



GOVERNMENT OF THE COOK ISLANDS
CIVIL REGISTRATION SYSTEM

Cook Islands

VITAL STATISTICS REPORT 1999-2013



Cook Islands Statistics Office
Ministry of Finance & Economic
Management



Pacific
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GOVERNMENT OF THE COOK ISLANDS

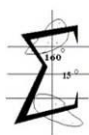
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**This report was compiled by Tearoa Iorangi, Anne Tangimetua,
with the assistance of the Pacific Community (SPC)
through Renee Sorchik and Karen Carter**



Tearoa Iorangi
Manager, Health Information Unit
MINISTRY OF HEALTH



Anne Tangimetua
Statistics Officer
COOK ISLANDS STATISTICS OFFICE
MINISTRY OF FINANCE AND ECONOMIC MANAGEMENT

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INDICATORS

KEY FACTS	1999 – 2003	2004 – 2008	2009 - 2013
2011 Census population, residents only	14,990	15,324	14,974
Total number of births	1,564	1,527	1,406
Total number of deaths	489	460	502
Sex Ratio (M:F)	110:100	112:100	109:100
Crude Birth Rate (CBR per 1,000)	20.9	19.9	18.8
Crude Death Rate (CDR per 1,000)	6.5	6.0	6.7
Total Fertility Rate (TFR per woman)	2.9	2.8	2.7
Teenage Fertility Rate	66.1	62.8	67.7
Life Expectancy at birth			
Males	68.6	71.9	71.7
Females	75.4	78.5	79.6
Life Expectancy at age 40			
Males	32.8	36.2	35.8
Females	37.8	41.4	40.8
Infant Mortality Rate (IMR per 1,000)	15.3	13.1	3.6
Under 5 Mortality (U5M per 1,000)	21.1	16.4	5.7
Adult Mortality (%)			
Males	19.1	19.8	16.1
Females	13.5	8.1	8.8
NCD Mortality (%)			
Aged 15-59			53.7
Aged 60+			68.4

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EXECUTIVE SUMMARY

This civil registration and vital statistics report is a compilation and training to make available the Cook Islands Births, Deaths and Causes of death measures as derived from the locally collected data. This is the first comprehensive report with data collated from the three main agencies in the Cook Islands, namely the Ministry of Justice, Ministry of Health and the Ministry of Finance & Economics Management – Statistics Office from 1999 to 2013, specific to the resident population of the Cook Islands.

Vital Statistics forms an essential basis of a country's civil registration and vital statistical systems. These statistics on births, deaths and causes of deaths are key indicators for governments and the communities to have access to for population estimates, service provisions and to determine and monitor the effectiveness of programs across a broad range of sectors, including health, education and other government services.

The Cook Islands population reported from the 2011 census stood at 17,794 total populations with 14,974 as resident population, that is, those group of people with the Cook Islands being their home.

Crude birth rate for the last five years (2009 – 2013) stood at 18.8 (95% CI: 16.6 - 20.9) per thousand population and crude death rate at 6.7 (95% CI: 5.4 – 8.1) per thousand population. This shows the rate of natural increase in the Cook Islands for the same period as 1.2 percent. Within the last fifteen years, that is, from 1999 to 2013 we had an annual average of 300 births and 97 deaths. The sex ratio for babies born in this period in the Cook Islands is calculated to be 110 males to 100 females.

Total fertility rate for the last five years (2009 – 2013) is estimated to be 2.7 (95% CI: 2.4 – 3.1). The average number of years a person is expected to live for the same period is calculated to be 71.7 (95% CI: 68.3 – 75.1) for males and 79.6 (95% CI: 76.6 - 82.6) for females.

As expected the majority of deliveries occurred on the main Island Rarotonga recording almost 83 percent of the total births for the period 1999 to 2013.

There has been a noticeable decline in infant and under 5 mortality, driven primarily by a large decrease in neonatal mortality that has occurred in the last 5 years. This decline is likely attributable to health programs implemented by the MOH to educate mothers, and bring them to the main hospital for delivery. The infant mortality rate for the last 5 years is estimated at 3.6 (95% CI: 1.2 – 8.3) per thousand live births achieving the MDG target of below 10.

Non Communicable Diseases (NCD) accounted for 54 percent of deaths among adults aged 15-59 over the last five years. However, by cause and sex, external causes of mortality (including road traffic accidents and suicide) were the leading cause of death in males aged 15-59. Specifically, transport accidents were the cause of 18 percent of deaths among males aged 15-59. Similarly, suicide accounted for 11 percent of all deaths among males aged 15-59. This was followed by circulatory disease, accounting for 37 percent of deaths. The leading causes of death in adult women aged 15-59 were circulatory disease (29%), cancer (22%), and external causes (15%). Among both men and women aged 60 and above, cardiovascular disease, diabetes, and cancer were the leading causes of death, accounting for about 70 percent of deaths.

INTRODUCTION

This report contains the results pertaining to two types of events, births and deaths. These are vital events occurring in the Cook Islands which include those births to Cook Islands resident including Non-Cook Islanders who hold Permanent Residency (PR) status, Non-Cook Islanders who are married to a Cook Islander, or permanent resident and have resided for more than six months consecutively in the Cook Islands and that of Non-Cook Islands women who are pregnant and give birth in the Cook Islands to a baby from a partner who is a Cook Islander.

The intention of this report is to provide an overview of a vital statistics report that illustrates current levels and trends of births, deaths, and causes of death over time; and that can be used and needed for multiple purposes ranging from;

- Government procedures / Administrative purposes
 - Establishing family relationships and inheritance rights
 - Proof of facts such as identity for legal documents (e.g. school entry, driving privileges)
 - Provide evidence of death
 - To identify the roll number of voters in a country
- Monitoring the health of a population
 - Identifying priorities – NCD's/Maternal and Child Health
 - Targeting Health Programs – Population at risk
 - Service Delivery – Immunizations / Populations/ Midwives etc
- Regional Agencies (WHO, SPC, UNFPA, UNSIAP etc)
 - Summarize the mortality experience of a population independent of its Age composition
- Policy and Planning purposes
 - Monitoring and Evaluation – funding/ International agreements
 - Decision makings

The registering of all vital events has been mandated by law under the Births and Deaths Registration Act 1973 and penalties do apply for late registrations. Births must be registered within 14 days from the time the baby was born. Every person that dies must be issued a death certificate if they died in the hospital facility or a coroner's letter of confirmation of death if died elsewhere and before the deceased is being buried. All deceased are to be identified by a medical officer or nurse practitioner on Islands without a medical officer.

METHODOLOGY

Throughout the report, most of the events has been aggregated to 5 years period from 1999-2013 to avoid year to year stochastic variation that is common in small populations, with annual updates provided where appropriate. Standard methods of calculation were used for indicators reported.

Aggregation of data from individual years makes comparison between periods statistically meaningful. Although much can be publicized from the facts collected to date of these events, this report only publicizes the facts listed in the table of contents.

Coverage

The scope on vital registered events is from each of the inhabited islands in the Cook Islands for births, deaths and causes of deaths covering a period of fifteen years from 1999 to 2013.

Registrations on births and deaths within the Cook Islands are essentially 100% complete due to a strong framework and key incentives for reporting. Such incentives are the baby bonus for mothers with new births on top of the monthly child benefits. For deaths benefits such as the entitlement to lands as well as to Tribal titles.

Data Source

Vital Statistics generated through Government's Civil Registration system and the Ministry of Health are the major data sources on births, deaths and causes of death which creates a permanent record of each event. Population based data which was derived from the Census Report are the other sources used for direct measures, such as the model life tables, calculating averages and estimates. The resident estimate population sourced from the annual vital statistics bulletin released by the government statistics office was also used to compute the crude birth rate.

Data Quality and Tabulation

For every birth occurring in the Cook Islands the Ministry of Health provides birth notifications which are delivered directly to the Civil Registration Office (Ministry of Justice) on each of the Islands including those on Rarotonga. As for the deceased, on Rarotonga, a certificate is issued for all those deaths occurring in the hospital and is to be picked up by the family from the funeral director upon receiving of the body. In the case of the Outer Islands a certificate is issued and given directly to the family for burial and a copy to the civil registration office on each of the islands.

For those deaths occurring outside the hospital a Coroner's report is written by a medical officer and is provided to the Civil registration office who in turn advice the family for the burial. This process is the same for both Rarotonga and the Outer Islands.

The births and deaths data are obtained from the Civil Registrar office on Rarotonga and also from all the Outer Islands Registrar. These records are provided to the Statistics Office through electronic spreadsheets (Microsoft excel) sourced from birth notification forms and death certificates registered, on a monthly basis. These records are often reconciled with the Ministry of Health records for a complete coverage before being published. Likewise the ministry of health also obtains the births and deaths data from the Outer Islands monthly reporting.

In order to obtain a complete data set, data from the Civil Registration office and the Ministry of Health are merged and checked for duplicates, missing data, missing values and excluding of inappropriate records.

Microsoft Office (excel, access and word) were used for coding, editing and tabulating these data. The population figures for 2001, 2006 and 2011 came from the Census report.

Formulas used for the computations are listed below;

Crude birth rate (CBR): $\frac{\text{Total Births}}{\text{Resident Population}} \times 1000$

Age-specific fertility rate (ASFR): $\frac{\text{No of births to women of age } x}{\text{Total Number of women of same age (including women who had no children)}}$

Total Fertility Rate (TFR): $(\text{Sum of ASFR} \times 5) / 1000$

Crude death rate (CDR): $\frac{\text{Total Deaths}}{\text{Resident population}} \times 1000$

Neonatal mortality rate (NMR): $\frac{\text{Sum over 5 years of all infant deaths aged } <28 \text{ days}}{\text{Total live births over same 5 year period}} \times 1000$

Infant Mortality Rate (IMR): $\frac{\text{Sum over 5 years of all deaths aged } 0 - 11 \text{ months}}{\text{Total live births over same 5 year period}} \times 1000$

Under 5 Mortality Rate for a 5 year period (U5MR):
 $\frac{\text{Sum over 5 years of all deaths of children aged } 0-59 \text{ months (under 5 years of age)}}{\text{Total live births over same 5 year period}} \times 1000$

Maternal mortality ratio: $\frac{\text{Number of maternal deaths of women aged } 15-49 \text{ years}}{\text{Number of live births}} \times 100,000$

Maternal mortality rate: $\frac{\text{Number of maternal deaths of women aged } 15-49 \text{ years}}{\text{Mid-year population of women aged } 15-49 \text{ years}} \times 100,000$

Age specific mortality rate (ASMR): $\frac{\text{the number of deaths at age } (x) \text{ during a year}}{\text{Mid-year population at age } (x) \text{ for the same year}} \times 1000$

BIRTHS

Total Births

The total number of live births reported to Cook Islands residents from 1999 to 2013 is 4,497. During this period, between 200 and 300 births were recorded each year. The highest number of births recorded occurred in 1999 (361) and lowest in 2013 (261).

Table 1: Total Births by year and sex

Year	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	Total
Males	176	164	168	153	158	162	162	161	157	163	147	137	152	163	133	2356
Females	185	145	138	140	137	151	135	143	163	130	133	152	132	129	128	2141
Total	361	309	306	293	295	313	297	304	320	293	280	289	284	292	261	4497

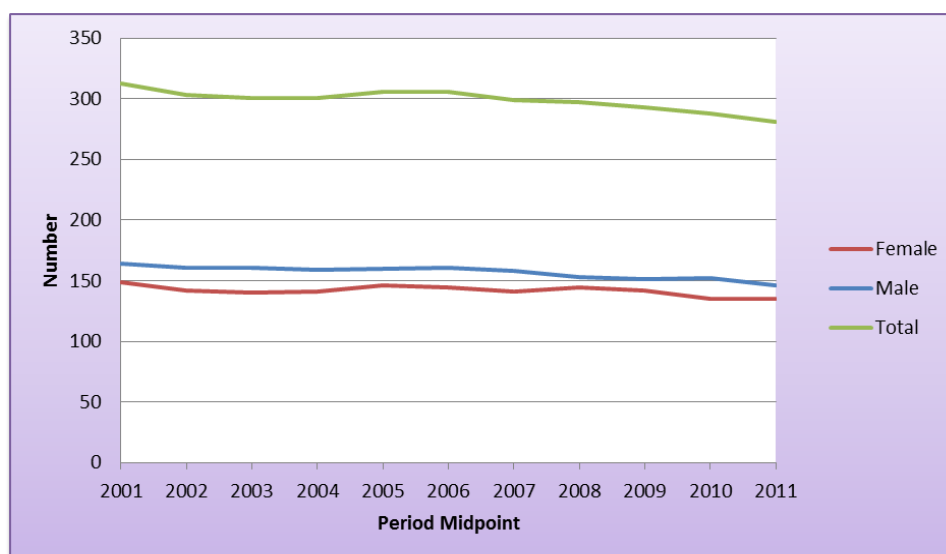
Of the 4,497 live births reported for 1999 to 2013, more of these births were males (2,356) compared to females (2,141), giving a sex ratio of 110 males for every 100 females born. The average number of babies born in the Cook Islands over the last 15 years was 300 per year (as shown below in **Table 2**). Over the last five years an average of 281 babies, were born per year.

