



**Cook Islands**  
**Demographic**  
**Profile**  
**2006-2011**

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## ABBREVIATIONS

ASFR	age-specific fertility rate
CBR	crude birth rate
CDR	crude death rate
IMR	infant mortality rate
MAC	means 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 then 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 official statistics.

Since this humble beginning nearly five decades ago, the Statistics for Development Division 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 working in collaboration development partners like ADB 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 Division's overall strategic objective has shifted to implementing the Action Plan for the 10 Year Pacific Statistics Development Strategy (TYPSS), which includes among others - data dissemination and utilization, national minimum development indicators (NMDI) which is linked to the current Pacific Plan 12.4, as well as assisting PICTs develop national strategies for the development of statistics (NSDS) in collaboration with the Paris21 Group. The present emphasis on data analysis and utilization emerged in direct response by stakeholders through an external review of the first two years of TYPSS implementation. Most data users in the region have had no formal training or first-hand experience with population and social statistical matters; they were therefore neither in a position to incorporate population/social considerations into development planning processes, nor able to digest highly technical social and demographic analyses. The objectives guiding our Division's activities over the last decade have been the strengthening of national capacities in the analysis and

utilization of population and socioeconomic 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 (like its predecessor) 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 2011 population census and also draws on recent health administrative records. The profile was updated by Arthur Jorari, Demographer with SPC Statistics for Development Division, with the assistance of Ms Tanga Morris, Senior Statistician, Cook Islands Ministry of Finance; guidance was provided throughout by Mrs Taggy Tangimetua, Government Statistician of the Cook Islands.

Gerald Haberkorn  
Director  
Statistics for Development Division  
**Secretariat of the Pacific Community**



## ACKNOWLEDGEMENT

It is my privilege to introduce the Cook Islands Population Profile 2006-2011. This profile presents the demographic characteristics of the Cook Island. It provides a measure of our country's population processes at a particular point in its national history and shows some trends over time. Data used in this profile relates to the 2006 and 2011 Census as well as migration data and vital statistics

The aim of this report is to provide an analysis of available Cook Islands demographic data, and to identify the implications of observed demographic levels and trends on crosscutting issues such as the environment, health, education, and economic activity. 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 Statistics for Development Division of the Secretariat of the Pacific Community (SPC), particularly the assistance provided by Mr Arthur Jorari in updating and producing this profile.

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

Kia manuia.

Taggy Tangimetua  
Government Statistician

## SUMMARY

The 2011 Census total was 17,794 people, which included 2,820 tourists or other short-term visitors. The resident population, defined as people usually resident in the country, and who have had an established residence in the country for at least one year, were 14,974 people. This compares to 15,324 residents in 2006.

This decline in population resembles an average annual rate of growth of –0.5 per cent, and if it were to continue, would cause the population to half its size every 140 years.

The decline of the population was most noticeable in the Outer Islands where the population was almost 14 per cent less in 2011 than in 2006.

This decline in population was mainly due to the fact that many people have been leaving 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 reason was a significant decline in the number of births, as a result of both:

1. fewer women of childbearing ages living in the country, and
2. an actual decline in fertility, as evident in a drop in the average number of births per woman.

It has been estimated that over 1,600 more people have left than have entered the country during the period 2006-2011. That was an average net-loss of about 322 people per year. The current trend of net migration continues to be negative, which means that still more people emigrate (leaving the country), than immigrate (entering the country).

The average annual number of births has increased from about 290 (2001-2006) to about 350 births during the period 2006-2011, and the Total Fertility Rate (TFR) (average number of births per woman) has increased from 2.5 in 2006 to about 2.8 during the period 2006-2011.

The presented fertility estimates are mainly based on the number of registered births. Although the registration of births that occur in the Cook Islands is regarded as complete, some resident women have births overseas and registered overseas but do not get recorded in the Cook Islands. However, the proportion of ‘overseas births’ out of the total number of births is estimated to be below 5 per cent.

The level and pattern of mortality in the Cook Islands is much more difficult to estimate than the overall population growth rate, fertility or migration, because of the small size of the population and therefore low number of deaths involved. This results in a wide range of fluctuations of events (deaths). It furthermore needs to be kept in mind that the registered numbers of deaths do not represent all deaths of Cook Islands residents, as some die overseas, particularly in New Zealand, which do not get registered in the Cook Islands. At this time it is not possible to prepare an estimate on the number of deaths of residents that occur overseas in order to determine a correction factor for the under registration of deaths.

Based on the registered number of deaths (average for the period 2001-2012), life expectancies at birth are estimated at 71.5 and 78.4 years for males and females respectively. Because of the reasons outlined above, these estimates have to be considered as *ceiling* figures (maximum estimates), because if deaths of Cook Islands residents who die overseas would be included in the calculations, life expectancies would obviously be lower.

The estimated mortality indicators show more positive mortality indicators for females than for males, with females expected to live, on average, about seven years longer than males.

The infant mortality rate (IMR) has been estimated at 10.2 for the period 2001-2012; 13.2 for males and 7.0 for females. This is an improvement from the shorter period 1996-2001 where the IMR was estimated at 21, and for the period 2001-2006 estimate of 14.

Internal migration continues to be directed from the Outer Islands (rural areas) towards Rarotonga (urban). During the one-year period before the 2011 census, Rarotonga experienced a net gain of 68 people from the Outer Islands, and 234 during the 5-year period before the census. There was very little movement of people between the Northern and Southern Group islands.

Net international migration is estimated indirectly by applying the demographic balancing equation to the known 2006–2011 intercensal population growth rate, and estimated CBR and CDR. The net migration rate is estimated at -21.1 per 1,000 population which equals on average -320 people per year during the intercensal period 2006–2011. This migration rate is an increase from the previous intercensal period of 2001-2006 which was estimated at -8.6 per 1,000 populations.

## SUMMARY OF MAIN INDICATORS

	Total	Males	Females
Total enumerated population (December 2011)	17,794	8,815	8,979
Resident population (December 2011)	14,974	7,490	7,484
<i>Rate of annual growth, 2006–2011 (%)</i>	-0.5		
<i>Rate of natural increase, 2006-2011 (annual)</i>	1.7		
<i>Crude net migration rate, 2006-2011 (annual)</i>	-2.2		
<b>Fertility</b>			
<i>Crude Birth Rate (CBR), 2006-2011</i>	22.9		
<i>Total Fertility Rate (TFR), 2006-2011</i>	2.8		
<i>Teenage Fertility Rate, 2006-2011</i>	48		
<i>Completed Fertility Rate, 2011</i>	4.1		
<i>General Fertility Rate (GFR), 2006-2011</i>	78		
<i>Mean Age at Childbearing (MAC), 2010-2011</i>	27		
<b>Mortality</b>			
<i>Crude Death Rate (CDR), 2006-2011</i>	6.3		
<i>Life expectancy at birth, 2001-2012</i>	74.7	71.5	78.4
<i>Infant Mortality Rate (IMR), 2001-2012</i>	10.2	13.2	7.0
<i>Child mortality Rate (1q4), 2001-2012</i>	3.2	2.6	3.8
<i>Under 5 mortality (q5), 2001-2012</i>	13.4	15.8	10.8

## 1. INTRODUCTION

This profile provides additional analysis of Cook Islands population data, and is based on the following source material:

- The Cook Islands 2011 census of population and dwellings;
- Vital registration data on births and deaths;
- The reported number of international arrivals and departures of Cook Islands residents.

The objective of the profile is to present the major population findings of the 2011 Census and, where possible, to compare them to earlier censuses. The 2011 census data are compared, evaluated and complemented with the latest available vital registration data. The profile also provides population projections covering a 20-year period from 2011-2031.

The demographic, political and administrative realities 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 the Cook Islands itself.

Pacific Island populations, particularly throughout Polynesia, have always been highly migratory. This has intensified in modern times with the emergence of frequent air transportation that enables people to travel back and forth with ease. It is therefore extremely difficult to keep track of population developments of highly migratory small Pacific Island populations such as the Cook Islands, as an easy distinction between permanent and temporary residents and visitors is virtually impossible to make.

Another difficulty is the very small population size of the country, which poses a challenge to calculate any meaningful indicators such as rates, ratios or percentages on an annual basis (let alone quarterly or monthly) due to very high random fluctuations of vital statistics. Examples are infant mortality rates, crude birth- and death rates, and even the total population growth rate.

In this context, 5-yearly census intervals remain an indispensable source of information to keep track of the Cook Islands population size and dynamics.

## **2. POPULATION GROWTH**

Population dynamics refer to the processes in a population that lead to its growth or decline. The three demographic components of a population's dynamic are fertility, mortality and migration. These three different components all counter-balance each other. While fertility leads to growth, mortality leads to a decrease of the population. Migration can be either a growth factor or, as in the case of the Cook Islands, can lead to a slowing or even decline of the population.

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

The total enumerated population of the Cook Islands has decreased by 1,548 people from 19,342 in 2006 to 17,794 in 2011. This was a decrease by 8.0 percent during the intercensal period, and represents an average annual rate of growth of  $-1.7$  per cent. However, the total enumerated population included a large number (2,820 persons) of temporary residents such as tourists or other short-term visitors.

The resident population of the Cook Islands those whose usual residential address was in the Cook Islands for at least one year, was 14,974 persons at the time of the census, a decline of 350 people since the 2006 census (Table 1).

**Table 1: Resident population change between 2006 and 2011**

Island/Region	Population size		Population change		Average annual rate of growth (%)
	2006	2011	Number	%	
<b>Rarotonga</b>	<b>10,226</b>	<b>10,572</b>	<b>346</b>	<b>3.4</b>	<b>0.7</b>
<b>Southern Group</b>	<b>3,729</b>	<b>3,290</b>	<b>-439</b>	<b>-11.8</b>	<b>-2.5</b>
Aitutaki	1,975	1,771	-204	-10.3	-2.2
Mangaia	631	562	-69	-10.9	-2.3
Atiu	558	468	-90	-16.1	-3.5
Mauke	372	300	-72	-19.4	-4.3
Mitiaro	193	189	-4	-2.1	-0.4
<b>Northern Group</b>	<b>1,369</b>	<b>1,112</b>	<b>-257</b>	<b>-18.8</b>	<b>-4.2</b>
Palmerston	62	60	-2	-3.2	-0.7
Pukapuka	507	451	-56	-11.0	-2.3
Nassau	75	73	-2	-2.7	-0.5
Manihiki	344	238	-106	-30.8	-7.4
Rakahanga	127	77	-50	-39.4	-10.0
Penrhyn	254	213	-41	-16.1	-3.5
Suvarrow	0	0	0	0.0	0.0
<b>Cook Islands</b>	<b>15,324</b>	<b>14,974</b>	<b>-350</b>	<b>-2.3</b>	<b>-0.5</b>

This resembles a decline of 2.3 per cent between 2006 and 2011 with an average annual rate of growth of –0.5 percent.

Except for Rarotonga, all islands have shown a declining population between 2006 and 2011, the population of the Outer Islands has decreased the most. Islands such as Rakahanga has lost more than one third of its population, with an average annual rate of growth of –10.0 percent, while Manihiki had lost almost a third of its population with an average annual growth rate of about -7.4 percent. Meanwhile, Rarotonga’s population had gained a little over 3 percent with a growth rate of 0.7 percent per annum.

As mentioned earlier population growth defines the change in a country’s population as the result of births, deaths and migration.

*Natural increase* defines population growth in terms of births and deaths, with growth occurring in a given time period when births exceed the number of deaths. If deaths exceed the number of births, growth is negative and the population declines:

$$\text{Natural increase} = \text{births} - \text{deaths}.$$

However, as is well known in the Cook Islands, population growth is primarily shaped by migration. It 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. The term 'net migration' refers to the sum of immigrants minus emigrants.

What is commonly referred to as the '*balancing equation*', overall population growth is summarized as:

$$\text{Population growth} = \text{natural increase} + \text{net migration (immigration} - \text{emigration)}.$$

In the Cook Islands, a total of 1,731 births and 473 deaths were registered in the five-year intercensal period of 2006–2011, and it is assumed that almost all were births and deaths of Cook Island residents. Few visitors have a baby or die in the Cook Islands. However, it is known that Cook Islands permanent residents are going to hospitals overseas, especially in New Zealand, for the delivery of their baby, or for special health care. Some may die there and their death will not be registered in the Cook Islands, which means that not all births and deaths of Cook Islands residents are appearing in the Cook Islands civil registration system.

By subtracting the number of deaths from the number of births, the total *natural increase* is obtained:  $1,731 - 473 = 1,258$ .

This means that the resident population of the Cook Islands has shown a natural increase of 1,258 people between the last two censuses, and the resident population in 2011 would have been about 16,582 people (resident population in 2006 = 15,324 + 1,258) if there were no migration. The natural increase between 2001 and 2006 was much lower with 914 persons.

Despite this natural increase, the resident population has decreased from 15,324 to 14,974 people between the two censuses 2006 and 2011, resulting in a net-decline of 350 people during the intercensal period.

