lies exactly between the intermediate levels of the high and low migration assumptions at –500 people per year, before it declines to the pre-1996 level of –300 during the period 2006–2011. It is assumed that migration then gradually declines to zero by the end of the projection period.

Assumption 3: low migration

When making migration projections, it is normal practice to include a zero-migration variant to highlight the powerful impact of migration on a country’s

population dynamic. But in view of the latest statistics on arrivals and departures this seems to be an unrealistic assumption, because the data show that the annual excess of departures over arrivals of Cook Islands residents was about -700 persons during 2002 and 2003. Therefore, the low migration variant assumes a net migration of -300 people per year for the period 2001-2006 and zero net migration for the remainder of the entire projection period. This assumption implies a sudden halt to the decades-long negative migration in Cook Islands, from 2004 onwards.

6.2 Projection results

The combination of these three different fertility and migration assumptions, with one prevailing mortality assumption, results in nine scenarios, of which only three are described here in detail (the high, the medium and the low population growth variants). The different scenarios highlight the impact of different levels of fertility on the one hand, and the impact of migration on the other (Table 10).⁵

TABLE 10 Resident population size in 2021 according to nine projection scenarios (combination of three different fertility and migration assumptions)

Fertility assumption (TFR from 2001 to 2021)	Migration assumption		
	Low	Medium	High
Slow decline (2.9 → 2.5)	17,522 (High population growth variant)	13,065	8,495
Medium decline (2.9 → 2.0)	16,716	12,466 (Medium population growth variant)	8,078
Fast decline (2.9 → 1.5)	16,019	11,950	7,724 (Low population growth variant)

TFR = Total Fertility Rate

5. Before examining projection results in more detail, it is useful to emphasise again that these projections are not forecasts, but represent different future population scenarios illustrating exactly what will happen under specific demographic conditions. In other words, the Cook Island population will reach, for example, 11,014 people in 2021, if fertility remains fairly stable between now (TFR = 2.75) and 2012 (TFR = 2.6), while net migration declines from around -500/year between 2001 and 2006, to -150/year between 2016 and 2021.

Scenario 1 (high population variant)

High fertility: The estimated current TFR of 2.9 will decrease slightly to 2.5 until 2021.

Mortality: The estimated level of life expectancy at birth gradually increases from 68.0 years and 74.3 years for males and females in 2001 to 72.4 years and 78.3 years respectively in 2021.

Low migration: Net migration starts at the pre-1996 level of -300 people per year during the period 2001–2006 and is set at zero net migration for the remainder of the projection period.

Scenario 2 (medium population variant)

Medium fertility: The estimated TFR of 2.9 in 2001 will gradually decrease to 2.0 in 2021.

Mortality: same as above.

Medium migration: The very high level of negative net migration of the period 1996–2001 (-857 people per year) is reduced to -500 people per year during the period 2001–2006, before it further decreases gradually to zero net migration for the period 2016–2021.

Scenario 3 (low population variant)

Low fertility: The estimated TFR of 2.9 in 2001 will decrease to 1.5 in 2021.

Mortality: same as above.

High migration: The high level of negative net emigration of the years 1996–2001 will gradually decline from -700 persons annually during the period 2001–2006 to the pre-1996 level of -300 people annually during the period 2011–2016, and then to -150 people annually towards the end of the projection period (2021).

In Table 11 and Figure 15, a comparison is made between the base year of the projections (2001) and the end year for the three projection scenarios (2021).

TABLE 11 Population indicators in 2021 according to three projection variants

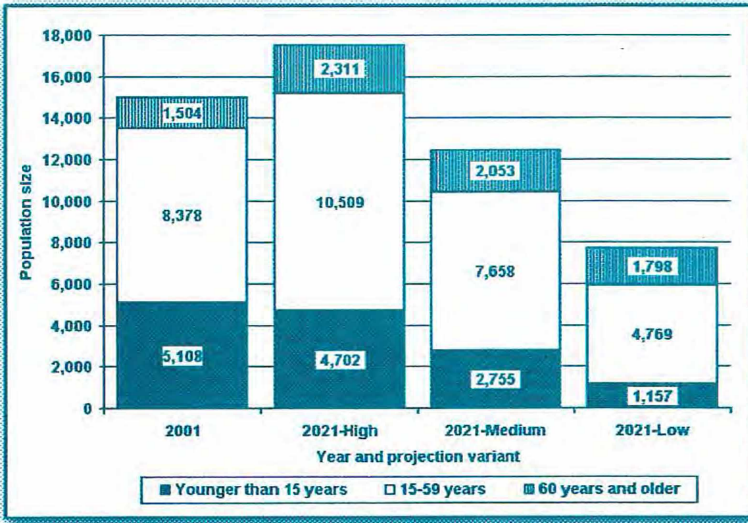
Indicator	2001 population	2021 population		
		High variant	Medium variant	Low variant
Median age (years)	25.3	29.0	32.4	45.2
Dependency ratio (15-59) ^b	78.9	66.7	62.8	62.0
Annual growth rate 2001-2021	-3.7 ^a	0.8	-0.9	-3.3
Sex ratio	106.7	102.8	103.5	105.1