Table 2: Average number of births in the Cook Islands for 5 year period

5 Year Periods	Average Number of Births		
	Males	Females	Total
1999 - 2003	164	149	313
2004 - 2008	161	144	305
2009 - 2013	146	135	281
1999 - 2013	157	143	300

Due to the fluctuations in the number of births in the Cook Islands, a five year rolling average was used to smooth out these fluctuations so that at any given point that may be unusually high or low does not distort overall trends. Based on the trends shown in **Figure 1**, it is evident that the overall trend in the number of births is consistently declining. The decline is most likely due to the outward-migration as reported in the 2011 population census, with most of the Islands showing a decline since the 2006 population census.

Figure 1: Five year rolling average number of births in Cook Islands: 1999 – 2013



Crude Birth Rates

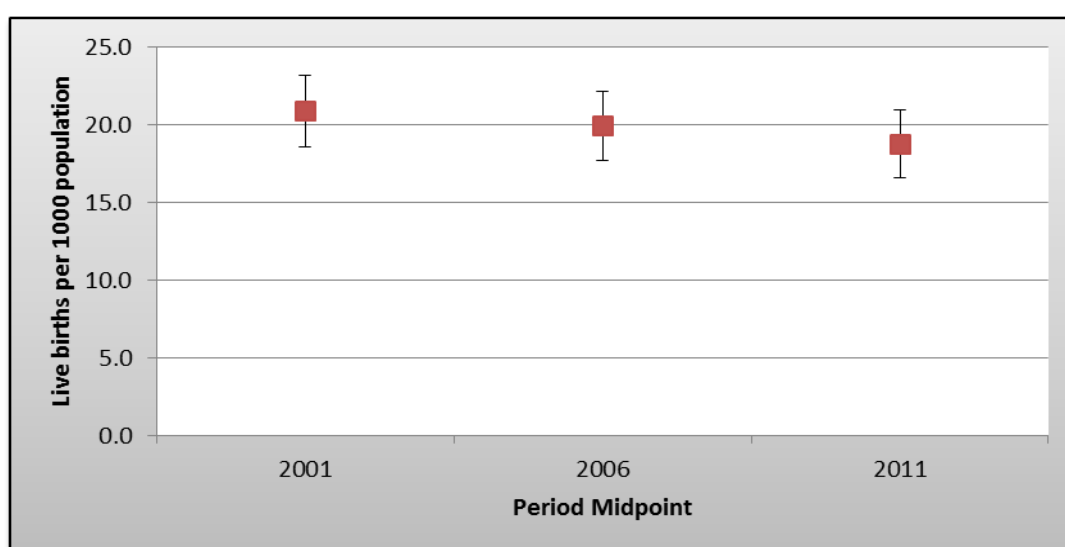
The crude birth rate (CBR) indicates the number of live births occurring in a year per 1,000 Population. The CBR in the Cook Islands is continuing to decline, as seen in table below, from 21 births for every 1,000 population in 1999 – 2003 periods to 19 births in 2009 – 2013. This is consistent with the CBR figure of 19.1 for the period of 2001-2006 as reported in the 2006 Cook Islands Census (Cook Islands Census, 2006). This is slightly higher than the CBR of Australia (13.3 per 1,000) and New Zealand (14 births per 1,000) in 2012 (WHO, 2014).

Although there has been a decline in the crude birth rate for the last 15 years, there had been no significant changes in the CBR over these years. This is clearly illustrated in **Figure 2**, with overlaps in the confidence intervals. These were calculated using the normal approximation of the binomial.

Table 3: Crude birth rate with 95% confidence interval by 5 year period

5yr period	1999-2003	2004-2008	2009-2013
CBR	20.9 (18.6 - 23.2)	19.9 (17.7 - 22.1)	18.8 (16.6 - 20.9)

Figure 2: Crude Birth Rate with 95% confidence intervals Cook Islands: 1999-2013



Age-specific Fertility Rate (ASFR)

Age-specific fertility Rates (ASFR) is the number of births occurring to mothers of a certain age group per 1,000 women in a given period of time. These are for women aged 15 to 49 years. Babies born outside this age range are excluded. There were only 6 live births to mothers below age 15 in 1999-2003, 2 in 2004-2008 and 5 in 2009-2013. No live births were reported to mothers 50 years and over.

The highest percentage of births occurring in the Cook Islands, are found among mothers aged between 20 and 24 years, within the three 5 year periods. In 2009-2013 there were a total of 382 births occurring in this age group. Women in this age group also experienced the highest fertility rates. The ASFR in this age group is 149, which means for every 1,000 women aged 20-24, 149 births will occur. Women aged 25-29 had the second highest fertility rates at 131 births per 1,000 women on this age group, followed by women aged 30-34 (106 births per 1,000 women aged 30-34).

The number of births to adolescent mothers aged 15 to 19 is showing fluctuations from 66 per 1,000 in 1999-2003 to 63 per 1,000 in 2004-2008 and up again to 68 per 1,000 in 2009-2013. This is higher than those reported in the Pacific Region of 61 per 1,000.¹ A contributing factor for this could be the lack of utilization or access to quality contraceptive services. A qualitative study conducted in the Cook Islands by Eijk (2007) highlighted that young people aged 15 to 19 years are less likely to use or access the Adolescent Reproductive Health services in the Cook Islands, because of the lack of

¹ United Nations Population Fund (UNFPA), 2010, Sexual and Reproductive Health for All: Reducing Poverty, Advancing Development and Protecting Human Rights, UNFPA; New York: 2010. Available from [<http://www.unfpa.org/public/home/publications/pid/6526>]

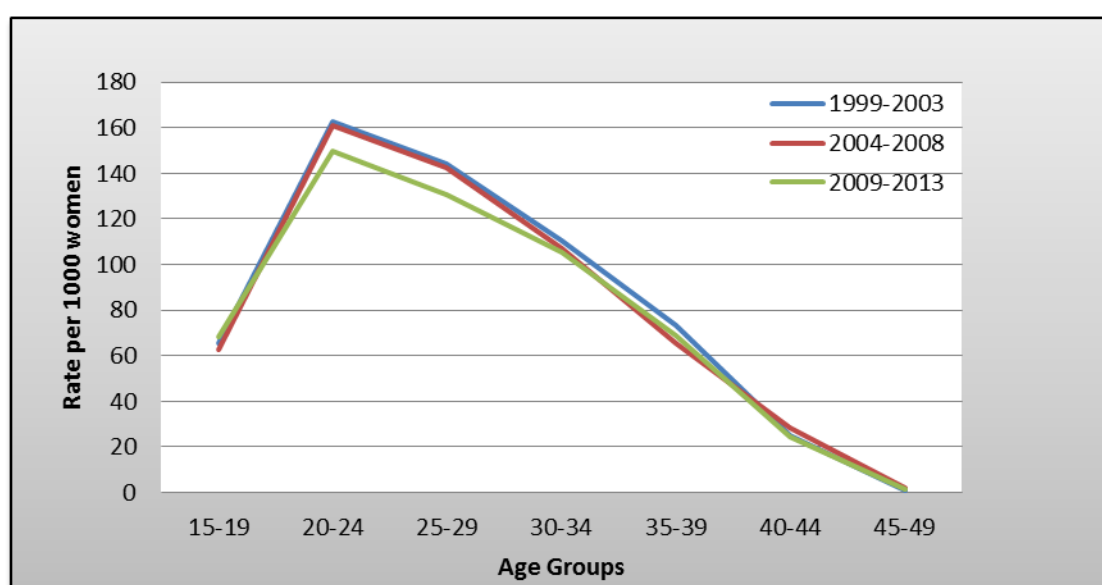
confidentiality, friendly staffs, youth friendly services and youth only clinics, hence a recommended area of action to address teen pregnancy.

Table 4: Age Specific Fertility Rate (ASFR)

Age Group of women	Aggregated Number of Births by 5 years			Female population			Average Number of Births			ASFR /1,000		
	1999-2003	2004-2008	2009-2013	2001	2006	2011	2001	2006	2011	2001	2006	2011
15 - 19	217	198	202	657	631	597	43.4	39.6	40.4	66	63	68
20 - 24	403	436	382	492	542	512	80.6	87.2	76.4	164	161	149
25 - 29	383	337	322	524	473	493	76.6	67.4	64.4	146	142	131
30 - 34	302	296	246	542	554	462	60.4	59.2	49.2	111	107	106
35 - 39	194	176	178	524	552	521	38.8	35.2	35.6	74	64	68
40 - 44	57	78	67	447	542	542	11.4	15.6	13.4	26	29	25
45 - 49	2	4	4	353	453	528	0.4	0.8	0.8	1	2	2
Total	1558	1525	1401	3539	3747	3655	311.6	305.0	280.2	588	567	549

There is evidence as shown in **Figure 3** that fertility among 20 to 34 year old women was declining in the Cook Islands as currently seen in the 2009-2013 Curve, which is smaller than the two previous 5 year groupings.

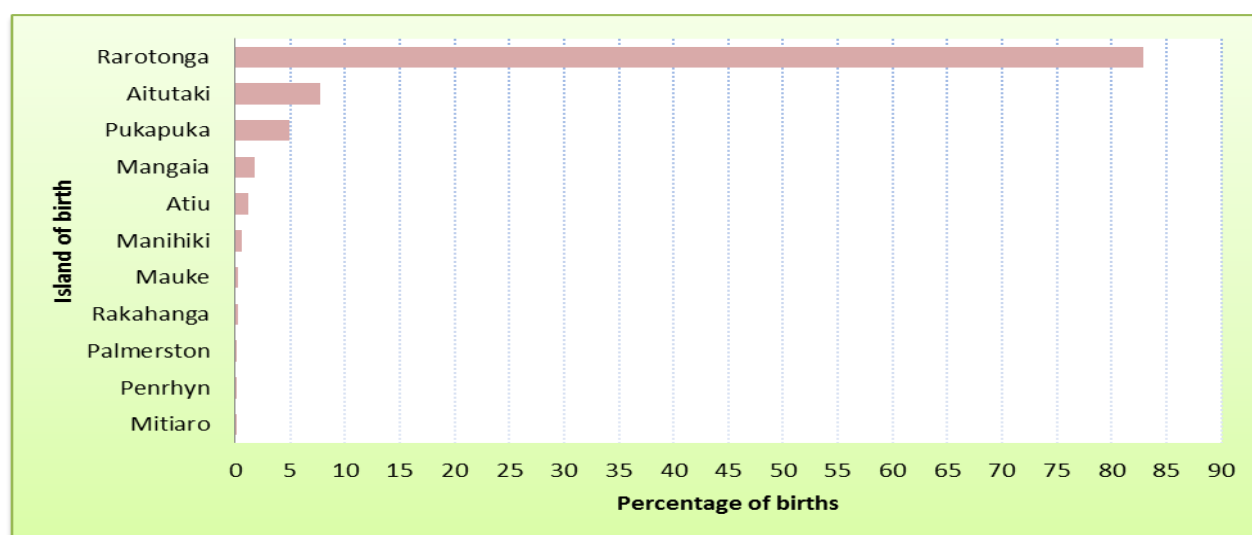
Figure 3: Age-specific fertility Rates for Cook Islands: 1999-2013



Births by Island

As shown below in **Figure 4**, the majority of births (over 80 percent) are occurring on the main island of Rarotonga, followed by Aitutaki, Pukapuka, Mangaia and Atiu subsequently. A fair number of these births occurring in Rarotonga are by mothers referred to from the Outer Islands with complications either during delivery or post-delivery. In some instances, the chartered flights or boats for other emergency referrals becomes filled up with pregnant women, who at the time are experiencing serious complications. This is done to prevent another expensive referral trip.