Applying the balancing equation allows us to make a crude estimate of the total extent of net-migration during the intercensal period, simply by applying the known elements to the balancing equation (2006-2011 overall population growth, plus the actual natural increase), as shown in Step 1 below, and the solving this simple equation by isolating 'net migration' (Step 2).

$$\text{Population Growth}_{2006-2011} = \text{Natural increase} + \text{Net migration (immigration} - \text{emigration)}.$$



$$\text{Step 1: } (-350) = (+1,258) + \text{Net Migration}$$

$$\text{Step 2: Net migration} = -1,258 - 350$$

$$\text{Net migration} = -1,608$$

In other words, between 2006 and 2011, about 1,608 more Cook Island residents have left the country than have arrived, resulting in an annual net migration of -322 persons (Table 2).

**Table 2: Number of registered births and deaths, estimated net-migrants and overall population change for the intercensal periods 2001-2006 and 2006 to 2011**

	Total number		Average annual number		Rate <sup>a</sup>		
	2001-2006-	2006-2011	2001-2006	2006-2011	2001-2006	2006-2011	
Births	1450	1731	285	346	18.8	22.9	CBR
Deaths	490	473	102	96	6.7	6.3	CDR
Net migrants	-653	-1,608	-131	-322	-8.6	-21.1	Migration rate
<b>Overall change</b>	<b>307</b>	<b>-350</b>	<b>52</b>	<b>-72</b>	<b>0.4</b>	<b>-0.5</b>	<b>Average annual rate of growth</b>

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 referring to 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 each 1,000 people and are normally calculated by simply dividing the number of births and/or deaths of a given year by the (mid-year) total population size of that year, multiplied by 1,000. For small populations such as the Cook Islands, it is advisable to use multi-year averages, as the random fluctuations of annual events can be quite considerable with very small numbers. Therefore rates should be calculated as an average of several years.

In this case the CBR and CDR are calculated by dividing the average annual number of births and deaths of the intercensal period 2006-2011, by the mid-period population size of the intercensal period [((resident population in 2006 = 15,324) + (resident population in 2011 = 14,974)) /2 = 15,149].

In the Cook Islands an average of 346 annual births during the intercensal period translates into an average CBR of 22.9 [(346/15,149)\*1000], and an average of 95

deaths during the same period translates into an average CDR of 6.2 [(95/15,149)\*1000].

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

CBR (22.9) – CDR (6.2) = 16.7 per 1000, or expressed in the more frequently used percentage term: 1.67 per cent per year. This means if there would not be any migration, the population would have grown by its natural increase of 1.67 per cent annually and would double its current size in about 42 years.

By applying the corresponding rates in the intercensal period to the balancing equation, we obtain the *crude net migration rate* (immigration-emigration):

The intercensal growth rate of the resident population between 2006-2011 has been – 0.5 percent and the average CBR and CDR of the intercensal period were 22.9 and 6.2 (per 1000), respectively:

$$\text{Net migration rate} = -0.5 - (2.29 - 0.62) = -2.17 \text{ (or 22 per 1000).}$$

### 3. FERTILITY

Fertility refers to the reproductive behavior of a population, relating 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 would be subject to the present fertility level and pattern during their entire reproductive lives. It is calculated from the number of live births by age of women in a given year, the *Age Specific Fertility Rates (ASFRs)*. Data needed are the total number of births by age of women 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 Ministry of Justice and/or Health Statisticians at the hospital) and data gathered during the census are compared and evaluated against each other.

During the 2011 census, all women 15 years of age and older were asked:

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

Regarding the question of live births, 5,372 resident women aged 15 years and over reported a total number of 14,046 children ever born. An estimated 3,833 women (71%) reported to having had at least one child, while 1,539 women (29%) have not had a child (yet). Based on the number of childless women aged 50 years and older, childlessness was about 10 per cent (Table 3).

Of all women who had children, most had 1-4 children. Two percent or 130 women had more than 10 children. The average number of children ever born to all women (average parity) was 2.6 children 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 3.3 children, and women older than 65 years of age had on average 5 children. The average parities 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 census (December, 2010 to November 2011), resident women reported a total of 267 births – a considerable drop to the number of births (N=306) recorded in the year preceding the 2006 census.

**Table 3: Female resident population 15 years and older by number of children ever born alive, 2011**

Age of Women	Number of Women	Number of Children ever born											Total	Average Parity		
		0	1	2	3	4	5	6	7	8	9	10+				
15 - 19	597	545	48	4											56	0.1
20 - 24	512	273	142	76	18	3									360	0.7
25 - 29	493	157	116	117	68	22	11	2							709	1.4
30 - 34	462	118	64	109	84	48	22	12	3	2					945	2.0
35 - 39	521	103	81	81	102	68	50	14	14	5	3				1,320	2.5
40 - 44	542	97	53	87	88	91	56	30	27	8	4	1			1,614	3.0
45 - 49	528	67	47	107	86	78	63	32	24	13	4	7			1,719	3.3
50 - 54	412	48	57	58	70	66	45	31	15	12	7	3			1,360	3.3
55 - 59	334	33	29	57	49	58	42	32	11	11	5	7			1,215	3.6
60 - 64	270	23	17	35	40	35	45	26	16	13	2	18			1,160	4.3
65 +	701	75	37	61	57	69	70	72	68	58	40	94			3,787	5.4
<b>TOTAL</b>	<b>5,372</b>	<b>1,539</b>	<b>691</b>	<b>792</b>	<b>662</b>	<b>538</b>	<b>404</b>	<b>251</b>	<b>178</b>	<b>122</b>	<b>65</b>	<b>130</b>			<b>14,245</b>	<b>2.7</b>

### 3.1 Reported Age Specific Fertility Rates (ASFR)

Based on the reported number of births by age of mother born during the year prior to the census the so-called ASFR, and TFR can be calculated (Table 4).

Although most babies were born to women in age groups 20-24 years (69) and 25-29 (69), relatively more babies were born to the 493 women aged 25-29 years expressed in the highest ASFR of 0.140, which means that there were 140 births to 1000 women in that age group. Twenty-three children were born to the 597 women aged 15-19 years, resulting in a teenage fertility rate of 39 (39/1000).

Based on the ASFRs, a TFR of 2.6 has been calculated. This is compared to TFR of 2.5 based on a calculation using the registered number of births in the 12 months from December 2010 to November 2011. The difference has to be explained by the fact that the registered number of births during the 12 months slightly lower (252 births) than the number of children reported to have been born during 12 months prior to the census (1 December 2006 - 30 November 2011) of 267 births.

The presented fertility indicators that are based on census data need to be cited with caution as they are based on information of only one single year (the census year

2011). For a small country such as the Cook Islands, annual indicators can fluctuate widely, and multi-year averages should be taken into account to calculate more robust indicators.

**Table 4: Reported number of births during the one-year period before the census (1 Dec 2010 to 30 Nov 2011) by age group of women, Cook Islands: 2011**

Age group of women	Number of women	Number of children	ASFR*
15–19	597	23	0.039
20–24	512	69	0.135
25–29	493	69	0.140
30–34	462	47	0.102
35–39	521	36	0.069
40–44	542	20	0.037
45–49	528	3	0.006
<b>Total</b>	<b>3,655</b>	<b>267</b>	<b>0.527</b>
* ASFR = age specific fertility rate TFR = total fertility rate			<b>2.6</b>

As noted above, responses from women during the 2011 census showed 267 children were born during the one-year period prior to the census, between 1 December 2010 and 30 November 2011. This count compares with 177 children younger than one year of age enumerated during the census (resident population age zero). This mismatch of counts suggests that some children might have left the country since birth, and some might have died during infancy (1 infant death was registered in 2011). During the same period, 252 births were registered at the Ministry of Justice. The fact that the number of reported births (267) is slightly higher than the officially registered births suggests that not all births are registered. This is not surprising because a sizeable number of births occur in New Zealand, and will not be registered in the Cook Islands.

The demographic indicator most commonly used to describe a country's fertility situation is called the total fertility rate (TFR). This measure is an indicator of the average number of children a woman gives birth to during her reproductive life (from ages 15–49 years). It is calculated from the number of live births by age of women in a given year — the age-specific fertility rates (ASFRs). The TFR calculated based on the reported number of children born during the year before the census is 2.6 (Table

4). The TFR using the same data as noted in the 2006 Census report was 3.6, 3.1 and 2.8 in 1996, 2001, and 2006 respectively.

Table 5 shows calculated fertility rates based on registered number of births of the 5-year period 2006-2011 with a TFR of 2.8 children per women. The corresponding TFR estimated in the 2006 census report for the period 2001-2006 was 2.7 children per women. This comparison shows a slight increase in TFR in the present period covered.

**Table 5: ASFR and TFR based on registered number of births, Cook Islands: 2006-2011**

Age group of women	Number of women in 2006	Number of women in 2011	Estimated mid-period women: 2006-2011	Avg.births 2006-2011	ASFR* 2006-2011
15-19	630	597	614	29	0.048
20-24	545	512	529	84	0.158
25-29	473	493	483	65	0.135
30-34	554	462	508	56	0.110
35-39	551	521	536	36	0.066
40-44	540	542	541	17	0.032
45-49	457	528	493	2	0.004
<b>Total</b>	<b>3,750</b>	<b>3,655</b>	<b>3,703</b>	<b>289</b>	<b>0.553</b>
* ASFR = age specific fertility rate TFR = total fertility rate					<b>2.8</b>

However, as mentioned before, the numbers of registered births does not present an accurate picture of the number of births occurring to women resident in the Cook Islands, because a sizeable number of women fly to New Zealand for the delivery of their child. Therefore the registration statistics does not include births occurring overseas.

In order to estimate the Cook Islands' fertility level, this analysis relies on indirect estimation techniques, based on census data on the number of children ever born by age of women, and the number of children born during the year prior to the census by age of women as reported in the census.

Fertility estimates are based on 2006 and 2011 census data, to which the Arriaga method — that measures fertility based on data in two points in time — was applied. The software MORTPAK 4.1 (the United Nations software package for demographic measurements), procedure FERTPF (Table 6), and PAS (from the US Census Bureau), procedure ARFE-2 were used. The results of all two procedures show consistent results.

The Cook Islands TFR was estimated at 2.8 in 2011, which is an increase compared to 2006 when the average number of children born per woman was about 2.5. The calculated fertility level for 2011 by age group of mother is based on an average of the adjustment factors for women aged 20–25, 25-30 and 30-35 (the bold numbers in column “Adjustment Factors” in Table 6). The adjusted ASFRs are shown in the last column at the far right side of Table 6.

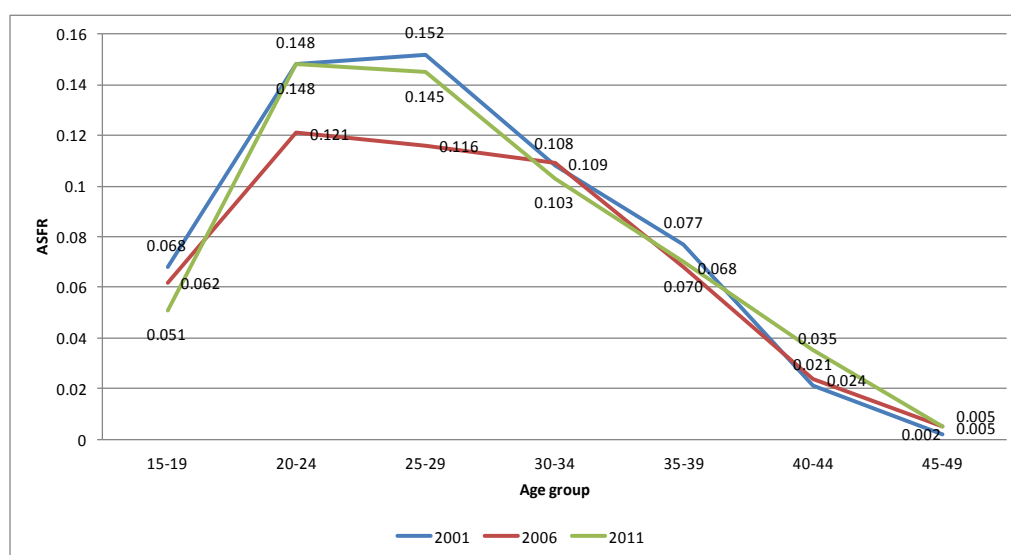
**Table 6: Arraiga's approach for estimation of ASFR for two points in time and the age patterns of fertility (Arriaga-Brass), Cook Islands: 2006-2011**