a 1996-2001 growth rate

b The economically dependent component of a country's population as a proportion its productive component.

The projection results highlight the difference in population size, growth and structure according to a possible decline in the level of fertility (the average number of children born per woman), and especially highlight the impact of international migration.

FIGURE 15 Population size by broad age groups in 2021, according to three projection variants



Summary of results

Scenario 1 (high population variant)

Under the assumption of near constant fertility, and the assumption that annual net migration decreases drastically from the recent high level of –857 people to –300 during 2001–2006 and then further to zero, the resident population would gradually increase to 17,522 people in 2021 (Table 10 and Figures 15 and 16). This would resemble the size of the resident population in 1991.

The young population (0–14 years) would decrease by 406 (from 5,108 in 2001 to 4,702 in 2021) and the working-age population (15–59 years) would increase by 2,131 people (from 8,378 in 2001 to 10,509 in 2021). The population over 60 years of age is expected to increase by 20% (from 1,504 in 2001 to 1,798 in 2021).

The *dependency ratio* would decrease from 78.9 to 66.7 during the same period because of the relative increase in the working-age population (from 56% of the total population in 2001 to 60% in 2021) and the relative decrease in the population younger than 15 years (from 34% of the total population in 2001 to 27% in 2021).

The *median age* of the population would increase from 25.3 to 29.0 years, given a decline in the number of children, and an increase in the 60+ population.

Scenario 2 (medium population variant)

Based on the assumptions that fertility would further decrease from its current level of 2.9 to 2.0 in 2021, and that the number of net migrants would gradually decrease from its current high level of -857 people annually to -500 during the period 2001–2006 and then gradually to zero during the period 2016–2021, the population would decline to 12,390 people in 2011 and would stabilize at that level for the remainder of the projection period.

The young population (0–14) would decrease by 2,353 children (from 5,108 in 2001 to 2,755 in 2021), and the working-age population would decrease from its current level by 720 people to 7,658 people in 2021. The *dependency ratio* would decrease to 62.8 as a result of a proportional increase in the working-age population (from 56% in 2001 to 61.4% in 2021) and a proportional decrease in the population 15 years and younger (from 34% to 22%).

The *median age* of the population would increase by 7 years, from 25.3 to 32.4 years.

Scenario 3 (low population variant)

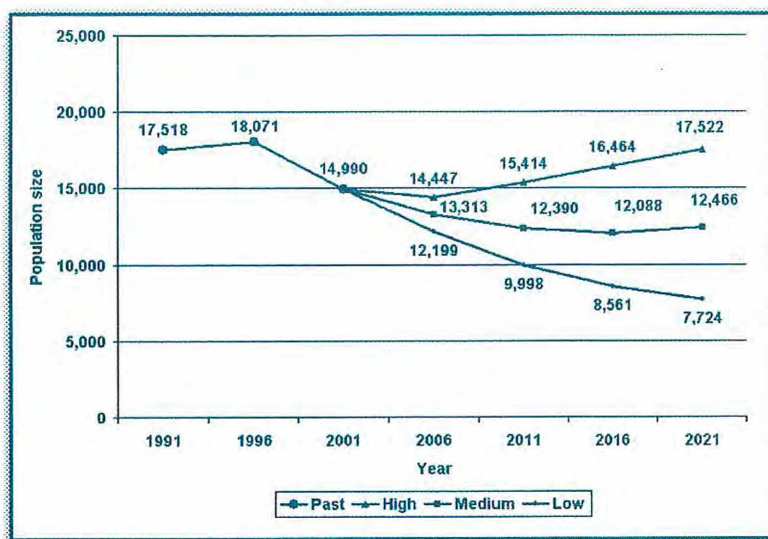
If fertility were to decrease from its current level of 2.9 to 1.5 in 2021, and the annual number of net migrants were to decrease only gradually from its recent high level of -857 people in the period 1996–2001 to -700 during the period 2001–2006, and further to -500 during 2006 before gradually declining to -150 in 2021, the population would decrease by -3.3% per year. The resident population would decline to 10,000 people in 2011 and would further decline to only 7,724 people in 2021.