Figure 4: Percentage distribution of Births by Island Cook Islands: 1999-2013



Total Fertility Rate

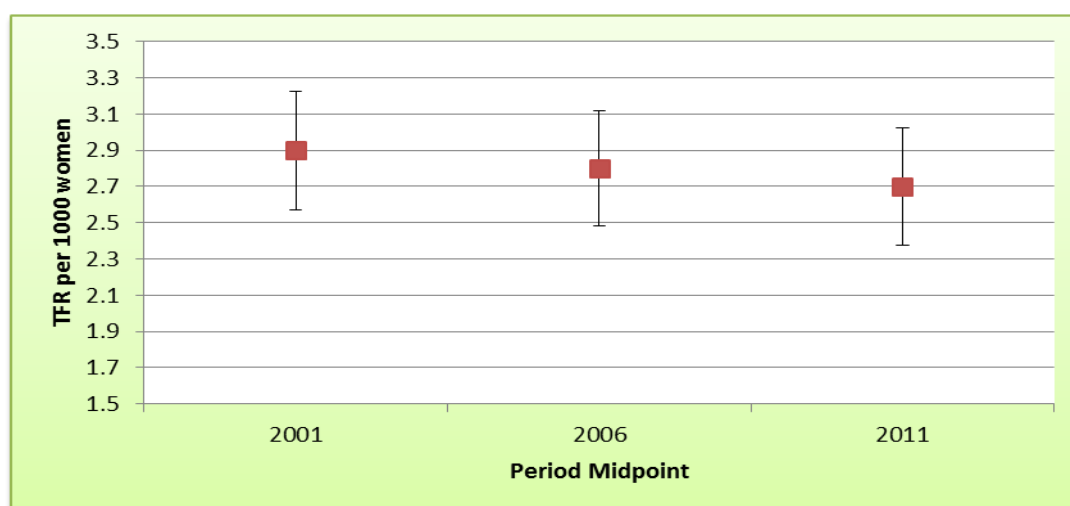
The total fertility rate (TFR) is a measure of the average number of children a woman would give birth to during her lifetime if she were to pass through her childbearing years (15 – 49 years) experiencing the present day age-specific fertility rates.

The total fertility rates for the Cook Islands in the last 15 years for the three groups show no significant changes. This remains steady at just under three births per woman.

Table 5: Total fertility rate with 95% confidence interval by year period

5yr period	1999-2003	2004-2008	2009-2013
TFR	2.9 (2.6 - 3.3)	2.8 (2.5 - 3.2)	2.7 (2.4 - 3.1)

Figure 5: Total Fertility Rate with 95% confidence intervals Cook Islands: 1999 - 2013



The Cook Islands have a higher TFR compared to New Zealand (2.0) and Australia (1.9) (Population Reference Bureau, 2013). On average, Cook Island women have more children over their lifetime compared to women in New Zealand and Australia.

DEATHS

Total Deaths

The total number of deaths to Cook Islands residents from 1999 to 2013 was reported as 1,451. 876 of these deaths are males and 575 females, giving a sex ratio of 152 males dying to 100 females. There was a total between 60 and 120 deaths occurring per year. The highest was recorded in 2000 (127) and the lowest in 2008 (65). On average, a total of 97 deaths per year occurred over the last 15 years.

Due to the small number of deaths occurring in each year, it was decided to aggregate this data into 5 year groups for presentations in this report.

It should be noted that these are only for deaths occurring in the Cook Islands. Those occurring abroad are excluded in this reporting, even those referred for medical reasons.

Table 6: Total number of deaths by sex

Year	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	Total
Males	56	80	45	64	46	65	62	55	61	41	46	62	56	69	68	876
Females	40	47	34	36	41	41	33	39	39	24	29	33	51	44	44	575
Total	96	127	79	100	87	106	95	94	100	65	75	95	107	113	112	1451

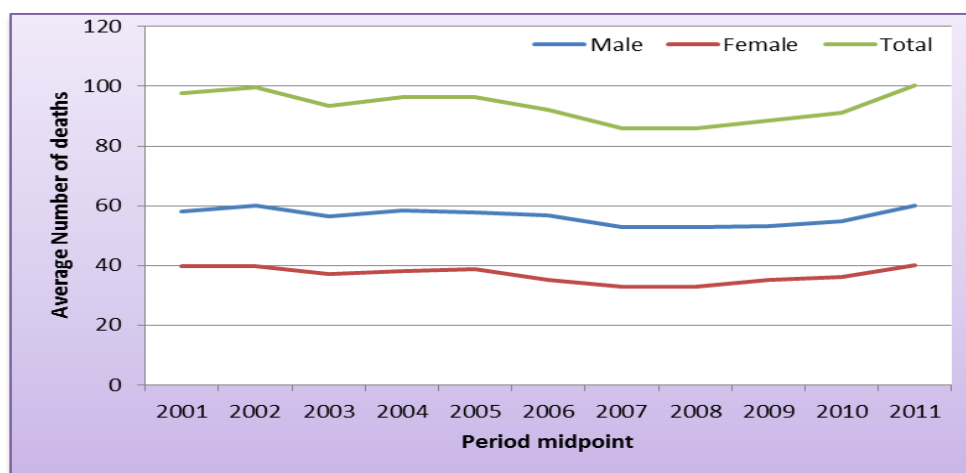
Table 7: Average number of deaths in Cook Islands for 5 year periods

5 year periods	Aggregated number of deaths		
	Male	Female	Total
1999-2003	291	198	489
2004-2008	284	176	460
2009-2013	301	201	502
Total	876	575	1451
Average number of deaths			
1999-2003	58.2	39.6	97.8
2004-2008	56.8	35.2	92.0
2009-2013	60.2	40.2	100.4
Total	58.4	38.3	96.7

Figure 6 below shows the rolling average number of deaths in the Cook Islands used to smooth out the fluctuations due to small numbers reported in our death data from 1999 to 2013. Similar trends are seen in both males and females indicating a small but steady increase in the number of deaths occurring within the last 5 years.

There are more male deaths occurring in the last 15 years when compared to female deaths; around 20 more male deaths a year than female deaths.

Figure 6: Average number of deaths in Cook Islands for 5 year periods: 1999 – 2013



Crude Death Rate

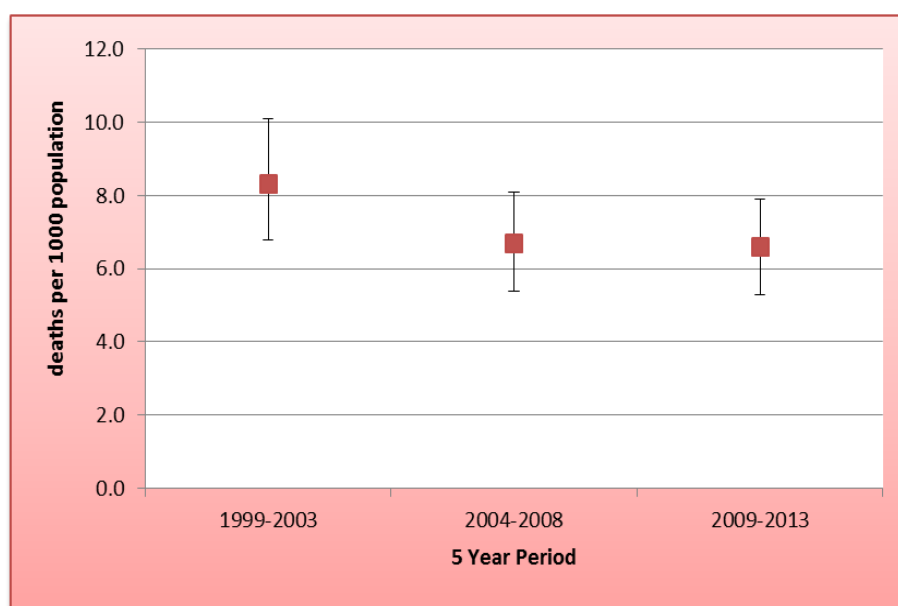
Over the last 15 years, the Crude Death Rate (CDR) for the Cook Islands varied between 6.0 (95% CI: 4.8 – 7.4) and 6.7 deaths (95% CI: 5.4 – 8.1) per 1000 resident population. This is consistent with the CDR reported in the 2006 population Census at 6.5 deaths occurring from 2001-2006. This rate is similar to the CDR of Australia (6.4 per 1,000) and New Zealand (6.3 per 1,000) (World Health Organization, 2014). Due to the small number of deaths occurring Poisson confidence intervals were used to generate the confidence limits.

The graph below shows that there is no significant change in the number of deaths reported in the Cook Islands as indicated by the confidence interval showing overlaps between the three periods in **Figure 7**.

Table 8: Crude death rate & Age standardized mortality rate per 1000 population with 95% confidence interval, Cook Islands: 1999-2013

5 year period	CDR	95% Confidence Interval	Direct Age Standardized Rate(DASR)	95% Confidence Interval
1999 – 2003	6.5	5.3 - 7.9	8.3	6.8 – 10.1
2004 – 2008	6.0	4.8 - 7.4	6.6	5.4 – 8.1
2009 – 2013	6.7	5.4 - 8.1	6.5	5.3 – 7.9

Figure 7: Age standardized mortality rates with 95% confidence intervals Cook Islands: 1999-2013



Age-specific Mortality

Age-specific mortality is the measure for the number of deaths per 1000 people of an identified age group in a given time period. The typical pattern for age-specific mortality rate is J-shaped. Mortality rates are normally high during infancy and early childhood and decreases to their lowest levels between the ages of 5 and 14 years. Subsequently, mortality rates start to rise with increasing age and increase exponentially beyond the age of 40 and onwards. The ASMR for the Cook Islands reflects this trend.

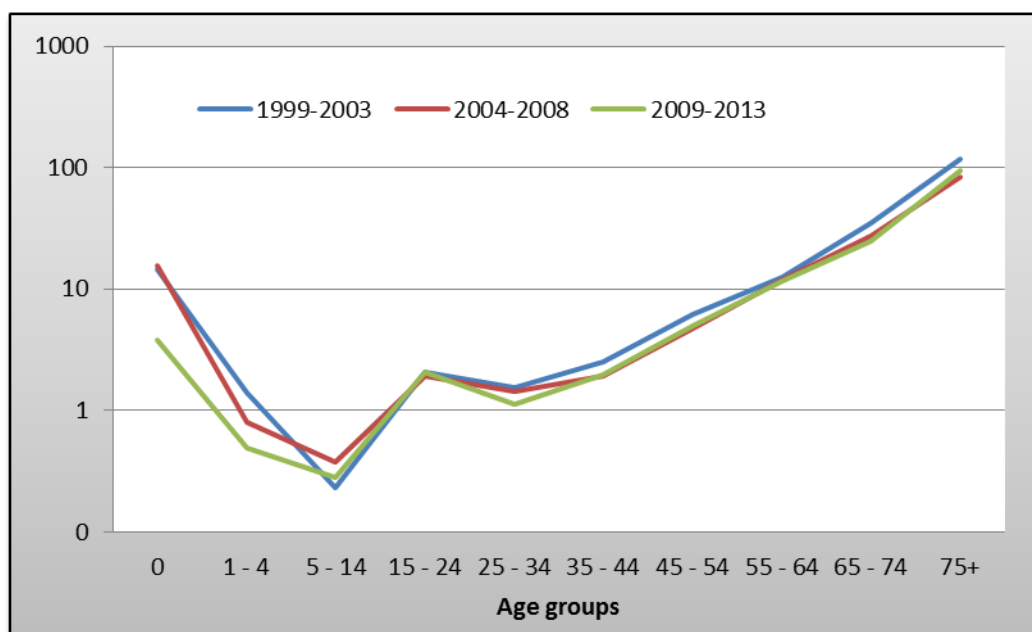
Table 9 illustrates the Age specific mortality rates by sex for each of the 5 year periods. Generally it can be seen throughout the last 15 years that the male rates are higher than the females as they do die younger than females.

Table 9: Age-Specific Mortality Rates (deaths per 1000 population) by Sex & Age Groupings

Age group	1999-2003			2004-2008			2009-2013		
	Male	Female	Both	Male	Female	Both	Male	Female	Both
0	19.9	8.1	14.5	17.3	13.8	15.7	2.9	4.7	3.8
1 - 4	1.5	1.3	1.4	0.3	1.3	0.8	1.0	0.0	0.5
5 - 14	0.1	0.4	0.2	0.7	0.0	0.4	0.3	0.3	0.3
15 - 24	1.7	0.5	1.1	2.3	1.5	1.9	3.4	0.7	2.1
25 - 34	3.2	1.1	1.5	2.6	1.2	1.4	2.6	0.6	1.1
35 - 44	2.7	2.3	2.5	2.6	1.3	1.9	2.9	1.1	2.0
45 - 54	7.8	4.3	6.1	6.9	2.4	4.7	5.7	4.0	4.9
55 - 64	15.4	9.6	12.5	16.8	6.4	11.9	14.1	8.9	11.6
65 - 74	40.0	28.8	35.1	36.5	17.8	27.4	32.1	17.4	24.7
75+	154.1	96.5	119.0	82.1	85.6	83.9	109.8	81.3	94.0

Figure 8 shows a plausible age specific mortality rate shape for 5 year period from 1999 to 2013 with mortality rates high in infants and early childhood, fall around ages 5-14 and then rising throughout adulthood. However, in the Cook Islands some health interventions are being implemented within the last 5 years targeting pregnant mothers, encouraging them to attend clinic check-ups with counseling towards proper care, exercising, and limiting smoking and alcohol use. The positive impact of these programs can be seen in the figure below with the 2009-2013 mortality rate in children under age 5 lower than the other two earlier periods. Mortality for the other age groups does not appear to have changed significantly over the last 15 years. There is a slight increase in mortality in young adults aged 15-24 that is due to incidental causes such as transport accidents and suicide, then mortality falls for adults aged 25-34. From age 35 on, mortality rises throughout the adult years. In the mid adult years starting around age 45, instead of the typical 'J' shape seen in countries like Australia or New Zealand where the curve is more concave, the 'J' becomes inverted (convex) and there is a bulge indicating premature adult mortality, likely due to non-communicable diseases (NCDs) such as diabetes and heart disease.

