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Volume 2 – Demographic Profile, 1991-2002

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Secretariat of the Pacific Community
BP D5
98848 Noumea Cedex
New Caledonia
Tel: 687 26.20.00
Fax: 687 26.38.18
Email: spc@spc.int
http://www.spc.int

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Abbreviations

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

Summary of main indicators

	Total	Males	Females
Total enumerated population (November 2002)	9,561	4,729	4,832
Resident population size (November 2002)	9,359	4,614	4,745
Rate of annual growth (%), 1991–2002	0.6		
Rate of natural increase, 1991–2002	1.7		
Crude net migration rate, 1991–2002	–1.1		
Fertility			
Average annual number of births, 1997–2002	241	132	109
Crude birth rate (CBR), 1997–2002	26.0		
Total fertility rate (TFR), 2000–2003	3.7		
Teenage fertility rate, 2000–2003	40/1000		
Mean age at childbearing (MAC), 1997–2002	29.3		
General fertility rate (GFR), 1997–2002	104		
Mortality			
Average annual number of total deaths, 1997–2002	94	48	46
Average annual number of infant deaths, 1997–2002	8	5	3
Crude death rate (CDR), 1997–2002	10.2		
Life expectancy at birth, 1997–2002	63.6	61.7	65.1
Infant mortality rate (IMR), 1997–2002	35	41	28
Child mortality rate (4q1), 1997–2002	9	6.5	11.7
Under 5 mortality rate (5q0), 1997–2002	41	44	36
Migration			
Average annual number, 1991–2002	-98	-45	-53

Summary

The 2002 Tuvalu census recorded a total de facto population of 9,561 people, which included 202 short-term visitors. Tuvalu's resident population was enumerated at 9,359 people. This compares to 8,750 residents in 1991, representing a small annual population growth of 0.6%, and an average annual increase of about 55 people.

This low overall population growth was largely the result of a relatively high level of emigration during the intercensal period 1991–2002, with more than 1,000 more residents having left than having entered Tuvalu during the intercensal period, accounting for an average annual net loss of about 100 people.

The average number of births declined slightly from about 251 per year during the period 1992–1997, to 241 during the period 1997–2002; however, the total fertility rate (TFR[1]) increased from 3.6 for the period 1992–1997 to about 3.8 for the period 1997–2002.

The reason for the slight fertility increase, despite a decline of the total number of births was a substantial decrease in the number of women aged 25–29, the most fertile age group of women. At the same time these women had more children per woman than during the late 1990s. The average TFR for 2000–2003 is estimated at about 3.7.

Compared to migration or fertility, it is more difficult to provide accurate contemporary estimates of mortality in the case of small populations. This is because age groups more prominently affected by death than others (eg infants, young adults, the elderly) can become so small that random demographic events (such as death) can seriously distort annual accounts, and thus provide a very misleading picture. To rule out the distorting impact of such chance events, it is best to use period averages, such as the six-year average of 1997–2002 used for Tuvalu.

Based on registered number of deaths, life expectancies at birth are estimated at 61.7 and 65.1 years for males and females, respectively. Corresponding life expectancies were 60.7 and 65.1 years during the period 1992–1997, which means that there was a slight increase for males and no change for females.
Tuvalu's infant mortality rate (IMR) has been estimated at 35 infant deaths per 1,000 live births for the period 1997–2002. This represents a substantial decrease compared to the situation in the early-mid 1990s, when infant mortality rates amounted to 51.

[1] Average number of births per woman.

1 - Introduction

The aim of this report is to provide a demographic analysis of recent Tuvalu population developments. It draws on data from the Tuvalu censuses of 2002 and 1991, and from registration records from the years 1991–2003. The report includes:

- a situational profile of current fertility, mortality and migration features;
- an analysis of recent developments;
- a set of medium-term population projections (2002–2027); and
- a brief discussion of likely impacts of some of these patterns and developments on wider social and economic development issues.

The small size of Tuvalu's population and the random fluctuations of demographic events in this context make it difficult to calculate meaningful demographic indicators on an annual, let alone on a quarterly or monthly basis. This is because age groups more prominently affected by specific demographic events than others can be or can become so small that random demographic events (such as births and death) can seriously distort quarterly, monthly or even annual accounts, and thus provide a very misleading picture.

For example, women aged 20–29 are more likely to bear children than women aged 30–34 or 35–39, which means that modest changes in the number of women in a particular age group, or the number of births in a given year to women in a particular age-group can provide a completely misleading snapshot picture.

The same applies to deaths, where a small increase in the number of infant deaths in a given year could see a country's image change from resembling a model for infant and child health to one appearing to lack even basic health standards.

To rule out the distorting impact of such chance events, it is preferable to use period averages (e.g. 1992–1997 and 1997–2002), as employed throughout this report.

Tuvalu's uncertain future in view of global sea-level rise means that it is difficult to make meaningful assumptions about likely future demographic developments (particularly regarding migration), and this has obvious implications for long-term population estimates and forecasts.

2 - Population growth

Population dynamics refers 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. Fertility contributes to population growth, and mortality to population decline; however, migration can contribute to both, depending on the direction and magnitude of the migration flow.

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

The total population of Tuvalu enumerated by the 2002 census was 9,561. This represents an increase of only 518 people since 1991, which translates into an intercensal growth of 5.7%, or an annual growth rate of just 0.5% (Table 1).

Tuvalu's resident population (which excludes short-term visitors) amounted to 9,359. This represents an increase of 609 people since the 1991 census, which translates into an intercensal growth of 7%, or an annual growth rate of 0.6%. Apart from the Tuvaluan and part-Tuvaluan population, which makes up 98% of all residents, the resident population includes mainly people from Kiribati (84) and other Pacific Islands (57).

Table 1 - Population change between 1991 and 2002

	Population size		Population change		Average annual
	1991	2002	Number	%	rate of growth (%)
Total population	9,043	9,561	518	5.7	0.5
Resident population	8,750	9,359	609	7.0	0.6
Funafuti	3,576	3,962	386	10.8	0.9
Outer Islands	5,174	5,397	223	4.3	0.4

As mentioned above, a country's population growth is shaped by natural increase, where growth means more births than deaths occurred during a specific time period. Populations decline when the number of deaths outweighs the number of births during the same time. Population growth is also shaped by migration: when the number of immigrants (people arriving in a country, seeking residence there, or returning to their country of birth) exceeds the number of emigrants (people leaving), this will add to population growth; yet when more people depart than arrive, this slows population growth or contributes to actual decline, with net migration describing the overall migration flow.

Population growth is thus represented as the sum total of natural increase plus net migration, as highlighted in what is commonly known as the "balancing equation":

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

In Tuvalu, a total of 2,703 births and 1,012 deaths were registered in the 11-year intercensal period 1991-2002. Subtracting the number of deaths from the number of births yields a natural increase of 1,691 people for this period (2,703 – 1,012 = 1,691). Had no migration occurred between 1991 and 2002, or had net migration been zero, Tuvalu's resident population in 2002 would have amounted to 10,441 (resident population in 1991 = 8,750 + 1,691).

Despite this natural increase of 1,691 people, the resident population has only shown a net gain of 609 people during the intercensal period — which suggests emigration has played a major role in shaping Tuvalu population dynamics in recent years.[2] Applying the balancing equation permits a crude estimate of net migration during the intercensal period. Adding all known components to this equation (annual intercensal population growth plus natural increase) as illustrated in Step 1 below, and solving this equation by isolating 'net migration' (Step 2), results in a net migration of –1,082 people between the two censuses, or an annual figure of –98 people (Table 2).

Population growth$_{1991–2002}$ = natural increase + net migration (immigration – emigration).

Step 1: (609) = (1,691) + net migration

Step 2: Net migration = 609 – 1,691

Net migration = –1,082

Table 2 - Number of registered births and deaths, estimated net migrants and overall population change for the intercensal period 1991–2002

	Total number 1991–2002	Average annual number 1991–2002	Rate* 1991–2002	
Births	2,703	246	27.2	CBR
Deaths	1,012	92	10.2	CDR
Net migrants	-1,082	-98	-11.0	Migration rate
Overall change	*609*	55	0.6	Average annual rate of growth

*Based on mid-period population size ; CBR = crude birth rate ; CDR = crude death rate

[2] This assumes that the 1991 and the 2002 census coverage were equally accurate and complete.

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 per 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 of that year, multiplied by 1,000. As stated previously, for small populations such as Tuvalu, it is advisable to always use multi-year averages, because annual random fluctuations of (demographic) events can be quite considerable in very small populations.

This report includes averages for 1992–1997 and 1997–2002. CBR and CDR are calculated by dividing the average annual number of births and deaths of the intercensal period 1991–2002, by the mid-period population size of the intercensal period:

(Resident population$_{1991}$ = 8,750) + resident population$_{2002}$ = 9,359) / 2 = 9,055

An average of 246 annual births during the period 1991–2002 translates into an average CBR of 27.2 [i.e. (246/9,055)*1,000], and an average of 92 deaths during the same period, results in an average CDR of 10.2 [i.e. (92/9,055)*1,000].

Subtracting the CDR (10.2) from the CBR (27.2) yields an annual rate of natural increase of 17.0 per 1,000, or 1.7% per year. Thus, had it not been for migration, Tuvalu's resident population would have grown at an annual rate of 1.7%, which would see the population double in about 41 years.

Applying all corresponding rates during the intercensal period to the balancing equation would yield an annual crude net migration rate of –1.1%.

Population growth$_{1991–2002}$ = natural increase + net migration (immigration – emigration)

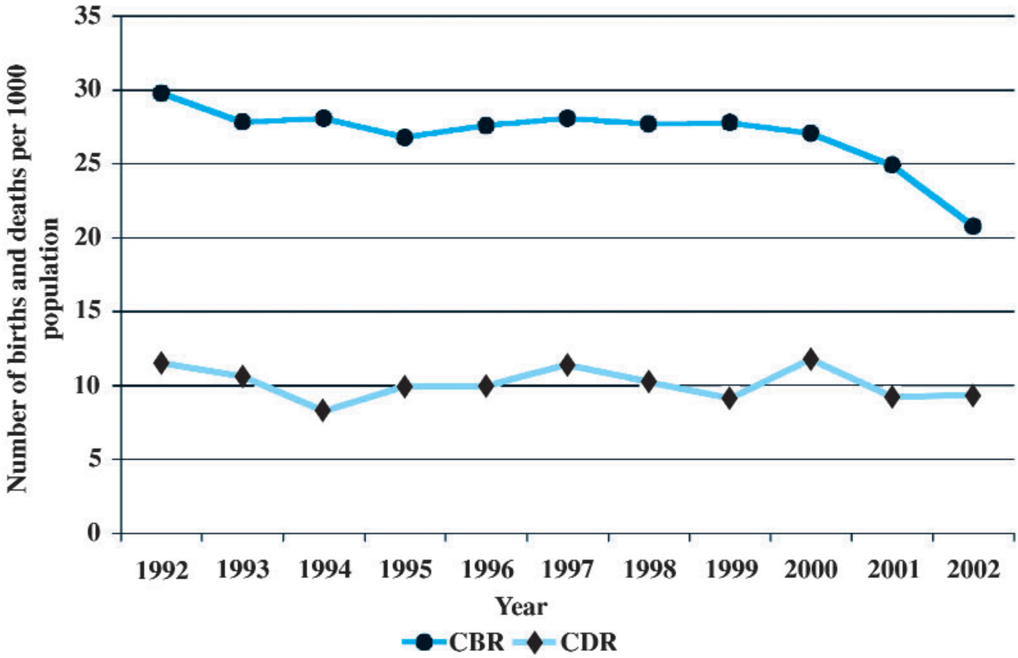
0.6% = 1.7% + net migration rate

Net migration rate = 0.6 – 1.7%

Net migration rate = –1.1%

Figure 1 and Appendix Table 1 illustrate the estimated annual CBRs and CDRs. The rate of natural increase is decreasing as a result of declining birth rates, and is represented as the area between the lines of the CBR and the CDR.