The young population aged 0–14 years would be less than a quarter of its current size (5,108) and there would only be 1,157 children left in Cook Islands. The working-age population would decrease from 8,378 in 2001 to 4,769 in 2021.

The *dependency ratio* would decrease from 79 in 2001 to 62 in 2021. This is the result of a relative increase in the working-age population to 61.7% of the total and a decrease in the population younger than 15 years from 34 to 15%.

These developments would see very rapid population ageing, reflected in a *median age* of 45.2 years; almost one quarter (23.3%) of the total population would be older than 60 years in 2021, resulting in a larger number of old people than children in Cook Islands.

FIGURE 16 Future population trends according to three projection variants, 2001–2021



General comments

Table 10 highlights the fact that the impact of fertility on Cook Island population dynamics, particularly future population growth, is far less pronounced than that of migration.

All three scenarios have the following characteristics in common:

- The population will continue to decline until 2006.
- The 2021 population under 15 years of age (which includes the school-age population) will be proportionally and in absolute numbers lower than in 2001.
- The proportion of the working-age population will be larger in 2021 than in 2001.
- The dependency ratio in 2021 will be considerable lower than in 2001.
- The population aged 60 years and older will increase proportionally and in absolute numbers by 2021.
- The median age of the 2021 population will have increased substantially.

Comparing the projection results across all nine assumptions (Table 10), highlights the fact that the 2021 Cook Islands resident population will only remain at its 2001 size of 15,000 people or more if net migration reverts to zero immediately!

Even if fertility were not to decrease significantly below its current level of 2.9, and if the level of annual net migration were to decline from its recent high level of -850 persons to -500, and from there gradually to zero, the population in 2021 would be considerably less than in 2001, consisting of only 13,065 people (Table 10).

However, the resident population would decline to an unprecedented low of between 7,724 and 8,495 people in 2021 (depending on our fertility assumptions), if the current high level of negative migration only gradually declines from its 1996–2001 level to -150 persons annually by 2021, as assumed in the *high migration* variants (Table 10).

While the *low population growth* variant projection results in a population so small that the projection seems very unrealistic, it needs to be pointed out that this variant assumes migration rates that are moderate compared to those of the period 1996–2001, and that the level of fertility has already declined to a TFR of less than two in many parts of the world (including New Zealand and Australia).

Population changes close to those presented in Scenario 2 (medium population growth variant), appear to be the most likely outcome. This is because fertility is expected to decline further (although slowly, as it has in the recent past), based on our understanding of developments in countries with similar levels of fertility. Therefore, the *high fertility variant*, assuming near constant high levels of fertility, seems to be an unlikely outcome.

Having said this, a more pronounced fertility decline is not expected to occur, as it seems “uncharacteristic” for Pacific Islands populations. Therefore, the *low fertility variant* with the assumption of a continued fast fertility decline also seems to be an unlikely outcome.

Although it is impossible to predict what the level of migration will be in the future, the *medium variant* assumption appears to be the most likely outcome, as the extreme high level of -860 people/year between 1996–2001 is unsustainable, yet a degree of negative net migration has prevailed in Cook Islands since the early 1970s and there are no signs that this trend will change, let alone reverse in the near future.

7. IMPLICATIONS OF DEMOGRAPHIC TRENDS

7.1 Population dynamics

• Fertility

Declining fertility — a reduced number of children per woman — will have the following impacts on the population and on development planning and policies:

- The natural growth rate will decrease.
- The population will become older (as the proportion of children reduces).
- There will be fewer school-age children.

In the long term, declining fertility also means that there would be fewer school leavers entering the labour market.

To make sensible estimates of future population size and growth, it is essential to have a complete birth registration system recording the number of births, preferably by the age of the mother. A system needs to be in place that ensures that births of residents that occur overseas are adequately captured in Cook Islands vital statistics.

• Mortality

Improved mortality rates mean that healthier people live longer lives. The following efforts should be made to continue working towards this goal.

- Improve infant, child and maternal health by improving primary health-care programmes.
- Expand programmes of immunisation.
- Provide a hygienic and safe living environment.
- Promote healthy nutrition.
- Advocate a generally healthy lifestyle, including regular physical exercise.
- Discourage smoking and excessive alcohol consumption.