Figure 8: Log of age-specific death rates for 5 year periods: Cook Islands 1999-2013



MEASURES OF INFANT AND CHILD MORTALITY

Deaths in children under the age of 5 in the Cook Islands is relatively rare. For this purpose, summarized in the table below are data from 1999 – 2013. Total live births over that time period were 4,497. There were 44 neonatal deaths, 49 infant deaths and 60 under 5 deaths in the last 15 years.

Table 10: Measure of Infant and Child Mortality

Deaths by age	Periods			Total
	1999-2003	2004-2008	2009-2013	
< 28 days	24	15	5	44
< 1 year	24	20	5	49
< 5 years	33	25	8	66
live births	1,564	1,527	1,406	4,497
NMR	15.3	9.8	3.6	
IMR	15.3	13.1	3.6	
U5M	21.1	16.4	5.7	

Infant Mortality Rate (IMR)

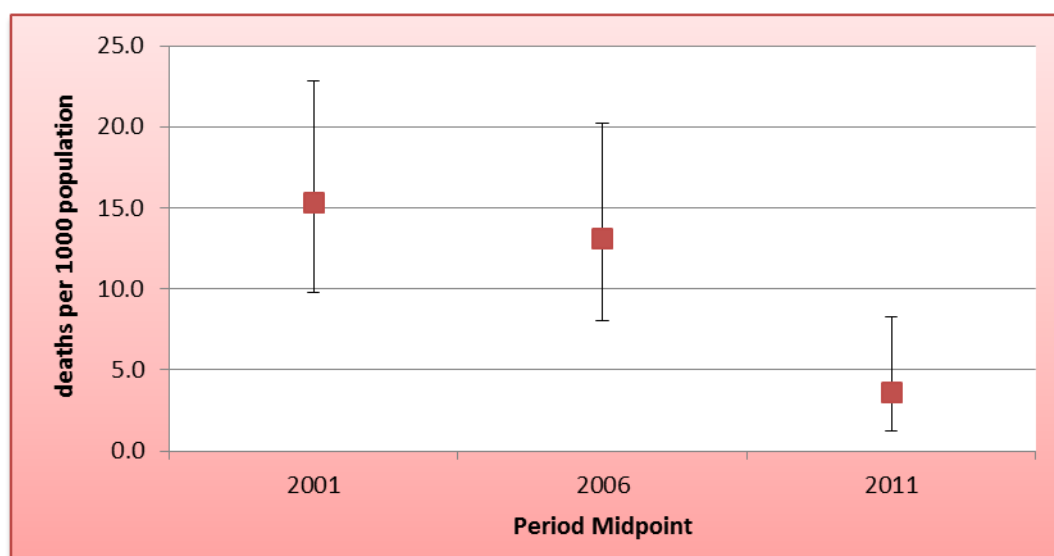
Infant mortality rate is the number of deaths to infants under age 1 per 1,000 live births in a given year.

There are no significant changes within the first two periods, but there are some significant decreases in IMR with regards to the last 5 years as compared to 1999-2003 periods. These changes are attributed by some of the prevention measures implemented by the Ministry of Health to improve IMR. Declines in neonatal mortality contributed the most to the decline in IMR, thus, prevention measures such as the promotion of good nutritional practices and raising awareness programs to encourage mothers to attend clinics for antenatal and postnatal services are having positive effects. Other examples of prevention measures includes the provision of adequate immunization programmes enabling high percentage of coverage and other counseling programs targeting mothers and the care for their young ones reference.

Table 11: Infant mortality rate with 95% confidence interval by year period: Cook Islands 1999-2013

	1999-2003	2004-2008	2009-2013
IMR	15.3 (9.8 - 22.8)	13.1 (8.0 - 20.2)	3.6 (1.2 - 8.3)

Figure 9: Infant Mortality Rate by 5 year period with 95% confidence intervals: Cook Islands 1999-2013



Neonatal Mortality Rate (NMR)

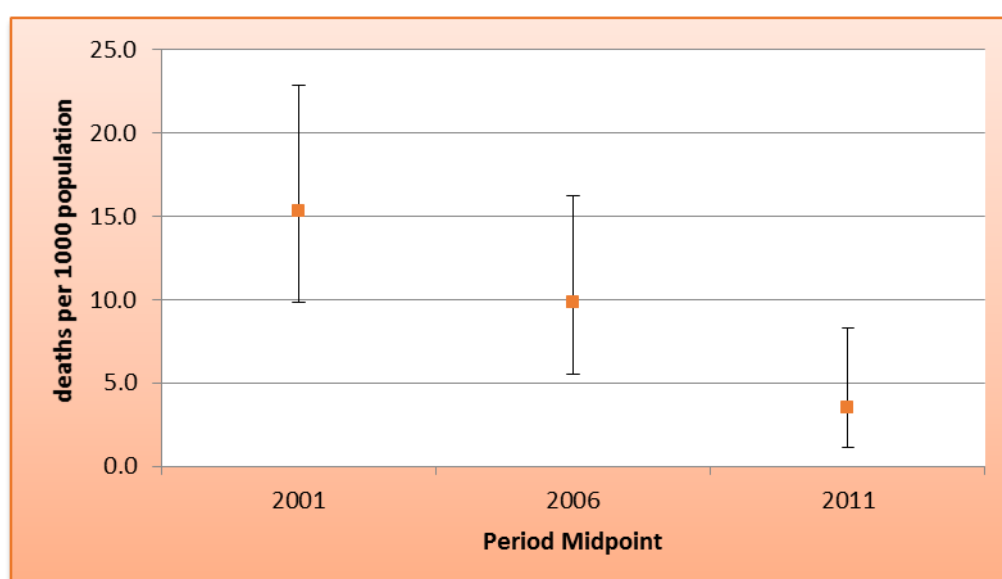
The neonatal mortality rate (NMR) is the number of deaths in live-born infants during the first 28 days of life per 1,000 live births over a specified time period. Mortality during the neonatal period (the first 28 days of life) accounts for a large proportion of child deaths, and is considered to be a useful indicator of maternal and newborn neonatal health and care.

The NMR fell significantly in the latest 5 year period from 15.3 in 1999-2003 to 3.6 in 2009-2013. This significant decrease is likely due to the targeted programmes from the Ministry of Health, mentioned above, and the concentrated effort to get mothers to the main hospital in Rarotonga for delivery. The significant decrease in NMR resulted in a large decrease in both IMR and the under 5 mortality as a large proportion of early childhood deaths occur in the first 28 days of life.

Table 12: Infant mortality rate with 95% confidence interval by year period: Cook Islands 1999-2013

	1999-2003	2004-2008	2009-2013
NMR	15.3 (9.8 - 22.8)	9.8 (5.5 - 16.2)	3.6 (1.2 - 8.3)

Figure 10: Neonatal Mortality Rate by 5 Year Period with 95% confidence intervals: Cook Islands 1999-2013



Under 5 Mortality Rate (U5MR)

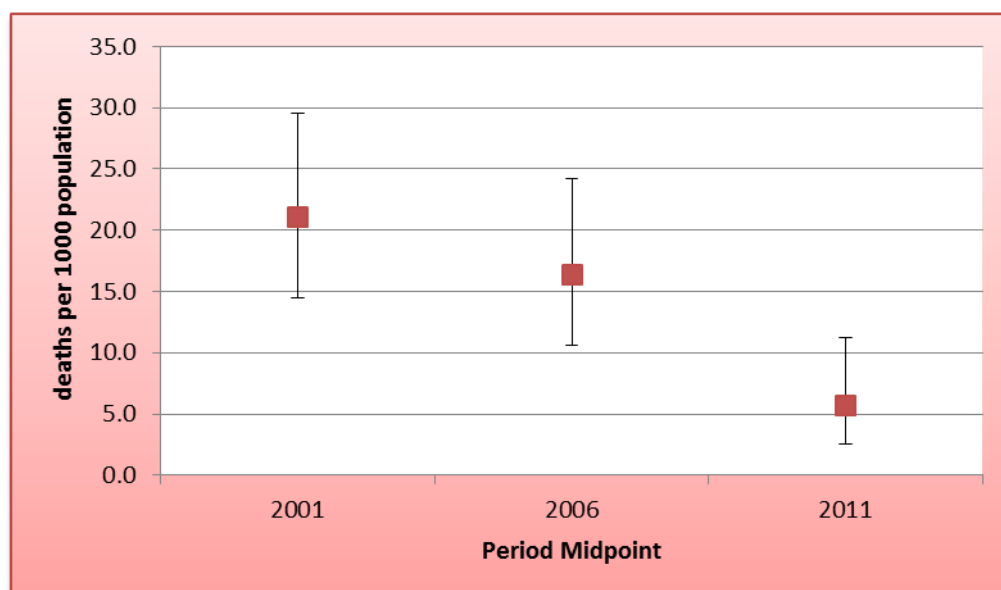
This is the probability that a new born child will die before reaching the age of five, per thousand live births in a given year. Both the neonatal and the infant deaths are included in this measure.

There is no significant change within the first two 5 year groupings, but there are some changes with regards to 2011 as compared to 2001. The U5MR has significantly fallen from 21.1 in 2001 to 5.7 in 2011. These changes are attributed to some of the prevention measures put into practice, such as immunization and others with high percentages of coverage.

Table 13: Under 5 year mortality rate with 95% confidence interval by year period

	1999-2003	2004-2008	2009-2013
U5MR	21.1 (14.5 - 29.6)	16.4 (10.6 - 24.2)	5.7 (2.5 - 11.2)

Figure 11: U5MR with 95% confidence intervals: Cook Islands 1999-2013



Life Expectancy (LE)

Life expectancy is computed using a life table, which converts observed population based mortality rates into risk of dying at each age. It is conventionally calculated separately for males and females. This measure can be calculated at any age with the most common as the life expectancy at birth (LE_0), which is the average number of years a person could be expected to live in total.

The population size for the Cook Islands was too small to allow the calculation of complete life tables with accuracy. Instead an abridged life table is used with ages grouped into 5 year age categories.

Note: Life tables by 5 year age groups and sex are available in the Appendices.

Table 14: Life expectancy at birth by sex & 5 year periods

5 year period	Male	Female	Total
1999 - 2003	68.6 (65.2 - 72.0)	75.4 (71.9 - 78.9)	71.7 (69.3 - 74.1)
2004 - 2008	71.9 (68.1 - 75.7)	78.5 (75.1 - 81.8)	74.9 (72.3 - 77.5)
2009 - 2013	71.7 (68.3 - 75.1)	79.6 (76.6 - 82.6)	75.3 (73.0 - 77.7)

There are no significant changes in the life expectancy of the Cook Islands for the last 15 years. Although improvements are usually slow and this can be seen in the above table for both sexes. For males, life expectancy for the 1999–2003 is 69 years showing an improvement of 3 more years covering a 10 year period to get to 72. In the case of females their life expectancy in 1999–2003 is 75 years with improvements of 5 more years in the following 10 year period to get to 80 years. It should be noted that the calculation of this life expectancies are based on the resident population of the Cook Islands only.

Adult Mortality

Adult mortality is the probability of dying between the ages of 15 to 59 inclusive ($_{45}q_{15}$), also thought of as the probability of a 15-year-old dying before reaching the age of 60.

Between the years of 2009 to 2013, the probability of dying between 15 and 59 years of age is 16 percent. This means, that 16 out of 100 fifteen year olds would not make it to 60 years of age. This is equivalent to 84 percent probability of surviving. By sex, the probability of dying for males is 19.1 percent. By the age of 60, 19 out of a 100 males would not make it, giving a surviving probability of 81 percent. This is higher compared to the females for the same period with a 14 percent of dying and at 86 percent probability of surviving.

