



# BERMUDA'S POPULATION PROJECTIONS

# 2010 – 2020



GOVERNMENT OF BERMUDA  
Cabinet Office

**Department of Statistics**



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THE CABINET OFFICE  
DEPARTMENT OF STATISTICS**

# **BERMUDA'S POPULATION PROJECTIONS 2010 - 2020**

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Cover Designed by the Department of Communication and Information

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## FOREWORD

The Department of Statistics continues to produce data and information that is relevant and facilitates informed decision-making. This report is a written account of mid-year population projections for Bermuda that spans a ten-year period, from 2010 to 2020. The information in this report is essential for planners and policy makers, as Bermuda builds upon its initiatives for economic growth.

The average annual growth rate in population for Bermuda will be negative each year from 2010 to 2020. With an aging population, net emigration, longer life expectancies at birth and lower fertility rates, there will be direct implications for the Bermuda workforce.

Using fertility, mortality and migration data as the key variables that impact the change of a population, the report lays out in detail the current population status, the assumptions of these variables and the methodology used to develop population projections. A brief analysis is also provided on the future implications for the social and economic structure of Bermuda.

I highly commend the Social and Demographic Division for the drive, commitment and hard work they displayed during the development of the population projections. The team consisted of Mrs. Melinda Williams, Social Statistician, Mr. Andrew Robinson, Assistant Statistician, Mrs. Dhwanne Denwiddie Burrows, Assistant Statistician, Mrs. Kitwana Mendoza, Statistical Officer and Ms. Jeanna-Dawn Trott, Statistical Officer. I am also grateful for the professional guidance, technical assistance and invaluable level of expertise that was provided to us from Dr. Peter Johnson of the US Census Bureau. This is a major achievement that could not have been realized without an unyielding determination to deliver with excellence.

Melinda Williams  
Acting Director of Statistics  
February 2014

## EXPLANATORY NOTES

### Limitations of Projections

Population projections are not predictions or forecasts. They are illustrations of how the structure, size and characteristics of Bermuda's population would change if certain assumptions on fertility, mortality and migration are held true over the projection period. While the assumptions are based upon an assessment of short-term and long-term demographic trends, there is no certainty that any of the assumptions will be realised. The projections do not take into account future non-demographic factors (e.g. major government policy decisions, economic factors, natural disasters, etc.) which may diminish the accuracy of the projections. Historically, Bermuda's projections are updated every decade after the decennial census so that new information about demographic trends can be included.

### Rounding

In this report, some percentage distributions may not add to one hundred percent (100%) due to rounding.

### Data Users

The tables in this report do not contain all possible tables of the complete population projections dataset. Data users are therefore encouraged to contact the Department of Statistics, Social Division at (441) 297-7710 to request customized tables for specific user needs or for additional details regarding the methodology used.

### Technical Note – 2010 Census of Population and Housing

At the end of Bermuda's 2010 Population and Housing Census data collection period, there were roughly 4,400 outstanding households for which data had not been obtained. To address this undercount, and in alignment with statistical best practices, administrative data sources were utilized to impute important demographic data items, such as age, sex, date of birth, Bermudian status, employment and race. Therefore, census records for 1,106 households comprising 2,551 persons were imputed for these demographic variables. This imputation reduced the undercount of outstanding households and resulted in the Department of Statistics successfully obtaining a rate of 96% coverage of households during the 2010 Census. The age-sex structure in this population projections report was based on self-reported data collected in the 2010 Population and Housing Census.

## HIGHLIGHTS

### Population Size and Growth

- Bermuda's mid-year population was 64,129 in 2010 and is projected to decrease to 61,566 by 2020, a decline of 4%.
- In 2010, the average annual growth rate was -1.40% and by 2020 it is expected to reach -0.04%.

### Age Structure of Total Population

- The median age will rise from 41 years in 2010 to 46 years by 2020.
- The proportion of young people (0-14 years) will decline from 16% in 2010 to 14% by 2020.
- The percentage of the population aged 15-24 will likely decrease from 11% in 2010 to 9% by 2020.
- The proportion of the population aged 25-44 is expected to fall from 29% in 2010 to 26% by 2020.
- The percentage of persons 45-64 will increase slightly from 30% in 2010 to 31% by 2020.
- The proportion of seniors (65 years and older) will climb from 14% in 2010 to 20% by 2020.
- The youth-dependency ratio will likely slip from 23 in 2010 to 22 by 2020.
- The old-age dependency ratio will soar from 19 in 2010 to 30 by 2020.

## INTRODUCTION

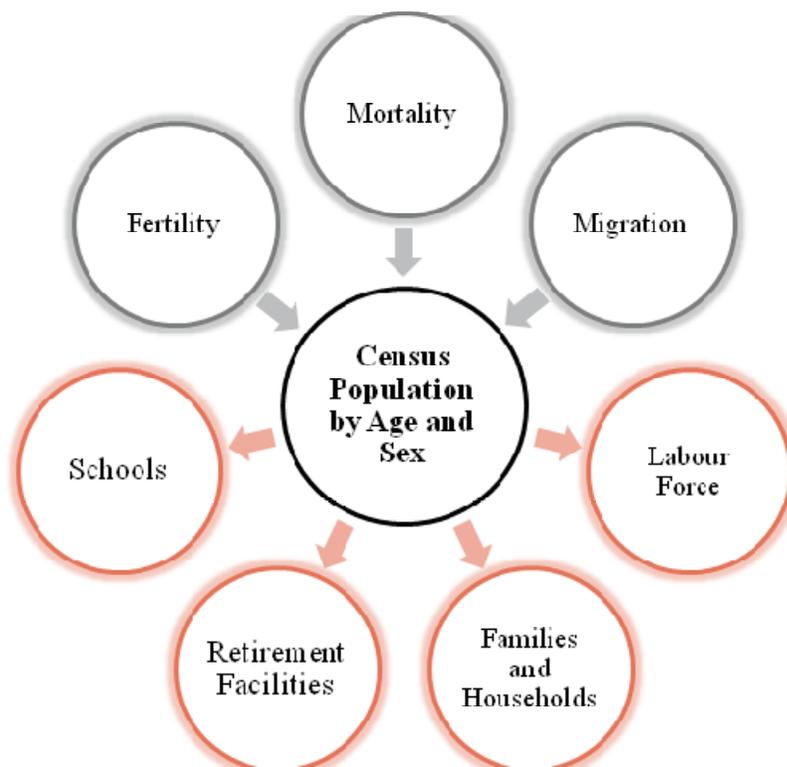
According to Thompson and Whelpton (1943) cited in United Nations (1979), population projections are:

... statements of what the size and the sex, age, color and nativity composition of the population would be at specified future times if birth rates, death rates and immigration were to follow certain specified trends.

These demographic rates (fertility, mortality and migration) are applied to the latest census or population estimate to carry the population forward to a future date. Projections are instrumental for suggesting a country's future based on past, present and anticipated trends. Some countries conduct their censuses every five or ten years. Bermuda historically had its census every decade but will now conduct its census every five years. During the intercensal period our recourse are population projections.

Population projections are essential to plan and administer government and private programmes. Knowing the number of people expected, their age and sex distribution will provide decision makers with sufficient time to prepare for the future needs such as schools and retirement homes. Figure 1 depicts the relationship between the components of population change and some of the sectors that are affected directly by population projections.