<b>First enumeration: December 2006</b>												
Fertility pattern by age of woman at enumeration												
Age Group of Women	Children ever born	Age Specific Fertility Pattern (A.S.F.P)	Fertility Consistent with C.E.B (A.S.F.R)	Fertility Pattern by Age at Survey 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			
						A.S.F.R	Fertility Pattern by Age at Birth		20-25	25-30	30-35	20-35
<b>December 2006 to December 2007</b>				Recorded	Calculated							
15 - 20	0.100	0.059	0.068	0.059	0.070	0.068	0.070	0.962	0.071	0.074	0.073	0.074
20 - 25	0.700	0.134	0.143	0.134	0.136	0.210	0.207	1.017	0.139	0.144	0.141	0.144
25 - 30	1.400	0.131	0.145	0.131	0.131	0.355	0.337	1.053	0.133	0.138	0.135	0.138
30 - 35	2.200	0.126	0.108	0.126	0.123	0.463	0.460	1.006	0.125	0.129	0.127	0.129
35 - 40	2.800	0.082	0.033	0.082	0.077	0.495	0.537	0.922	0.078	0.081	0.080	0.081
40 - 45	3.200	0.030	0.018	0.030	0.027	0.514	0.564	0.912	0.027	0.028	0.027	0.028
45 - 50	3.300	0.007	0.007	0.007	0.005	0.521	0.569	0.915	0.005	0.006	0.005	0.006
Mean Age of Childbearing:			25.9	26.8								
Total Fertility Rate:			2.6	2.8		2.89 2.99 2.94 3.00						
<b>First enumeration: December 2011</b>												
Fertility pattern by age of woman at enumeration												
Age Group of Women	Children ever born	Age Specific Fertility Pattern (A.S.F.P)	Fertility Consistent with C.E.B (A.S.F.R)	Fertility Pattern by Age at Survey 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			
						A.S.F.R	Fertility Pattern by Age at Birth		20-25	25-30	30-35	20-35
<b>December 2010 to December 2011</b>				Recorded	Calculated							
15 - 20	0.100	0.039	0.066	0.039	0.049	0.066	0.049	1.365	0.055	0.051	0.053	0.051
20 - 25	0.700	0.135	0.147	0.135	0.140	0.213	0.189	1.129	0.158	0.147	0.153	0.148
25 - 30	1.400	0.140	0.129	0.140	0.137	0.342	0.326	1.047	0.155	0.144	0.149	0.145
30 - 35	2.000	0.102	0.075	0.102	0.098	0.417	0.425	0.983	0.111	0.103	0.107	0.103
35 - 40	2.500	0.069	0.037	0.069	0.066	0.454	0.491	0.926	0.075	0.069	0.072	0.070
40 - 45	3.000	0.037	0.031	0.037	0.033	0.485	0.524	0.927	0.037	0.034	0.036	0.035
45 - 50	3.300	0.006	0.011	0.006	0.004	0.497	0.528	0.941	0.005	0.005	0.005	0.005
Mean Age of Childbearing:			25.9	27.0								
Total Fertility Rate:			2.5	2.6		2.98 2.77 2.87 <b>2.78</b>						

The estimated ASFRs are shown in Figure 1. It shows the number of births per 1000 women by age group, and includes the data of the 2001 and 2006 censuses. It shows that the patterns for 2001 and 2011 are similar but differ in the levels. Except for women aged 20-24 years, the 2011 ASFR are generally lower up to age 35-39 years. The levels for women aged 20-29 years in 2006 are much lower compared to ASFR estimated in 2001 and 2011.

The *mean age at childbearing* was estimated at 27.0 years, the 1991 mean age was estimated at 27.5 years, while the 2001 mean was estimated at 28 years. In 2006 the mean was estimated at 28.4 years.

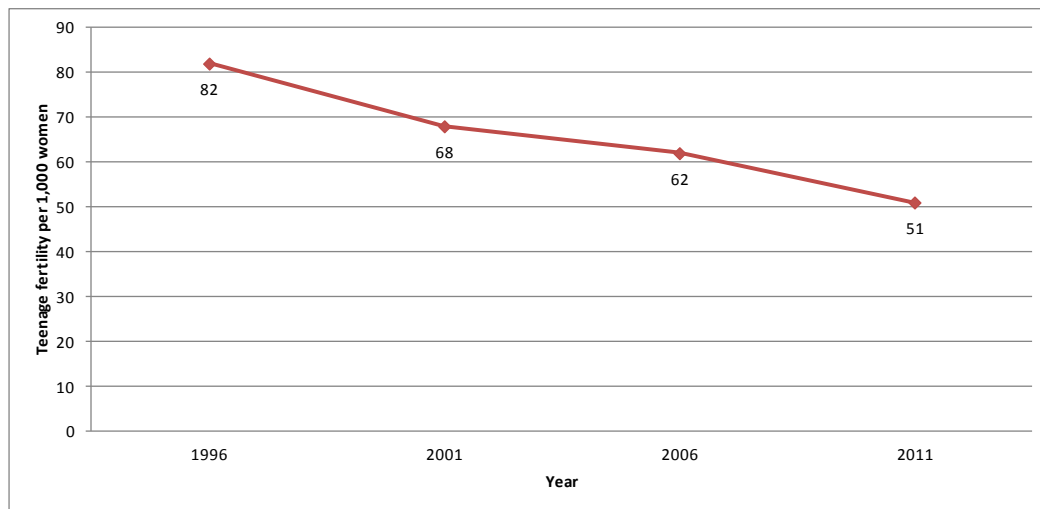
**Figure 1: Estimated Age Specific Fertility Rates (ASFR) – multi-year averages for the periods 1997-2001 and 2001-2006, and 2006-2011**



The *teenage fertility rate*, the average number of births of women aged 15-19 has been estimated at about 51 births per 1,000 women aged 15-19. Teenage fertility in the Cook Islands has been declining since 1996 from 82 births per 1,000 women to the present 2011 level.



**Figure 2: Trend in estimated Teenage Fertility Rates (per 1,000 women), 1996, 2001, 2006 and 2011**



## 4. MORTALITY

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

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

- Demographic composition of the population, i.e. the age and sex distribution;
- Quality and utilization of health and medical services such as immunization programmes, maternal and child health care, primary health care, etc.;
- Environmental conditions and availability of infrastructure such as housing, water supply, sanitation, 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, war;
- Socio-economic status.

The questions that related to mortality in the 2011 census were: (1) marital status question that provides widowhood status; and (2) the question on the number of children ever born and still alive. This report only summarises the results of the question on children ever born and those surviving, which are summarized in Table 7.

Table 7: Female resident population 15 years and older by number of children ever born, number of children still alive, and number of children dead, 2011

Age of women	Number of women	Number of children ever born	Number of children still alive	Number of children dead	Proportion still alive
15 - 19	597	56	56	0	100.0
20 - 24	512	360	356	4	98.9
25 - 29	493	709	701	8	98.9
30 - 34	462	945	932	13	98.6
35 - 39	521	1,320	1,296	24	98.2
40 - 44	542	1,614	1,583	31	98.1
45 - 49	528	1,719	1,670	49	97.1
50 - 54	412	1,360	1,306	54	96.0
55 - 59	334	1,215	1,156	59	95.1
60 - 64	270	1,160	1,086	74	93.6
65+	701	3,787	3,448	339	91.0
<b>Total</b>	<b>5,372</b>	<b>14,245</b>	<b>13,590</b>	<b>655</b>	<b>95.4</b>

From all children that were ever born to women 15 years and older (14,245), 95 percent (13,590) were still alive, and 655 children have died (Table 7). The proportion of surviving children decreases with the age of women. While all children were still alive that were ever born to women 15-19, only 97 percent of children born to women aged 45-49 were still alive and 91 percent of children born to women aged 65 years and older.

This general trend is explained by the fact that as the age of mothers increases, so does the age of their children; the proportion of birth cohorts that have died rises with an increase in the age of mothers.

The calculation of the Cook Islands mortality indicators are based on both vital statistics – the registration of the number of deaths by age and sex, and the indirect calculation based on children ever born and children surviving data collected from the 2011 census. Both direct calculation of mortality measures from registration data as well as indirect estimations were undertaken to validate the results. Information on the number of referrals of residents to New Zealand who have died there have been included in the direct calculations. However, the registration based calculated mortality indicators need to be treated as the absolute minimum as it is likely that many more deaths of residents occur overseas that are not included in the officially registered number of referrals.

Based on the average annual number of deaths by age and sex of the years 2001-20012 (taking the number of referrals into account), and the estimated mid-period

population (mid-year 2006), age-specific death rates – expressed as  $m(x)$ -values – were calculated (Table 8).

**Table 8: Average annual number of deaths of the period 2001-2012, estimated mid period (2006) population by age and sex, and age specific death rates [M(x)], Cook Islands: 2001-2012**

Age	Average number of deaths 2001-2012*			Estimated population for mid-year 2006			Age-specific death rates M(x)		
	T	M	F	T	M	F	T	M	F
0-1	3	2	1	298	159	139	0.0098	0.0126	0.0066
1-4	1	0	1	1,247	641	606	0.0008	0.0007	0.0010
5-9	0	0	0	1,618	829	790	0.0002	0.0004	0.0000
10-14	1	1	0	1,557	841	716	0.0003	0.0006	0.0000
15-19	2	1	1	1,325	698	627	0.0016	0.0017	0.0015
20-24	2	1	0	994	492	502	0.0015	0.0025	0.0005
25-29	1	1	0	971	462	509	0.0009	0.0011	0.0008
30-34	1	1	0	973	471	502	0.0011	0.0016	0.0007
35-39	2	2	1	1,040	517	523	0.0022	0.0032	0.0011
40-44	3	1	1	986	492	495	0.0025	0.0027	0.0024
45-49	3	2	1	892	452	441	0.0032	0.0039	0.0025
50-54	5	3	2	749	397	353	0.0063	0.0074	0.0052
55-59	5	4	1	633	317	316	0.0079	0.0113	0.0045
60-64	8	6	2	564	296	268	0.0140	0.0189	0.0087
65-69	10	7	3	455	239	216	0.0227	0.0290	0.0158
70-74	11	7	4	339	176	164	0.0327	0.0408	0.0240
75-79	12	7	5	204	92	112	0.0598	0.0792	0.0439
80+	19	9	11	153	60	94	0.1258	0.1429	0.1150
<b>Total</b>	<b>88</b>	<b>54</b>	<b>35</b>	<b>14,996</b>	<b>7,627</b>	<b>7,369</b>	<b>0.01</b>	<b>0.0070</b>	<b>0.0047</b> *

includes number of registered referrals

The US Bureau of Census developed software package PAS, procedure LTPOPDTH has been used to calculate a life table for males and females (Tables 10 and 11 below) with data shown in Table 8 as inputs. A summary of the life table mortality indicators for 2011 and 2006 are shown in Table 9 below.

**Table 9: Mortality indicators, Cook Islands: 2006 and 2011**

Indicator	2006			2011		
	Total	Males	Females	Total	Males	Females
Life expectancy at birth, E(0)	72.8	69.5	76.2	74.7	71.5	78.4
Infant mortality rate (IMR)	13.9	18.5	9.0	10.2	13.2	7.0
Child mortality rate (4q1*)	4.5	2.8	6.4	3.2	2.6	3.8
Under 5 mortality rate (q5**)	18.4	21.2	15.3	13.4	15.8	10.8

\* = the probability of dying between age 1 and age 5

\*\* = the probability of dying between birth and age 5

According to the data assumptions made, and the procedures and methods used, life expectancy at birth was calculated at 71.5 and 78.4 years for males and females, respectively for the period 2011-2012 (Table 9). This compares with estimates of 69.5 and 76.2 years for males and females for the period 2001-2007; and with estimates of 68.0 and 74.3 years for males and females for the period 1996-2002.

The IMR based on the calculated life tables is estimated at 13.2 and 7.0 for males and females, respectively, which is considerably lower than those calculated for the period 2001-2007, when it was 18.5 and 9.0 for males and females respectively. IMR is a measure of the number of deaths of children under one year of age per 1,000 live births.

Child mortality on the other hand is a probability of dying between age 1 and age 5, and was estimated at about 3 male deaths and 4 female deaths per 1,000 people of that age. This is compared to 3 male deaths and 6 female deaths estimated for the period 2001-2007.

Under 5 mortality, the probability of dying between birth and age 5, was estimated at about 16 and 11 for males and females, respectively per 1,000 population.

The above mortality indicators are as expected. The indicators continue the improving mortality trend as reported in previous census reports which show more positive mortality indicators for females than for males, with females living longer, on average almost 7 years longer, than males.