In order to facilitate reliable estimates of the level and trend of mortality indicators, it is essential to have a complete death registration system recording the number of deaths by age and sex. A system needs to be in place that ensures that deaths of residents that occur overseas are accounted for in Cook Islands statistics. This may be preceded by a special research project investigating the number of deaths of residents that occur overseas.

- **Internal migration**

Migration from the Outer Islands (especially from the Southern Group islands) to Rarotonga is relatively high. The reason might be lack of schooling and employment opportunities in the Outer Islands, with Rarotonga also attracting people by its higher living standard, and the availability and accessibility of services such as medical and educational institutions, entertainment facilities and, of course, a wider range of paid employment opportunities.

If the government wishes to stop or reverse this trend, at least some of the disadvantages of living in the Outer Islands have to be eased by improving the abovementioned services and opportunities.

- **International migration**

Cook Islands' population decline during the period 1971–1986 and even its slight population increase between 1986 and 1996 was, and still is, due to negative net migration of Cook Island residents, primarily to New Zealand.

Overseas destinations, mainly New Zealand, may be seen as places of opportunity, with better access to employment and education for one's children, as well as to a wider range of services and benefits, all of which are widely reported to be the main incentives that entice Cook Islanders to its shores. A move may also be seen as a sign of progress and a means of bettering oneself. Even the prospect of not securing a good job, or any job at all, but qualifying for other social benefits in New Zealand might be perceived as more rewarding than life with low or no income in Cook Islands.

While the current high negative growth rate of -3.7% per year is clearly not sustainable, as the population of Cook Islands would simply disappear over time, there are no visible indications that the trend of negative net migration is going to reverse in the near future, especially as the rate of emigration has increased dramatically since 1996, and continues to be high.

7.2 Cross-cutting issues

• The environment

The size and density of the population has a direct impact on water and energy consumption, sewage and waste production, general infrastructure such as roads, the use of land, and the development of agriculture, forestry and marine resources.

In recent years, environment groups have voiced their concern regarding the water quality of Muri lagoon, which is a major attraction to both the local population and tourists. The coastal strip is dotted with hotels and motels catering to tourists from various countries. Offensive smells, the presence of algae, and muddy water can all act as tourist deterrents, which may lead to a decline in occupancy rates. Since tourism is the most important income source of Cook Islanders, the protection of Cook Islands' environmental beauty, and the prevention of pollution of any kind, should be of the highest importance to the people of the country to ensure the sustainability of the industry.

• Health services

The health status of each individual and their family members is probably the most important concern people have. Therefore, the availability, utilization and affordability of quality health and medical services are major issues in people's decisions about where to live.

It cannot be expected that certain special health-care facilities will be available to a small and remote population such as that of Cook Islands, because the low number of cases prohibit the operation of state-of-the-art health services that employ specialists, and the purchase and maintenance of expensive equipment. However, provisions need to be in place to ensure a system of efficient referrals to the nearest health facilities. Regular visits of overseas medical specialists are another way to meet people's health needs, demands and expectations.

• Education

The educational level of a population is a key indicator of the development and quality of life of a country. Education plays an important role in development through its links with demographic, as well as economic and social factors. In general, there is a close and complex relationship between education, fertility, morbidity, mortality and mobility: when couples are better educated, they tend to have fewer children, their children's health status improves and their survival rates tend to increase. Higher levels of educational attainment also contribute to a better-

qualified workforce and better economic performance than is the case where a large proportion of people have had little to no formal education and training.

In this regard, it is of benefit that young people leave the country to join higher educational institutions. However, these people need to be provided with suitable employment in Cook Islands after completing their education; otherwise, it will be difficult to entice them to return.

- **Economic activity**

Economic activity and employment in a country is shaped by the size of the working-age population, the educational skill level of the labour force, the economic resources available, and obviously the overall state of the national economy.

As New Zealand citizens, Cook Islanders are entitled to live and work in New Zealand. There is a regular two-way movement of Cook Islanders between the islands and the metropolitan labour market of New Zealand. These movements strongly depend on economic opportunities in Cook Islands and overseas, and socio-economic developments in Cook Islands are very much interwoven with developments overseas, especially in New Zealand.

In this regard, Cook Islands has to compete with higher wages, lower prices and the better quality of many goods and services offered in New Zealand, which is one of the major reasons people leave the islands.