**Figure 1**  
**Interrelationship between Demographic Variables and the Public and Private Domain**



In this report, Bermuda's population is projected by age and sex. Separating the components of the population is important for two reasons. Firstly, separate projections series could result in significant improvements in the accuracy of the total population projections. Secondly, it is important to project these sub-populations separately because they have different age structures, fertility, mortality and migration patterns.

## PROJECTION METHODOLOGY

Most of the input data for the population projections were generated by using the Population Analysis with Microcomputers (PAM) software developed by the United States Census Bureau. One of the modules of PAM is the Rural-Urban Projection (RUP) computer programme which uses the cohort-component method to produce population projections. RUP was used to project the population by age and sex to 2020.

In the cohort-component method, the components of population change (fertility, mortality, and net migration) are projected separately for persons born in a given year. The base population is advanced each year by using projected survival rates and net migration by single year of age group and sex. Each year, a new birth cohort is added to the population by applying the projected fertility rates.

The cohort survival method is preferred as it takes into account the age-sex-specific fertility and mortality rates. It states that the population at the next time interval (interval "t + 1") is the population at the beginning time interval ("t") plus the net natural increase (or decrease) plus the net migration (see formula below).

$$\text{Population [t+1]} = \text{Population [t]} + \text{Natural Increase} + \text{Net Migration}$$

### Scope of the Projections

This population projection series is for Bermuda as a whole from July 1, 2010 until July 1, 2020. The mid-year population was adopted because it is the traditional methodology used by other statistical agencies and it is useful for stakeholders who may need mid-year population estimates as denominators. Another justification is that inputs like the data on births and deaths that are reported for calendar years are for the year surrounding the population. The mid-year population was derived by adjusting the census population as at May 20, 2010 to July 1, 2010.

### Base Population

The population projections are based on the civilian, non-institutional sheltered population as at July 1, 2010. This population includes all persons who reside in private dwelling units and group dwellings. The institutional population and the non-sheltered population are excluded from this projection series.

### Projection Assumptions

Assumptions have been and continue to be the major challenge of demographic projections because of the uncertainty of the future (United Nations 1979:16).

#### *Estimating Fertility*

The total fertility rate was assumed to decline steadily from 1.75 children per woman in 2010 to 1.58 children per woman in 2020. This assumption was based on a three-year average of births recorded from 2011 to 2013.

***Estimating Mortality***

The projected age-sex specific death rates were interpolated between the 2010 rates and those in an ultimate life table for the year 2020. An ultimate life table represents the highest life expectancy based on the available age-specific death rates.

Between 2010 and 2020, life expectancies were projected to change based on a logistic function for each sub population. Each population will also have greater longevity by the end of the projected period.

***Estimating International Migration***

Ideally, migration statistics should be accurate and timely, cover all categories of migrants (age, sex, etc.), be consistent over time, be sufficiently detailed and be measured with a minimum of unverifiable assumptions (Warren, Percy-Kelly 1985:13-14). However, migration is the most difficult demographic variable to project for two reasons:

1. less reliable statistical data to assess past and present migration patterns; and
2. migration can change significantly without much notice (Lutz 1994:24).

In Bermuda, migration projections are hampered by the unavailability of migration statistics by single-year of age, sex and year of occurrence. In the absence of adequate evidence-based data, it was necessary to estimate the volume of migration by using the trends between censuses. The reverse-forward survival rate methodology was used and an assumption was made that net emigration would be higher from 2010 to 2013 than 2014 to 2020. This assumption was based on the *National Economic Report of Bermuda, 2012* which forecasts “economic stabilization in the second half of 2013 and modest growth in 2014” (Ministry of Finance, 2013:14). This move away from economic contraction would likely lower the net emigration rate through less emigration due to increased employment opportunities associated with economic growth.

***Sex Ratio***

It was assumed that the sex ratio at birth was 105 males per 100 females for the population.

## PAST TRENDS

### Fertility

The reduction in fertility rates had a great impact on Bermuda's demographic profile. Three indicators of fertility are the number of registered live births, crude birth rate and total fertility rate.

In 1950, the crude birth rate was 30.4 live births per 1,000 people and plummeted to 12.0 by 2010 (Table 1). Some of the factors that could have contributed to the reduction in fertility over the decades include increased use of contraceptives, the increasing labour force participation of women and changing lifestyle preferences. Women are more likely now to aspire for higher education and professional careers which can result in them opting to delay/ forgo marriage/ childbearing. This trend is supported by the 2010 Census which reported mothers starting their families later and completing their fertility later (Statistics 2010:21). This shift in childbearing patterns is reflected also in women's increased labour force participation rate. In 1970, the rate was 63% and by 2010 it recorded a record high of 81%.

**Table 1**

**Bermuda's Fertility Trends, 1950-2010**

Census Year	Number of Live Births	Crude Birth Rate (per 1,000 population)	Total Fertility Rate (per woman)
1950	1,138	30.4	N/A
1960	1,208	28.3	N/A
1970	1,062	20.3	N/A
1980	807	14.9	1.64
1991	893	15.4	1.76
2000	838	13.5	1.74
2010	769	12.0	1.74

N/A - Not Available      *Source: Department of Statistics and Registrar General*

The onset of the recession in 2008 may also be a factor for declining births in recent years as the number of births has dropped from 819 in 2009 to 648 in 2012, a 21% decline. This could possibly be due to couples deciding to have fewer children for financial reasons or to net emigration.

## Mortality

Bermuda's crude death rate fell consistently from 9.7 per 1,000 people in 1950 to 7.3 by 1980 (Table 2). Despite this progress, the reduction of the crude death rate in the 1980's and 1990's was hampered by deaths due to Acquired Immune Deficiency Syndrome (AIDS). By 2000, AIDS-related deaths was no longer the leading cause of death for any age group. Some of the factors contributing to the decline in deaths due to AIDS include the following:

- Education
- High quality health care reducing the circulation of the virus
- Prevention of mother to child transmission initiative
- Introduction of anti-retroviral drugs

Life expectancy at birth and infant mortality has improved over the decades (Table 2). The general improvements in life expectancy are attributable primarily to the advancement in medical technology. For example, in 1987, the King Edward VII<sup>th</sup> Memorial Hospital installed its first computerized tomographic scanner and later added a magnetic resonance imaging machine. This equipment has increased greatly the scope, accuracy and speed by which many patients can be diagnosed locally.