Table 15: Adult mortality in percentages by sex & 5 year periods

5 year period	Males	Females
1999 – 2003	19.1	13.5
2004 – 2008	19.8	8.1
2009 - 2013	16.1	8.8

Life Expectancy at 40

Life expectancy at 40 years of age is also an indicative measure on premature mortality. This is the number of years a person aged 40 would be expected to live, on average, if they continued to experience current mortality rates.

Table 15 shows that a 40 year old male Cook Islander would be expected to live 36 more years, compared to 41 more years for female Cook Islander of the same age for the period of 2009-2013. In comparison, for the period 2012-2014, New Zealand's life expectancy at 40 was 41.2 for males and 44.3 for females.² While the Cook Islands' numbers are lower than those of New Zealand, they are comparable with other Pacific Island countries such as Western Samoa (33 males and 39 females) and Nauru (38 males and 46 females).³ The lower life expectancy at age 40 in many Pacific Islands is due to the rise of NCDs such as diabetes, heart diseases, and cancer, and is not expected to increase until healthier lifestyle habits are consistently adapted.

Table 16: Life expectancy at age 40 by sex & 5 year periods

5 year period	Male	Female
1999 - 2003	32.8 (30.3-35.4)	37.8 (34.8-40.8)
2004 - 2008	36.2 (33.3-39.2)	41.4 (38.8-43.9)
2009 - 2013	35.8 (33.3-38.2)	40.8 (38.2-43.5)

² Statistics New Zealand, New Zealand Abridged Period Life Table: 2012–14. [Available from:] <http://www.stats.govt.nz/~media/Statistics/Browse%20for%20stats/NZAbridgedPeriodLifeTable/HOTP12-14final/nzaplt-12-14-final.xls>

³ World Health Organization (2015) Global health observatory [database]. [Available from:] <http://apps.who.int/gho/data/view.main.61410>

CAUSES OF DEATH

Causes of death reported are only for the last five years from 2009 to 2013. This is due to time constraints to release this report and also due to some of the missing detailed data from some of the previous years. Cook Islands are using the International Classification of Diseases, tenth revision (ICD-10) with 103 tabulation list for its mortality coding.

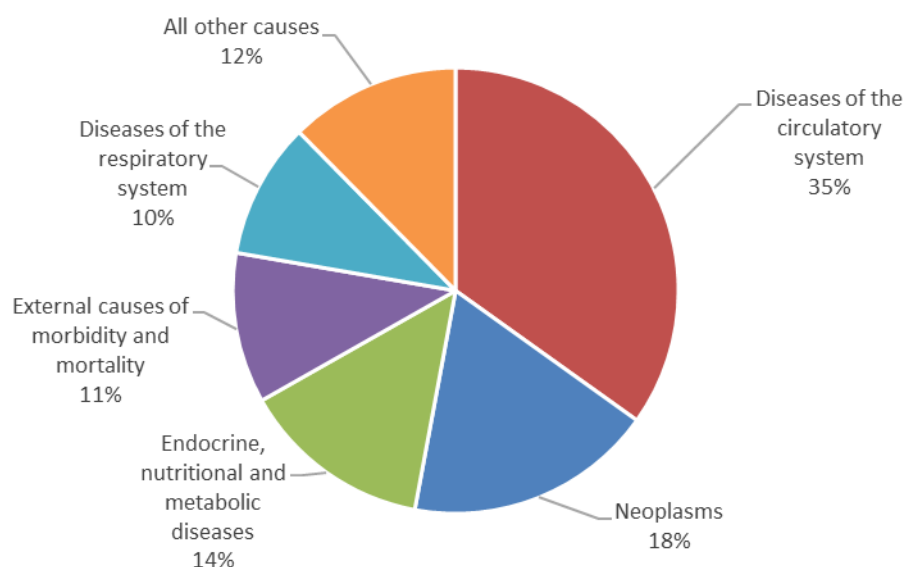
In this period, a total of 502 deaths were reported and collated from the Civil Registry (Ministry of Justice) and the Ministry of Health. The top three main causes of death are the Circulatory diseases with 35 percent, followed by Cancer at 18 percent and the Endocrine, nutritional and metabolic diseases of mainly diabetes (14%). It should be noted that ill-defined deaths of 26 cases were excluded from the tables and figures given below.

Table 17: Causes of death (number and percent distribution) by ICD-10 chapter and sex: 2009-2013

Leading Causes of Death (all ages)	Males	Females	Total	Percent distribution (both sexes)*
Diseases of the circulatory system	98	68	166	34.9
Neoplasms	56	30	86	18.1
Endocrine, nutritional and metabolic diseases	35	31	66	13.9
External causes of morbidity and mortality	43	9	52	10.9
Diseases of the respiratory system	25	22	47	9.9
Diseases of the digestive system	10	9	19	4.0
Diseases of the genitourinary system	7	8	15	3.2
Certain infectious and parasitic diseases	3	8	11	2.3
Certain conditions originating in the perinatal period	2	3	5	1.1
Symptoms, signs & abnormal findings	17	9	26	-
All other causes	5	4	9	1.9
Total	301	201	502	100.0

*Excludes 26 ill-defined deaths.

Figure 12: Leading causes of death, all ages, both sexes: 2009 – 2013



Total number of deaths by causes of deaths and rates in age groups

Under 5 years

There were only 8 deaths in children under age 5 over the period 2009-2013, making it difficult to accurately report cause-specific mortality rates. Five deaths were due to perinatal conditions, 2 to external causes, and 1 to diseases of the circulatory system.

5 – 14 years

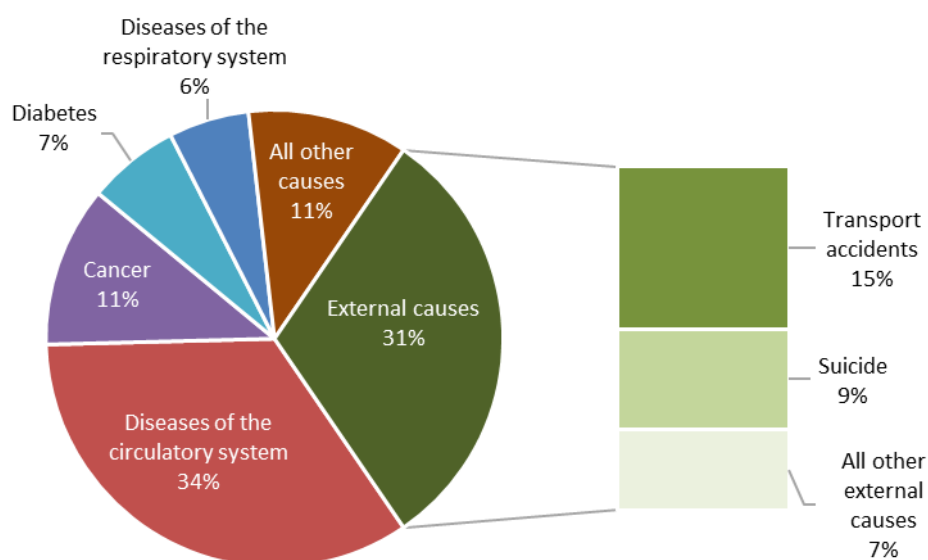
A total of four cases were reported for this age group from 2009 to 2013, of which two cases were for respiratory diseases and a case each for external causes and diseases of the circulatory system. Of these cases two are male and the other two females. The number of deaths in this age group is too small to accurately report cause-specific mortality rates.

Adult Mortality: 15 – 59 years

Non Communicable Diseases (NCD) are the leading cause of death in the Cook Islands over the last five years from 2009 to 2013, accounting for 54 percent of deaths among adults aged 15-59. The leading cause of death in this age group is cardiovascular diseases, accounting for 34 percent of deaths. Cancer (11%) and diabetes (7%) also account for a sizable percentage of adult deaths.

External causes are the second leading cause of death among adults aged 15-59, with transport accidents and suicide accounting for almost 1 out of every 4 deaths.

Figure 13: Mortality in adults aged 15-59: main causes of death, % distribution: 2009 – 2013



External causes of mortality were the leading cause of death in adult men aged 15-59, accounting for 39 percent of deaths. A large proportion of these deaths were due to transport accidents which accounted for 18 percent of deaths among males aged 15-59, resulting in a cause specific mortality rate of 69 per 100,000 males. Similarly, suicide was one of the leading causes of death in males, accounting for 11 percent of all deaths among males aged 15-59, resulting in a cause-specific mortality rate of 42 per 100,000. After external causes, diseases of the circulatory system, is the second leading cause of death, accounting for 37 percent of deaths.

The leading causes of death in adult women aged 15-59 were circulatory disease (29%), cancer (22%), and external causes (15%).

Note, due to the high level of uncertainty, cause-specific mortality rates are not shown for causes with fewer than 6 deaths.

Table 18: Cause specific Mortality for males aged 15-59 years by ICD-10 chapter (deaths per 100,000 population, including 95% Confidence Intervals), 2009-2013

Causes of Death	Number of male deaths aged 15-59	Percent distribution (95% CI)	Cause Specific Mortality Rate (95% CI)
External causes of morbidity and mortality	32	39.0 (26.7-55.1)	148 (101-209)
Transport accidents	15	18.3 (10.2-30.2)	69 (39-115)
Intentional self-harm (suicide)	9	11.0 (5.0-20.8)	42 (19-79)
All other external causes	8	9.8 (4.2-19.2)	37 (16-73)
Diseases of the circulatory system	30	36.6 (24.7-52.2)	139 (94-198)
Endocrine, nutritional and metabolic diseases	5	6.1 (2.0-14.2)	-
Diabetes	4	4.9 (1.3-12.5)	-
Other	1	1.2 (0.0-6.8)	-
Neoplasms	5	6.1 (2.0-14.2)	-
Diseases of the respiratory system	3	3.7 (0.8-10.7)	-
All other causes	7	8.5 (3.4-17.6)	-
Total	82	100.0	

Table 19: Cause specific Mortality for females aged 15-59 years by ICD-10 chapter (deaths per 100,000 population, including 95% Confidence Intervals), 2009-2013

Causes of Death	Number of female deaths aged 15-59	Percent distribution (95% CI)	Cause Specific Mortality Rate (95% CI)
Diseases of the circulatory system	12	29.3 (15.1-51.1)	55 (28-95)
Neoplasms	9	22.0 (10.0-41.7)	41 (19-78)
External causes of morbidity and mortality	6	14.6 (5.4-31.9)	27 (10-59)
Transport accidents	3	7.3 (1.5-21.4)	-
Intentional self-harm (suicide)	2	4.9 (0.6-17.6)	-
All other external causes	1	2.4 (0.1-13.6)	-
Endocrine, nutritional and metabolic diseases	4	9.8 (2.7-25.0)	-
Diabetes	4	9.8 (2.7-25.0)	-
Other	0	0.0 (0.0-9.0)	-
Diseases of the respiratory system	4	9.8 (2.7-25.0)	-
All other causes	6	14.6 (5.4-31.9)	-
Total	41	100.0	

Maternal Mortality

A maternal death is defined by the WHO as the death of a woman while pregnant or within 42 days of termination of pregnancy, irrespective of the duration and site of the pregnancy, from any cause related to or aggravated by the pregnancy or its management but not from accidental or incidental causes. The *maternal mortality ratio* (MMR) is the ratio of the number of maternal deaths during a given time period per 100,000 live births during the same time-period. A live birth is defined by the WHO as the complete expulsion or extraction from its mother of a product of conception, irrespective of the duration of the pregnancy, which, after such separation, breathes or shows any other evidence of life - e.g. beating of the heart, pulsation of the umbilical cord or definite movement of voluntary muscles - whether or not the umbilical cord has been cut or the placenta is attached. Each product of such a birth is considered live born.

There were no maternal deaths during 1999-2013 in the Cook Islands; the last maternal death was reported in 1995. See Table 20 for confidence intervals on the maternal mortality rate and ratio of zero.

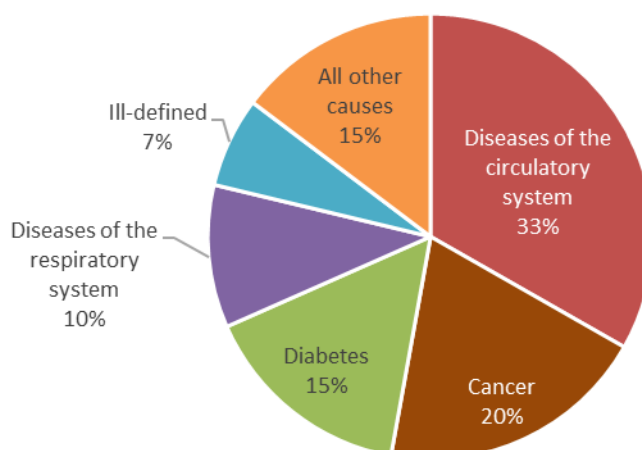
Table 20: Number of maternal deaths, maternal mortality rate, and maternal mortality ratio (including 95% confidence intervals), 1999-2013

Number of maternal deaths	Maternal Mortality Rate	Maternal Mortality Ratio
0	0 (0 – 20.2)	0 (0 – 262.4)

Adults aged 60 and above

As expected, Non communicable diseases (NCD) are the leading cause of death among adults aged 60 years and over, accounting for about 3 out of every 4 deaths.