Figure 1 - Crude birth rate and crude death rate, 1992-2002



3 - Fertility

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

Fertility has a great impact on a country's age–sex composition, because the proportions of a population that are young or old depend largely on birth rates rather than death rates. Populations become older with falling birth rates (since this reduces the proportion of children), not with falling death rates; the latter contribute to a younger age distribution, because more infants and children survive.

There are two ways of looking at fertility: cross-sectionally and longitudinally. The more frequently used approach is a cross-sectional method — period analysis — which considers the number of births of all women during a specific reference period (usually one calendar year or a multi-year reference period).

3.1 Crude fertility measures

The most frequently used measure of fertility, the CBR, relates the number of births in a given year to the mid-year population of that year.

The CBR does not represent a true fertility measure, because it considers the total population as the main reference population, rather than the population group that gives birth (i.e. women in their reproductive years). The general fertility rate (GFR) at least relates the number of births in a given year to the mid-year population of women in their child-bearing ages. Dividing the reported number of births per year by the estimated mid-year number of women aged 15–49, yields a GFR of 104 (Appendix Table 2).

Although the GRF introduces some controls for age and sex, because it relates births only to those at risk of giving birth, there is still room for considerable variation in demographic composition of the same population over time, or between different populations. This happens when, for example, one island has few women of child-bearing age (e.g. when most of the women are under 20 or over 50 years of age), compared to another island that may have a more balanced population distribution, and therefore a higher GFR, simply because more women live there who are in their main reproductive years.

The only way to properly control for such variations over time, or between different populations is to standardise fertility by examining fertility behaviour in particular age groups. The measure of choice is the age-specific fertility rate (ASFR), which relates the number of births to women of a particular age group in a specific year, to the mid-year population of all women belonging to that age group (Appendix Table 2). The total fertility rate (TFR) combines these different age-specific rates into one single indicator, which shows the number of children a woman would give birth to, on average, during her reproductive life, if she were to progress through her childbearing years conforming to the ASFRs of a given year or period.

Annual vital events, such as births (and deaths), are likely to vary from year to year, sometimes quite substantially. It is therefore imperative in small populations such as that of Tuvalu to always work with multi-year averages, which provide more robust demographic indicators. Fortunately, the Tuvalu vital registration system is fairly complete and reliable, and its data can be used for an in-depth analysis of fertility (levels and patterns). During the 1990s, the number of annual births was relatively stable, fluctuating at around 250 births annually. Since the year 2000, the number of births decreased quite dramatically before it increased again in 2003 (Figure 2, Appendix Table 2)

Figure 2 - Number of registered births by age of mother, 1992–2003

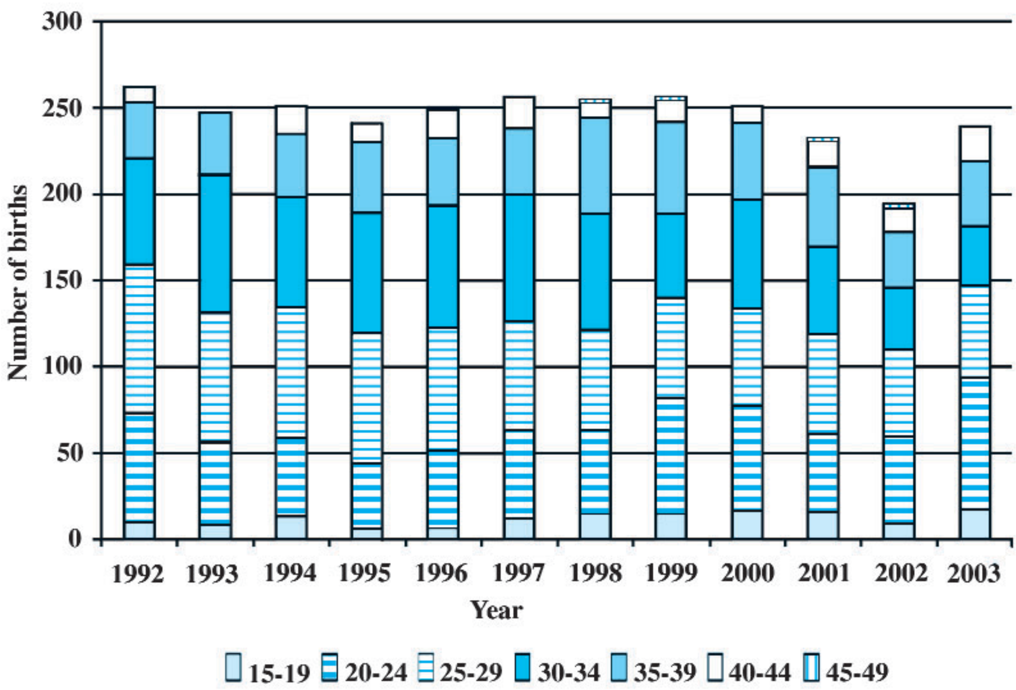
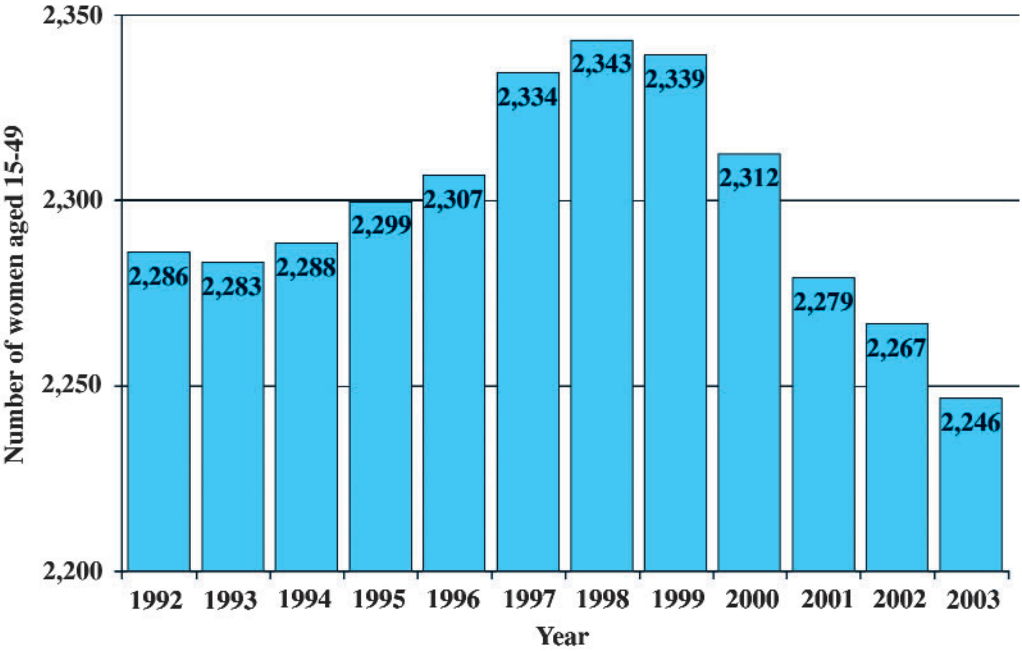


Figure 3 - Estimated number of women aged 15–49 years, 1992–2003



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

As referred to earlier, the most widely used measure of fertility is based on age-specific fertility. The enumerated women by age in the 1991 and 2002 censuses can be estimated from the number of women by age of each intercensal year (Figure 3). Together with the annual registered number of births by age of mother (Figure 2, Appendix Table 2), calculation of ASFR and TFR is fairly straightforward (number of births by age of mother, divided by the number of women by age).

Figure 4 and Appendix Table 2 compare the average ASFRs of the period 1992–1997 to the period 1997–2002. It shows that there was a slight fertility increase among women aged 20–39 years in the later period. Fertility rates of women aged 20 years and younger, and those of women 40 years and older, remained virtually unchanged.

Women aged 25–29 reported the highest number of births during the period 1992–1997 (74), whereas women aged 25–29 and 30–34 years had equal numbers of births during the period 1997–2002 (57). However, the highest ASFRs of all women were for those aged 25–29 during the period 1992–2002. The rate was 206 and 218 births per 1,000 women for the periods 1992–1997 and 1997–2002, respectively.

An annual average of 13 children was born to the 377 women aged 15–19 years during the period 1997–2002, resulting in a teenage ASFR of 0.036, indicating 36 births per 1000 young women in this age group. However, with 40 births per 1,000 teenagers, teenage fertility was slightly higher for the years 2000–2003.

The estimated TFRs for every year between 1992 and 2002 are shown in Figure 5 and Appendix Table 2. The TFR showed an increasing trend during the 1990s, from about 3.5 to 4; however, it decreased quite dramatically during the first three years of the 21st century. Whether or not this is indicative of a long-term declining fertility trend is difficult to say, especially as the TFR for the year 2003 has increased again, to 3.8. However, the average TFR for the years 2000–2003 was 3.7.

Births to Tuvalu residents that occur overseas have only been captured adequately since 1996; *therefore, the number of registered births of the period before 1996 might be incomplete.* This in turn could explain the lower calculated fertility rates during the early 1990s.

The average age at childbearing during the period 1992–2002 was 29.3 years.

Figure 4 - Age-specific fertility rates: period averages, 1992–1997 and 1997–2002