**Table 2**

**Bermuda's Mortality Levels and Life Expectancy at Birth, 1950-2010**

Census Year	Total Deaths	Crude Death Rate (per 1,000 population)	Infant Mortality Rate	Life Expectancy at Birth	
				Male	Female
1950	362	9.7	46.6	N/A	N/A
1960	363	9.9	31.5	70.61	65.07
1970	385	7.6	15.1	66.89	73.86
1980	393	7.3	13.9	68.69	76.10
1991	449	7.7	7.8	70.01	78.25
2000	473	7.2	0 r	75.26	80.60
2010	475	7.4	2.0	75.93	83.57

N/A - Not Available  
r - revised

Source: Department of Statistics and Registrar General

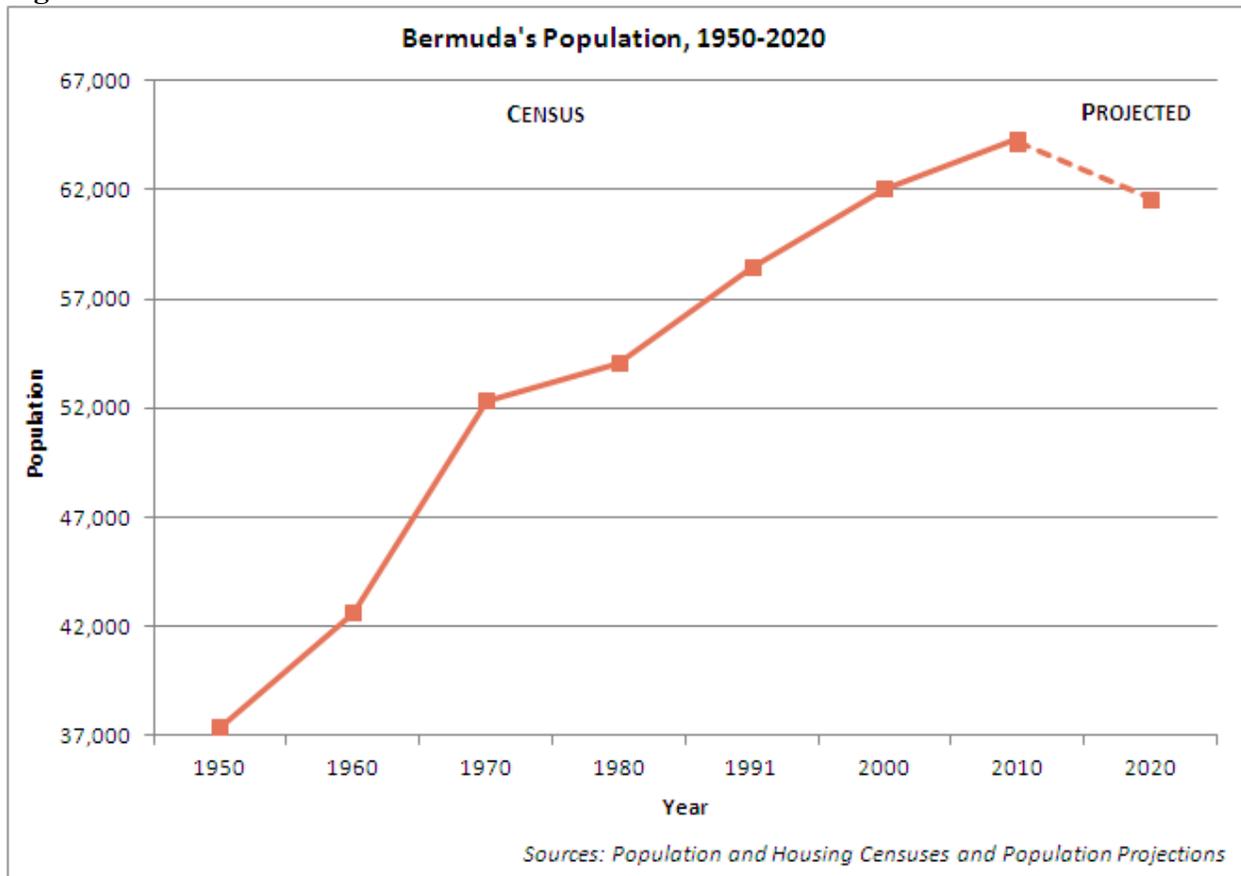
By the twenty-first century, the leading causes of deaths were circulatory illnesses, cancer, respiratory illnesses, accidents and violence. It is evident from the leading causes of death statistics that Bermuda progressed to the fourth stage of epidemiological transition, whereby personal behaviour and lifestyles influence the patterns and levels of disease and injury. As a result, the population has become less healthy (Statistics, 2010:23). Between 2006 and 2011, the overall health of Bermuda's population declined by 3% (Bermuda Health Council, 2011:20).

## RESULTS

### Annual Rate of Growth Projected to be Negative

Bermuda's total population is projected to decrease from 64,129 in 2010 to 61,566 by 2020 (Figure 2). This is as a result of net emigration (emigration greater than immigration) exceeding natural increase every year. In 2014, the annual negative growth rate is projected to reach its lowest level of the period, largely due to the aforementioned assumed growth in the economy. The slight increase in negative growth from 2014 onwards is mainly attributable to the continuously shrinking natural increase growth outpacing a relatively constant rate of net emigration (Table 3).

Figure 2



**Table 3**  
**Projected Annual Growth Rates by Sex, 2010-2020**

Mid-Year	Total	Male	Female
	Percent		
2010	-1.40	-2.13	-0.72
2011	-1.54	-1.62	-1.47
2012	-0.96	-1.04	-0.88
2013	-0.50	-0.52	-0.49
2014	-0.07	-0.07	-0.07
2015	-0.07	-0.06	-0.07
2016	-0.06	-0.05	-0.07
2017	-0.06	-0.05	-0.06
2018	-0.06	-0.04	-0.07
2019	-0.05	-0.03	-0.06
2020	-0.04	-0.02	-0.06

*Source: Department of Statistics*

### ***Rate of Natural Increase Expected to Contract***

An examination of selected vital rates shows the rate of natural increase declining from 0.46% in 2010 to 0.12% in 2020 (Table 4). This is due to the crude birth rate decreasing and crude death rate increasing over the period. The increase in the death rate may be attributed to baby boomers (persons born between the years 1946 and 1964) reaching an age where the probability of dying is much higher.

**Table 4****Projected Vital Rates for the Total Population, 2010-2020**

Mid-Year	Rate of Natural Increase (%)	Crude Birth Rate (per 1,000)	Crude Death Rate (per 1,000)	Total Fertility Rate (per woman)
2010	0.46	11.98	7.41	1.75
2011	0.38	10.60	6.79	1.59
2012	0.36	10.38	6.76	1.59
2013	0.28	10.49	7.72	1.63
2014	0.25	10.34	7.85	1.63
2015	0.22	10.20	7.97	1.62
2016	0.20	10.05	8.04	1.61
2017	0.18	9.96	8.16	1.60
2018	0.16	9.85	8.29	1.60
2019	0.14	9.81	8.44	1.59
2020	0.12	9.71	8.54	1.58

*Source: Department of Statistics and Registrar General*

***Total Fertility Rate Expected to Fall***

As a universal convention for developed countries, a woman would need to have about 2.10 children on average to replace herself and her partner and to account for infant mortality. Between 2010 and 2020 the total fertility rate for Bermuda's women is expected to decline from 1.75 to 1.58 children per woman (Table 4). Simply, this means that Bermuda's couples are having insufficient children to replace themselves. Many developed nations such as the United States, West Germany and Denmark also experience persistent sub-replacement level fertility (Haub 1987:31).

***Emigration Likely to Exceed Immigration***

Table 5 illustrates that emigration is expected to be greater than immigration throughout the decade. It is expected that males and females will each comprise 50% of the net emigration (Table 5).