**Table 10: Abridged Life Tables based on deaths and population, Cook Islands: Males (2001-2012 average)**

Age, x	nMx	nqx	lx	ndx	nLx	5Px	Tx	ex
0	0.01336	0.01320	100000	1320	98786	0.985789	7148338	71.5
1	0.00065	0.00260	98680	256	394109	0.997423	7049551	71.4
5	0.00040	0.00201	98424	198	491625	0.997512	6655443	67.6
10	0.00059	0.00297	98226	292	490401	0.994356	6163818	62.8
15	0.00167	0.00833	97934	816	487633	0.989533	5673417	57.9
20	0.00254	0.01262	97119	1226	482529	0.990967	5185784	53.4
25	0.00108	0.00540	95893	518	478171	0.993340	4703254	49.0
30	0.00159	0.00793	95375	756	474986	0.988056	4225084	44.3
35	0.00322	0.01599	94619	1513	469313	0.985259	3750098	39.6
40	0.00271	0.01347	93106	1254	462395	0.983686	3280785	35.2
45	0.00388	0.01919	91852	1763	454851	0.972427	2818390	30.7
50	0.00736	0.03612	90089	3254	442310	0.954632	2363539	26.2
55	0.01130	0.05497	86835	4773	422243	0.927980	1921229	22.1
60	0.01886	0.09007	82062	7391	391833	0.888431	1498986	18.3
65	0.02900	0.13520	74671	10096	348117	0.841582	1107153	14.8
70	0.04084	0.18526	64575	11964	292969	0.749453	759037	11.8
75	0.07923	0.33067	52612	17397	219566	0.528897	466068	8.9
80	0.14286	1.00000	35215	35215	246502		246502	7.0

*nMx = Age-specific central death rate.*

*nax = Average person-years lived by those who die between ages x and x+n.*

*nqx = Probability of dying between exact ages x and x+n (age-specific mortality rate).*

*lx = Number of survivors at age x.*

*ndx = Number of deaths occurring between ages x and x+n.*

*nLx = Number of person-years lived between ages x and x+n.*

*5Px = Survival ratio for persons aged x to x+5 surviving 5 years to*

*ages x+5 to x+10 = 5Lx+5/5Lx (first 5Px = 5L0/5L0,*

*second 5Px= 5L5/5L0, last 5Px = Tx+5/Tx).*

*Tx = Number of person-years lived after age x.*

*ex = Life expectancy at age x.*

**Table 11: Abridged Life Tables based on deaths and population, Cook Islands: Females (2001-2012 average)**

Age, x	$nM_x$	$nq_x$	$l_x$	$ndx$	$nL_x$	$5P_x$	$T_x$	$e_x$
0	0.00705	0.00700	100000	700	99350	0.99120	7843992	78.4
1	0.00096	0.00384	99300	381	396251	0.99797	7744642	78.0
5	0.00000	0.00000	98919	0	494593	1.00000	7348391	74.3
10	0.00000	0.00000	98919	0	494593	0.99636	6853798	69.3
15	0.00146	0.00728	98919	720	492792	0.99511	6359205	64.3
20	0.00050	0.00249	98198	244	490380	0.99672	5866413	59.7
25	0.00082	0.00408	97954	400	488769	0.99630	5376033	54.9
30	0.00066	0.00331	97554	323	486961	0.99556	4887264	50.1
35	0.00112	0.00557	97230	541	484799	0.99136	4400303	45.3
40	0.00236	0.01173	96689	1134	480611	0.98803	3915504	40.5
45	0.00246	0.01222	95555	1168	474857	0.98110	3434893	35.9
50	0.00520	0.02567	94387	2423	465880	0.97606	2960036	31.4
55	0.00448	0.02217	91964	2039	454726	0.96769	2494156	27.1
60	0.00872	0.04268	89926	3838	440034	0.94098	2039430	22.7
65	0.01582	0.07608	86088	6550	414064	0.90619	1599397	18.6
70	0.02396	0.11301	79538	8988	375219	0.84714	1185333	14.9
75	0.04390	0.19779	70550	13954	317863	0.60763	810114	11.5
80	0.11497	1.00000	56596	56596	492251		492251	8.7

$nM_x$  = Age-specific central death rate.

$nax$  = Average person-years lived by those who die between ages  $x$  and  $x+n$ .

$nq_x$  = Probability of dying between exact ages  $x$  and  $x+n$  (age-specific mortality rate).

$l_x$  = Number of survivors at age  $x$ .

$ndx$  = Number of deaths occurring between ages  $x$  and  $x+n$ .

$nL_x$  = Number of person-years lived between ages  $x$  and  $x+n$ .

$5P_x$  = Survival ratio for persons aged  $x$  to  $x+5$  surviving 5 years to

ages  $x+5$  to  $x+10$  =  $5L_{x+5}/5L_x$  (first  $5P_x$  =  $5L_0/5L_0$ ,

second  $5P_x$  =  $5L_5/5L_0$ , last  $5P_x$  =  $T_x+5/T_x$ ).

$T_x$  = Number of person-years lived after age  $x$ .

$e_x$  = Life expectancy at age  $x$ .

## 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. The people involved are referred to as migrants. Immigration is the movement of people into a country (immigrants), and emigration if they are moving 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 deciding 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 materialize, and the person decided to return to his/her 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 one-year period, in order to establish whether the arriving and departing persons qualify as visitors or migrants.

### 5.1 Internal Migration

Internal Migration, the movement of people from one island of the Cook Islands to another, can be estimated by comparing the different intercensal growth rates per island or regions, comparing the number of people born on certain islands and 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 2011 census.

During the year before the 2011 census, Rarotonga has had a net gain of 68 migrants from all the other islands, and 234 migrants during 5 years before the census, most of them came from the Southern Group islands (Table 12).

The Southern Group population has had a net loss of –51 and –122 persons during 1 and 5 years before the census, respectively. Almost all of them went to Rarotonga.

The Northern Group population had experienced slightly lower net migration as the Southern Group islands, and similarly directed towards Rarotonga. The Northern Group islands experienced a net loss of –17 and –112 persons during 1 and 5 years before the census, respectively.

Population movement between the Northern and Southern Group Islands was only very minimal as in previous censuses.

**Table 12: Interregional recent migration by sex during 1 and 5 years before the 2011 census**

Island & Region	In-Migrants		Out-Migrants		Net Migrants	
	< 1 year	< 5 years	< 1 year	< 5 years	< 1 year	< 5 years
<b>Total</b>						
Rarotonga	797	1,990	729	1,756	68	234
Southern Group	179	382	230	504	-51	-122
Northern Group	60	130	77	242	-17	-112
<b>Male</b>						
Rarotonga	387	965	365	872	22	93
Southern Group	89	202	103	242	-14	-40
Northern Group	31	65	39	118	-8	-53
<b>Female</b>						
Rarotonga	410	1,025	364	884	46	141
Southern Group	90	180	127	262	-37	-82
Northern Group	29	65	38	124	-9	-59

*Source: Cook Islands Census of Population and Dwellings 2011, Main report (resident population by Island and usual residential address 1 and 5 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). 1,727 people, who were born in the Northern and Southern Group islands, now live in Rarotonga, while only 1,037 people who were 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 have moved there sometimes during their life, 937 to the Southern Group islands and 364 to the Northern Group islands. More than twice the amounts of in-migrants have left. 1,477 and 514 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 of the Northern- or Southern Group islands are only visiting Rarotonga’s hospital for a short time for the delivery of their babies. These children technically qualify as “in-migrants” because they were 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 13: Interregional lifetime migration by sex, Cook Islands, 2011**

Island & Region	In-Migrants	Out-Migrants	Net Migrants
<b>Total</b>			
Rarotonga	1,727	1,037	690
Southern Group	937	1,477	-540
Northern Group	364	514	-150
<b>Male</b>			
Rarotonga	864	542	322
Southern Group	472	718	-246
Northern Group	192	268	-76
<b>Female</b>			
Rarotonga	863	495	368
Southern Group	465	759	-294
Northern Group	172	246	-74

**Source:** Cook Islands Census of Population and Dwellings 2011, Main report (resident population by place of birth and place of residence)

As has been shown earlier, 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. Although migration was negative in all regions of the Cook Islands, it was highest in the Northern Group with –4.1 percent per annum, followed by the Southern Group islands (-3.0). Rarotonga has shown the least rate of migration with only –1.6 percent per annum (Table 14).

**Table 14: Estimated net migration rate by regions, Cook Islands, 2006-2011**

Island/Region	Resident population size		Population growth rate	Natural growth rate	Estimated net migration rate
	2006	2011	2006-2011		
Rarotonga	10,226	10,572	0.7	2.2	-1.6
Southern Group	3,729	3,290	-2.5	0.5	-3.0
Northern Group	1,369	1,112	-4.1	-0.05	-4.1

Cook Islands	15,324	14,974	-0.5	1.7	-2.1
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As there was no region in the Cook Islands that has received a positive number of net migrants, it can be concluded, that the overall flow of migration was primarily directed towards overseas destinations.

## 5.2 International Migration

As mentioned earlier, international migration refers to people who move to another country and thereby change their permanent residential address. The amount of net-migration of a country during a certain period of time is composed of those who arriving (immigrants) in the country minus those departing (emigrants) the country.

On the question of where a person's residential address was one year ago, 749 persons (5 percent) of the resident population one year and older answered that they have lived overseas, with eighty-four percent of these people residing in Rarotonga.

On the question of where they lived five years ago, 1,852 persons (14 percent) of the resident population 5 years and older replied having resided overseas with 86 percent living in Rarotonga. Unfortunately it is not possible to determine from these census data how many of these people former residents who are returning were, and how many are first time residents (new comers).

From the question on a person's place of birth, it was found that almost 26 per cent (3,879 of the resident population had been born overseas. Over 85 percent of them reside in Rarotonga.

As indicated earlier when discussing the balancing equation to arrive at crude migration estimates (Section 2), it has been estimated that between 2006 and 2011, on average about 322 more residents have left the Cook Islands each year than moved to the Cook islands. Also, when asked for their place of residence five years ago, 1,852 residents replied having resided overseas. By assuming that these people have entered (immigrated) to the Cook Islands during the last five years, this number translates into an annual average of 370 immigrants (1,852 divided by 5). In order to account for an annual net loss of 322 people annually, between 2006 and 2011, some 692 people would have had left the Cook Islands each year.

### **5.3 Annual Migration Statistics, 2011**

Estimates on the annual number of migrants for the period after every censuses have to rely on the recorded number of arrivals and departures, simply by subtracting all departing passengers from those who have arrived.

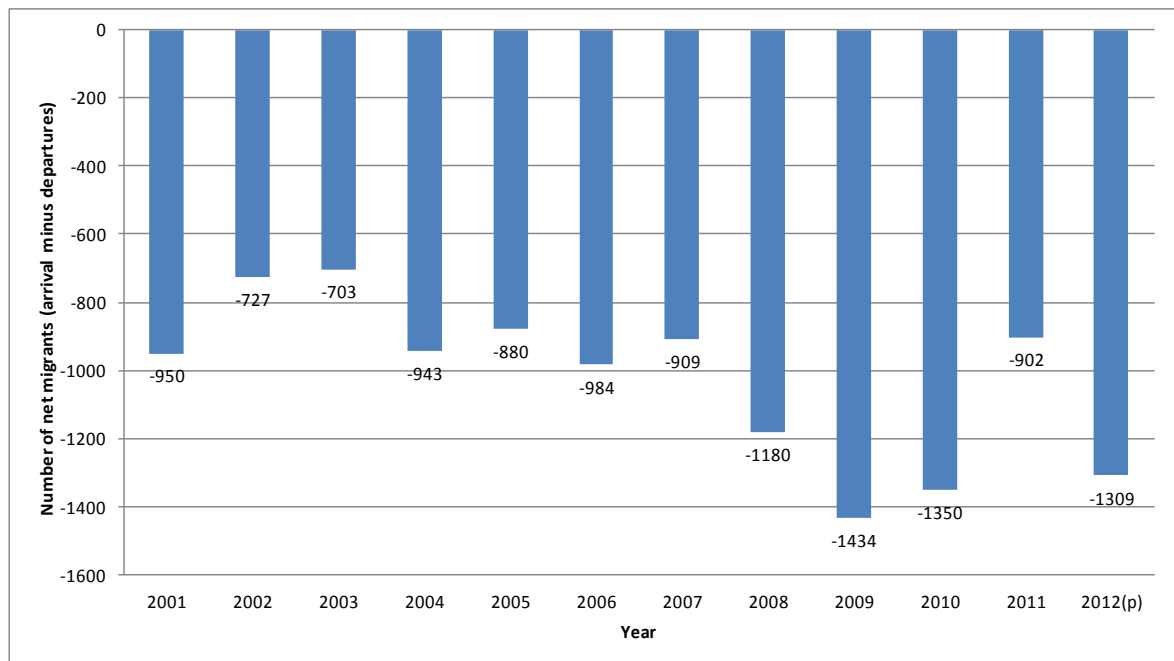
Since 1997, the Cook Islands have a complete and very timely registration system in place. It records all arriving and departing passengers at Rarotonga International Airport by date of arrival/departure, by age and sex, and whether it is a permanent resident of the Cook Islands or a visitor.

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

However, the demographic, political and administrative realities of 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 visitors' population, as some may have turned into residents after entering the country. Persons who intend to stay only for a relatively short time, and classify themselves as 'visitors' on their arrivals 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 family in the 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 2001, more people departed than entered the country (Figure 3 and Table A7). The years 2008, 2009, and 2010 have had over 1,000 people are leaving compared to other years, except in 2012 which provisional at the time of analysis. And from the latest statistics on arriving and departing passengers (in 2012) it seems that there continues to be a net loss of residents, recording a net loss of 1,309 people (provisional).