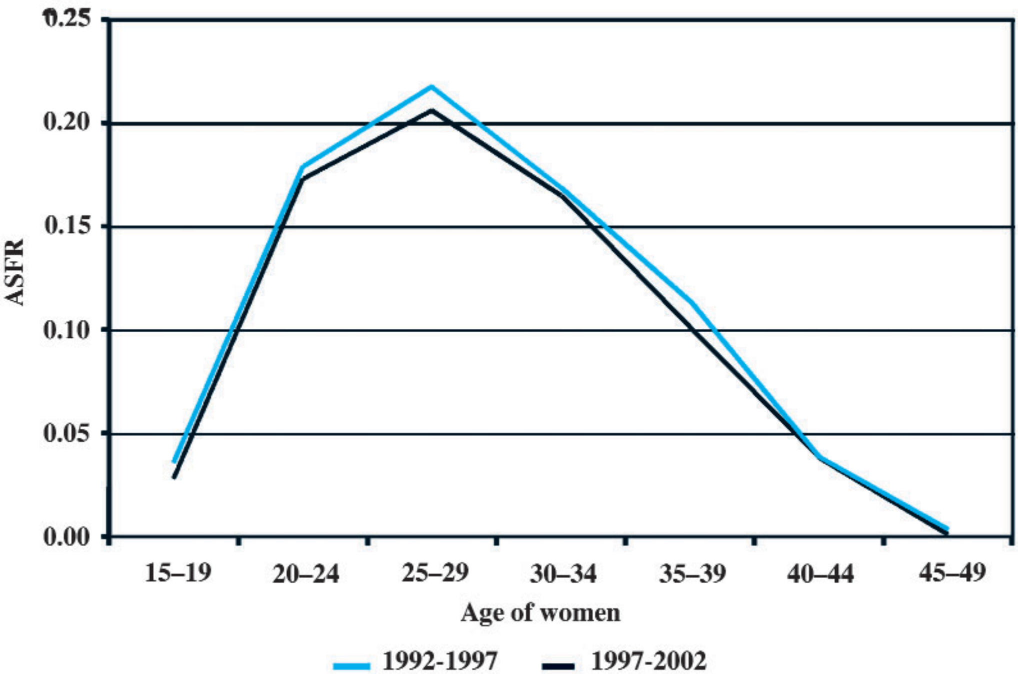
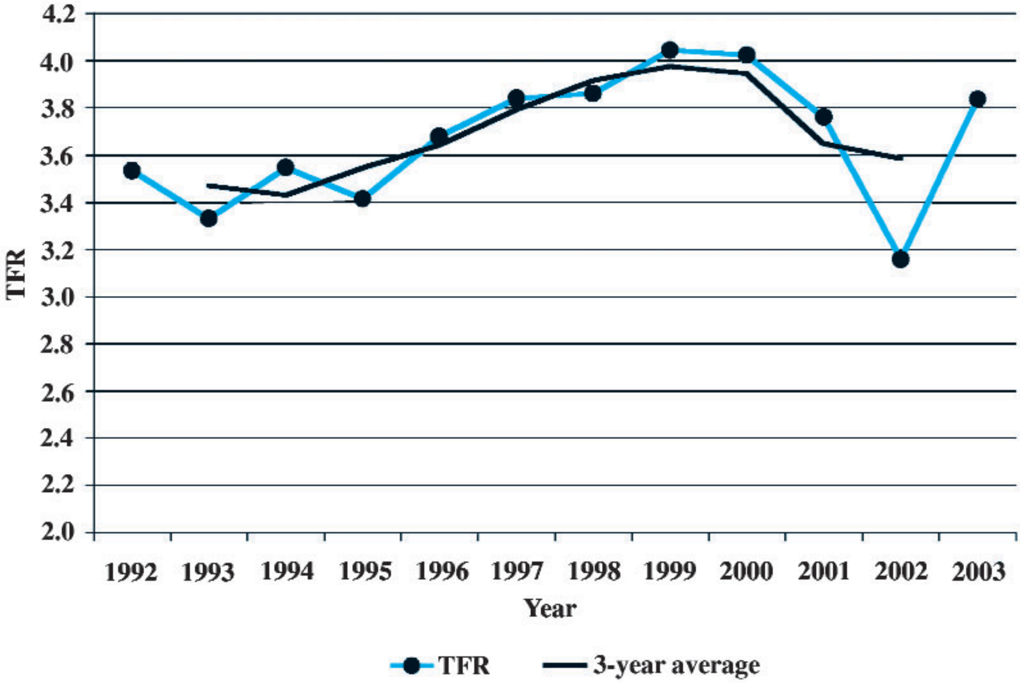


Figure 5 - Total fertility rate, 1992–2003



4 - Mortality

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

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

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

As in the case of fertility, mortality estimates are based on Tuvalu's vital registration system, which records deaths by age and sex. These data can be used to directly calculate a life table[3] from data of deaths by 5-year age groups. Because the possibility of random fluctuations is high when dealing with small numbers, as is the case with the Tuvalu data, it is imperative to work with multi-year averages to derive meaningful indicators. Figure 6 shows the average number of registered deaths by age and sex in the period 1997–2002.

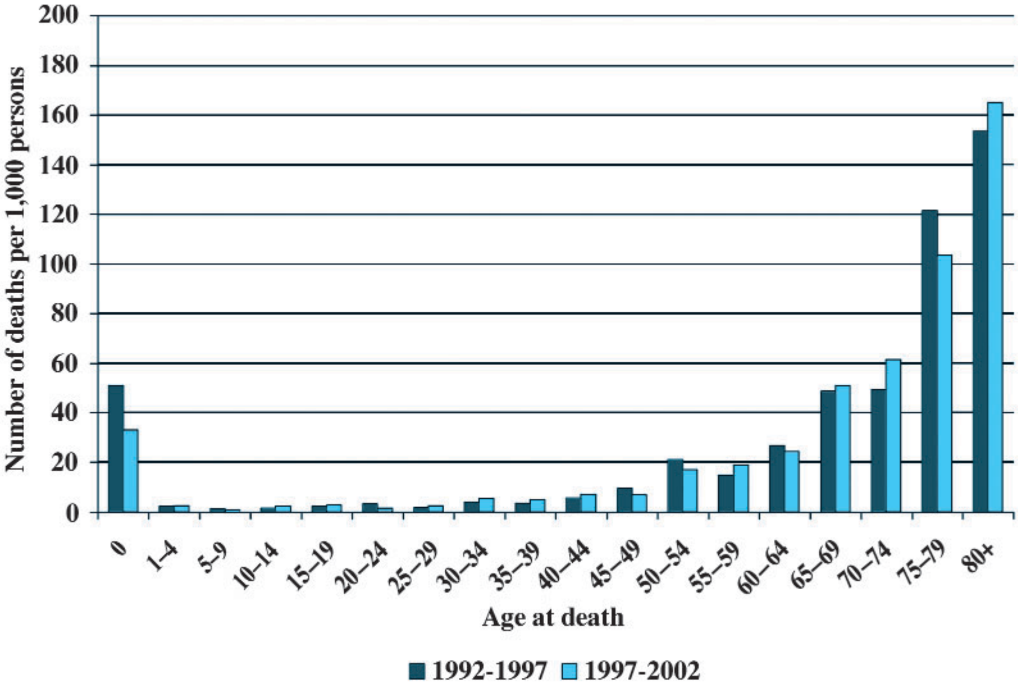
As discussed in Section 2, the average CDR for the resident population has been calculated at 10.2 for the period 1997–2002 (Figure 1, Appendix Table 1), which is about the same as for the period 1992–1997 (10.3).

From annual death registration data (Appendix Table 3) it can be seen that most deaths occur as infants (age 0–1) and at age 65 and older. There were more male (521) than female deaths (491).

[3]A life table is used to simulate the lifetime mortality experience of a population. It does so by taking that population's age-specific death rates and applying them to a hypothetical population of 100,000 people born at the same time. For each year on the life table, death inevitably thins the hypothetical population's ranks until, in the bottom row of statistics, even the oldest people die.

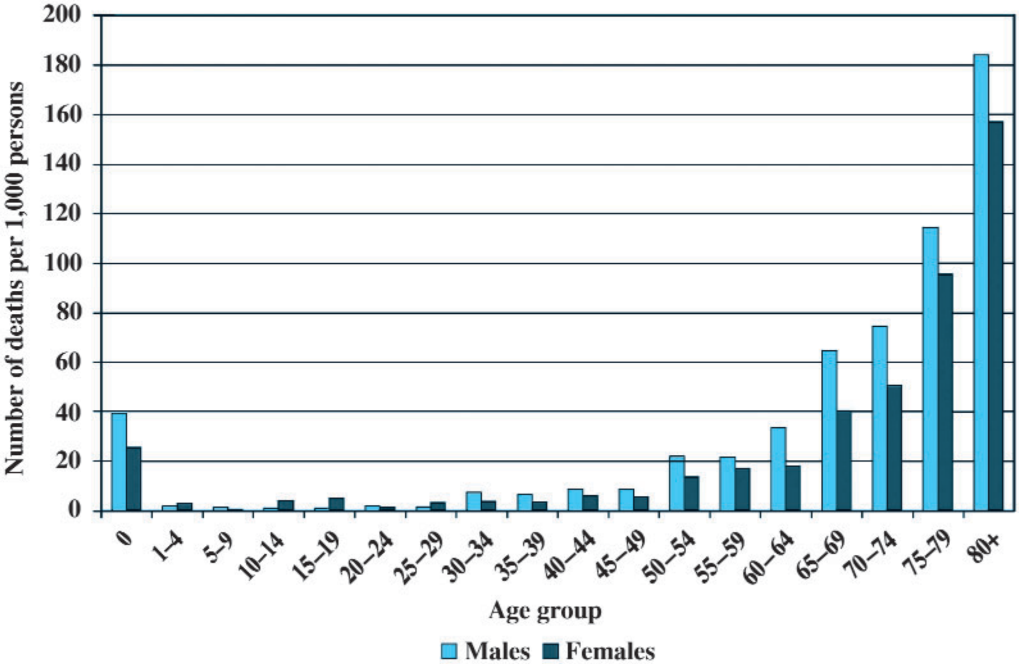
From these data the average numbers of deaths by age and sex were calculated for the years 1997–2002 (Figure 6). Age-specific death rates, M(x)-values, are calculated by dividing the average annual number of deaths of the period 1997–2002 by the estimated mid-period population by age and sex (Appendix Table 4). These values (shown in Figure 7) form the basis for calculating separate life tables for the male and female resident populations (Appendix Table 5a, 5b).[4]

Figure 6 - Average annual number of registered deaths by age and sex, 1997–2002



[4]The procedure 'LTPOPDTH' of the software programme PAS of the US Census Bureau was used to calculate life tables. The procedure 'LIFTB' of the software programme MORTPAK LITE 3.0 of the United Nations was used to verify the results.

Figure 7 - Estimated age specific death rates [M(x)], average of years 1997-2002



Life expectancy at birth for males and females has been estimated at 61.7 and 65.1 years, respectively. The difference in life expectancy of 3.4 years in favour of females is consistent with the fact that more male than female deaths have been reported during the period 1997–2002 in most age groups (285 male deaths were registered compared to 279 female deaths; a difference that is particularly significant in view of the fact that there were more females than males counted during the 2002 census). It is also consistent with data on widowhood, which can be used as an indication of the number of male and female spouses that have died. More widowed females than males were reported in the 2002 census. Although fewer than 17% of all males 60 years and older were widowed, 46% of females of the same age group were widowed.

Compared to the period 1992–1997, life expectancies at birth appear to have increased only slightly for males, whereas female life expectancies remained constant at about 65.1 years (Table 3).

Table 3 - Life expectancies by sex for the periods 1992–1997 and 1997–2002

	1992–1997	1997–2002
Males	60.7	61.7
Females	65.1	65.1
Total	62.9	63.6

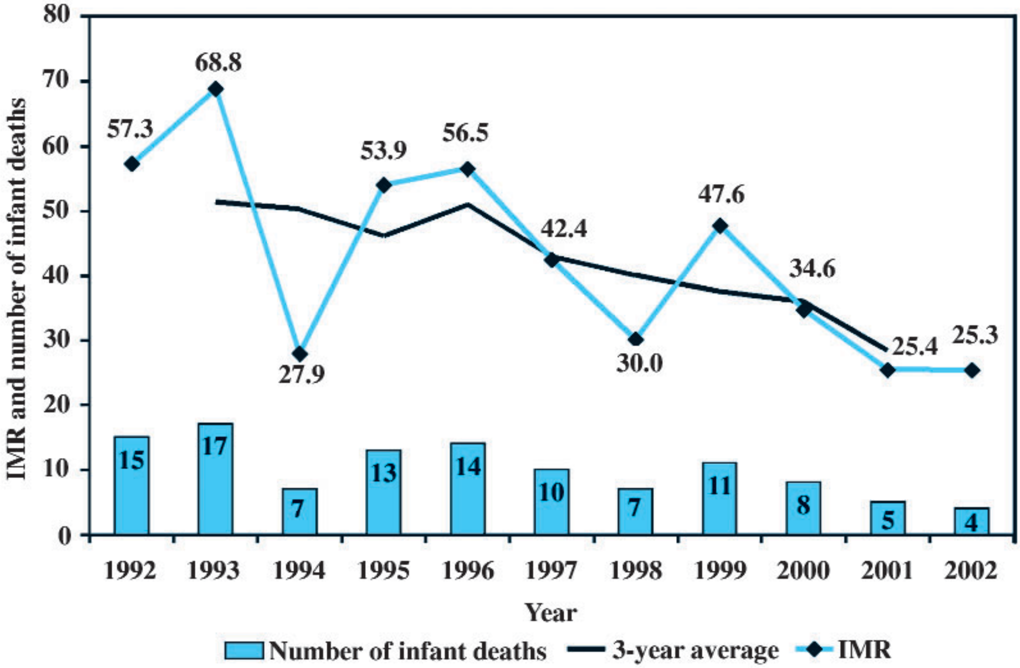
The IMR is the most common and basic measurement of early age mortality. It measures the number of deaths of children under one year old in relation to 1,000 births in a given time interval (usually a calendar year). During the period 1997–2002, 45 infant deaths were recorded (Figure 8). During the same period, 1284 births were registered. Dividing the number of infant deaths by the number of births results in an average IMR of 35 for the period 1997–2002 (Table 4). Male infant mortality, at 41 infant deaths per 1,000 live births, was considerably higher than female infant mortality, at 28 infant deaths per 1,000.