**Table 5**  
**Annual Projected Net Migration by Sex,**  
**2010-2020**

Mid-Year	Total	Male	Female
2010	-1,190	-774	-416
2011	-1,216	-589	-627
2012	-822	-392	-430
2013	-484	-223	-261
2014	-196	-79	-117
2015	-180	-71	-109
2016	-162	-62	-100
2017	-146	-54	-92
2018	-130	-46	-84
2019	-112	-37	-75
2020	-96	-29	-67

*Source: Department of Statistics*

- represents emigration exceeding immigration

***Life Expectancies at Birth Projected to Increase***

The total population's life expectancy at birth is anticipated to rise from 79.88 years in 2010 to 82.07 years by 2020 (Table 6). By 2020, males are expected to live for 78.33 years while females are anticipated to reach 86.00 years.

**Table 6**  
**Life Expectancy at Birth by Sex, 2010-2020**

Mid-Year	Total	Male	Female
2010	79.88	75.94	83.58
2011	81.30	77.46	85.03
2012	81.91	77.99	85.55
2013	80.68	76.87	84.46
2014	80.88	77.09	84.69
2015	81.09	77.30	84.91
2016	81.29	77.51	85.13
2017	81.49	77.72	85.35
2018	81.68	77.92	85.57
2019	81.88	78.13	85.79
2020	82.07	78.33	86.00

*Source: Department of Statistics*

### Population Expected to Age

The age structure of a country or region is the demographic engine that drives population growth/ decline at given fertility, migration and mortality levels (Lutz 1994:6). Population pyramids can tell a great deal about the demographic transition of a population. For example, Bermuda's females comprise the larger proportion of the oldest age groups because of their greater life expectancy which is a universal trend among developed countries (Figure 3).

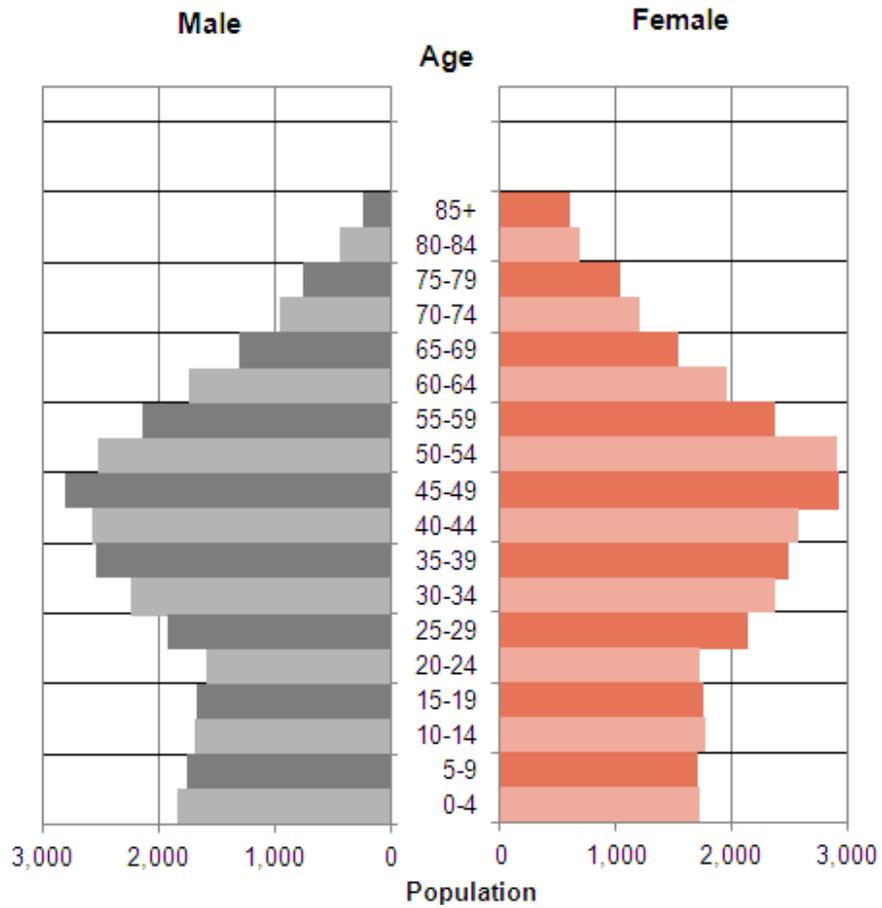
The age structure of the total population will become older during the projection period. Table 7 shows the age structure becoming more concentrated at the middle and top (45 to 64 years and 65 years and older age groups) by 2020. This will happen as life expectancy increases and as large groups born during past periods of high fertility become older.

One indicator of an aging population is the median age. In 2010, the median age for the total population was 41 years and by 2020 the median age is projected to increase to 46 years (Table 7). This means that 10 years later, half of the total population will be over 46 years old.

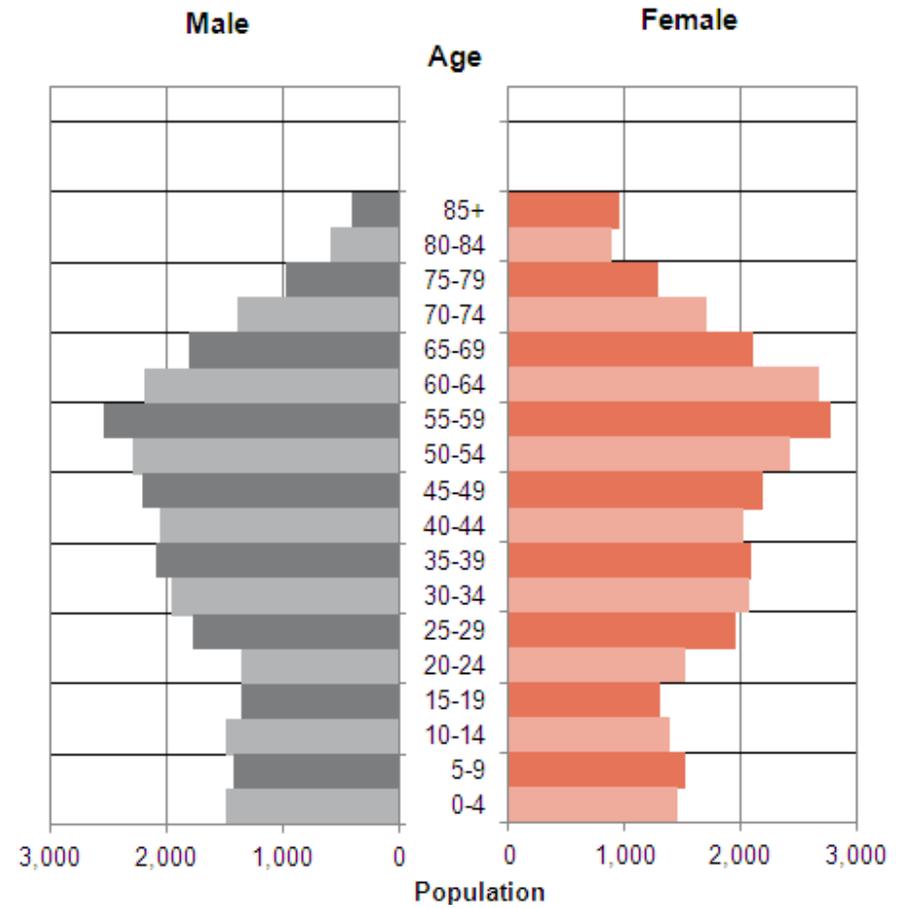
Another indicator of aging is the old-age dependency ratio which estimates society's capacity to maintain the quality of life of seniors. In 2010, the old-age dependency ratio was 19 and by 2020 it will soar to 30. This means that in 2020 there will be 30 seniors (65 years and older) for every 100 people of working age (15-64 years). During the same period, the youth dependency ratio is anticipated to slip from 23 to 22, largely a result of declining fertility. Between 2010 and 2020, the total dependency ratio is expected to rise from 43 to 51. This measures the working age population's ability to support persons under 15 years and 65 years and older.