- **Labour market**

The recent high emigration rates, especially of people of working age, have led to a noticeable labour shortage, specifically in the tourism industry in Rarotonga. Vacancies cannot be filled, and businesses have started importing labour from overseas.

- **Supply and demand of goods and services**

The remoteness of most islands and high transportation costs cause imported products to be rather expensive. This will increasingly be aggravated by the smaller size of the market (economy of scale). A declining population might result in a general reduction in the supply and variety of goods and services, as an ever-declining population means less customers (demand) for educational and health services, established businesses, farmers and fishers, who supply the local market. This may lead to a stalling in the improvement of services of any kind, and may even

result in closure of shops and general services. This in turn may lead to further population decline: a vicious circle.

- **Quality of life**

The fact that many people are leaving Cook Islands points to dissatisfaction with local living conditions. It shows that those who emigrate or who are planning to leave expect to better themselves, in ways that vary from person to person. A specially designed survey may shed more light on the specific motives and aspirations of migrants.

- **Good governance**

Good governance and effective policy-making should provide the framework for sustainable development within which the population, environment and all possible socio-economic aspects of a country can prosper cohesively.

In this regard, it is important that policy-makers, planners, political parties and community leaders are aware of the needs and aspirations of the people of their country in order to effectively provide for the specific needs of their population and the different population sub-groups. Governments need to be aware of their country's population structure, population processes and socio-economic characteristics in order to plan for an adequate standard of living, and for a proper provision and distribution of goods and services.

APPENDIX

TABLE A1 Estimated total fertility rate of the 1996–2001 intercensal period, based on number of registered births

Age group of women	Census count of resident women		Estimated mid-period number of resident women ^a	Average annual number of registered births	ASFR
	1996	2001	1996–2001	1996–2001	1996–2001
15–19	785	656	708	48	0.068
20–24	777	492	640	95	0.148
25–29	728	524	639	97	0.152
30–34	627	542	604	65	0.108
35–39	530	524	532	41	0.077
40–44	424	447	439	9	0.021
45–49	360	353	357	1	0.002
Total	4,231	3,538	3,919	357	0.577
				TFR =	2.9

a Estimate derived at by interpolating birth cohorts 1996–2001

TABLE A2 Estimated total fertility rate of the 1996–2001 intercensal period, using the ARFE-2 procedure of the PAS software package of the United States Census Bureau

Reference period 1 June 1997									
Age of mother	ASFR from CEB		ASFR pattern		Adjusting factors	Adjusted ASFR's based on age group			
	ASFR	Cumulative	ASFR	Cumulative		20-29	25-29	25-34	30-34
15-19	0.0816	0.0816	0.0785	0.0785	1.0396	0.0677	0.0667	0.0653	0.0639
20-24	0.1630	0.2446	0.2010	0.2795	0.8751	0.1733	0.1707	0.1672	0.1637
25-29	0.1475	0.3921	0.1821	0.4616	0.8494	0.1570	0.1547	0.1515	0.1483
30-34	0.0913	0.4834	0.1320	0.5936	0.8143	0.1138	0.1121	0.1098	0.1075
35-39	0.0931	0.5764	0.0937	0.6874	0.8386	0.0808	0.0796	0.0780	0.0763
40-44	0.0949	0.6714	0.0294	0.7167	0.9367	0.0253	0.0250	0.0244	0.0239
45-49	0.0352	0.7066	0.0062	0.7230	0.9774	0.0053	0.0053	0.0052	0.0051
TFR	3.53		3.61			3.12	3.07	3.01	2.94
Mean age			28.02						

Reference period 1 June 2001									
Age of mother	ASFR from CEB		ASFR pattern		Adjusting factors	Adjusted ASFR's based on age group			
	ASFR	Cumulative	ASFR	Cumulative		20-29	25-29	25-34	30-34
15-19	0.0633	0.0633	0.0576	0.0576	1.0988	0.0570	0.0562	0.0552	0.0543
20-24	0.1607	0.2240	0.1656	0.2232	1.0034	0.1639	0.1616	0.1589	0.1562
25-29	0.1410	0.3650	0.1509	0.3741	0.9757	0.1493	0.1472	0.1447	0.1423
30-34	0.1003	0.4653	0.1193	0.4934	0.9431	0.1180	0.1164	0.1144	0.1125
35-39	0.0935	0.5588	0.0891	0.5825	0.9593	0.0882	0.0869	0.0855	0.0840
40-44	0.0418	0.6006	0.0336	0.6160	0.9750	0.0332	0.0327	0.0322	0.0316
45-49	0.0156	0.6162	0.0000	0.6160	1.0003	0.0000	0.0000	0.0000	0.0000
TFR	3.08		3.08			3.05	3.01	2.96	2.91
Mean age			28.45						