Table 4 - Number of registered infant deaths, number of births, and infant mortality rate (IMR) by sex, 1992–2002

	1992–1997			1997–2002			1992–2002		
	Male	Female	Total	Male	Female	Total	Male	Female	Total
Number of births[a]	784	701	1,485	705	581	1,284	1,355	1,180	2,535
Number of infant deaths	39	37	76	29	16	45	65	46	111
IMR	50	53	51	41	28	35	48	39	44

[a] Births occurring in Tuvalu only

Figure 8 - Number of registered infant deaths and infant mortality rate (IMR), 1992–2002



Generally, the data show a considerable decrease in the number of infant deaths and corresponding IMRs during the period 1992–2002, as the IMR of 51 for the period 1992–1997 was considerably higher than in recent years (35).

Child mortality, or the probability of dying between age 1 and exact age 5, was estimated at about 11.7 deaths per 1,000 persons in that age group. Between 1997 and 2002, 13 deaths of children aged between 1 and 4 years were recorded — 5 boys and 8 girls (Table 5).

Table 5 - Mortality indicators by sex, 1997–2002

Indicator	Total	Males	Females
Life expectancy at birth	63.6	61.7	65.1
Infant mortality rate	35.0	41.2	27.6
Child mortality rate	9.0	6.5	11.7
Under 5 mortality	40.8	44.4	36.4

Sometimes mortality indicators can be estimated by calculating the proportion of people, by sex and age group, who have survived from one census to the next (cohort survival). As has been shown earlier, Tuvalu is subject to a significant amount of migration, and this type of estimation is therefore not suitable, because it would be impossible to establish whether a person had died or migrated.

5 - International migration

Migration is the movement of people across a certain boundary for the purpose of establishing a new residence. Together with fertility and mortality, migration is the third component of population change.

When people move across national boundaries or borders, we speak of international migration, and refer to those involved in this movement as immigrants (people moving into a country) or emigrants (people leaving a country). When the movement of people occurs within a country (e.g. between islands, districts or villages), we speak of internal migration, and refer to people involved in this process as “in-migrants” and “out-migrants”, respectively. Movement usually involves mobility in both directions; therefore, the term “net migration” describes the actual impact of migration on a particular population. Net migration shows the net effect of immigration and emigration on a particular population, and is usually defined in terms of an increase or decrease per 1000 people in a given area, or as an annual growth rate in percentage terms.

Time is another important factor 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, because a visitor can become a migrant if the person decides to stay for a longer time; for example, if a sudden job opportunity emerges. Similarly, a person intending to migrate may become a visitor if, for example, expected job opportunities do not materialise, and the person decides to return to their place of departure.

The consideration of time and intent together with spatial phenomena highlight two key challenges when it comes to measuring migration. First, whether or not a particular person qualifies as a migrant can only be established after a certain period of time, because of the need to establish whether the person qualifies as a visitor or a migrant. Second, one year has emerged as the most frequently used benchmark in censuses worldwide.

The Tuvalu census contained two questions related to migration, one asking people for their place of birth, the other asking where their place of residence was five years before the census (in 1997).

5.1 Place of birth and place of residence five years before the census

Every fifth Tuvalu resident was born overseas (1,892, or 20.2%). The same applies to more than one-quarter of Funafuti’s residents (1,077), and 15% of the Outer Islands population.

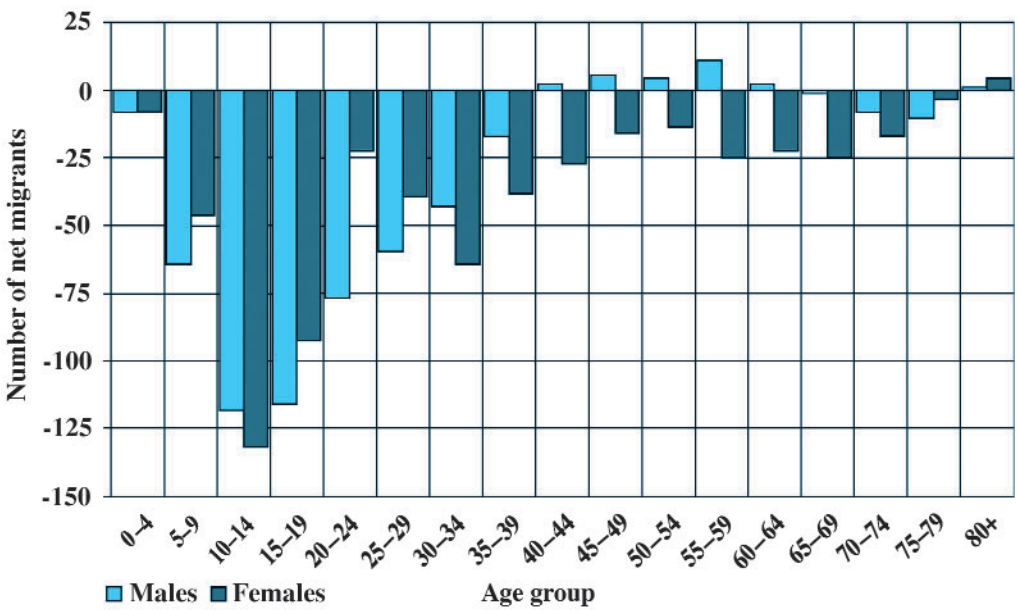
In answer to the question of where people lived five years before the census, 1,047 persons (13.1%) of the resident population answered that they had their usual place of residence overseas. Almost 1 in 5 (19.5%) Funafuti residents lived overseas five years before the census.

Unfortunately, from data on people's place of birth and place of residence five years before the census, it is not possible to establish proper migration rates, because it is not clear exactly when people who were born overseas or lived overseas entered the country. More importantly, data on persons leaving the country are not available from the census simply because the people were not present for interview during the census enumeration. Therefore, census-based migration rates can only be estimated indirectly, by comparing the population size by age and sex of the two nearest censuses; in this case, the censuses of 1991 and 2002.

About 1,082 more Tuvalu residents have left than have arrived in Tuvalu during the intercensal period. These figures represent crude migration estimates, derived as the difference between the natural increase of the population and the total population growth during the intercensal period.

Comparing 1991 and 2002 census populations by five-year cohorts, and taking the registered number of births and deaths by age and sex into consideration, it appears that it was mainly the population aged 10–19 years who left Tuvalu during the intercensal period (Figure 9). More than half (58%) of all migrants were younger than 19 years of age, and a further 34% were aged between 20 and 59 years.

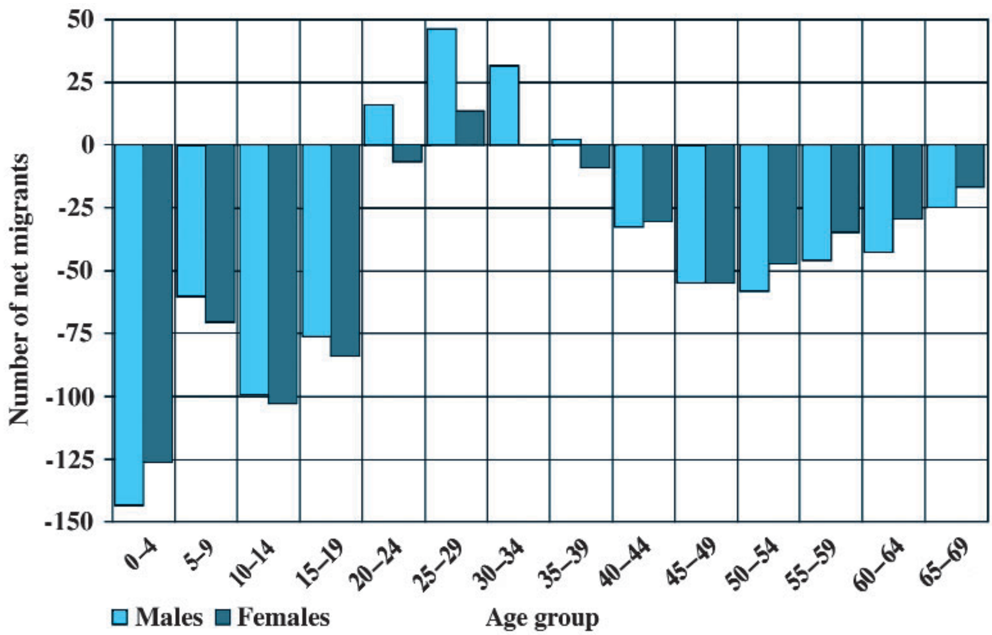
Figure 9 - Estimated number of Tuvalu intercensal net migrants by age and sex, 1991–2002



The size and age structure of Tuvalu migrants in the intercensal period 1991–2002 was also shaped by the sudden return of some 200 Tuvaluans from Nauru, just before the census — a movement triggered by the economic crisis in Nauru. Thus, the Tuvalu 1991–2002 migration profile shown in Figure 9 is not a true reflection of "normal" migration occurring during the intercensal period. To provide such a profile is difficult without information about the exact age–sex structure of these recent returnees.

It is possible, however, to provide an estimate, and thus arrive at a more realistic "average" Tuvaluan migration profile for the period 1991–2002, which is required for population projections. The calculation is based on the assumption that this group of recent returnees bears a close resemblance in their age–sex structure to the net-migration profile of (former) Nauru residents of non-Nauruan decent,[5] many of whom were Tuvaluans. It is simply a matter of allocating 200 Tuvaluan return migrants to this age–sex profile of the non-Nauruan net migrants of non-Nauruan descent (Figure 10), and subtracting the relevant numbers from the Tuvalu 1991–2002 net-migration profile (Figure 9). The result is shown in Figure 11, which describes a more realistic long-term average of "normal" Tuvaluan migration, with Appendix Table 6 containing the adjusted age-specific migration totals.