Figure 14: Mortality in adults aged 60 and above: Main causes of death % distribution (2009-2013)



Cardiovascular disease, diabetes, and cancer were the leading causes of death among both men and women aged 60 and above, accounting for about 70 percent of deaths. The percentage of deaths due to external causes falls to 4 percent in men and 1 percent (data not shown) in women.

Due to the high level of uncertainty, cause-specific mortality rates are not shown for causes with fewer than 6 deaths.

Table 21: Cause specific mortality for males aged 60 and above by ICD-10 chapter (deaths per 100,000 population, including 95% Confidence Intervals), 2009-2013

Causes of Death	Number of male deaths aged 60+	Percent distribution (95% CI)	Cause Specific Mortality Rate (95% CI)
Diseases of the circulatory system	67	31.6 (24.5-40.1)	1409 (1092-1789)
Neoplasms	51	24.1 (17.9-31.6)	1073 (799-1410)
Endocrine, nutritional and metabolic diseases	30	14.2 (9.5-20.2)	631 (426-901)
Diabetes	30	14.2 (9.5-20.2)	631 (426-901)
Other	0	0.0 (0.0-1.7)	-
Diseases of the respiratory system	20	9.4 (5.8-14.6)	421 (257-650)
Symptoms, signs & abnormal findings	16	7.5 (4.3-12.3)	336 (192-546)
External causes of morbidity and mortality	9	4.2 (1.9-8.1)	189 (87-359)
Transport accidents	2	0.9 (0.1-3.4)	-
Intentional self-harm (suicide)	1	0.5 (0.0-2.6)	-
All other external causes	6	2.8 (1.0-6.2)	-
Diseases of the digestive system	9	4.2 (1.9-8.1)	189 (87-359)
Diseases of the genitourinary system	6	2.8 (1.0-6.2)	126 (46-275)
All other causes	4	1.9 (0.5-4.8)	-
Total	212	100.0	

Table 22: Cause specific mortality for females aged 60 and above by ICD-10 chapter (deaths per 100,000 population, including 95% Confidence Intervals), 2009-2013

Causes of Death	Number females deaths aged 60+	Percent distribution (95% CI)	Cause Specific Mortality Rate (95% CI)
Diseases of the circulatory system	55	35.5 (26.7-46.2)	1133 (853-1475)
Endocrine, nutritional and metabolic diseases	27	17.4 (11.5-25.3)	556 (366-809)
Diabetes	27	17.4 (11.5-25.3)	556 (366-809)
Other	0	0.0 (0.0-2.4)	-
Neoplasms	21	13.5 (8.4-20.7)	433 (268-661)
Diseases of the respiratory system	18	11.6 (6.9-18.4)	371 (220-586)
Symptoms, signs & abnormal findings	8	5.2 (2.2-10.2)	165 (71-325)
Diseases of the digestive system	8	5.2 (2.2-10.2)	165 (71-325)
Diseases of the genitourinary system	7	4.5 (1.8-9.3)	144 (58-297)
Certain infectious and parasitic diseases	6	3.9 (1.4-8.4)	124 (45-269)
All other causes	5	3.2 (1.0-7.5)	-
Total	155	100.0	

Adult Mortality from Non-Communicable Diseases (NCDs)

Non-communicable diseases are the leading cause of death in the world and in Pacific Island countries and territories. A number of NCD-related indicators can be used to measure progress against NCD-related mortality including cause-specific proportional mortality (% of deaths due to selected NCDs), cause-specific mortality rates from selected NCDs and age-standardized mortality from NCDs.

Worldwide, the ICD-10 classification system is the system most commonly used to classify deaths.⁴ Selected non-communicable diseases for reporting against WHO international targets by ICD General Mortality List 1 include 1-026 – Neoplasms, 1-052 – Diabetes, 1-064 Diseases of the Circulatory System, and 1-076 – Chronic Lower respiratory Disease. It may also be argued that 1-080 – Diseases of the Liver are important in the Pacific Region and should be considered when examining NCDs.

Table 23: Selected Non-Communicable Diseases (NCDs) for Reporting Against International Targets by ICD General Mortality List 1

List code	Disease	ICD Codes
1-026	Neoplasms	C00–D48
1-052	Diabetes mellitus	E10–E14
1-064	Diseases of the circulatory system	I00–I99
1-076	Chronic lower respiratory diseases	J40–J47

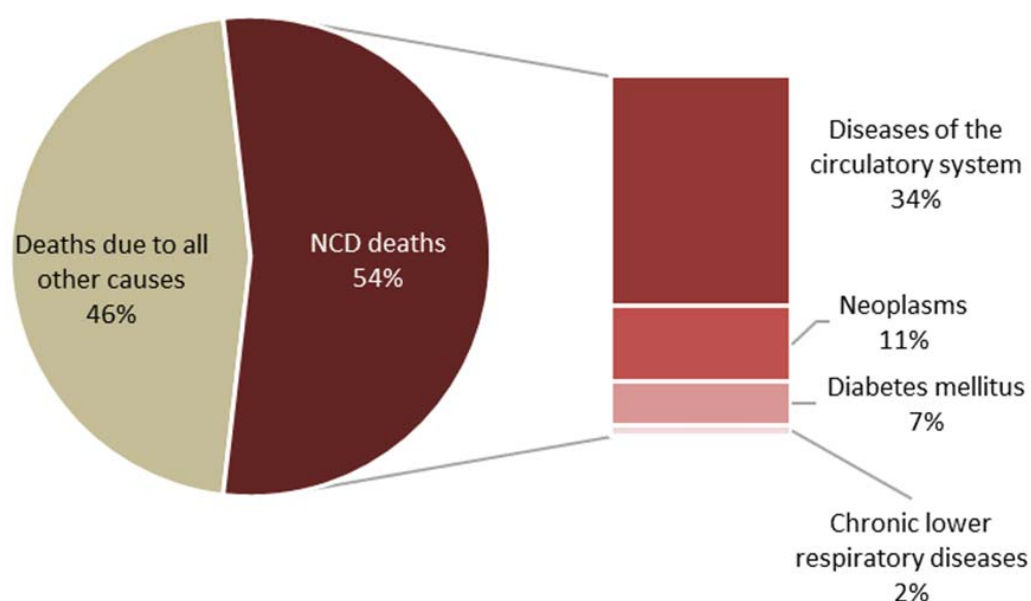
Cause-specific proportional mortality

Age-specific proportional mortality for adults aged 15-59 years from specific groups of NCDs shows the proportion of deaths due to these diseases. While proportional mortality shows the relative burden from NCDs compared to other causes of death and is easy to measure, it does not provide a measure of the overall impact of NCD related deaths and does not paint a complete picture. For the purpose of this analysis, deaths from chronic liver & cirrhosis were not included.

Figure 15 shows that among adults aged 15-59 years, 54 percent of deaths were due to NCDs. It's notable that almost one-third (34%) of adult deaths were due to causes categorized as diseases of the circulatory system, 11 percent of deaths were due to cancer, and 7 percent were due to diabetes.

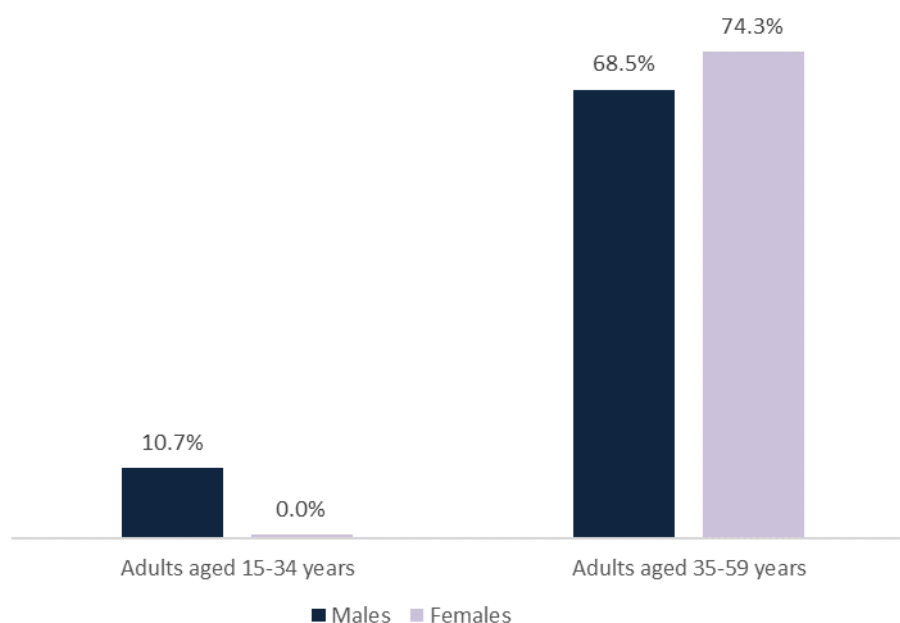
⁴ WHO. (2012). Classifications, International Classification of Diseases (ICD). Retrieved September 2012, from World Health Organization: <http://www.who.int/classifications/icd>

Figure 15: Percentage of deaths due to NCDs compared to all other causes in adults aged 15-59, 2009-2013



When broken down by sex and broad age group, there were no deaths due to NCDs among young women aged 15-34. However, for women aged 35-59, NCDs accounted for about 3 out of every 4 deaths (74%). While deaths due to NCDs are not particularly high in young men (11%), among men aged 35-59, NCDs accounted for slightly more than two out of every three deaths (69%).

Figure 16: Percentage of deaths in adults aged 15-59 due to NCDs by sex & age group, 2009-2013



Cause-specific mortality rates from selected NCD's

Cause-specific mortality rates provide a direct measure of the overall impact of NCD-related deaths on the population. While these rates cannot be used to provide a comparison either between countries or over time as they will be affected by the age structure of the population, rates for 15-34 year olds and 35-59 year olds can be useful in providing more detailed information for targeting specific NCD-related interventions.

Table 21 shows combined cause-specific mortality rates for selected NCDs by sex and broad age group. There were too few deaths among young men and women aged 15-34 to display cause-specific rates with certainty as there were just 3 male and no female deaths in this age group from these NCDs. Among adults aged 35-59, men experienced higher rates of death compared to women, bearing a heavier burden from NCDs in general.

Table 24: Cause-specific mortality rates in adults aged 15-59 years for combined selected NCDs by sex & broad age groups

Sex and age group	Cause-specific mortality rate for selected NCDs (95% CI)
Males 15-34	-
Males 35-59	324 (228 - 446)
Males 15-59	185 (132 - 252)
Females 15-34	-
Females 35-59	223 (145 - 326)
Females 15-59	118 (77 - 173)
Total 15-34	-
Total 35-59	273 (209 - 349)
Total 15-59	151 (117 - 193)

Age-standardized mortality from NCD's

For comparison over time and across countries, age standardized rates should be used. Table 22 shows age-standardized death rates using the WHO World Standard Population⁵ for the selected NCD's. Using this standardization, for every 100,000 adults aged 15-59, 149 would die in a given year from the selected NCDs.

Table 25: Age-standardized mortality rates for adults aged 15-59 years from selected NCDs by sex (deaths per 100,000 Population) 2009-2013

Sex	Age-standardized mortality rates for selected NCDs (95% CI)
Males	167 (119-228)
Females	117 (76-171)
Both sexes	149 (116-190)

The probability of dying among adults aged 30-69 years (inclusive) from designated NCDs – WHO Indicator

The probability of dying among adults aged 30-69 years (inclusive) from specific causes has recently been introduced by WHO as an outcome indicator for the impact of NCDs. This is the probability that a person aged 30 will die from the selected disease before their 70th birthday. Estimates of mortality from selected non-communicable diseases for this age group are reported here for comparison with international reporting. This indicator does not include deaths from Diseases of the Liver (1-080). The probability of dying from these diseases is calculated using life table methods, entering in the number of deaths by 5 year age group from selected NCDs among males and females aged 30-69.

The results in Table 26 indicate that males aged 30 had a little more than one in four (26%) chance of dying before reaching age 70. The probability of dying was slightly less in females, with a 30 year old woman having a 13 percent chance of dying

⁵ Ahmad OB, Boschi-Pinto C, Lopez AD, Murray C, Lozano R, Inoue M, 2001, Age Standardization of Rates: A New WHO Standard. Geneva, World Health Organization (GPE Discussion Paper Series no. 31, EIP/GPE/EBD), [available from:] <http://www.who.int/healthinfo/paper31.pdf>

before her 70th birthday from selected NCDs. For both sexes combined, a 30 year old adult had a 20 percent chance of dying from the selected NCDs before reaching their 70th birthday, highlighting the impact of NCDs on adult mortality in the Cook Islands.