**Figure 3: Recorded annual net migrants (Arrivals minus Departures) of Cook Island residents, 2001 - 2012**



Source: Statistics Office, Ministry of Finance and Economic Management, Cook Islands, and (p) is provisional.

## 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 like in the future. The appropriate method to do this is to provide a series of population scenarios, in order to anticipate changes in population size and characteristics.

The starting point for any projections is a reliable age-sex distribution of a population in this case it is the Cook Islands 2011 census age and sex distribution of the Cook Islands 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, which women have children, and 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<sup>1</sup>.

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 the short-term visitors are very hard, if not impossible to make, because the visitors population give birth overseas and are usually overseas when they die.

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<sup>1</sup> Population Analysis with Microcomputers, Volume I, Presentation of Techniques, p.309/310, by Eduardo E.Arriaga, Bureau of the Census, Department of Commerce, USA

Given recent and ongoing high levels of negative net-migration – that is, far more Cook island residents leaving the Cook islands each year than moving/returning to the Cook islands – which are not sustainable in the long run, much care is advised when interpreting these population projections. It is important to highlight 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 possible future developments of what the country’s population will look like, if specific fertility, mortality and migration trends are to prevail in the coming years. While fertility and mortality are relatively stable, which means that dramatic changes usually do not occur overnight, migration pattern and trends can change quite suddenly and dramatically; this has serious implications on the reliability of population projection in countries exposed to high levels of migration, such as the 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 a 20 year period, from 2011 to the year 2031. As just referred to, preparing meaningful assumptions for the Cook Islands is particularly difficult because of extreme variations in migration levels in the past and in recent years, ranging from around -300 people/year during the period 1991-1996, around -860 people/year during the years 1996-2001, around -653 people/year during the period 2001-2006, and around -1,600 people/year during the period 2006-2011. In order to cover possible developments within reason, three different migration assumptions have been prepared.

The following demographic inputs were used for the projections:

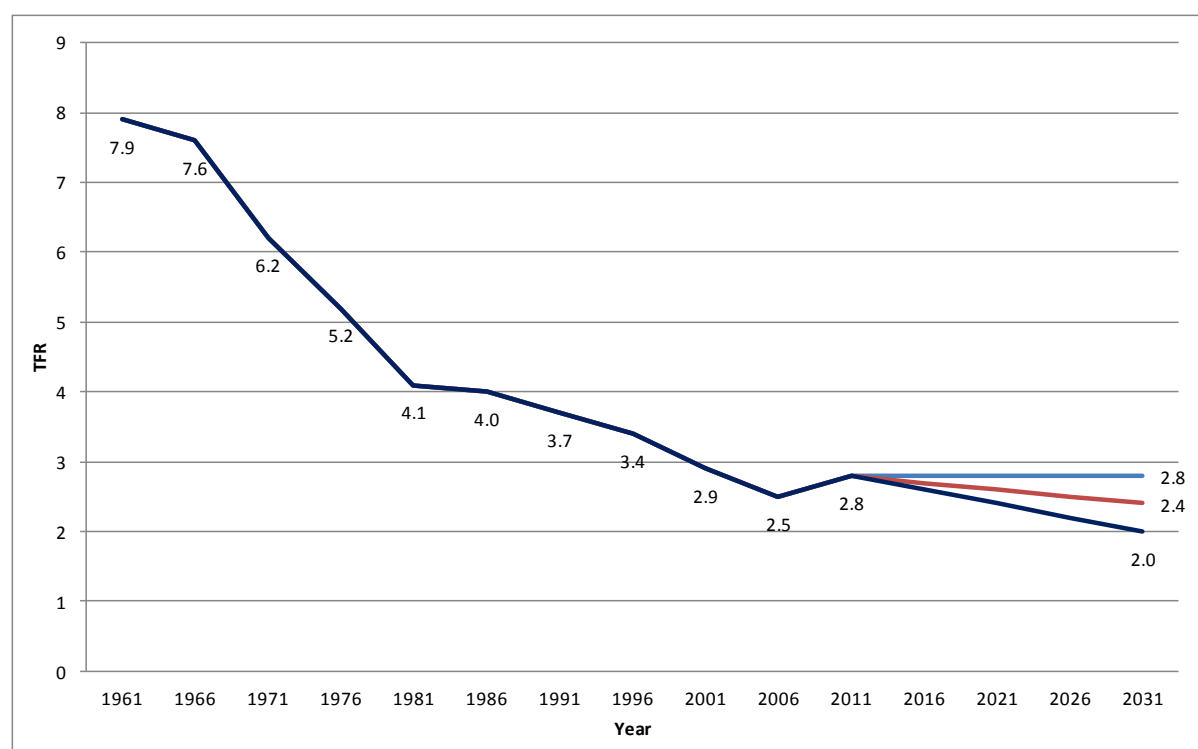
#### Base Population:

2011 census age and sex distribution of the Cook Island resident population, adjusted to mid-year 2011 (Appendix Table A9).

#### Fertility:

The fertility pattern, the Age Specific Fertility Rates (ASFR), together with a Total Fertility Rate (TFR) of 2.8 is used as the starting level of fertility for the projections in 2011 (as described in Section 3 on fertility above).

**Figure 4: Fertility assumptions for projections, 2011-2031**



From the estimated level of fertility of 2.8 (TFR) in 2011, three fertility assumptions are made (Figure 4):

- Assumption 1: High fertility variant  
Initially fertility remains at its current level of 2.8 up to the end of the projection period in 2031;
- Assumption 2: Medium fertility variant  
Fertility decreases to 2.4 in the year 2031; and
- Assumption 3: Low fertility variant  
Fertility decreases to 2.0 in the year 2031.

#### Mortality:

Life expectancy at birth  $E(0)$  of 71.5 years and 78.4 years for males and females respectively is used as the starting point for the projections in 2011. These estimates are based on the number of registered deaths by age and sex of the years 2001-2012 (see Section 4), and again it needs to be mentioned that an unknown number of deaths of residents that occurred overseas were not included in the death statistics. Therefore the estimated life expectancies have to be considered as an absolute maximum.

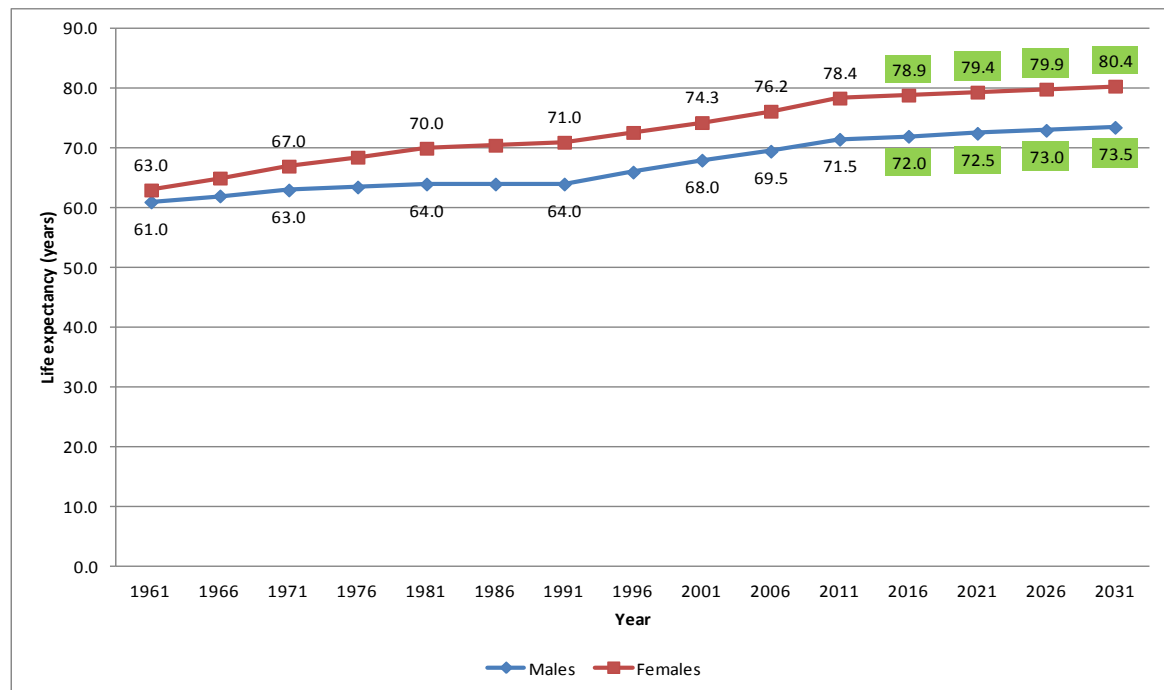
The population projections all assume the same rising trend in life expectancy for males and females according to the very slow variant of the United Nations working model for mortality improvement as described in *World Population Prospects* (United Nations, 2006, p.152). The reason for this is that 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 the Cook Islands and mortality levels will continuously improve throughout the projection period. Therefore it is decided to use only one mortality assumption for the projections. According to this procedure, life expectancy in the year 2031 would be 73.5 years and 80.4 years for males and females, respectively (Figure 5).

According to the UN's software package MORTPAK 4.1 (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 characterized by relatively low infant and child mortality and a high level of adult mortality, especially for males.



**Figure 5: Mortality assumption (life expectancy at birth) for projections, 2011-2031**



*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 migrants has changed dramatically after the implementation of the Cook Islands government's economic re-structuring programme. While there have been only –130 net annual migrants during the period 2001-2006, about –1,608 more people have left the Cook Islands than have arrived during the years 2006 to 2011 which is -320 net migrants annually (see Section 2 and 5.2 above). As has been noted in past census reports, this high level of emigration is not sustainable as over time there would be less people left in the Cook Islands to emigrate. Therefore the question seems to be when this high level is going to decrease and to which level.

Given the continuously changing level and pattern of migration in the Cook Islands, a UN model has been used to project the number of male and female migrants by age: the so-called family migration model (Appendix Table A9). Furthermore it is assumed that there will be equal numbers of males and female migrants.

Three different migration assumptions have been prepared:

- Assumption 1: High migration

Normally the preferred option would be simply to assume constant high level of migration as estimated for the period 2006-2011. 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 emigration of the years 2006-2011 will gradually decline from –320 persons annually during the period 2006-2011 to the 2001-2006 level of –130 people annually towards the end of the projection period (2031).

- Assumption 2: Medium migration

Net migration is assumed at a level of -160 people per year in 2011 for the medium projection scenario. It then gradually decreases to -65 people per year which resembles the middle level of the high and the low migration assumption in the year 2031.

- Assumption 3: Low migration

Normally with projections, the standard procedure would simply assume zero net migration, but in view of the latest statistics on arrivals and departures, this would seem a very unrealistic assumption in the Cook Islands, because data show that the excess of arrivals and departures of Cook Islands residents was about –1,300 persons in 2012. Therefore the low migration variant assumes a net migration of –80 people per annum for the year 2011, and then gradually declines to 32 net migrants in 2031.

## 6.2 Projection Results

The combination of these three different fertility and migration assumptions, with one prevailing mortality assumption, results in nine population growth scenarios, of which only three are described 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 15).

Before examining projection results in more detail, it is useful to emphasize 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, 12,860 people in 2031, if fertility remains constant between now (TFR=2.8) and 2031 (TFR=2.8), while net-migration declines from around –320/year between 2006-2011, to the 2001-2006 level of –130/year between 2026-2031.

**Table 15: Resident population size in the year 2031 according to 9 projection scenarios (combination of three different fertility and migration assumptions)**

Fertility assumption (TFR from 2011 to 2031)	Migration assumption		
	Low	Medium	High
No decline: 2.8 → 2.8	<b>17,474</b> (High variant)	15,944	12,860
Medium decline (2.8 → 2.4)	17,067	<b>15,576</b> (Medium variant)	12,570
Fast decline (2.8 → 2.0)	16,631	15,182	<b>12,260</b> (Low variant)

**Scenario 1: High population growth variant**

- *Fertility (high)*: The estimated current total fertility rate (TFR) of 2.8 will not decrease until 2031.
- *Mortality*: The estimated level of life expectancy at birth gradually increases from 71.5 years and 78.3 years for males and females in 2011 to 73.5 years and 80.4 years respectively in the year 2031.
- *Migration (low)*: Net migration starts at -80 people per annum in the year 2011, and then gradually declines to -32 net migrants in 2031.

**Scenario 2: Medium population growth variant**

- *Fertility*: The estimated total fertility rate (TFR) of 2.8 in 2011 will gradually decrease to 2.4 in the year 2031.
- *Mortality*: same as above.
- *Migration*: The high level of negative net migration of the period 2006-2011 of -320 people per annum is reduced to -160 people per annum for 2011 which is assumed to gradually decrease to -64 people by 2031.