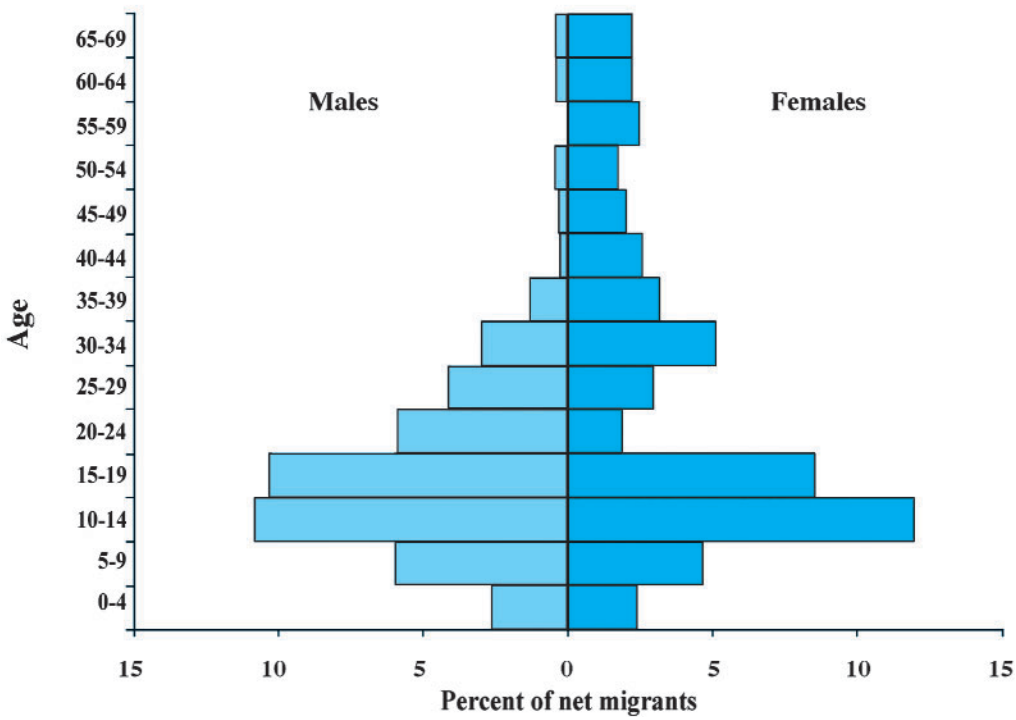
Figure 10 - Number of net migrations, by age and sex, of Nauruan residents of non-Nauruan descent, 1992–2002



Source: Demographic Profile of Nauru, 1992–2002

[5]This group refers mainly to I-Kiribati, Tuvaluans and some Asian residents on Nauru

Figure 11 - Estimated age and sex distribution of Tuvaluan net migrants (excluding returnees from Nauru), 1991–2002



With more than one-third of net migration involving children (0–14 years of age) and a further 19% involving youth (15–24 years of age), three distinct contemporary migration patterns emerge from Tuvalu:

- entire families are leaving Tuvalu, as illustrated by the classic migration-shape age pyramid shown in Figure 11;
- young people are leaving to further their education, and/or seek work overseas; and
- there are clear indications of age-specific migration differentials, with young men (20–29) outnumbering young women at a rate of 2:1, and with a complete and even more pronounced reversal apparent in the 30+ age groups, where women outnumber men by more than 3:1.

Overall, women feature more strongly, accounting for 54% of all migrants.

6 - Population projections

In formulating social and economic policy, and corresponding development plans, population variables ought to play a central role, alongside economic and social considerations. For governments to cater effectively for the specific needs of different population groups at different points in time, it is important for planners and policy-makers to gain an idea of how their population might look in the future. The appropriate method is to consider different population scenarios that spell out specific population outcomes (size, structure, distribution) under different assumptions of fertility, mortality and migration developments.

The starting point for any projections is a reliable age–sex distribution of a population. In this case, it is the Tuvalu 2002 census age and sex distribution of the total Tuvalu resident population, combined with information on fertility, mortality and migration.

The population projections presented here were calculated using the cohort–component method. 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–sex structure of the population, in a simulation that takes into account the fact that death rates relate to sex and age, that women have children, and that some people change their residence. The cohort–component method of projecting a population follows each cohort of people of the same age and sex throughout their lifetime, according to their exposure to fertility, mortality and migration.[6]

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.

Population projections are not forecasts suggesting what is going to happen in the future; rather, they provide policy-makers and planners with "what-if scenarios"; that is, information about what future population will look like under given assumptions. These projections are not meant to suggest that the assumptions will materialise (i.e. that certain fertility, mortality, migration patterns and developments will eventuate) — they merely suggest that certain population outcomes will happen if specific fertility, mortality and migration trends eventuate or prevail in the coming years.

[6] Population Analysis with Microcomputers, Volume I, Presentation of Techniques, p.309–310, by Eduardo Earring, Bureau of the Census, Department of Commerce, USA

Fertility and mortality are relatively stable, which means that dramatic changes usually do not occur overnight; however, migration pattern and trends can change quite suddenly and dramatically, particularly in societies exposed to fragile economic and environmental situations, such as in Tuvalu.

6.1 Projection assumptions

To gain a better understanding of Tuvalu's future population situation, several projections have been prepared, covering a 25-year period, from 2002 to 2027. A range of demographic inputs are used for the projections, as listed below.

6.1.1 Base population

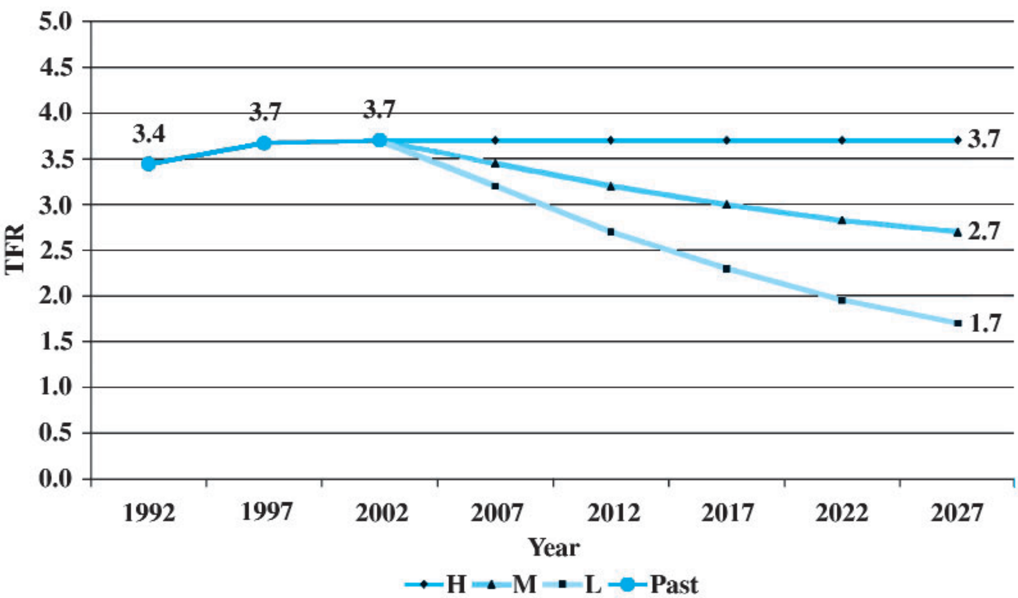
The base population is estimated from the 2002 census age and sex distribution of the resident population (Appendix Table 7).

6.1.2 Fertility

The average TFR for the years 2000–2003 of 3.7 and associated ASFR (see Section 3), are used as a starting point, with three different assumptions made about future fertility developments (Figure 12):

- high fertility — fertility remains constant at its current level of 3.7 until 2027;
- medium fertility — fertility decreases by 1 child from 3.7 to 2.7 in the year 2027, and resembles exactly the intermediate level of the high fertility assumption and the low fertility assumption; and
- low fertility — fertility decreases by 2 children, from 3.7 to 1.7 in the year 2027.

Figure 12 - Fertility assumptions for projections, 2002–2027



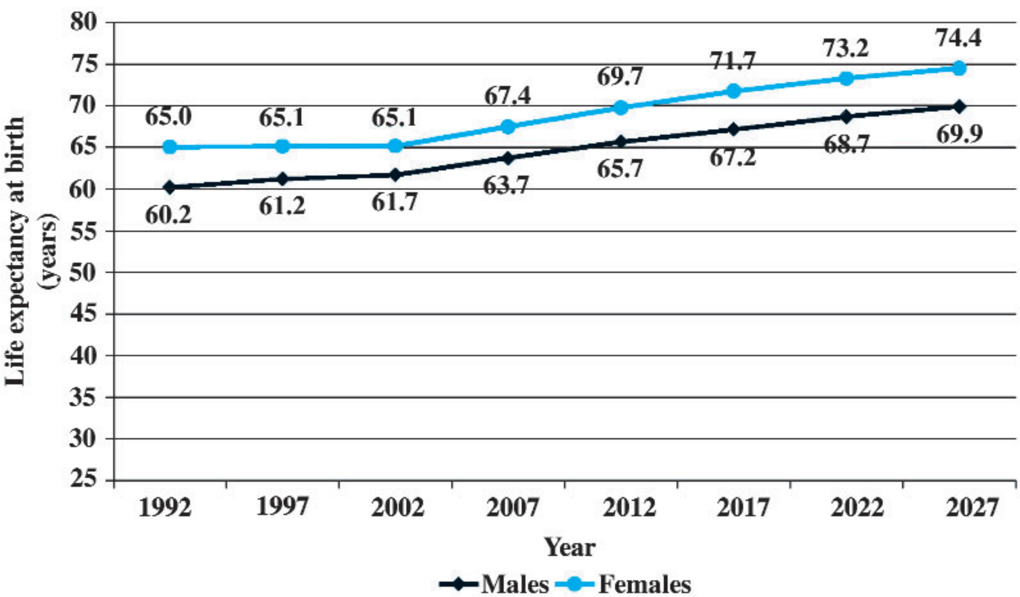
6.1.3 Mortality

Life expectancy at birth of 61.7 years and 65.1 years for males and females, respectively, is used as the starting point for the projections in 2002. These estimates are based on the number of registered deaths by age and sex of the years 1997–2002 (see Section 4).[7]

The population projections all assume the same rising trend in life expectancy for males and females, based on the medium variant of the United Nations working model for mortality improvement, as described in *World Population Prospects*.[8] This is because assumed differences in mortality usually have only a minor impact on the final projection results; also, they require the production of many different scenarios that would only complicate the presentation of results.

In addition, under normal circumstances (i.e. the absence of catastrophes such as wars, epidemics and major natural disasters), the health situation in Tuvalu and mortality levels will improve throughout the projection period. Therefore, it was decided to use only one mortality assumption for the projections. According to this scenario, life expectancy in the year 2027 was assumed to increase to 69.9 years and 74.4 years, respectively for males and females (Figure 13).

Figure 13 - Mortality assumption (life expectancy at birth) for projections, 2002–2027



[7] According to the UN's software package MORTPAK3.0 (procedure COMPARE), the Far East Asian Model of the United Nations' model life tables is most similar to the observed age structure of mortality.

[8] United Nations, 1995, p144.

6.1.4 Migration

Making meaningful assumptions about future migration developments provides the single greatest difficulty for undertaking population projections, because many of the social and economic parameters shaping migration patterns depend largely on countries' overall social, economic and political developments, which can fluctuate widely and are difficult to predict. In view of future possible rising sea levels, the Tuvaluan people and their government have started to consider moving to other countries, such as New Zealand or Australia. However realistic or not such a scenario may be, the migration assumptions presented in this report assume that life in Tuvalu continues in the near future without major upheavals.

As has been shown in Section 2, 1,000 more people have left Tuvalu than have established residence there during the years 1991 to 2002, resulting in an annual average net migration of about –100.