Figure 3

Population Pyramid by Five-Year Age Groups and Sex, 2010



Population Pyramid by Five-Year Age Groups and Sex, 2020



**Table 7**  
**Total Population by Sex and Selected Age Groups, 2010-2020**

Age Groups	2010	2020	2010	2020
	Mid-Year Population		Percentage Distribution	
<b>Total</b>	64,129	61,566	100	100
Under 15 Years	10,474	8,750	16	14
15-24 Years	6,741	5,517	11	9
25-44 Years	18,841	15,985	29	26
45-64 Years	19,357	19,251	30	31
65 Years and Over	8,716	12,063	14	20
Median Age (years)	41	46		
<b>Male</b>	30,792	29,415	100	100
Under 15 Years	5,300	4,404	17	15
15-24 Years	3,271	2,715	11	9
25-44 Years	9,315	7,883	30	27
45-64 Years	9,225	9,245	30	31
65 Years and Over	3,681	5,168	12	18
Median Age (years)	40	44		
<b>Female</b>	33,337	32,151	100	100
Under 15 Years	5,174	4,346	16	14
15-24 Years	3,470	2,802	10	9
25-44 Years	9,526	8,102	29	25
45-64 Years	10,132	10,006	30	31
65 Years and Over	5,035	6,895	15	21
Median Age (years)	42	47		

Source: Department of Statistics

**Ratio of Men to Women to Fall Slightly**

The sex ratio for the total population was 92.4 men per 100 women in 2010. By 2020, the sex ratio is projected to drop to 91.5 men for every 100 women. An analysis of the sex ratio by age, reveals that at older ages the sex ratio is more unbalanced. Older women outnumber older men in almost every society. Among Bermuda's seniors, there were 73.1 men for every 100 women in 2010. By 2020, the ratio is expected to increase to 75.0 men for every 100 women.

Sex differences in survivorship rates are significant because older men and women have different social and economic resources available. On average, elderly females are more likely to have greater need for services such as income maintenance, housing, meals, transportation and health care because they have less financial resources. According to the 2010 Census, senior women had an annual median personal income that was 60% of the amount for senior men.

## **FUTURE IMPLICATIONS FOR BERMUDA**

The past sixty years witnessed a shift in the demographic profile of Bermuda's population. In the future, two major phenomena will dominate. Firstly, Bermuda's population will begin an unprecedented decline; and secondly, there will be a shift in the island's age structure as the population continues to age. Bermuda's evolving demographic profile will have fewer children, an older workforce and more elderly people.

### **Shrinking Population**

Bermuda's population is due to shrink between 2010 and 2020 as net emigration is expected to exceed natural increase every year. In order to reverse this trend, there needs to be either:

- fewer deaths
- more births
- less emigration
- more immigration
- a combination of the above.

Fewer deaths could be achieved through further advances in medical technology and healthier lifestyle choices. More births could be realized through pro-natalist policies (i.e. incentives to have children) and potentially through less unemployment (more financial security to raise a child). Less emigration can primarily be accomplished through improved employment options locally, as factors relating to employment were cited as the main reason for residents emigrating between the 2000 and 2010 Censuses (Statistics, 2013:6). More immigration can be achieved through a strengthening economy which provides increased job opportunities.

A shrinking population can have environmental benefits as there would be less strain on the island's resources (e.g. less traffic congestion, pollution, etc). However, from an economic perspective, the expected decline in Bermuda's population over the next decade could have serious implications, especially if it occurs rapidly over a matter of years rather than decades. Van Dalen and Henkens state population decline can be a negative occurrence "because (1) the tax base decreases, but if government expenditures are fixed or slow to adjust, deficits accumulate, and tax rates will eventually have to rise; and (2) if certain population levels are needed to finance public goods (e.g. schools, hospitals, public transport) that are essential for a community to function, and the population drops below these thresholds, the process of depopulation may speed up" (Van Dalen and Henkens, 2011:445). According to Van Dalen and Henkens, in order to avoid an increase in tax rates, it is important for governments to act quickly once a population begins to decline so that public expenditures are reduced in line with the tax base (2011:445). As much of Bermuda's shrinking population can be attributed to increased net emigration, there may also be a 'brain drain' effect (i.e. the loss of skilled human capital as a result of persons emigrating) leading to a shortage of skilled human capital (Statistics, 2013:1)

Population decline can also lead to excess supply and less demand for goods and services, which is problematic as businesses often require a certain population size to provide the demand needed to remain viable. In addition, population decline can lead to a decrease in housing demand resulting in falling prices. This could be seen as beneficial to persons who are

looking to rent or buy a home. However, persons who rely heavily on rental income for their livelihood may suffer (Van Dalen and Henkens, 2011: 446).

### **Aging Population**

Once a relatively small segment of Bermuda's population, older residents are now an expanding portion of the population. According to the United Nations, if fewer than 4 percent of a country's population is 60 and over (or 65 and over), it is "young"; 4 percent to 7 percent of elderly persons represent a "mature" population and more than 7 percent is an "aged" population (McPherson 1983:83). As early as 1950, Bermuda progressed into the mature stage with 6% of its population 65 years or older. By 1980, Bermuda's age structure was considered to be "aged" with 9% of its population 65 years and older. In 2010, Bermuda's elderly population increased to 14% and by 2020 it is anticipated to represent 20% of the total population. This is the result of high fertility in the past and rising life expectancies in the future.

### ***'Sandwich' Generation***

During the past sixty years, there was a change in Bermuda's family structure. Social values shifted towards childlessness, smaller families and some children emigrating overseas thereby limiting the parents' contact with their children (on the enactment of the *British Overseas Territories Act, 2002*, Bermudians who were British Overseas Territories Citizens had the opportunity to obtain a passport as a British citizen).

As life expectancies are on the rise, more adults now have the dual responsibility of taking care of their elderly parents and their own children simultaneously. These persons are known as the 'sandwich' generation. The decline in the young population and their ability to look after their parents someday will have consequences on the structure of our society and economy. At the individual level, this situation may be even more precarious. For example, the illness, death, or estrangement of even a single adult child can leave elderly parents without the support system they need.