TABLE A3 Estimated total fertility rate of the intercensal period 1996–2001 using the FERTPF procedure of the MORTPAK software program of the United Nations

Application of Arriaga's approaches for estimation of age specific fertility rates based on children ever born for two point(s) in time and the age pattern(s) of fertility (Arriaga-Brass)

Age of mother	Children ever born (CEB)	Fertility consistent with CEB (ASFR)	Fertility pattern by age at census date	Fertility pattern by age at birth of child	Cumulation of		Adjustment factors	Age specific fertility rates based on adjustment factor for the age group		
					ASFR	Fertility pattern by age at birth of child		20-25	25-30	30-30
Reference period December 1996 - December 1997										
15-20	0.135	0.0816	0.065	0.0803	0.0816	0.0803	1.0152	0.0698	0.0681	0.069
20-25	0.937	0.1629	0.196	0.201	0.2444	0.2814	0.8686	0.1746	0.1704	0.1725
25-30	1.861	0.1475	0.185	0.1809	0.3919	0.4623	0.8477	0.1571	0.1533	0.1552
30-35	2.646	0.0914	0.136	0.1318	0.4833	0.594	0.8136	0.1145	0.1117	0.1131
35-40	3.123	0.093	0.1	0.0938	0.5763	0.6879	0.8379	0.0815	0.0795	0.0805
40-45	3.896	0.0836	0.033	0.0292	0.6599	0.717	0.9203	0.0253	0.0247	0.025
45-50	4.481	0.0305	0.008	0.006	0.6904	0.723	0.9549	0.0052	0.0051	0.0051
TFR		3.45		3.62				3.14	3.06	3.1
Reference period December 2000 - December 2001										
15-20	0.105	0.0632	0.047	0.0586	0.0632	0.0586	1.0787	0.0583	0.0569	0.0576
20-25	0.776	0.1606	0.161	0.1661	0.2238	0.2246	0.9962	0.1654	0.1615	0.1634
25-30	1.74	0.141	0.153	0.1505	0.3648	0.3761	0.9724	0.1499	0.1464	0.1482
30-35	2.454	0.1005	0.122	0.119	0.4652	0.4941	0.9415	0.1185	0.1157	0.1171
35-40	3.113	0.0935	0.094	0.0896	0.5587	0.5837	0.9572	0.0893	0.0871	0.0882
40-45	3.356	0.0386	0.04	0.0333	0.5974	0.617	0.9681	0.0332	0.0324	0.0328
45-50	3.805	0.0143	0.0001	0.0001	0.6117	0.6171	0.9912	0.0001	0.0001	0.0001
TFR		3.06		3.09				3.07	3.00	3.04

TABLE A4 Number of registered deaths, by age and sex, 1996–2002

Age	1996			1997			1998			1999			2000			2001			2002		
	T	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T	M	F
0-1	13	6	7	15	7	8	8	5	3	5	4	1	6	4	2	4	3	1	3	2	1
1-4	4	4	0	2	1	1	1	1	0	2	2	0	2	1	1	4	1	3	0	0	0
5-9	1	1	0	2	1	1	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0
10-14	2	1	1	4	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15-19	3	2	1	2	2	0	2	0	2	1	0	1	3	2	1	1	0	1	2	2	0
20-24	3	2	1	6	3	3	3	2	1	2	2	0	2	2	0	1	1	0	1	1	0
25-29	2	1	1	2	2	0	0	0	0	1	1	0	2	2	0	1	1	0	1	0	1
30-34	1	1	0	3	1	2	4	3	1	1	0	1	2	2	0	2	1	1	2	1	1
35-39	5	3	2	6	5	1	6	4	2	4	3	1	6	3	3	0	0	0	1	1	0
40-44	1	1	0	0	0	0	2	2	0	3	2	1	5	4	1	3	1	2	2	1	1
45-49	4	1	3	3	2	1	2	2	0	5	4	1	1	0	1	3	2	1	4	3	1
50-54	3	1	2	5	3	2	3	1	2	7	6	1	6	4	2	3	1	2	6	3	3
55-59	6	3	3	8	4	4	4	3	1	3	1	2	5	4	1	6	1	5	6	4	2
60-64	5	3	2	16	13	3	4	4	0	8	3	5	11	7	4	4	4	0	12	10	2
65-69	16	10	5	20	9	11	12	9	3	11	5	6	12	7	5	12	6	6	16	14	2
70-74	9	5	3	13	5	8	18	13	5	10	5	5	14	8	6	13	8	5	5	3	2
75-79	14	9	4	15	10	5	17	10	7	10	6	4	12	10	2	10	8	2	17	8	9
80+	16	7	9	22	13	9	22	13	9	21	11	10	29	19	10	20	10	10	19	6	13
Total	110	64	46	144	83	61	108	72	36	96	56	40	121	81	40	88	49	39	97	59	38