**Scenario 3: Low population growth variant**

- *Fertility (low)*: The estimated total fertility rate (TFR) of 2.8 in 2011 will decrease to 2.0 in the year 2031.
- *Mortality*: same as above.

- *Migration (high)*: The high level of negative net emigration of the years 2006-2011 (-320 people per year) will gradually decline to the 2001-2006 level of -130 people by the end of the projection period (2031).

In Table 16 and Figure 6, a comparison is made between the base year of the projections, 2011, and the end year for the three projection scenarios, 2031.

**Table 16: Population indicators in 2031 according to three projection variants**

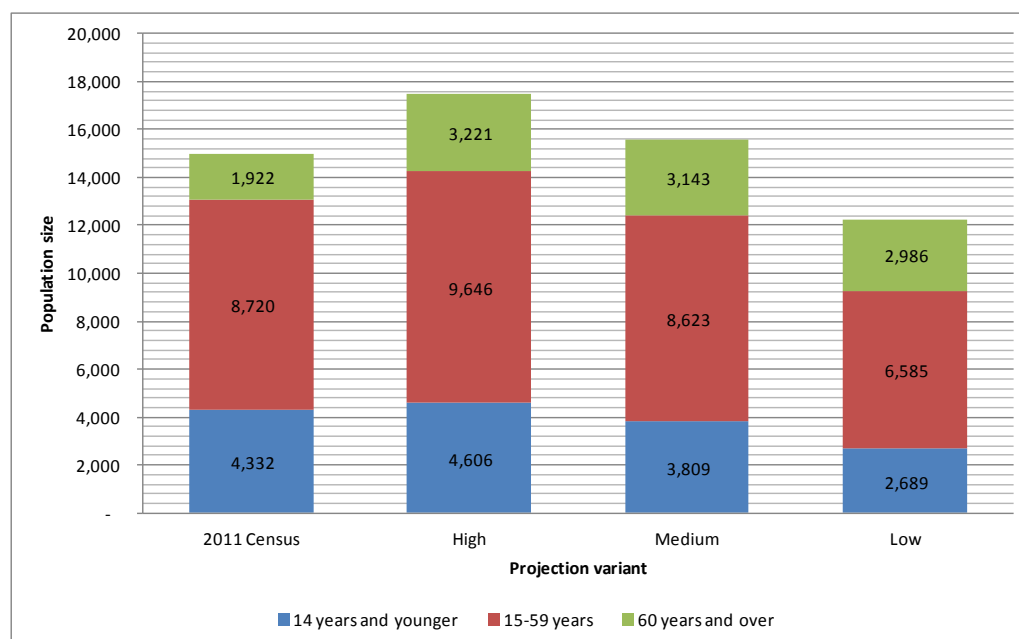
Indicator	2011 population	2031 population		
		High variant	Medium variant	Low variant
Median age (years)	29.5	30.2	30.8	31.0
Dependency ratio (15-59)	71.7	81.1	80.6	86.2
Annual growth rate 2011-2031	-0.5*	0.8	0.2	-1.0
Sex ratio	100.1	97.6	97.2	96.4

\*2006-2011 growth rate

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 the impact of international migration.

### Summary of results

**Figure 6: Population size by broad age groups in 2013 according to three projection variants**



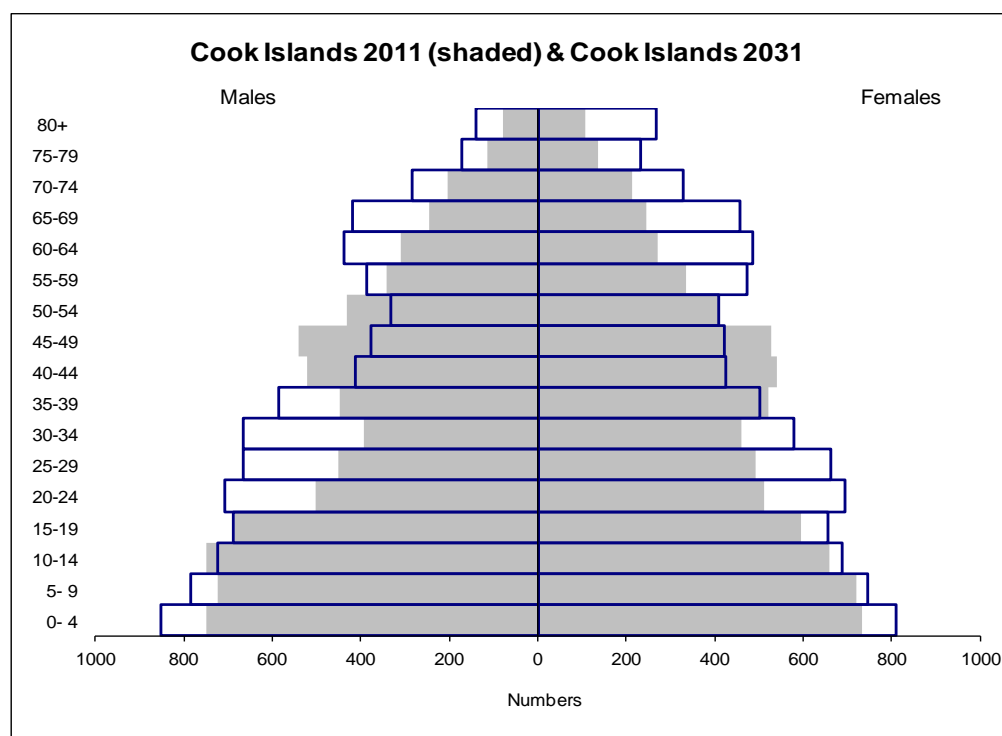
### **Scenario 1: *High population growth variant***

Under the assumption of constant fertility of 2.8 children per women, and the assumption that the number of net-migration decreases drastically from the high level of -320 people/year between 2006-2011), to an average of -80/year during 2011-2016, and then further decline to -32 by 2031, the resident population would increase to 17,474 people in the year 2031 (Table 15 and Figures 6 and 10).

Under this scenario, the number of children (population aged 0-14 years) is expected to increase very slightly by about 274 children, from 4,332 in 2011 to 4,606 in 2031, and the working-age population (15-59 years) would increase by about 926 people from 8,720 in 2011 to 9,646 in 2031; the 60+ population is expected to increase from 1,922 to 3,221.

The slight increase in the number of children, plus a 1,299 person increase in the 60+ population would also see the *median age* increase from 29.5 to 30.2 years, and increase in the *dependency ratio* from 71.7 to 81.1 during the same period because of the relative increase of the old-age population (from 13.3 per cent of the total population in 2011 to 18.4 per cent in 2031) and the relative decrease of the population younger than 15 years (from 28.9 per cent of the total population in 2011 to 26.4 per cent in 2031).

**Figure 7: Population pyramid, high population projection, Cook Islands: 2011 and 2031**



Under this projection scenario (Figure 7), next loss will be noticeable in the age groups 40-54 years as migration is assumed to decline by 2031. In contrast, and as a result of constant fertility assumed under this variant, there is likely to be increase of children in the age groups 0-9 years.

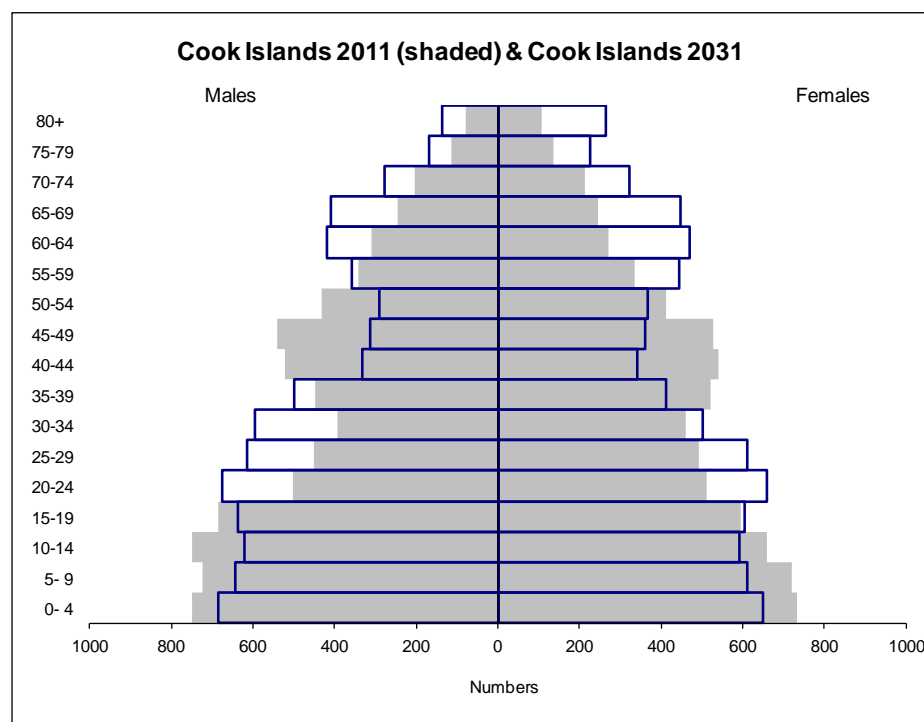
**Scenario 2: *Medium population growth variant***

On the assumption that fertility would decrease from its current level of 2.8 to 2.4 in the year 2031, and the number of net migrants would gradually decrease from its high 2006-2011 level of -320 people/year, to -160 during the period 2011-2016, and then again gradually to -64 people/year in the year 2031, the population is expected to grow at 0.2 percent per year. This would mean the Cook island resident population is expected to increase to 15,576.

Under this scenario, the children population (0–14) would decrease by about 523 children from 4,332 in 2011 to 3,809 in 2031, and the working age population would decrease from its current level (8,720) by about 97 people to 8,623 people in the year 2031. In contrast, the older population (60 years and over) is likely to increase from 1,922 people in 2011 to about 3,143 in the year 2031, an increase by about 1,221 people.

The *median age* of the population would slightly increase from the current 29.5 to 30.8 years. And the *dependency ratio* would increase from 71.7 per cent in 2011 to 80.6 per cent in 2031 and a proportional decrease of the population 15 years and younger (from 29 per cent to 24 per cent).

**Figure 8: Population pyramid, medium population projection, Cook Islands: 2011 and 2031**

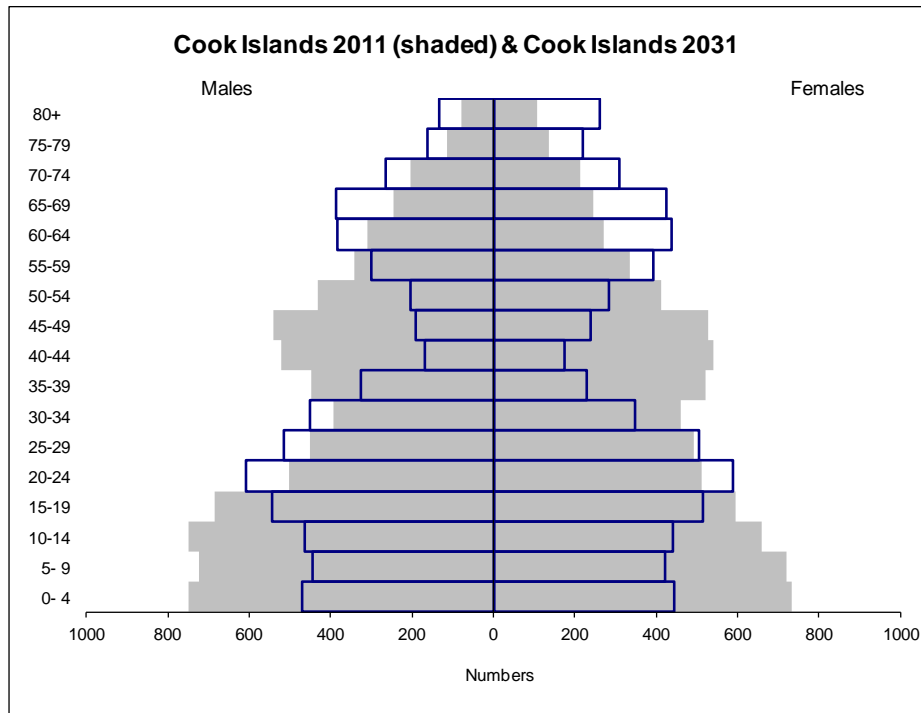


Under the medium projection scenario (Figure 8), next loss will again be noticeable in the age groups 40-54 years as migration is assumed to decline by 2031. Similarly, there is likely to be decrease in the children population in the age groups 0-19 years as a result of medium fertility decline assumed from the current 2.8 to 2.4 children per women by 2031.

**Scenario 3: Low population growth variant**

Assuming that fertility would decrease from its current level of 2.8 to 2.0 in the year 2031, and the number of net migrants would gradually decrease from its high 2006-2011 levels of -320 people/year, to the 2001-2006 level of -130 people/year in the year 2031, the population would decrease by -1.0 per cent per annum. The resident population would decline to 12,260 people in the year 2031.