Table 26: Probability of dying (%) from selected NCDs in 30-69 year olds (inclusive) by sex, 2009-2013

Sex	Probability of dying (%) from selected NCDs in 30-69 year olds (95% CI)
Males	26 (20-31)
Females	13 (9-18)
Both sexes	20 (16-23)

CONCLUSIONS

The number of births is consistently declining, but fertility rates are remaining steady at around 2-3 births per woman. Fertility rates are highest among women aged 20 and 24 years, followed by women aged 25-29. Of concern is the high birth rates of teen mothers aged 15 to 19 years. This rate is higher than those reported in the Pacific region.

By Islands, majority of the births take place on the main island of Rarotonga, followed by Aitutaki, Pukapuka, Mangaia and Atiu. A proportion of these births on Rarotonga are attributed by pregnant mother's preference for their delivery and for some referred to from the outer islands.

The number of deaths have been steady over the years from 1999-2013. Generally mortality rates start high during infancy and early childhood, then goes down between 5 and 14 years, and subsequently rises with increasing age. However, there is a slight increase in the age-specific death rate for young people aged 15-24, due to external causes such as transport accidents, suicide, and assault. Mortality goes down slightly for ages 25-34 then gradually increases at age 35 and into older adulthood. Starting at around age 45, there is slightly higher adult mortality than would be seen in countries such as Australia or New Zealand. This is likely due to the impact of NCDs. By gender, most of these deaths are males.

This trend is reflected in the life expectancy for both sexes. For the last five years, females tend to live longer (80 years) compared to males with 72 years.

There has been a noticeable decline in infant and under 5 mortality, driven primarily by a large decrease in neonatal mortality that has occurred in the last 5 years. This decline is likely attributable to health programs implemented by the MOH to educate mothers, and bring them to the main hospital for delivery.

Non Communicable Diseases accounted for 54 percent of deaths among adults aged 15-59 over the last five years. However, by cause and sex, external causes of mortality (including road traffic accidents and suicide) were the leading causes of death in males aged 15-59. Specifically, transport accidents were the cause of 18 percent of deaths among males aged 15-59. Similarly, suicide accounted for 11 percent of all deaths among males aged 15-59. This was followed by circulatory diseases, accounting for 37 percent of deaths. The leading causes of death in adult women aged 15-59 were circulatory disease (29%), cancer (22%), and external causes (15%). Among both men and women aged 60 and above, cardiovascular disease, diabetes, and cancer were the leading causes of death, accounting for about 70 percent of deaths.

The probability of dying among adults 30-69 years is 26 percent for males and 13 percent for females highlighting the impact of NCDs on adult mortality in the Cook Islands.

GLOSSARY

Adult Mortality (${}_{45}Q_{15}$): The probability of dying between the ages of 15-60 that is, the probability of a 15 year old dying before reaching the age of 60, if subject to current age –specific mortality rates between those ages.

Age-adjusted death rate (Direct method): A summary of age-specific death rates, applied to a standard population to calculate what rate would be expected if the selected population had the same distribution as the standard population. The total of expected deaths divided by the total of the standard population and multiplied by 100,000 yields the age-adjusted death rate per 100,000.

Age-specific mortality rate: The number of deaths for a specific age group per 100,000 populations in the same age group.

Cause of death: The underlying cause of death determined to be the primary condition leading to death, based on the international rules and sequential procedure set forth for manual classification of the underlying causes of death (International Classification of Disease).

Crude death rate: The number of deaths per 1,000 populations. This rate should not be used for making comparisons between different populations when the age, race, and sex distributions of the populations are different. (See "Age-adjusted death rate" and "Age-specific death rate.")

Fetal death: Death prior to the complete expulsion or extraction from the mother of a product of conception, which has passed through at least the 20th week of gestation. The fetus shows no signs of life such as heartbeat, pulsation of the umbilical cord, or movement of voluntary muscles.

Infant death: Death occurring to an individual of less than one year (365 days) of age.

Live birth: The complete expulsion or extraction from the mother of a product of conception, regardless of the duration of pregnancy; after such separation, shows signs of life (e.g., heartbeat, pulsation of the umbilical cord, or movement of voluntary muscles).

Maternal death: The death of a woman while pregnant or within 42 days of termination of pregnancy, irrespective of the duration and site of the pregnancy, from any cause related to or aggravated by the pregnancy or its management but not from accidental or incidental.

Neonatal death: Death occurring to an infant less than 28 days of age.

Occurrence: Place of occurrence identifies where the vital event actually took place, regardless of residence.

Post neonatal death: Death occurring to an infant aged 28 days to less than 1 year.

Premature: A live birth or fetal death occurring before the 37th week of gestation.

Residence: The usual place of abode of the person to whom the vital event occurred. For births and fetal deaths, residence is defined as the mother's usual place of residence.

Teenage mother: A woman under 20 years of age on the date of delivery.

Total Fertility Rate: TFR is the average number of children a woman would give birth to during her lifetime if she were to pass through her childbearing years experiencing the present day age-specific fertility rates.

Underlying cause of death: The disease or injury that initiated the sequence of events leading directly to death or the circumstances of the accident or violence that produced the fatal injury.

APPENDICIES

Life table for Males: 2009-2013

	<i>x</i>	<i>nx</i>	<i>ax</i>	<i>pop</i> (<i>Nx</i>)	<i>death</i>	<i>mx</i>	<i>qx</i>	<i>lx</i>	<i>dx</i>	<i>Lx</i>	<i>Tx</i>	<i>ex</i>
<5	0	5	0.2	748	1	0.0013	0.0066	100000	665	497340	7169572	71.70
5-9	5	5	0.5	723	0	0.0000	0.0000	99335	0	496676	6672231	67.17
10-14	10	5	0.5	749	0	0.0005	0.0027	99335	265	496013	6175556	62.17
15-19	15	5	0.5	686	2	0.0029	0.0145	99070	1434	491767	5679543	57.33
20-24	20	5	0.5	503	2	0.0040	0.0197	97636	1922	483378	5187776	53.13
25-29	25	5	0.5	451	1	0.0022	0.0110	95715	1055	475934	4704398	49.15
30-34	30	5	0.5	394	1	0.0015	0.0076	94659	718	471501	4228464	44.67
35-39	35	5	0.5	448	2	0.0040	0.0199	93941	1868	465035	3756963	39.99
40-44	40	5	0.5	521	1	0.0019	0.0096	92073	879	458165	3291928	35.75
45-49	45	5	0.5	542	3	0.0055	0.0273	91193	2489	449743	2833763	31.07
50-54	50	5	0.5	432	3	0.0060	0.0296	88704	2630	436946	2384019	26.88
55-59	55	5	0.5	342	2	0.0070	0.0345	86074	2968	422951	1947074	22.62
60-64	60	5	0.5	310	7	0.0219	0.1040	83106	8641	393928	1524123	18.34
65-69	65	5	0.5	244	8	0.0311	0.1445	74465	10759	345428	1130194	15.18
70-74	70	5	0.5	204	7	0.0333	0.1538	63706	9801	294027	784766	12.32
75+	75	18	0.5	193	21	0.1098	1.0000	53905	53905	490739	490739	9.10

Life table for Males: 2004-2008

	<i>x</i>	<i>nx</i>	<i>ax</i>	<i>pop</i> (<i>N_x</i>)	<i>death</i>	<i>mx</i>	<i>qx</i>	<i>lx</i>	<i>dx</i>	<i>Lx</i>	<i>Tx</i>	<i>ex</i>
<5	0	5	0.2	780	3	0.0033	0.0164	100000	1645	493421	7188189	71.88
5-9	5	5	0.5	786	0	0.0005	0.0025	98355	250	491151	6694768	68.07
10-14	10	5	0.5	888	1	0.0009	0.0045	98105	441	489424	6203616	63.23
15-19	15	5	0.5	819	2	0.0022	0.0109	97664	1067	485654	5714192	58.51
20-24	20	5	0.5	514	1	0.0023	0.0116	96597	1121	480182	5228539	54.13
25-29	25	5	0.5	439	1	0.0027	0.0136	95476	1296	474140	4748356	49.73
30-34	30	5	0.5	468	1	0.0013	0.0064	94180	602	469395	4274216	45.38
35-39	35	5	0.5	533	2	0.0030	0.0149	93578	1394	464405	3804821	40.66
40-44	40	5	0.5	556	1	0.0022	0.0107	92184	989	458447	3340416	36.24
45-49	45	5	0.5	473	2	0.0047	0.0230	91195	2096	450732	2881969	31.60
50-54	50	5	0.5	364	4	0.0099	0.0483	89098	4300	434742	2431237	27.29
55-59	55	5	0.5	353	6	0.0159	0.0763	84799	6470	407818	1996496	23.54
60-64	60	5	0.5	265	5	0.0181	0.0866	78329	6787	374678	1588677	20.28
65-69	65	5	0.5	225	6	0.0249	0.1172	71542	8382	336757	1213999	16.97
70-74	70	5	0.5	186	9	0.0505	0.2243	63161	14170	280379	877242	13.89
75+	75	24	0.5	173	14	0.0821	1.0000	48991	48991	596863	596863	12.18

Life table for Males: 1999-2003

	<i>x</i>	<i>nx</i>	<i>ax</i>	<i>pop</i> (<i>Nx</i>)	<i>death</i>	<i>mx</i>	<i>qx</i>	<i>lx</i>	<i>dx</i>	<i>Lx</i>	<i>Tx</i>	<i>ex</i>
<5	0	5	0.2	850	5	0.0054	0.0265	100000	2649	489406	6861395	68.61
5-9	5	5	0.5	935	0	0.0000	0.0000	97351	0	486757	6371989	65.45
10-14	10	5	0.5	933	0	0.0002	0.0011	97351	104	486497	5885232	60.45
15-19	15	5	0.5	706	1	0.0017	0.0085	97247	823	484178	5398736	55.52
20-24	20	5	0.5	477	1	0.0017	0.0084	96424	805	480108	4914557	50.97
25-29	25	5	0.5	470	1	0.0026	0.0127	95619	1213	475063	4434449	46.38
30-34	30	5	0.5	544	1	0.0018	0.0091	94406	864	469871	3959387	41.94
35-39	35	5	0.5	581	2	0.0031	0.0154	93542	1438	464117	3489516	37.30
40-44	40	5	0.5	460	1	0.0022	0.0108	92104	996	458033	3025399	32.85
45-49	45	5	0.5	360	4	0.0100	0.0488	91109	4444	444433	2567366	28.18
50-54	50	5	0.5	360	2	0.0056	0.0274	86664	2374	427386	2122933	24.50
55-59	55	5	0.5	292	4	0.0137	0.0662	84290	5582	407495	1695547	20.12
60-64	60	5	0.5	281	5	0.0171	0.0819	78708	6447	377422	1288052	16.36
65-69	65	5	0.5	233	10	0.0421	0.1903	72261	13751	326928	910630	12.60
70-74	70	5	0.5	147	5	0.0367	0.1682	58510	9843	267944	583703	9.98
75+	75	13	0.5	109	17	0.1541	1.0000	48667	48667	315759	315759	6.49

Life table for Females: 2009-2013

	<i>x</i>	<i>nx</i>	<i>ax</i>	<i>pop</i> (<i>Nx</i>)	<i>death</i>	<i>mx</i>	<i>qx</i>	<i>lx</i>	<i>dx</i>	<i>Lx</i>	<i>Tx</i>	<i>ex</i>
<5	0	5	0.2	733	1	0.0008	0.0041	100000	408	498368	7958655	79.59
5-9	5	5	0.5	720	0	0.0003	0.0014	99592	138	497615	7460287	74.91
10-14	10	5	0.5	659	0	0.0003	0.0015	99454	151	496892	6962672	70.01
15-19	15	5	0.5	597	1	0.0010	0.0050	99303	498	495271	6465780	65.11
20-24	20	5	0.5	512	0	0.0004	0.0020	98805	193	493544	5970509	60.43
25-29	25	5	0.5	493	0	0.0004	0.0020	98612	200	492563	5476965	55.54
30-34	30	5	0.5	462	0	0.0004	0.0022	98413	213	491531	4984402	50.65
35-39	35	5	0.5	521	0	0.0004	0.0019	98200	188	490529	4492871	45.75
40-44	40	5	0.5	542	1	0.0018	0.0092	98012	900	487808	4002342	40.84
45-49	45	5	0.5	528	2	0.0045	0.0225	97112	2182	480102	3514534	36.19
50-54	50	5	0.5	412	1	0.0034	0.0168	94929	1599	470648	3034432	31.97
55-59	55	5	0.5	334	2	0.0060	0.0295	93330	2753	459767	2563784	27.47
60-64	60	5	0.5	270	3	0.0126	0.0610	90577	5529	439062	2104017	23.23
65-69	65	5	0.5	246	3	0.0130	0.0630	85048	5357	411846	1664955	19.58
70-74	70	5	0.5	214	5	0.0224	0.1062	79691	8463	377296	1253109	15.72
75+	75	25	0.5	241	20	0.0813	1.0000	71228	71228	875812	875812	12.30