TABLE A5 Estimated resident population, by age and sex, mid-1999

Age group	Males	Females	Total
0-1	180	186	366
1-4	841	749	1,590
5-9	1,068	976	2,044
10-14	929	845	1,774
15-19	763	708	1,471
20-24	628	629	1,257
25-29	627	623	1,250
30-34	633	633	1,266
35-39	593	535	1,128
40-44	431	414	845
45-49	372	352	724
50-54	359	344	704
55-59	304	309	613
60-64	308	259	567
65-69	226	188	414
70-74	145	117	261
75-79	72	90	162
80+	57	82	139
Total	8,535	8,040	16,575

TABLE A6 Smoothed abridged life table based on deaths and population, males, 1996–2002

Age (x)	nMx	nqx	lx	ndx	nLx	5Px	Tx	ex
0–1	0.0251	0.0245	100000	2451	97826	0.97275	6798331	68.0
1–4	0.0017	0.0070	97549	679	388549	0.99515	6700506	68.7
5–9	0.0003	0.0014	96869	133	484014	0.99815	6311956	65.2
10–14	0.0005	0.0023	96736	226	483116	0.99563	5827943	60.2
15–19	0.0013	0.0064	96510	618	481006	0.99196	5344827	55.4
20–24	0.0019	0.0097	95892	929	477141	0.98982	4863821	50.7
25–29	0.0021	0.0107	94964	1015	472281	0.98848	4386680	46.2
30–34	0.0025	0.0123	93949	1160	466843	0.98572	3914398	41.7
35–39	0.0033	0.0162	92788	1507	460176	0.98073	3447555	37.2
40–44	0.0045	0.0224	91282	2041	451307	0.97565	2987379	32.7
45–49	0.0053	0.0264	89241	2354	440319	0.96892	2536072	28.4
50–54	0.0073	0.0359	86887	3120	426635	0.95450	2095753	24.1
55–59	0.0114	0.0554	83767	4645	407223	0.92627	1669118	19.9
60–64	0.0195	0.0931	79122	7365	377197	0.87814	1261896	15.9
65–69	0.0333	0.1536	71757	11021	331231	0.79663	884698	12.3
70–74	0.0603	0.2622	60736	15924	263868	0.64912	553467	9.1
75–79	0.1232	0.4711	44812	21110	171282	0.40855	289599	6.5
80+	0.2003	1.0000	23701	23701	118317		118317	5.0

Note: nMx values were smoothed for ages 15+ based on a moving average of the logs: smoothed $\log(5Mx) = 1/3 [\log(5Mx - 5) + \log(5Mx) + \log(5Mx + 5)]$

TABLE A7 Smoothed abridged life table based on deaths and population, females, 1996–2002

Age (x)	nMx	nqx	lx	ndx	nLx	5Px	Tx	ex
0–1	0.0174	0.0171	100000	1711	98463	0.98136	7426829	74.3
1–4	0.0010	0.0038	98289	376	392217	0.99700	7328367	74.6
5–9	0.0003	0.0015	97914	143	489210	0.99796	6936150	70.8
10–14	0.0005	0.0026	97770	256	488213	0.99631	6446940	65.9
15–19	0.0010	0.0048	97515	466	486410	0.99529	5958727	61.1
20–24	0.0009	0.0046	97049	451	484119	0.99528	5472318	56.4
25–29	0.0010	0.0048	96598	463	481836	0.99453	4988199	51.6
30–34	0.0012	0.0062	96136	593	479198	0.99220	4506364	46.9
35–39	0.0019	0.0094	95543	902	475461	0.98890	4027166	42.2
40–44	0.0026	0.0128	94641	1209	470183	0.98510	3551705	37.5
45–49	0.0034	0.0170	93432	1593	463178	0.97715	3081523	33.0
50–54	0.0058	0.0288	91839	2640	452595	0.96589	2618345	28.5
55–59	0.0081	0.0396	89199	3534	437158	0.94715	2165751	24.3
60–64	0.0138	0.0666	85664	5707	414054	0.91188	1728593	20.2
65–69	0.0235	0.1111	79957	8887	377569	0.85073	1314539	16.4
70–74	0.0425	0.1922	71070	13657	321210	0.78927	936970	13.2
75–79	0.0529	0.2337	57414	13418	253523	0.58828	615760	10.7
80+	0.1215	1.0000	43995	43995	362237		362237	8.2