### ***More Will Retire***

As baby boomers age over the coming years, more persons will be reaching retirement age than in the past. Due to declining fertility, it may be difficult for employers to secure qualified young Bermudians to fill these vacant positions. Also, there would be a greater proportion of elderly dependents who would need to be supported by the working population. In order to provide all of the services the elderly would require, some taxes may need to be raised for those of working age. One possible policy option would be to increase the mandatory retirement age of 65 in some industries or to eliminate it altogether. Early retirement diminishes the labour pool, an effect that may become more important in the future as the proportion of working-age adults in Bermuda remains steady or declines. Aside from substantial immigration, another way to increase the labour supply immediately will be to bring more of the elderly into the workforce.

In the future, the needs of the elderly will undoubtedly shift public policy and the provision of public and private services. Finding care providers for seniors will become a more pressing challenge than finding baby-sitters, as the population continues to age. More retirement

facilities and senior citizen daycare programmes will also be required. As a result, Bermuda's "greying" population will be one of the greatest challenges facing Bermuda in the 21<sup>st</sup> century.

### ***Resources Needed for Chronic Health Conditions***

Of all Bermuda residents, 6% were 75 and older in 2010. By 2020, this proportion is anticipated to increase to 8%. The increase in the proportion of older seniors will likely increase the demand for purpose-built residential facilities with trained staff. This is inevitable because with increasing age, seniors are more likely to have chronic health challenges that may require the assistance of another person or permanent care in an institution. According to the 2010 Census, 77% of seniors had a long-term health condition compared with 35% of persons under 65 years of age. Also, 14% of seniors had a disabling long-term health condition in comparison to 4% of the population under 65 years of age.

### ***Rising Health Care Costs Outpaces Inflation***

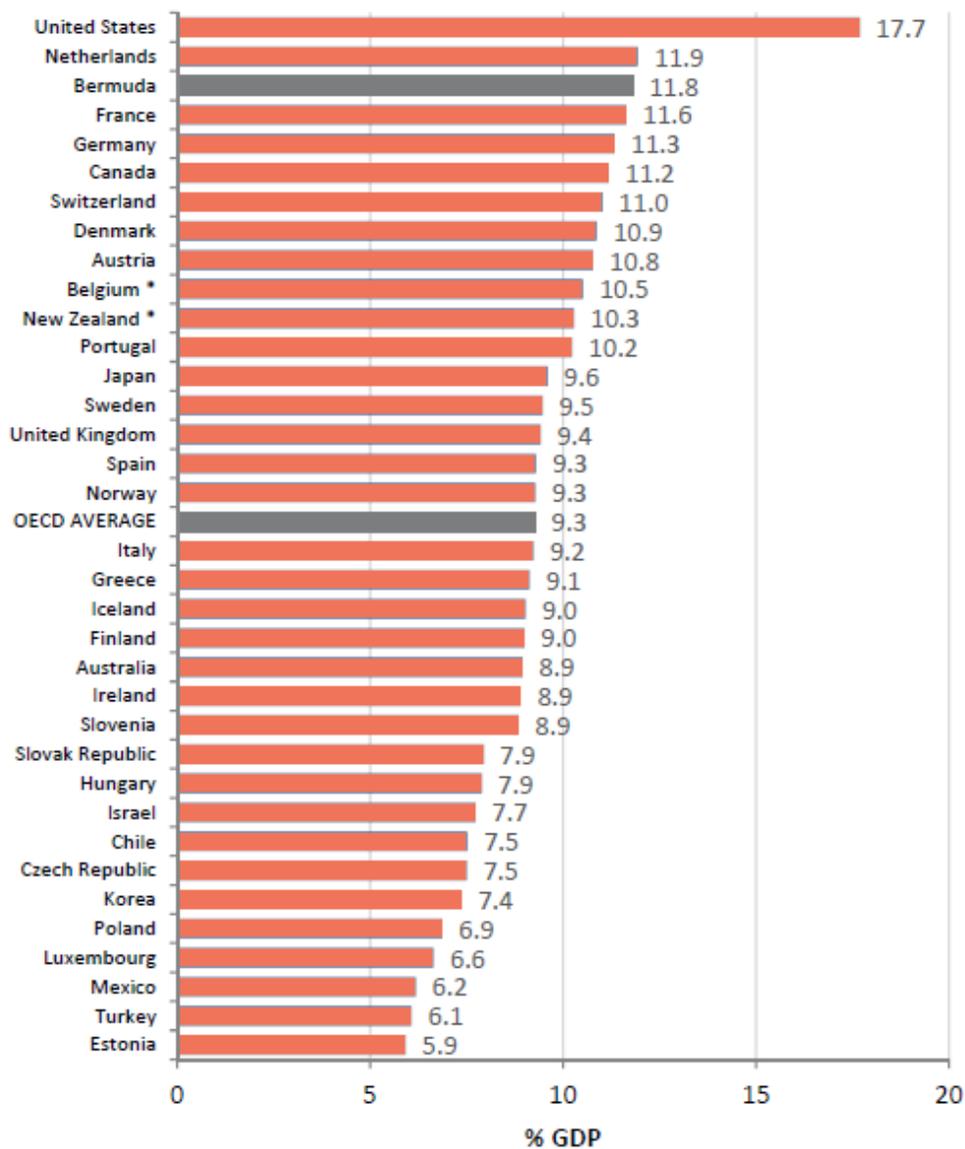
As people live longer, there are more demands placed on the health care system. Issues such as quality of life, access to health care and health care costs become increasingly important. According to the Health Care Review Final Report, "... there is a limit to the financial burden that families and government can bear. It is essential, therefore, that guiding principles and policies be established to manage the health care system and control health care costs" (1996:6).

In 2004, each Bermuda household spent about \$7,000 a year on health care on average, a 156% increase from the amount spent in 1993. This represents a greater increase in health care expenditure than the 32% rate of inflation during this period. The amount each household spent on health care was roughly \$10,300 on average in 2013, a 47% increase from 2004. This was also a greater increase than the 30% rate of inflation during this period. In 2013, households headed by seniors spent \$10,919 per year on health care, up from \$6,000 in 2004. Seventy-six percent (76%) of that expenditure was comprised of health insurance (Department of Statistics, 2005 and 2014).

Figure 4 indicates that Bermuda's health expenditure as a share of GDP is the third highest out of the Organization for Economic Co-operation and Development (OECD) countries in 2011. This is a concern as "it will be an important challenge for the country to control this trend while maintaining quality of care and quality of life" (BHEC, 2013:13).

Figure 4

**Health Expenditure as a Share of GDP, 2011 (or latest year available)**



\* Excluding investments

Source: National Health Accounts Report, 2013

***Inadequacy of Contributory Pension Fund***

In addition to providing more services, the importance of private-occupational retirement plans, introduced in 2000, will rise to meet the financial needs of retirees. The decline in the number of births mentioned previously has far-reaching consequences for a pay-as-you-go type pensions such as the Bermuda Government’s Contributory Pension Fund (CPF). This is because the contributions that are paid into the fund in a given year by workers are generally paid out as benefits in the same year.

The financial viability of this type of pension scheme can be problematic if the number of pensioners is rising at a faster rate than the number of workers. In fact, the Spending and Government Efficiency (SAGE) Commission has indicated that “the CPF faces the challenge of a lower ratio of workers to pensioners. This scheme is 43% funded, the underfunded portions amount to \$2,066 million. Left in its current structure, workers would have to pay ever-increasing amounts in contributions for people who are retired. This is an untenable option” (SAGE Commission, 2013: 15).