**Figure 9: Population pyramid, low population projection, Cook Islands: 2011 and 2031**



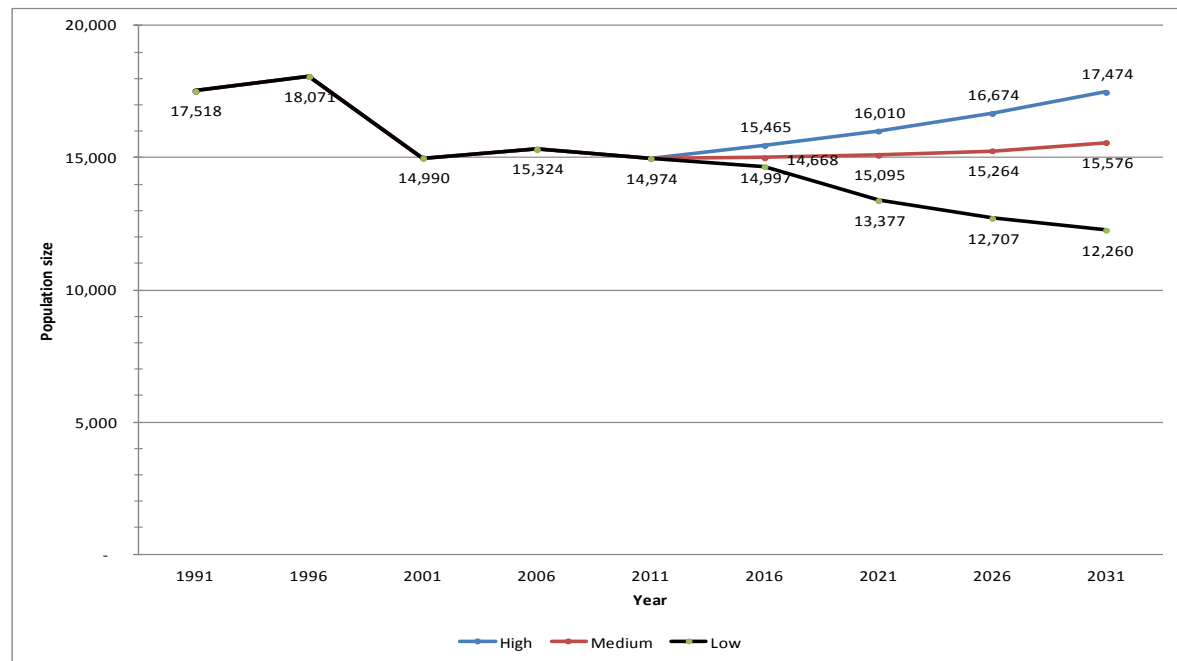
The number of children (0-14 years) would total 2,689, representing 62 per cent of its current size (4,332), and accounting for 22 per cent of the total Cook island resident population in 2031. The working age population would decrease from 8,720 in 2011 to 6,585 people in 2031, and the 60+ population would amount to 2,986 people, representing almost one quarter (24.4 per cent) of the Cook island resident population in the year 2031.

These developments would see an increase in a median age to 31years, and the dependency ratio would similarly increase from 72 per cent in 2011 to 86 per cent in 2021.

Figure 10 shows the trend in future population growth under the three different projection variants.



**Figure 10: Future population trend according to three projection variants, 2011-2031**



**General comments:**

Table 15 highlighted that the impact of both fertility and migration on the Cook island population dynamics. The following main characteristics are noted from the three projection scenarios:

- The population is likely to increase under the high and medium scenarios compared to a likely decrease under the low projection scenario by year 2031;
- The population aged 15 years and younger (which includes the school age population) in the year 2031 will be proportionally and in absolute numbers lower than in 2011 under the high and medium scenarios;
- The proportion of the working age population in the year 2031 will be higher than in 2011 under the high growth scenario only;
- The dependency ratio in the year 2031 will be higher than in 2011 under all the three projection scenarios;
- The elderly population (60+) will proportionally and in absolute numbers increase under all the three projection scenarios;
- The median age of the population would increase under all the three projection scenarios.

A key message is that Cook Islands' resident population in twenty years time (2031) will only remain at its 2006/2011 level of just over 15,000 people in 2006 or around 15,000 in 2011 people, if net migration would revert to around 2001-2006 level (130-160 people/year), and if fertility (TFR) does not decrease significantly (see medium population growth variant assumption).

The resident population would decline to 12,260 people in the year 2031, if the current high level of negative migration gradually declines from its 2006-2011 level (-320) to the 2001-2006 level of -130 persons annually by 2031, while fertility declines from 2.8 to 2.0 children per women in 2031.

Population changes close to those spelled out 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 been in the recent past, based on our understanding on developments worldwide 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.
- Similarly, a more pronounced fertility decline is not expected to occur, as it seems 'uncharacteristic' for Pacific Island populations. Therefore, the *low fertility variant* with the assumption of a continued fast fertility decline also seems an unlikely outcome.
- It is clearly impossible to predict future levels of international migration. The *medium variant* assumption appears to the least contentious, as the high levels of -320 people/year between 2006-2011 may not continue as the resident population would "run out of people" in specific age groups, yet a degree of negative net-migration has prevailed in the Cook Islands since the early 1970s, and there are no signs that this trend will change, let alone reverse in the near future.

## IMPLICATIONS OF DEMOGRAPHIC TRENDS

### 7.1 Population dynamics

#### Fertility

Declining fertility, a reduced number of children per woman, will have the following impact on Cook island population dynamics, and implicitly, on development planning and policies:

- a decreasing natural growth rate;
- the population becoming older (as it reduces the proportion of children);
- fewer school children;
- in the long term, it also means less pressure on the public and private sector to provide jobs for school leavers as the number of school leavers will eventually become smaller.

To make sensible assumptions underpinning future population growth scenarios, it is essential to have a good, reliable database to work from, such as a complete birth registration system, which records the number of births, preferably by age and usual residence of mother. Such a system also needs to ensure, the births overseas to women normally/usually resident in the Cook Islands, are adequately captured.

#### 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 immunization;
- provide a hygienic and safe living environment;
- promote healthy nutrition;
- advocate a general healthy life style including regular physical exercise;

- discourage smoking, excessive alcohol consumption, and other substance abuse.

As noted in previous reports, in order to facilitate reliable estimates on 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 usual residents that occur overseas are accounted for in the Cook Islands statistics. This may be preceded by a special research project investigating the number of deaths of residents that occur overseas.

### **Internal Migration**

As shown in previous analysis of census data, migration from the Outer islands (especially from the Southern Group islands) to Rarotonga continues to be 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 standards, and the availability and accessibility of key services, such as medical and educational institutions, entertainment facilities and, of course, a wider range of paid employment opportunities.

As has been noted in past census analysis, if the Government wish 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 above mentioned services.

### **International Migration**

Cook Islands' population decline during the period 1971 to 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 and possibly Australia, 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 the Cook Islands.

While the current trend of a high negative growth rate of  $-0.5$  per cent per annum is clearly not sustainable, as the population of the Cook Islands would continue to decline over time, there are no visible indications that this 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. CROSSCUTTING ISSUES

### **The Environment**

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

In recent years environment groups 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. Within recent times, offensive smells, the presence of algae, and muddy water can all contribute as tourist deterrent which may lead to a decline in occupancy rates. Since tourism is the most important income source of Cook Islanders, the protection of the 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 tourism industry.

### **Health services**

The health status of each individual and his/her 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 decision where to live.

As noted in past census reports, while it cannot be expected that certain special health care facilities will be available to a small and remote population such as the Cook Islands (because the low number of cases prohibit the operation of state-of-the-art health services that would include the employment of specialist, and purchase and maintenance of expensive equipment), provisions need to be in place to ensure a system of efficient referrals to the nearest health facilities is in place. Regular visits of overseas medical specialists are an obvious way to meet peoples' 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 where a large proportion of people have had little to no formal education and training.

In this regard and as noted in past census analysis it is of benefit that young people leave the country to join overseas higher educational institutions. However, it needs to be assured that these people are provided with suitable employment in the Cook Islands after completing their education otherwise it will be difficult to entice them to return.

### **Economic activity**

Economic activity and employment is shaped by the size of the working-age population, the educational skill level of the labour force, and obviously the state of the national economy.

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

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

### **Labour market**

The continuous high emigration rates, especially of people in their working ages, 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 causes imported products to be rather expensive, due to high transportation costs. 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 supply and variety of goods and services, as an ever-declining population means less and less customers (demands) 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 the country points to a dissatisfaction with local living conditions, and/or expectations that life is better, or promises to be better elsewhere than at home. As has been noted in past analysis, a specially designed survey may shed more light on the specific motives and aspirations of migrants, which would provide a factual basis for policies aimed at reversing this trend.

### **Good governance**

Good governance and effective policymaking should provide the framework for sustainable development within which the interrelationship of 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 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 Tables**

**Table A1: Estimated Total Fertility Rate (TFR) of the intercensal period 2006-2011, based on number of registered births**

Age group of women	Census count of resident women		Estimated mid-period number of resident women 2006-2011	Average annual number of registered births 2006-2011	ASFR 2006-2011
	2006	2011			
15-19	630	597	614	29	0.048
20-24	545	512	529	84	0.158
25-29	473	493	483	65	0.135
30-34	554	462	508	56	0.11
35-39	551	521	536	36	0.066
40-44	540	542	541	17	0.032
45-49	457	528	493	2	0.004
<b>Total</b>	<b>3,750</b>	<b>3,655</b>	<b>3,703</b>	<b>289</b> <b>TFR=</b>	<b>0.553</b> <b>2.8</b>

**Table A2: Estimated Total Fertility Rate (TFR) of the intercensal period 2006-2011 using procedure 'ARFE-2' of the software package PAS of the US Census Bureau**

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
<b>Reference period: 1 June 2006</b>									
15-19	0.0676	0.0676	0.0693	0.0693	0.9760	0.0718	0.0729	0.0713	0.0697
20-24	0.1425	0.2101	0.1368	0.2060	1.0200	0.1418	0.1441	0.1408	0.1376
25-29	0.1451	0.3552	0.1312	0.3372	1.0533	0.1360	0.1382	0.1351	0.1320
30-34	0.1078	0.4630	0.1230	0.4603	1.0059	0.1276	0.1296	0.1267	0.1238
35-39	0.0325	0.4955	0.0769	0.5372	0.9224	0.0797	0.0810	0.0792	0.0773
40-44	0.0135	0.5090	0.0266	0.5638	0.9028	0.0276	0.0280	0.0274	0.0268
45-49	0.0031	0.5121	0.0052	0.5690	0.9000	0.0054	0.0055	0.0054	0.0052
TFR	2.56		2.85			2.95	3.00	2.93	2.86
Mean age			28.4						
<b>Reference period: 1 June 2011</b>									
15-19	0.0662	0.0662	0.0475	0.0475	1.3955	0.0518	0.0498	0.0482	0.0467
20-24	0.1470	0.2133	0.1404	0.1879	1.1353	0.1533	0.1473	0.1427	0.1380
25-29	0.1285	0.3418	0.1379	0.3258	1.0492	0.1506	0.1447	0.1401	0.1356
30-34	0.0755	0.4173	0.0987	0.4245	0.9830	0.1078	0.1036	0.1003	0.0970
35-39	0.0372	0.4544	0.0663	0.4908	0.9258	0.0725	0.0696	0.0674	0.0652
40-44	0.0325	0.4869	0.0328	0.5236	0.9299	0.0358	0.0344	0.0333	0.0322
45-49	0.0119	0.4988	0.0044	0.5280	0.9447	0.0048	0.0046	0.0045	0.0043
TFR	2.49		2.64			2.88	2.77	2.68	2.60
Mean age			28.6						

**Table A3: Estimated Total Fertility Rate (TFR) of the intercensal period 2001-2011 using procedure 'ARFE-3' of the software package PAS of the US Census Bureau**