The estimated pattern (percentage distribution by age) of net migrants of the intercensal period 1991–2002 has been used (Section 5, Figure 11, and Appendix Table 6). In regard to the number of migrants, three different migration assumptions are made (Figure 14):

— high migration — the estimated level of negative net emigration of the years 1991–2002 will double to –200 people per year for the entire projection period 2002–2027;

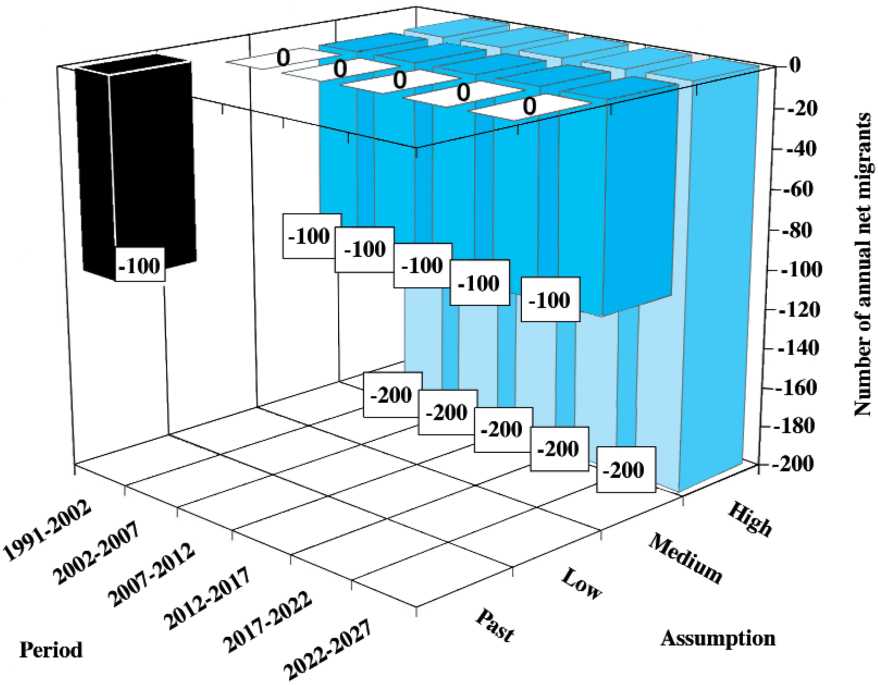
— medium migration — the estimated level of negative net migration of the period 1991–2002 of –100 people per year remains at that level for the entire projection period 2002–2027; and

— zero migration — net migration is assumed to be zero for the entire projection period.

The inclusion of a high migration assumption (–200 per year) was prompted by two considerations:

- the 1991–2002 annual net migration estimate of –98 per year (based on the balancing equation) would have been much higher, had it not been for the return to Tuvalu from Kiribati of many Tuvaluans just before the census; and
- it is understood that fewer Tuvaluans are currently making use of their migration quota to New Zealand than are eligible.

Figure 14 - Migration assumptions for projections, 2002–2027



6.2 Projection results

The combination of three different fertility and migration assumptions, with one prevailing mortality assumption, results in nine scenarios, of which only three are described in detail (the high, the medium and the low population 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 6).

Table 6 - Resident population size in the year 2027 according to nine projection scenarios (combination of three different fertility and migration assumptions)

Fertility assumption (TFR from 2001 to 2021)	Migration assumption		
	Zero	Medium (–100)	High (–200)
Constant **3.7→3.7**	**14,331 (High variant)**	10,735	7,124
Medium decline **(3.7→2.7)**	13,196	**9,837 (Medium variant)**	6,469
Fast decline **(3.7→1.7)**	11,922	8,826	**5,719 (Low variant)**

TFR = total fertility rate

6.2.1 Scenario 1 (High population growth variant)

- High fertility — the estimated current TFR of 3.7 will remain constant until 2027.
- Mortality — the estimated level of life expectancy at birth gradually increases from 61.7 years and 65.1 years for males and females to 69.9 years and 74.4 years, respectively in the year 2027.
- Zero migration — net migration is assumed to be zero.

6.2.2 Scenario 2 (Medium population variant)

- Medium fertility — the estimated TFR of 3.7 in 2002 will gradually decrease to 2.7 in the year 2027.
- Mortality — same as above.
- Medium migration — the estimated level of negative net migration of the period 1991–2002 of –100 people per year remains at that level for the entire projection period 2002–2027.

6.2.3 Scenario 3 (Low population variant)

- Low fertility — the estimated TFR of 3.7 in 2002 will decrease to 1.7 in the year 2027.
- Mortality — same as above.
- High migration — the level of negative net emigration of the years 1991–2002 will double to –200 people per year for the entire projection period 2002–2027.

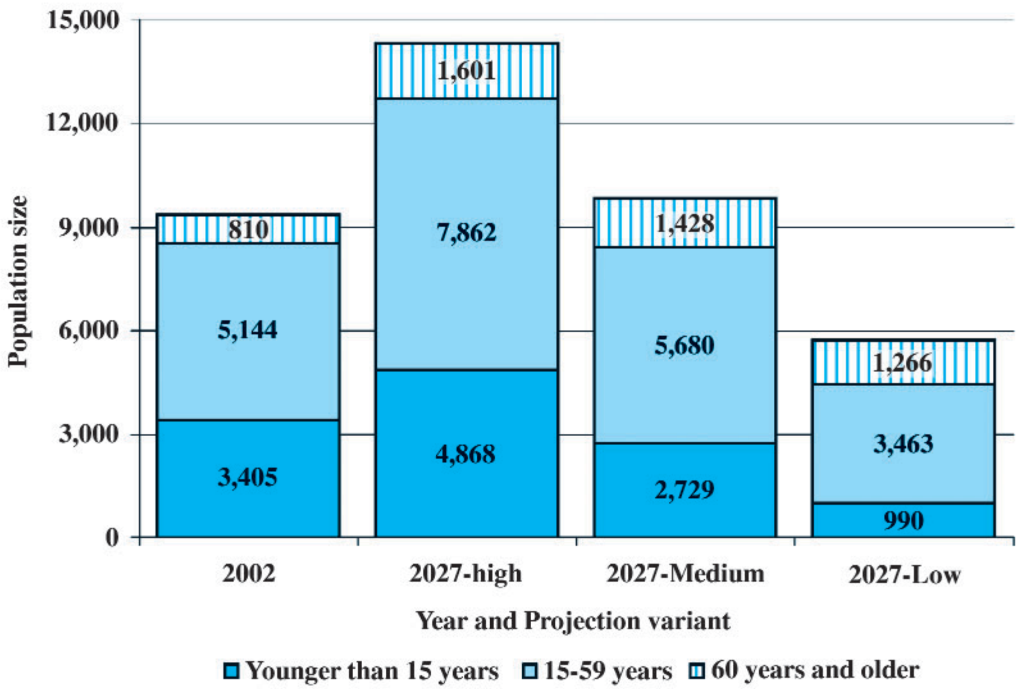
Tables 6 and 7, and Figure 15, compare the various projections, highlighting the differential impact on population size, growth and structure caused by declining fertility and migration.

Table 7 Population indicators in 2027 according to three projection variants

Indicator	2002 population	2027 population		
		High variant	Medium variant	Low variant
Median age (years)	23.6	25.1	30.0	38.6
Dependency ratio (15–59)	81.9	82.3	73.2	65.1
Annual growth rate 2002–2027	0.6*	1.7	0.2	-2.0

*1992–2002 growth rate

Figure 15 - Population size by broad age groups in 2027, according to three projection variants



6.2.4 Scenario 1 (High population growth variant)

- Under the assumption of constant high fertility, and the assumption that net migration would be zero, Tuvalu's resident population would increase to 14,331 people in the year 2027 (Table 6 and Figures 15 and 16).
- The population under 15 years of age would increase by 1,463 children from 3,405 in 2002 to 4,868 in 2027, and the working-age population (15–59 years) would increase by 2,718 people, from 5,144 in 2002 to 7,862 in 2027.
- The dependency ratio would increase only marginally, from 81.9 to 82.3, during the same period, because the proportion of the working-age population would remain at 55% of the total population in 2027.
- The median age of the population, however, would increase from 23.6 to 25.1 years, because the proportion of the population 60 years and older would increase from 8.7% in 2002 to 11.2% in 2027.
- The population growth rate would be 1.7% per year.

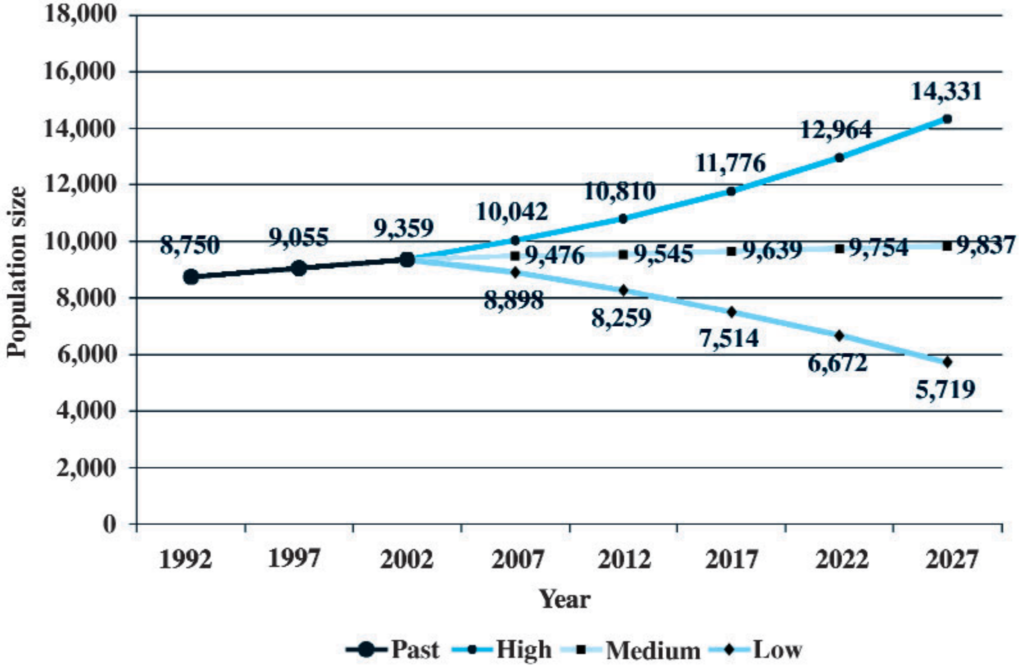
6.2.5 Scenario 2 (Medium population growth variant)

- Based on the assumption that fertility would decrease from its current level of 3.7 to 2.7 in the year 2027, and the number of net migrants would remain at its current level of –100 people annually throughout the period 2002–2027, the population is expected to increase only slightly to 9,837 people in the year 2027.
- The overall number of children (0-14) would decrease from 3,405 in 2002 to 2,729 in 2027 (–676), and the working-age population would increase from its current level by 536 people to 5,680 people in the year 2027.
- The dependency ratio would decrease to 73.2 as a result of a proportional increase of the working-age population (from 55% in 2002 to 57.7% in 2027), and a proportional decrease of the population 15 years and younger (from 36.4% to 27.7%).
- The median age of the population would again increase by more than 6 years, from 23.6 to 30 years, because the proportion of the population 60 years and older would increase from 8.7% in 2002 to 14.5% in 2027.
- The population growth rate would be 0.2% per year, similar to that of the recent past.

6.2.6 Scenario 3 (Low population growth variant)

- If fertility decreased from its current level of 3.7 to 1.7 in the year 2027, and the number of net migrants doubled from its current level to –200 people per year, Tuvalu's resident population would decrease to 5,719 people in 2027.
- The number of children, at 990, would be less than one-third of its current size (3,405), whereas the working-age population would decrease by more than 1,600 people, to a size of 3,463 people.
- The dependency ratio would decrease quite substantially from the current 81.9 to 65.1 in 2027. This is the expected result of a marked proportional increase in Tuvalu's resident working-age population, with almost 2 in 3 Tuvalu residents in this age-group, and a concomitant decrease in the population younger than 15 years, from 36.4 to 17.3%.
- These developments would see a significant ageing of the population, reflected in a median age rising to 38.6 years, with 22.1% of the total population expected to be older than 60 years of age in the year 2027.
- The population would decrease with an annual rate of growth of –2%.