“On August 4, 2010, the National Pension Scheme (Financial Hardship) Regulations 2010 (as amended) under the National Pension Scheme (Occupational Pensions) Act 1998 were passed into law. These regulations permit qualified and approved applicants to receive limited payments from their pension funds for four types of financial hardships: eligible medical expenses, eligible educational expenses, imminent loss of principal residence due to mortgage or debt arrears and imminent threat of eviction from home due to rent arrears” (The Pension Commission, 2008: 20). Although this law allows eligible participants to obtain limited monies from their pension fund to alleviate short-term crises, it can have long-term consequences as making a hardship withdrawal can result in a reduced retirement pension.

## CONCLUSION

The projections presented in this report indicate a possible trend of the population by age and sex based on one series of fertility, mortality and migration assumptions. If Bermuda’s demographic trends vary, however, it will result in a different population by 2020.

In closing, it must be noted that “... population projections are not final products, placed on the table and let to stand for all time. They provide the means for ongoing evaluation and re-evaluation” (Haub, 1987:3). Therefore, it is imperative that we continue to monitor fertility, mortality and migration patterns so that adjustments can be made for unforeseen circumstances.

## **APPENDIX**

## GLOSSARY

### Base Population

The population at the beginning of a period used as a reference or starting point of the projection process. A base population can either be a population estimate or the enumerated population.

### Crude Birth Rate

The crude birth rate indicates the number of live births per 1,000 population in a given year. It is calculated by the following formula:

$$\frac{\text{Number of live births} \times 1,000}{\text{Total population}}$$

### Crude Death Rate

The crude death rate is the number of deaths per 1,000 population in a given year. It is represented by the following formula:

$$\frac{\text{Number of deaths} \times 1,000}{\text{Total population}}$$

### Emigration

The permanent relocation of persons in another country for at least one year.

### Growth Rate

This rate at which a population is increasing (or decreasing) in a given year due to natural increase and net migration, expressed as a percentage of the base population.

### Immigration

The process of entering one country from another to take up permanent residence.

### Infant Mortality Rate

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

$$\frac{\text{Number of deaths to infants under age 1} \times 1,000}{\text{Total live births}}$$

### Life Expectancy at Birth

Life expectancy at birth represents the average length of life of individuals from a hypothetical cohort of births whose members have been subject since birth to the mortality levels of the period in question.

**Median Age**

The age that divides a population into two numerically equal groups; that is, half the people are younger than this age and half are older.

**Mid-Year Population**

Estimate of the total number of persons usually resident in a country on 1 July of the year indicated.

**Migration Rate**

This is the ratio of the annual balance of migration during a given period to the average population during that period.

**Net Migration**

This indicator is defined as the contribution of migration to overall population growth; the volume of net migration is measured as the mean annual difference between immigration and emigration.

**Old-Age Dependency Ratio**

The ratio of persons aged 65 years and older to those in the ages defined as economically productive years (15-64) in a population.

**Population**

The projections are based on the civilian, non-institutional, sheltered population.

**Rate of Natural Increase**

The rate at which a population is increasing (or) decreasing in a given year due to the a surplus (or deficit) of births over deaths, expressed as a percentage of the base population.

**Sex Ratio**

This is the ratio of the number of males to the number of females in a population, and it is usually expressed as an index value.

**Total Dependency Ratio**

The ratio of the elderly (65 years and over) plus the young (those under 15 years of age) to the population in the working ages (those 15-64 years of age).

**Total Fertility Rate**

The average number of children that would be born alive to a woman (or group of women) during her lifetime, if she were to pass through her childbearing years (15-49) conforming to the age-specific

fertility rates of a given year. As a universal convention in developed countries, a woman would need to have on average 2.10 children to replace herself and her partner and to account for infant mortality.

### **Youth Dependency Ratio**

The ratio of persons under 15 years to those in the ages defined as economically productive years (15-64) in a population.

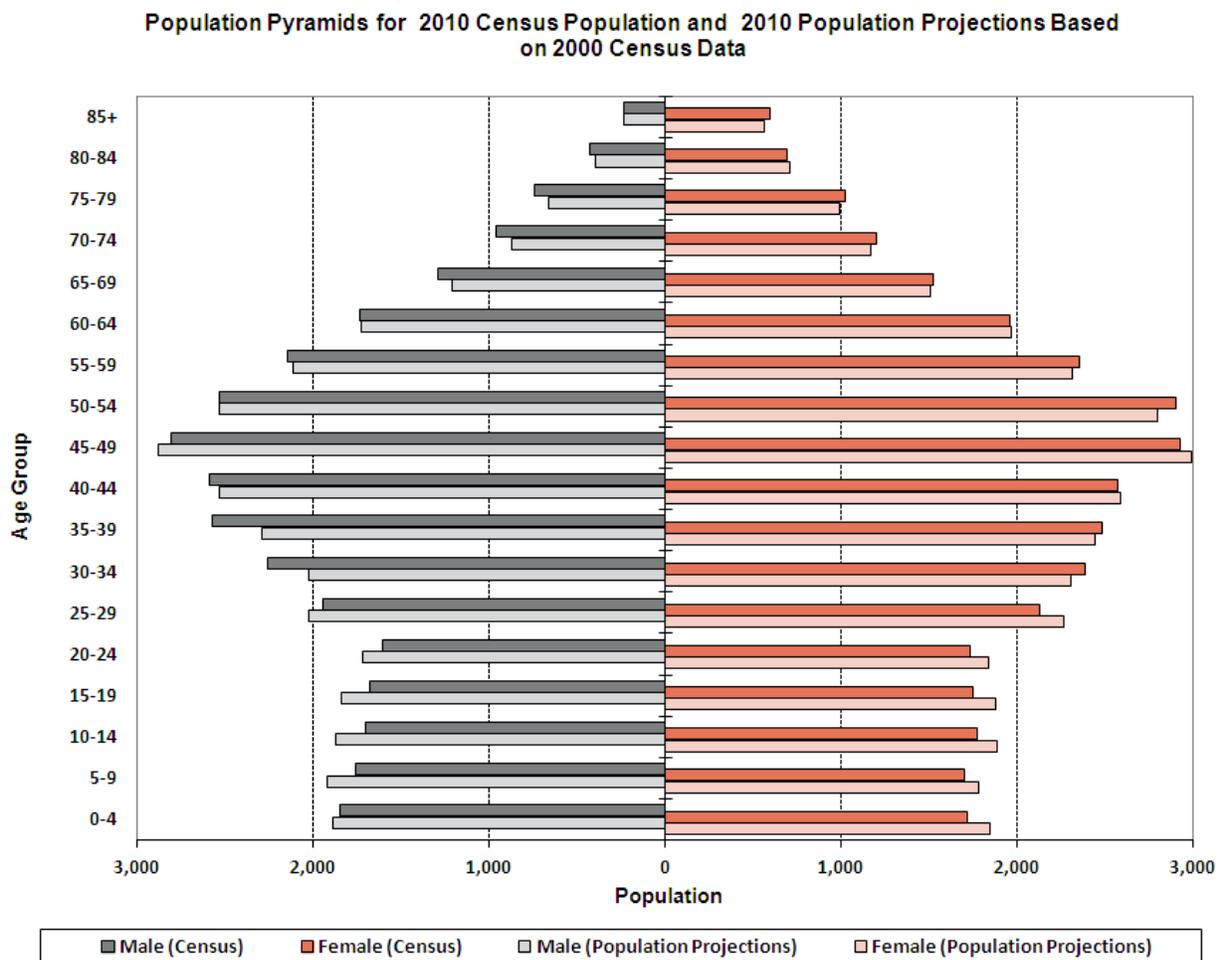
## ACCURACY OF PAST PROJECTIONS

Past projections can be evaluated by comparing the 2010 Census Day population for the entire island with the 2010 projected population based on the 2000 Census. The age pyramid (Figure 1A) shows that the 2010 projected figures by age and sex are relatively close to the 2010 Census Day population.