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
<b>Reference period: 1 June 2001</b>									
15-19	0.0703	0.0703	0.0573	0.0573	1.2256	0.0549	0.0516	0.0503	0.0491
20-24	0.1571	0.2274	0.1661	0.2234	1.0176	0.1592	0.1494	0.1458	0.1422
25-29	0.1095	0.3369	0.1512	0.3746	0.8993	0.1449	0.1360	0.1327	0.1295
30-34	0.0862	0.4231	0.1195	0.4942	0.8562	0.1146	0.1075	0.1049	0.1023
35-39	0.0272	0.4503	0.0895	0.5837	0.7715	0.0858	0.0805	0.0786	0.0767
40-44	0.0034	0.4537	0.0333	0.6170	0.7354	0.0319	0.0300	0.0292	0.0285
45-49	0.0012	0.4549	0.0000	0.6170	0.7373	0.0000	0.0000	0.0000	0.0000
TFR	2.27		3.09			2.96	2.77	2.71	2.64
Mean age			28.45						
<b>Reference period: 1 June 2006</b>									
15-19	0.0678	0.0678	0.0693	0.0693	0.9788	0.0668	0.0659	0.0645	0.0631
20-24	0.1335	0.2012	0.1368	0.2060	0.9769	0.1318	0.1301	0.1274	0.1246
25-29	0.1195	0.3207	0.1312	0.3372	0.9511	0.1265	0.1248	0.1222	0.1196
30-34	0.0988	0.4195	0.1230	0.4603	0.9114	0.1186	0.1170	0.1146	0.1121
35-39	0.0315	0.4511	0.0769	0.5372	0.8397	0.0741	0.0731	0.0716	0.0701
40-44	0.0146	0.4657	0.0266	0.5638	0.8260	0.0257	0.0253	0.0248	0.0243
45-49	0.0046	0.4703	0.0052	0.5690	0.8265	0.0050	0.0050	0.0049	0.0047
TFR	2.35		2.85			2.74	2.71	2.65	2.59
Mean age			28.40						
<b>Reference period: 1 June 2011</b>									
15-19	0.0662	0.0662	0.0475	0.0475	1.3955	0.0518	0.0498	0.0482	0.0467
20-24	0.1470	0.2133	0.1404	0.1879	1.1353	0.1533	0.1473	0.1427	0.1380
25-29	0.1285	0.3418	0.1379	0.3258	1.0492	0.1506	0.1447	0.1401	0.1356
30-34	0.0755	0.4173	0.0987	0.4245	0.9830	0.1078	0.1036	0.1003	0.0970
35-39	0.0372	0.4544	0.0663	0.4908	0.9258	0.0725	0.0696	0.0674	0.0652
40-44	0.0325	0.4869	0.0328	0.5236	0.9299	0.0358	0.0344	0.0333	0.0322
45-49	0.0119	0.4988	0.0044	0.5280	0.9447	0.0048	0.0046	0.0045	0.0043
TFR	2.49		2.64			2.88	2.77	2.68	2.60
Mean age			28.56						

**Table A4: Number of Registered deaths, by age and sex, 2001-2012**

Age	2001			2002			2003			2004			2005			2006			2007			2008			2009			2010			2011			2012		
	T	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T	M	F			
0-1	5	4	1	3	2	1	5	3	2	5	4	1	6	4	2	3	3	-	2	1	1	2	2	-	1	-	1	1	-	1	-	1	1	1	-	
1-4	4	1	3	1	1	-	-	-	-	1	1	-	-	-	-	-	-	-	3		3	-	-	-	1	1	-	1	1	-	1	-	1	-	-	
5-9	-	-	-	-	-	-	1	1	-	1	1	-	-	-	-	-	-	-	2	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
10-14	-	-	-	1	1	-	-	-	-	2	2	-	-	-	-	1	1	-	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	-
15-19	1	-	1	2	2	-	1	1	-	1	1	-	3	2	1	4	1	3	2	1	1	2	-	2	3	2	1	2	2	-	2	2	-	2	-	2
20-24	1	1	-	1	1	-	2	2	-	4	2	2	1	1		1	-	1	2	2	-	1	1	-	3	3	-	-	-	-	1	1	-	1	1	-
25-29	1	1	-	1	-	1	1	-	1	-	1	-	3	2	1	-	-	-	1	-	1	1	1	-	1	1	-	-	-	-	-	-	-	1	1	-
30-34	2	1	1	2	1	1	1	1	-	1	1	-	2	2	-	-	-	-	1	-	1	-	-	-	2	1	1	-	-	-	1	1	-	1	1	-
35-39	-	-	-	1	1	-	4	3	1	2	2	-	1	1	-	-	-	-	1	1	-	7	4	3	5	4	1	2	1	1	-	-	-	4	3	1
40-44	3	1	2	2	1	1	4	3	1	3	3	-	3	1	2	2	-	2	1	1	-	3	2	1	2	1	1	2	1	1	3	2	1	2	-	2
45-49	3	2	1	5	4	1	3	2	1	2	2	-	3	2	1	-	-	-	4	3	1	1	-	1	3	1	2	4	2	2	3	2	1	3	1	2
50-54	3	1	2	7	3	4	4	3	1	4	4	-	10	9	1	9	3	6	1	-	1	3	2	1	3	1	2	5	3	2	5	3	2	3	3	-
55-59	6	1	5	6	4	2	7	4	3	6	5	1	6	4	2	9	8	1	8	8	-	3	3	-	1	1	-	2	-	2	2	1	1	4	4	-
60-64	5	4	1	12	10	2	6	5	1	13	9	4	8	7	1	6	1	5	7	5	2	1	1	-	6	3	3	8	7	1	4	2	2	19	13	6
65-69	11	5	6	17	15	2	12	9	3	12	8	4	12	6	6	5	4	1	8	5	3	5	3	2	9	5	4	14	11	3	7	4	3	12	8	4
70-74	12	7	5	6	4	2	13	8	5	12	7	5	9	8	1	21	13	8	13	11	2	10	9	1	9	1	8	11	8	3	10	6	4	7	4	3
75-79	10	7	3	18	8	10	12	8	4	12	8	4	8	4	4	10	8	2	9	4	5	9	4	5	8	5	3	20	15	5	15	8	7	15	8	7
80+	22	11	11	20	7	13	16	-	16	17	4	13	17	8	9	25	10	15	22	13	9	12	8	4	15	10	5	20	7	13	17	8	9	28	16	12
Total	89	47	42	105	65	40	92	53	39	99	64	35	92	61	31	96	52	44	88	58	30	60	40	20	72	40	32	92	58	34	72	40	32	104	65	39

**Table A5: Estimated mid-period resident population by age and sex, June 2006 and June 2008**

Age	2006			2008		
	Total	Male	Female	Total	Male	Female
<b>Total</b>	<b>14,996</b>	<b>7,627</b>	<b>7,369</b>	<b>15,150</b>	<b>7,657</b>	<b>7,493</b>
0	298	159	139	277	147	130
1-4	1,247	641	606	1,220	619	601
5-9	1,618	829	790	1,478	754	725
10-14	1,557	841	716	1,544	819	725
15-19	1,325	698	627	1,367	753	614
20-24	994	492	502	1,037	508	529
25-29	971	462	509	929	446	483
30-34	973	471	502	939	431	508
35-39	1,040	517	523	1,026	490	536
40-44	986	492	495	1,080	539	541
45-49	892	452	441	1,001	508	493
50-54	749	397	353	785	398	387
55-59	633	317	316	655	348	308
60-64	564	296	268	565	288	277
65-69	455	239	216	471	234	237
70-74	339	176	164	385	196	190
75-79	204	92	112	229	110	119
80+	153	60	94	168	73	96

**Table A6: Life expectancy at birth (E(0)) and Infant Mortality Rate (IMR), Cook Islands, 1945 - 2011**

Year	1945	1951	1954	1961	1966	1971	1976	1981	1996	2001	2006	2011
<b>E(0)</b>												
Males	41	42	49	61	60	63	63	64	68.4	68.0	69.5	71.5
Females	43	44	48	63	63	67	67	70	71.5	74.3	76.2	78.4
<b>IMR</b>	121.4	151.9	N/A	43.7	48	43.1	38.2	28.5	15.9	21.0	13.9	10.2

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 A7: Recorded annual arrivals, departures, and net migration of Cook Islands residents, 2001 to 2012**

Period	Total			Visitors			Cook Islands Residents		
	Arrivals	Departures	Excess <sup>(1)</sup>	Arrivals	Departures	Excess <sup>(1)</sup>	Arrivals	Departures	Excess <sup>(1)</sup>
<b>YEAR</b>									
2001	82,736	83,398	-662	74,575	74,287	288	8,161	9,111	-950
2002	81,473	81,404	69	72,781	71,985	796	8,692	9,419	-727
2003	87,846	86,191	1,655	78,328	75,970	2,358	9,518	10,221	-703
2004	94,086	92,841	1,245	83,333	81,145	2,188	10,753	11,696	-943
2005	100,360	99,667	693	88,405	86,832	1,573	11,955	12,835	-880
2006	104,422	103,470	952	92,328	90,392	1,936	12,094	13,078	-984
2007	109,431	108,160	1,271	97,316	95,136	2,180	12,115	13,024	-909
2008	106,521	107,281	-760	94,776	94,356	420	11,745	12,925	-1,180
2009	112,078	111,415	663	101,229	99,132	2,097	10,849	12,283	-1,434
2010	115,090	113,260	1,830	104,265	101,085	3,180	10,825	12,175	-1,350
2011	124,963	125,063	-100	113,114	112,312	802	11,849	12,751	-902
2012 <sup>(b)</sup>	133,284	133,201	83	122,231	120,839	1,392	11,053	12,362	-1,309

NOTE: <sup>(1)</sup> Excess = Arrivals less Departures

**Table A8: UN family migration model of net-migrant by age and sex**

Age	Males	Females	Males	Females
2.5	-0.062	-0.062	0.062	0.062
7.5	-0.027	-0.027	0.027	0.027
12.5	-0.021	-0.022	0.021	0.022
17.5	-0.105	-0.116	0.105	0.116
22.5	-0.189	-0.201	0.190	0.201
27.5	-0.181	-0.187	0.182	0.187
32.5	-0.137	-0.136	0.138	0.136
37.5	-0.095	-0.091	0.095	0.091
42.5	-0.064	-0.059	0.064	0.059
47.5	-0.042	-0.038	0.042	0.038
52.5	-0.028	-0.024	0.028	0.024
57.5	-0.018	-0.015	0.018	0.015
62.5	-0.012	-0.010	0.012	0.010
67.5	-0.008	-0.006	0.008	0.006
72.5	-0.005	-0.004	0.005	0.004
77.5	-0.003	-0.002	0.003	0.002
82.5	-0.002	-0.002	0.002	0.002
Total	-1.000	-1.000	1.002	1.002

**Table A9: Base population for projections: 2011 census resident population by age and sex**

Age	December 2011			June 2011*		
	Total	Males	Females	Total	Males	Females
<b>Total</b>	<b>14,974</b>	<b>7,490</b>	<b>7,484</b>	<b>14,965</b>	<b>7,485</b>	<b>7,480</b>
0-4	1,481	748	733	1,481	748	733
5-9	1,443	723	720	1,442	722	720
10-14	1,408	749	659	1,407	749	658
15-19	1,283	686	597	1,282	685	597
20-24	1,015	503	512	1,015	503	512
25-29	944	451	493	943	451	492
30-34	856	394	462	855	393	462
35-39	969	448	521	969	448	521
40-44	1,063	521	542	1,062	521	541
45-49	1,070	542	528	1,070	542	528
50-54	844	432	412	843	431	412
55-59	676	342	334	676	342	334
60-64	580	310	270	579	310	269
65-69	490	244	246	490	244	246
70-74	418	204	214	418	204	214
75-79	249	114	135	249	114	135
80+	185	79	106	184	78	106

\* using MOVEPOP software from US Bureau of Census Package PAS

**Table A10: Population projections results by sex for selected years**

Projection variants	Projection years				
	2013	2016	2021	2026	2031
<b>High growth</b>					
Total	15,164	15,465	16,010	16,674	17,474
Males	7,570	7,701	7,945	8,252	8,632
Females	7,593	7,763	8,065	8,422	8,842
<b>Medium growth</b>					
Total	14,997	15,031	15,095	15,264	15,576
Males	7,487	7,484	7,486	7,544	7,678
Females	7,510	7,547	7,610	7,720	7,898
<b>Low growth</b>					
Total	14,668	14,186	13,377	12,707	12,260
Males	7,322	7,061	6,625	6,263	6,017
Females	7,345	7,125	6,752	6,444	6,243

**Table A11: Population projections results by broad age groups for selected years**

Broad age groups	Projection variant		
	High	Medium	Low
<b>2013</b>			
14 years and younger	4,314	4,288	4,239
15-59 years	8,843	8,706	8,434
60 years and over	2,007	2,003	1,994
<b>Total</b>	<b>15,164</b>	<b>14,997</b>	<b>14,668</b>
<b>2016</b>			
14 years and younger	4,277	4,178	4,006
15-59 years	9,041	8,717	8,068
60 years and over	2,147	2,135	2,112
<b>Total</b>	<b>15,465</b>	<b>15,031</b>	<b>14,186</b>
<b>2021</b>			
14 years and younger	4,253	3,958	3,483
15-59 years	9,314	8,721	7,532
60 years and over	2,443	2,416	2,362
<b>Total</b>	<b>16,010</b>	<b>15,095</b>	<b>13,377</b>
<b>2026</b>			
14 years and younger	4,322	3,769	2,936
15-59 years	9,478	8,669	7,041
60 years and over	2,874	2,826	2,730
<b>Total</b>	<b>16,674</b>	<b>15,264</b>	<b>12,707</b>
<b>2031</b>			
14 years and younger	4,606	3,809	2,689
15-59 years	9,646	8,623	6,585
60 years and over	3,221	3,143	2,986
<b>Total</b>	<b>17,474</b>	<b>15,576</b>	<b>12,260</b>