Note: nMx values were smoothed for ages 15+ based on a moving average of the logs: smoothed $\log(5Mx) = 1/3 [\log(5Mx - 5) + \log(5Mx) + \log(5Mx + 5)]$

TABLE A8 Life expectancy at birth (E(0)) and infant mortality rate, Cook Islands, 1945–2001

Year	1945	1951	1954	1961	1966	1971	1976	1981	1996	2001
e(0)										
Males	41	42	49	61	60	63	63	64	68.4	68.0
Females	43	44	48	63	63	67	67	70	71.5	74.3
IMR	121.4	151.9	N/A	43.7	48	43.1	38.2	28.5	15.9	21.0

Source (1945–1981): Population of the Cook Islands, Country Monograph Series No.7.3, ESCAP and SPC, 1983. 1996: Cook Islands population profile based on 1996 census: A Guide for Planners and Policy Makers. Noumea, New Caledonia: Secretariat of the Pacific Community, 1999.

TABLE A9 Estimated total number and percentage distribution of net migrants by age and sex, resident population, 1996–2001

Age group	Total numbers			Percentage distribution		
	Total	Males	Females	Total	Males	Females
0–4	-133	-35	-98	3.1	0.8	2.3
5–9	-598	-294	-304	14.0	6.9	7.1
10–14	-549	-264	-284	12.8	6.2	6.6
15–19	-647	-353	-294	15.1	8.2	6.9
20–24	-670	-374	-296	15.6	8.7	6.9
25–29	-510	-268	-242	11.9	6.3	5.6
30–34	-314	-161	-153	7.3	3.8	3.6
35–39	-191	-97	-94	4.5	2.3	2.2
40–44	-134	-54	-80	3.1	1.3	1.9
45–49	-104	-32	-71	2.4	0.8	1.7
50–54	-102	-43	-58	2.4	1.0	1.4
55–59	-123	-62	-60	2.9	1.5	1.4
60–64	-103	-41	-62	2.4	1.0	1.4
65–69	-59	-26	-32	1.4	0.6	0.8
70–74	-48	-28	-20	1.1	0.7	0.5
Total	-4,284	-2,134	-2,150	100.0	49.8	50.2

Source: based on 1996 and 2001 census population, and interpolation of birth cohorts

TABLE A10 Recorded monthly arrivals, departures and net migration of Cook Islands residents, December 2001 to December 2003

Month	Arrivals	Departures	Net Migration
Dec-01	791	1,612	-821
Jan-02	1,357	619	738
Feb-02	600	798	-198
Mar-02	689	847	-158
Apr-02	775	822	-47
May-02	739	627	112
Jun-02	488	485	3
Jul-02	523	679	-156
Aug-02	509	752	-243
Sep-02	610	750	-140
Oct-02	699	895	-196
Nov-02	1,034	635	399
Dec-02	669	1,510	-841
Jan-03	1,325	810	515
Feb-03	618	753	-135
Mar-03	633	759	-126
Apr-03	796	1,074	-278
May-03	973	789	184
Jun-03	660	683	-23
Jul-03	703	657	46
Aug-03	617	781	-164
Sep-03	739	766	-27
Oct-03	818	841	-23
Nov-03	826	968	-142
Dec-03	810	1,340	-530
Total	19,001	21,252	-2,251

TABLE A11 Base population for projections: 2001 census resident population, by age and sex

Age group	Total	Males	Females
0-5	1,609	852	757
5-9	1,792	934	858
10-14	1,705	932	773
15-19	1,363	706	657
20-24	969	477	492
25-29	994	470	524
30-34	1,085	543	542
35-39	1,107	583	524
40-44	906	459	447
45-49	713	360	353
50-54	653	360	293
55-59	590	292	298
60-64	546	281	265
65-69	419	233	186
70-74	260	147	113
75-79	158	69	89
80+	121	40	81
Total	14,990	7,738	7,252