Figure 16 - Future population trends according to three projection variants, 2002 – 2027



6.2.7 General comments

Table 6 shows that the impact of fertility on Tuvalu's population dynamics, particularly future population growth, is less pronounced than that of migration. Figure 15 shows that all three scenarios have one outcome in common: the population 60 years and older will increase substantially, proportionally and in absolute numbers, leading to an overall ageing of the Tuvalu population.

Although the low population growth variant projection assumptions may seem drastic, this variant assumes migration rates that are similar to those of the intercensal period 1992–2002, if one deducts the migrants returning from Nauru just before the 2002 census. Fertility has already declined to around two births in many parts of the world, including three Pacific island countries and territories.

It seems unlikely that net migration will ever be zero or that Tuvalu will emerge as a migration destination, and that fertility will remain at its current high level. It appears equally unlikely that Tuvalu's population will increase above 10,000 in the future. Population developments along the lines outlined in Scenario 2 (medium population growth variant) appear to be the most likely outcome.

Looking at developments elsewhere in the Pacific and the experience of countries with similar levels of fertility, we can expect the current relatively high level of fertility to decline over the coming years. Therefore the high population growth variant with the assumption of a near constant high level of fertility seems unlikely.

However, a rapid fertility decline is not expected to occur in the immediate future, because it seems 'uncharacteristic' for most Pacific Islands populations (despite the fact that three countries have already reached TFRs of around 2). Hence, the low population growth variant, assuming a fast fertility decline, also appears unlikely.

It is impossible to predict future migration patterns and levels; however, the medium population growth variant assumption appears to be the most realistic, because it results in a population growth that is similar to that of the recent past (1991–2002). Also, it reflects the average migration level and pattern of a relatively long period (11 years).

In view of Funafuti's relatively densely populated situation, and especially in view of the possibility of a further sea level rise, a migration assumption of zero seems highly unlikely, while an annual level of –200 net migrants would result

7 - Implications of demographic trends

7.1 Population dynamics

7.1.1 Fertility

Without current levels of negative migration, fertility levels of 3.7 live births per woman and a rate of natural increase of 1.7% per year would see Tuvalu's population double in 41 years.

Should Tuvalu wish to reduce its current fertility levels, provisions need to be put in place for easier access to family planning and health services, accessible to both males and females. This would include improving the awareness, knowledge, acceptability, availability and degree of satisfaction of family planning methods and services, especially amongst men and women of childbearing age and adolescents, to raise the level of contraceptive use. To achieve this improvement, information and counselling services would need to be available in all villages, through well trained-community workers.

Declining fertility (a reduced number of births per woman) will have the following impact on population growth, and on development planning and policies:

- a decreasing rate of natural increase;
- Tuvalu's population becoming older (as it reduces the proportion of children);
- a gradual decline in the number of school children, and in the medium-to-long term, declining pressure on the labour market, with fewer school leavers looking for employment.

To make sensible forecasts of population size and growth, it is essential to have a complete birth registration system in place, providing accurate and up-to-date records of the number of births, preferably by age of mother. As a significant number of births of Tuvalu residents occur overseas, particularly in Fiji and New Zealand, these births must be adequately captured in Tuvalu's vital statistics.

7.1.2 Mortality

From studies on the level of mortality presented in this profile, it seems that life expectancy at birth is relatively low. This unfortunate situation could be counteracted by intensifying health advocacy and public health awareness campaigns, and promoting healthier lifestyles, because a low overall life expectancy is often caused by a prevalence of lifestyle diseases, such as diabetes, combined with high alcohol consumption, smoking and little exercise.

Concerted efforts should be undertaken to improve infant, child and maternal health care programs leading to better overall child care, to further reduce infant mortality.

Improved mortality rates mean healthier people living 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 programs;
- expand programs of immunisation;
- provide a hygienic and safe living environment;
- promote healthy nutrition;
- advocate a general healthy lifestyle including regular physical exercise; and
- discourage smoking and excessive alcohol consumption.

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. As in the case of birth registration, a system needs to be in place that ensures that deaths of usual Tuvalu residents occurring overseas are accounted for in Tuvalu statistics.

7.1.3 International migration

Tuvalu's low population increase during the period 1991–2002 was mainly due to high levels of negative net-migration. If the current threat of sea level rise prevails, this trend will most likely continue in the near future.

Overseas destinations may be seen as lands of opportunity, with education and employment being the main incentives that entice Tuvaluans to their shores. A move may also often be seen as a sign of progress and a means of bettering oneself.

It is important to improve migration statistics, so that an up-to-date population register can be maintained for planning purposes. This requires a reliable compilation of arrival and departure information from all incoming and outgoing passengers, with minimum-information requirements concerning age, sex and nationality.

7.2 Crosscutting development issues

7.2.1 Health

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

It cannot be expected that certain special health-care facilities will be available to a small and remote population such as Tuvalu (because the low number of cases prohibits the operation of state-of-the-art health services that would include the employment of specialists, and the purchase and maintenance of expensive equipment). However, provisions need to be in place to ensure a system of efficient referrals to the nearest health facilities. Also, regular visits of overseas medical specialists are a useful way to meet peoples' health needs, demands and expectations.

Should some households and families not be capable of sustaining an acceptable, healthy lifestyle, they may need the extra attention of the government or community, since unhealthy living environments will affect everybody in the long run. In particular, minimum housing conditions should include availability and access to safe and clean water, public electricity and hygienic waste disposal.

The major consequence of reduced mortality is healthier people living longer lives. Therefore, health promotion should play a prominent role in the government and its development partners' development agenda.

7.2.2 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 or no formal education and training.

Thus, it is of benefit for young people to leave the country to join overseas higher educational and training institutions, and access to work experience where they can undertake apprenticeships not available in Tuvalu. However, these people need to be provided with suitable employment in Tuvalu after completing their education, otherwise it will be difficult to entice them to return. Therefore, educational and vocational programs need to be of relevance to the specific Tuvalu socio-economic circumstance.

7.2.3 Economic activity

Economic activity and employment are shaped by a country's access to economic resources, and the size and skills of its working-age population.

In Tuvalu, income is mainly derived from outside sources such as trust funds, the sale of fishing rights, revenue generated from internet access, and periodic remittances from Tuvaluans abroad. A fast growing and larger population will place increased pressure on these limited resources, and lower the average standard of living in the long term, unless alternative sources of income can be found. With the government being the main employer in Tuvalu, any dramatic developments in this sector will have serious social and economic consequences.

Migration movements depend on economic opportunities in Tuvalu and overseas, and socio-economic developments in Tuvalu are very much interwoven with developments overseas. In this regard, Tuvalu has to compete with higher wages, lower prices and better quality of many goods and services offered overseas which will be one of the major reasons for people to leave the islands.

7.2.4 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 fewer customers (demands) for educational and health services, established businesses, farmers and fishers who supply the local market. This situation may lead to a stalling in the improvement of services of any kind, and may even result in closure of shops and general services. In turn, this may lead to further population decline — a vicious circle.

7.2.5 Good governance

Good governance and effective policy making 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.

Policy makers, planners, political parties and community leaders need to be aware of the needs and aspirations of the people of their country, so that they can effectively provide for the specific needs of their population and the different population sub-groups. A government needs to be aware of its country's population structure, population processes and socio-economic characteristics, to plan for an adequate standard of living, and for a proper provision and distribution of goods and services.

Appendix

Table A1 - Registered number of births, deaths, infant deaths, and estimated CBR, CDR and IMR, 1992–2002

Year/ period	Mid year/period population	Total births	Tuvalu births	Deaths	Infant deaths	Net migrants	CBR	CDR	IMR*
1992	8,802	262	262	101	15		29.8	11.5	57.3
1993	8,874	247	247	94	17	-85	27.8	10.6	68.8
1994	8,940	251	251	74	7	-99	28.1	8.3	27.9
1995	9,002	241	241	89	13	-103	26.8	9.9	53.9
1996	9,063	250	248	90	14	-95	27.6	9.9	56.5
1997	9,119	256	236	104	10	-101	28.1	11.4	42.4
1998	9,167	254	233	94	7	-107	27.7	10.3	30.0
1999	9,217	256	231	84	11	-116	27.8	9.1	47.6
2000	9,270	251	231	109	8	-104	27.1	11.8	34.6
2001	9,315	232	197	86	5	-99	24.9	9.2	25.4
2002	9,346	194	158	87	4	-95	20.8	9.3	25.3
Average annual									
1992-1997	8,966	251	248	92	13	-96	28.0	10.3	51.2
1997-2002	9,239	241	214	94	8	-104	26.0	10.2	35.0

' Total births ' include births of Tuvalu residents that occur overseas, mainly in Fiji and New Zealand

* The IMR is calculated based on Tuvalu births, because the registered infant deaths relate to births occurring in Tuvalu only

Table A2 - Estimated number of women aged 15–49, registered number of births by age of mother, ASFR, MAC, GFR and TFR, 1992–2003

Number of women

Age	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	Age	1992-1997	1997-2002
15–19	297	308	316	326	347	374	394	401	387	361	347	344	**15–19**	328	377
20–24	322	285	267	264	267	281	289	292	300	318	339	356	**20–24**	281	303
25–29	405	392	385	353	325	298	264	249	247	251	264	273	**25–29**	360	262
30–34	438	453	441	433	410	380	369	359	329	301	274	239	**30–34**	426	335
35–39	354	347	351	365	377	404	412	405	403	384	355	343	**35–39**	366	394
40–44	272	295	316	323	334	336	332	336	341	346	369	376	**40–44**	313	343
45–49	197	203	212	235	247	262	283	297	306	317	319	316	**45–49**	226	297
Total	**2,286**	**2,283**	**2,288**	**2,299**	**2,307**	**2,334**	**2,343**	**2,339**	**2,312**	**2,279**	**2,267**	**2,246**	**Total**	**2,300**	**2,312**

Number of births

Age	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	Age	1992-1997	1997-2002
15–19	10	8	13	6	6	12	14	14	16	15	9	17	**15–19**	9	13
20–24	63	48	46	38	45	51	49	68	61	46	51	76	**20–24**	49	54
25–29	86	75	75	75	71	63	58	58	57	58	50	53	**25–29**	74	57
30–34	62	80	64	70	72	74	68	49	63	51	36	35	**30–34**	70	57
35–39	32	36	37	41	38	38	56	53	45	46	32	37	**35–39**	37	45
40–44	9	0	16	11	17	18	9	13	10	15	14	20	**40–44**	12	13
45–49	0	0	0	0	1	0	1	1	0	1	2	0	**45–49**	0	1
Total	**262**	**247**	**251**	**241**	**250**	**256**	**254**	**256**	**251**	**232**	**194**	**239**	**Total**	**251**	**241**

ASFR

Age	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	Age	1992-1997	1997-2002
15–19	0.034	0.026	0.041	0.018	0.017	0.032	0.036	0.036	0.042	0.042	0.025	0.050	**15–19**	0.028	0.036
20–24	0.196	0.168	0.172	0.144	0.170	0.182	0.170	0.231	0.203	0.144	0.151	0.214	**20–24**	0.173	0.179
25–29	0.212	0.191	0.195	0.213	0.217	0.211	0.219	0.231	0.229	0.230	0.188	0.196	**25–29**	**0.206**	**0.218**
30–34	0.141	0.177	0.145	0.162	0.174	0.194	0.183	0.136	0.192	0.168	0.132	0.145	**30–34**	0.165	0.169
35–39	0.090	0.104	0.105	0.112	0.102	0.094	0.135	0.131	0.111	0.120	0.091	0.109	**35–39**	0.101	0.114
40–44	0.033	0.000	0.051	0.034	0.051	0.055	0.026	0.040	0.029	0.044	0.037	0.053	**40–44**	0.038	0.038
45–49	0.000	0.000	0.000	0.000	0.004	0.000	0.004	0.004	0.000	0.004	0.008	0.000	**45–49**	0.001	0.003
Total	**0.707**	**0.666**	**0.709**	**0.683**	**0.736**	**0.768**	**0.772**	**0.809**	**0.805**	**0.752**	**0.632**	**0.767**	**Total**	**0.712**	**0.757**