Life table for Females: 2004-2008

	<i>x</i>	<i>nx</i>	<i>ax</i>	<i>pop</i> (<i>Nx</i>)	<i>death</i>	<i>mx</i>	<i>qx</i>	<i>lx</i>	<i>dx</i>	<i>Lx</i>	<i>Tx</i>	<i>ex</i>
<5	0	5	0.2	725	2	0.0033	0.0163	100000	1634	493466	7846020	78.46
5-9	5	5	0.5	730	0	0.0000	0.0000	98366	0	491832	7352554	74.75
10-14	10	5	0.5	793	0	0.0000	0.0000	98366	0	491832	6860721	69.75
15-19	15	5	0.5	631	1	0.0019	0.0095	98366	931	489505	6368889	64.75
20-24	20	5	0.5	542	1	0.0011	0.0055	97436	538	485833	5879384	60.34
25-29	25	5	0.5	473	1	0.0017	0.0084	96898	816	482449	5393551	55.66
30-34	30	5	0.5	554	0	0.0004	0.0018	96082	173	479976	4911102	51.11
35-39	35	5	0.5	552	0	0.0007	0.0036	95908	347	478675	4431127	46.20
40-44	40	5	0.5	542	1	0.0018	0.0092	95562	878	475614	3952452	41.36
45-49	45	5	0.5	453	1	0.0018	0.0088	94684	832	471339	3476837	36.72
50-54	50	5	0.5	364	1	0.0033	0.0163	93852	1534	465423	3005498	32.02
55-59	55	5	0.5	280	1	0.0043	0.0212	92317	1957	456694	2540075	27.51
60-64	60	5	0.5	283	2	0.0085	0.0415	90360	3752	442420	2083382	23.06
65-69	65	5	0.5	226	4	0.0168	0.0807	86608	6987	415572	1640961	18.95
70-74	70	5	0.5	167	3	0.0192	0.0914	79621	7280	379904	1225390	15.39
75+	75	23	0.5	187	16	0.0856	1.0000	72341	72341	845486	845486	11.69

Life table for Females: 1999-2003

	<i>x</i>	<i>nx</i>	<i>ax</i>	<i>pop</i> (<i>Nx</i>)	<i>death</i>	<i>mx</i>	<i>qx</i>	<i>lx</i>	<i>dx</i>	<i>Lx</i>	<i>Tx</i>	<i>ex</i>
<5	0	5	0.2	754	2	0.0027	0.0131	100000	1312	494751	7538424	75.38
5-9	5	5	0.5	859	1	0.0007	0.0035	98688	344	492578	7043674	71.37
10-14	10	5	0.5	775	0	0.0000	0.0000	98344	0	491718	6551096	66.61
15-19	15	5	0.5	657	1	0.0009	0.0046	98344	448	490598	6059378	61.61
20-24	20	5	0.5	492	0	0.0000	0.0000	97896	0	489478	5568780	56.88
25-29	25	5	0.5	524	1	0.0015	0.0076	97896	744	487617	5079302	51.88
30-34	30	5	0.5	542	0	0.0004	0.0018	97151	179	485308	4591685	47.26
35-39	35	5	0.5	524	1	0.0023	0.0114	96972	1104	482100	4106377	42.35
40-44	40	5	0.5	447	1	0.0022	0.0111	95868	1066	476674	3624277	37.80
45-49	45	5	0.5	353	1	0.0034	0.0169	94802	1598	470014	3147603	33.20
50-54	50	5	0.5	294	2	0.0054	0.0268	93204	2502	459764	2677590	28.73
55-59	55	5	0.5	297	4	0.0128	0.0620	90702	5623	439452	2217826	24.45
60-64	60	5	0.5	265	2	0.0060	0.0297	85079	2530	419070	1778374	20.90
65-69	65	5	0.5	186	5	0.0280	0.1307	82549	10785	385781	1359304	16.47
70-74	70	5	0.5	113	3	0.0301	0.1399	71764	10041	333715	973523	13.57
75+	75	21	0.5	170	16	0.0965	1.0000	61723	61723	639807	639807	10.37

Causes of Death by sex and age groups: 2009-2013

SEX: MALE	0	1-4	5-9	10-14	15-19	20-24	25-29	30-34	35-39	40-44	45-49	50-54	55-59	60-64	65-69	70-74	75+	Total
Diseases of the circulatory system		1	0	0	0	1	1	0	2	2	7	8	8	18	17	8	43	116
Neoplasms						0	0	0	0	0	1	3	1	7	8	12	26	58
Endocrine, nutritional & metabolic diseases						1	0	0	2	2	2	1	2	3	8	9	13	43
External causes of morbidity and mortality		2	0	0	10	6	2	3	5	1	3	1	0	1	0	2	5	41
Diseases of the respiratory system				2	0	1	1	0	0	0	1	0	0	5	3	2	6	21
Certain infectious & parasitic diseases							1	0	0	0	0	0	1	0	1	1	0	4
Diseases of the digestive system																	3	3
Diseases of blood & blood-forming organs											1	0	0	0	1	0	0	2
Perinatal conditions	2																0	2
Diseases of the nervous system						1											1	2
Diseases of the genitourinary system																	1	1
Ill-defined																	8	8
TOTAL	2	3	0	2	10	10	5	3	9	5	15	13	12	34	38	34	106	301
SEX: FEMALE																		
Diseases of the circulatory system										2	3	2	2	4	4	11	48	76
Endocrine, nutritional & metabolic diseases											1	1	3	7	2	7	20	41
Neoplasms										2	3	1	5	3	5	4	10	33
Diseases of the respiratory system	1								1	0	3	1	0	1	0	1	11	19
External causes of morbidity and mortality			1	0	3	1	0	1	0	1	0	0	0	1	0	0	0	8
Certain infectious & parasitic diseases							1	0	0	0	0	1	0	0	1	1	3	7
Diseases of the digestive system											1	0	0	1	1	0	2	5
Diseases of the genitourinary system												1	0	0	1	0	2	4
Perinatal conditions	2																	2
Diseases of blood & blood-forming organs				1														1
Ill-defined											1	0	0	0	2	0	2	5
TOTAL	3	0	1	1	3	1	1	1	1	5	12	7	10	17	16	24	98	201

Causes of Death (ICD Mortality 103 cause list) by sex and age groups: 2009-2013 MALE

SEX: MALE	< 5	5-14	15-59	60+	Total
Total	5	2	82	212	301
Hypertensive diseases			10	29	39
Diabetes mellitus			6	32	38
Other heart diseases	1	0	6	29	36
Ischaemic heart diseases			10	14	24
Pneumonia	0	2	3	12	17
Transport accidents			15	2	17
Cerebrovascular diseases			2	13	15
Malignant neoplasm of trachea, bronchus and lung			2	13	15
Malignant neoplasm of prostate			0	13	13
Intentional self-harm			11	1	12
Symptoms, signs & abnormal clinical & lab findings			0	8	8
Malignant neoplasm of liver & intrahepatic bile ducts			2	5	7
Remainder of malignant neoplasms			0	6	6
Assault	1	0	2	2	5
Endocrine, nutritional and metabolic diseases			4	1	5
Falls			1	3	4
Remainder of diseases of the respiratory system			0	4	4
Septicaemia			2	2	4
Leukaemia			1	2	3
Malignant neoplasm of bladder			0	3	3
Accidental drowning and submersion	1	0	1	0	2
Certain conditions originating in the perinatal period	2	0	0	0	2
Malignant neoplasm of colon, rectum and anus			0	2	2
Malignant neoplasm of lip, oral cavity & pharynx			0	2	2
Malignant neoplasm of pancreas			0	2	2
Malignant neoplasm of stomach			0	2	2
Remainder diseases of blood & blood-forming organs			1	1	2
Remainder of diseases of the circulatory system			1	1	2
Remainder of diseases of the digestive system			0	2	2
Accidental poisoning by & expose to noxious substances			1	0	1
Alzheimer's disease			0	1	1
Diseases of the liver			0	1	1
Glomerular & renal tubulointerstitial diseases			0	1	1
Malignant neoplasm of meninges, brain & other			0	1	1
Malignant neoplasm of oesophagus			0	1	1
Remainder of diseases of the nervous system			1	0	1
Remainder of neoplasms			0	1	1

Causes of Death (ICD Mortality 103 cause list) by sex and age groups: 2009-2013 FEMALE

SEX: FEMALE	< 5	5-14	15-59	60+	Total
Total	3	2	41	155	201
Diabetes mellitus			4	35	39
Other heart diseases			3	25	28
Hypertensive diseases			3	20	23
Ischaemic heart diseases			2	11	13
Cerebrovascular diseases			1	11	12
Malignant neoplasm of breast			5	7	12
Pneumonia	1	0	3	6	10
Septicaemia			1	5	6
Chronic lower respiratory diseases			2	3	5
Symptoms, signs & abnormal clinical & lab findings			1	4	5
Malignant neoplasm of trachea, bronchus and lung			1	3	4
Remainder diseases of the genitourinary system			1	3	4
Remainder of diseases of the respiratory system			0	4	4
Transport accidents			3	1	4
Gastric and duodenal ulcer			1	2	3
Malignant neoplasm of lip, oral cavity & pharynx			1	2	3
Malignant neoplasm of liver & intrahepatic bile ducts			0	3	3
Remainder of malignant neoplasms			1	2	3
Certain conditions originating in the perinatal period	2	0	0	0	2
Endocrine, nutritional and metabolic diseases			1	1	2
Intentional self-harm			2	0	2
Leukaemia			0	2	2
Malignant neoplasm of cervix uteri			1	1	2
Malignant neoplasm of colon, rectum and anus			1	1	2
Remainder of diseases of the digestive system			0	2	2
Accidental drowning and submersion			1	0	1
Certain infectious and parasitics diseases			1	0	1
Falls		1	0	0	1
Malignant neoplasm of ovary		0	1	0	1
Malignant neoplasm of pancreas		0	0	1	1
Remainder diseases of blood & blood-forming organs		1	0	0	1

CRVS data shows clear reduction in IMR due to health policy changes

COOK ISLANDS



- In 2014, staff from the National Statistics Office and Ministry of Health attended a data analysis and report writing course with BAG partners.
- The work focussed on analysing trends in birth, death, and cause of death data from the national CRVS system.
- Data showed a dramatic drop in the infant mortality rate (IMR) from 15.3 in the period of 1999 – 2003 to 3.6 in 2009-2013.
- The results clearly show the effect of policy changes to ensure mothers received antenatal care and that high risk births were transferred early to the hospital on the main island of Rarotonga.

Both infant and child mortality declined from the period 1999-2003 to 2009-2013

- IMR declined from **15.3** to **3.6** per 1,000 live births
- U5M declined from **21.1** to **5.7** per 1,000 live births

Next Steps:

The Cook Islands are currently discussing methods of capturing and sharing off-island events such as births and deaths with the New Zealand Registrar.

This data sharing will allow a more comprehensive picture of mortality in the Cook Islands.

The Cook Islands

The Cook Islands is a small island country in the South Pacific with a resident population of 14,974 (2011). It comprises 15 small islands whose total land area is 240 square kilometres (92.7 sq mi) and a Exclusive Economic Zone (EEZ) of 2.2M square kilometres (690,000 sq mi) of ocean. While most of the population lives on the main island of Rarotonga, there are 12 inhabited islands in total, seven of which do not have routinely scheduled transport.

Targeted Health Programs

- Over the last 5 years, interventions targeting pregnant mothers have encouraged them to:
 - ▶ attend antenatal check-ups
 - ▶ receive counseling of proper antenatal care
 - ▶ eat well, exercise, stop smoking, and avoid alcohol.
- Additionally, policies were enacted to ensure transport costs were covered to reach the main hospital in Rarotonga for delivery. Policies also made it easier for mothers to attend clinics for antenatal and postnatal services. Home visits for post natal services are also provided by public health nurses.
- Free and easy accessibility to all types of contraception (Pills/Injectables implants/IUCD/condoms) has prevented unwanted pregnancy complications.
- Improvements in immunization programs enabling a higher percentage of coverage, along with more postnatal counseling programs, also decreased infant and child deaths.



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