	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	Age	1992-1997	1997-2002
MAC	28.6	28.7	29.3	29.8	29.8	29.5	29.5	28.9	28.8	29.7	29.5	28.9	**MAC**	29.3	29.3
TFR	3.5	3.3	3.5	3.4	3.7	3.8	3.9	4.0	4.0	3.8	3.2	3.8	**TFR**	3.6	3.8
GFR	115	108	110	105	108	110	108	109	109	102	86	106	**GFR**	109	104

ASFR: age specific fertility rate
GFR: general fertility rate
MAC: mean age at childbearing
TFR: total fertility rate

Table A3 - Total number of registered deaths by age and sex, 1992–2002

Age group	1992			1993			1994			1995			1996			1997			1998			1999			2000			2001			2002			Total		
	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	T	M	F	T
0	6	9	15	11	6	17	3	4	7	8	5	13	8	6	14	3	7	10	6	1	7	7	4	11	5	3	8	5	0	5	3	1	4	65	46	111
1–4	1	0	1	0	2	2	0	1	1	1	0	1	1	2	3	2	2	4	2	5	7	1	1	2	0	0	0	0	0	0	0	0	0	8	13	21
5–9	3	0	3	0	1	1	1	0	1	0	0	0	0	1	1	2	0	2	0	1	1	0	0	0	1	0	1	1	0	1	0	0	0	8	3	11
10–14	0	2	2	1	0	1	0	1	1	0	0	0	2	1	3	0	0	0	1	0	1	1	2	3	1	8	9	0	0	0	0	0	0	6	14	20
15–19	0	0	0	2	2	4	1	0	1	0	2	2	0	1	1	0	0	0	1	0	1	0	0	0	0	10	10	1	1	2	0	0	0	5	16	21
20–24	2	0	2	1	0	1	1	0	1	1	0	1	3	0	3	1	0	1	1	1	2	1	0	1	0	1	1	0	0	0	0	0	0	12	3	15
25–29	2	0	2	1	1	2	1	0	1	1	1	2	1	0	1	0	1	1	2	0	2	0	0	0	0	0	0	0	3	3	0	1	1	7	6	13
30–34	1	0	1	2	2	4	1	1	2	2	1	2	1	3	4	4	2	6	2	1	3	0	1	1	4	1	5	0	0	0	4	2	6	20	13	33
35–39	1	0	1	2	2	3	1	0	1	2	0	2	2	1	3	1	2	3	1	1	2	1	1	2	5	3	8	2	0	2	2	1	3	19	12	30
40–44	5	3	7	1	2	3	1	1	1	1	2	3	1	1	2	0	2	2	4	4	8	2	3	5	1	2	3	2	1	3	5	0	5	22	20	42
45–49	5	2	7	1	2	3	1	0	1	1	1	2	1	3	4	4	1	5	3	1	4	2	2	4	1	1	2	1	2	3	0	3	3	19	19	38
50–54	2	3	4	3	4	6	3	3	5	3	4	7	1	2	3	6	8	14	2	0	2	1	2	3	4	2	6	5	3	8	2	2	4	31	32	63
55–59	1	2	4	2	3	6	2	2	5	2	4	6	1	1	2	2	3	5	2	1	3	7	2	9	1	3	4	3	3	6	2	3	5	26	28	54
60–64	4	4	8	3	1	4	6	2	8	5	8	13	2	5	7	1	2	3	6	5	11	2	4	6	8	2	10	1	3	4	4	1	5	42	37	79
65–69	7	5	12	5	5	9	6	4	10	5	4	9	10	2	12	10	7	17	10	3	13	3	6	9	5	3	8	6	1	7	3	9	12	70	48	118
70–74	7	3	10	5	3	8	5	3	9	5	3	8	7	1	8	1	7	8	6	3	9	4	7	11	6	5	11	8	3	11	10	3	13	64	42	106
75–79	7	6	12	4	6	10	5	5	10	5	5	10	6	8	14	4	7	11	6	3	9	2	4	6	4	9	13	9	7	16	6	6	12	58	65	123
80+	4	6	11	3	6	9	4	6	9	3	5	8	1	4	5	4	8	12	3	6	9	4	7	11	1	9	10	6	9	15	6	8	14	39	75	114
Total	56	45	**101**	46	48	**94**	41	33	**74**	45	44	**89**	48	42	**90**	45	59	**104**	58	36	**94**	38	46	**84**	47	62	**109**	50	36	**86**	47	40	**87**	521	491	**1,012**

Table A4 - Estimated resident population by age and sex, mid period 1997–2002

Age group	Total	Males	Females
0–1	227	123	104
1–4	961	509	452
5–9	1,181	616	564
10–14	984	553	431
15–19	787	410	377
20–24	593	290	303
25–29	522	260	262
30–34	657	322	335
35–39	716	322	394
40–44	619	275	343
45–49	516	219	297
50–54	361	152	209
55–59	281	133	149
60–64	268	110	158
65–69	216	96	120
70–74	171	78	93
75–79	108	45	63
80+	72	22	50
Total	**9,239**	**4,534**	**4,705**

Table A5a - Abridged life table based on deaths and population: males, 1997–2002

Age (x)	nMx	nqx	lx	ndx	nLx	5Px	Tx	ex
0	0.0394	0.0381	100000	3815	96766	0.9599	6165398	**61.7**
1	0.0016	**0.0065**	96185	627	383196	0.9928	6068632	63.1
5	0.0011	0.0054	95558	515	476500	0.9950	5685437	59.5
10	0.0009	0.0045	95042	428	474140	0.9957	5208937	54.8
15	0.0008	0.0041	94614	384	472109	0.9937	4734796	50.0
20	0.0017	0.0086	94230	809	469125	0.9925	4262688	45.2
25	0.0013	0.0064	93420	597	465610	0.9791	3793562	40.6
30	0.0072	0.0356	92823	3303	455859	0.9669	3327952	35.9
35	0.0062	0.0306	89520	2739	440753	0.9640	2872093	32.1
40	0.0085	0.0415	86781	3600	424905	0.9588	2431340	28.0
45	0.0084	0.0409	83181	3405	407393	0.9283	2006435	24.1
50	0.0219	0.1039	79776	8285	378167	0.8973	1599042	20.0
55	0.0214	0.1014	71491	7246	339340	0.8735	1220875	17.1
60	0.0335	0.1545	64245	9923	296417	0.7890	881535	13.7
65	0.0646	0.2779	54322	15097	233867	0.7070	585118	10.8
70	0.0745	0.3140	39225	12315	165338	0.6329	351250	9.0
75	0.1143	0.4446	26910	11963	104643	0.4371	185913	6.9
80	0.1839	1.0000	14947	14947	81269		81269	5.4

Column "nMx" shows the proportion of each age group dying in each age interval. These data are based on the observed mortality experience of a population.
Column "lx" shows the number of people alive at the beginning of each age interval, starting with 100,000 at birth.
Column "nDx" shows the number who would die within each age interval.
Column "nLx" shows the total number of person-years that would be lived within each age interval.
Column "Tx" shows the total number of years of life to be shared by the population in the age interval and in all subsequent intervals. This measure takes into account the frequency of deaths that will occur in this and all subsequent intervals. As age increases and the population shrinks, the total person-years that the survivors have to live necessarily diminish.
Column "ex" shows the average number of years remaining for a person at a given age interval. The first value in column "ex" represents life expectancy at birth.
Source: Population Reference Bureau's Population Handbook, 4th International Edition.

Table A5b - Abridged life table based on deaths and population: females, 1997–2002

Age (x)	nMx	nqx	lx	ndx	nLx	5Px	Tx	ex
0	0.0255	0.0250	100000	2497	97815	0.9699	6514465	**65.1**
1	0.0029	**0.0117**	97503	1142	387140	0.9928	6416650	65.8
5	0.0003	0.0015	96361	142	481451	0.9897	6029510	62.6
10	0.0039	0.0192	96219	1844	476485	0.9784	5548059	57.7
15	0.0049	0.0240	94375	2265	466210	0.9851	5071574	53.7
20	0.0011	0.0055	92109	505	459285	0.9894	4605364	50.0
25	0.0032	0.0158	91604	1444	454411	0.9835	4146079	45.3
30	0.0035	0.0172	90160	1554	446914	0.9830	3691668	40.9
35	0.0034	0.0168	88606	1487	439310	0.9773	3244754	36.6
40	0.0058	0.0287	87119	2501	429341	0.9718	2805443	32.2
45	0.0056	0.0277	84618	2340	417237	0.9536	2376103	28.1
50	0.0136	0.0657	82277	5404	397875	0.9271	1958866	23.8
55	0.0168	0.0807	76873	6206	368851	0.9168	1560990	20.3
60	0.0179	0.0858	70667	6065	338175	0.8680	1192139	16.9
65	0.0402	0.1826	64603	11797	293519	0.7990	853964	13.2
70	0.0503	0.2236	52805	11807	234509	0.7057	560445	10.6
75	0.0955	0.3854	40998	15801	165490	0.4923	325936	7.9
80	0.1570	1.0000	25198	25198	160446		160446	6.4

E0 = life expectancy at birth
5q0 = under-five mortality rate

Table A6 - Estimated total number and percentage distribution of net-migrants by age and sex, 1991–2002

Age group	Total numbers			Percentage distribution		
	Total	Male	Female	Total	Male	Female
0–4	–54	–29	–26	5.0	2.6	2.4
5–9	–115	–65	–51	10.6	6.0	4.7
10–14	–247	–117	–130	22.8	10.8	12.0
15–19	–204	–112	–93	18.9	10.3	8.6
20–24	–84	–64	–20	7.8	5.9	1.9
25–29	–77	–45	–32	7.1	4.1	3.0
30–34	–88	–32	–55	8.1	3.0	5.1
35–39	–49	–14	–34	4.5	1.3	3.2
40–44	–31	–3	–28	2.9	0.3	2.6
45–49	–25	–3	–22	2.3	0.3	2.0
50–54	–24	–5	–19	2.2	0.5	1.7
55–59	–27	–27 0	–27	2.5	0.0	2.5
60–64	–28	–5	–24	2.6	0.4	2.2
65–69	–29	–5	–24	2.7	0.4	2.2
Total	**–1,082**	**–498**	**–584**	**100.0**	**46.0**	**54.0**

Source: based on Tuvalu 1991 and 2002 censuses, and the Nauru 1992 and 2002 censuses.

Table A7 - Base population for projections: 2002 census resident population by age and sex

Age group	Total	Males	Females
0–4	1,156	605	551
5–9	1,178	603	575
10–14	1,071	588	483
15–19	803	458	345
20–24	664	319	345
25–29	507	237	270
30–34	532	269	263
35–39	670	326	344
40–44	684	302	382
45–49	561	245	316
50–54	453	189	264
55–59	270	127	143
60–64	273	127	146
65–69	205	83	122
70–74	167	75	92
75–79	98	39	59
80+	67	22	45
Total	**9,359**	**4,614**	**4,745**