Overall, the projected total population was 329 persons, or 0.51%, higher than the Census Day count. The differential between the populations ranged from a population projection over count of 286 persons in the 15-19 age group to a population projection undercount of 316 persons aged 30-34. The population projection overcount was confined primarily to the 0-29 and 45-49 age groups while the population projection undercount was concentrated in the 30-44, 50-59 and 65+ age groups.

As population projections are based upon fertility, mortality and migration assumptions, it could be that the assumptions made for the 2000 Population Projections may not have held true in their entirety a decade later when the 2010 Census was conducted. This would result in the differences shown in the population pyramid below.

Figure 1A



**TABLE 1: TOTAL POPULATION PROJECTIONS**

Age Group	July 1, 2010			July 1, 2011			July 1, 2012		
	Total	Male	Female	Total	Male	Female	Total	Male	Female
<b>Total</b>	64,129	30,792	33,337	63,193	30,218	32,975	62,408	29,819	32,589
0 - 4	3,561	1,844	1,717	3,521	1,792	1,729	3,466	1,755	1,711
5 - 9	3,448	1,758	1,690	3,362	1,735	1,627	3,221	1,655	1,566
10 - 14	3,465	1,698	1,767	3,335	1,638	1,697	3,264	1,623	1,641
15 - 19	3,415	1,673	1,742	3,268	1,591	1,677	3,125	1,518	1,607
20 - 24	3,326	1,598	1,728	3,197	1,513	1,684	3,099	1,465	1,634
25 - 29	4,045	1,930	2,115	3,782	1,785	1,997	3,571	1,672	1,899
30 - 34	4,628	2,250	2,378	4,471	2,165	2,306	4,345	2,115	2,230
35 - 39	5,015	2,550	2,465	4,723	2,370	2,353	4,569	2,272	2,297
40 - 44	5,153	2,585	2,568	5,095	2,552	2,543	4,950	2,500	2,450
45 - 49	5,720	2,810	2,910	5,623	2,803	2,820	5,454	2,750	2,704
50 - 54	5,429	2,530	2,899	5,444	2,517	2,927	5,456	2,520	2,936
55 - 59	4,509	2,147	2,362	4,605	2,160	2,445	4,726	2,191	2,535
60 - 64	3,699	1,738	1,961	3,757	1,774	1,983	3,850	1,803	2,047
65 - 69	2,827	1,301	1,526	3,002	1,393	1,609	3,130	1,460	1,670
70 - 74	2,162	958	1,204	2,160	942	1,218	2,232	992	1,240
75 - 79	1,775	753	1,022	1,833	800	1,033	1,824	785	1,039
80 - 84	1,123	433	690	1,145	439	706	1,220	473	747
85+	829	236	593	870	249	621	906	270	636

Age Group	July 1, 2013			July 1, 2014			July 1, 2015		
	Total	Male	Female	Total	Male	Female	Total	Male	Female
<b>Total</b>	61,954	29,587	32,367	61,777	29,499	32,278	61,735	29,480	32,255
0 - 4	3,360	1,689	1,671	3,248	1,610	1,638	3,183	1,566	1,617
5 - 9	3,192	1,629	1,563	3,219	1,654	1,565	3,205	1,643	1,562
10 - 14	3,190	1,605	1,585	3,104	1,581	1,523	3,027	1,558	1,469
15 - 19	3,032	1,497	1,535	2,992	1,462	1,530	2,937	1,421	1,516
20 - 24	3,056	1,439	1,617	3,034	1,438	1,596	3,027	1,440	1,587
25 - 29	3,423	1,591	1,832	3,385	1,572	1,813	3,435	1,609	1,826
30 - 34	4,280	2,077	2,203	4,271	2,063	2,208	4,184	2,035	2,149
35 - 39	4,421	2,205	2,216	4,299	2,158	2,141	4,293	2,139	2,154
40 - 44	4,855	2,453	2,402	4,752	2,406	2,346	4,585	2,340	2,245
45 - 49	5,232	2,612	2,620	4,949	2,450	2,499	4,809	2,380	2,429
50 - 54	5,482	2,578	2,904	5,551	2,678	2,873	5,494	2,662	2,832
55 - 59	4,904	2,269	2,635	5,023	2,285	2,738	5,131	2,349	2,782
60 - 64	3,894	1,841	2,053	3,996	1,907	2,089	4,184	1,972	2,212
65 - 69	3,225	1,489	1,736	3,314	1,539	1,775	3,379	1,567	1,812
70 - 74	2,347	1,054	1,293	2,459	1,092	1,367	2,566	1,147	1,419
75 - 79	1,831	787	1,044	1,828	776	1,052	1,857	796	1,061
80 - 84	1,276	490	786	1,349	525	824	1,384	542	842
85+	954	282	672	1,004	303	701	1,055	314	741

Source: Department of Statistics

Age Group	July 1, 2016			July 1, 2017			July 1, 2018		
	Total	Male	Female	Total	Male	Female	Total	Male	Female
<b>Total</b>	61,695	29,463	32,232	61,658	29,447	32,211	61,623	29,433	32,190
0 - 4	3,098	1,533	1,565	3,060	1,525	1,535	3,025	1,520	1,505
5 - 9	3,200	1,613	1,587	3,172	1,593	1,579	3,081	1,535	1,546
10 - 14	2,978	1,555	1,423	2,869	1,489	1,380	2,859	1,471	1,388
15 - 19	2,868	1,396	1,472	2,843	1,404	1,439	2,796	1,400	1,396
20 - 24	3,011	1,430	1,581	2,963	1,405	1,558	2,923	1,411	1,512
25 - 29	3,533	1,664	1,869	3,622	1,713	1,909	3,684	1,741	1,943
30 - 34	4,085	1,993	2,092	4,024	1,954	2,070	3,973	1,922	2,051
35 - 39	4,249	2,124	2,125	4,222	2,123	2,099	4,214	2,111	2,103
40 - 44	4,373	2,211	2,162	4,285	2,148	2,137	4,182	2,107	2,075
45 - 49	4,797	2,375	2,422	4,692	2,341	2,351	4,623	2,306	2,317
50 - 54	5,443	2,678	2,765	5,316	2,645	2,671	5,119	2,518	2,601
55 - 59	5,180	2,362	2,818	5,223	2,383	2,840	5,268	2,452	2,816
60 - 64	4,306	1,998	2,308	4,440	2,035	2,405	4,628	2,117	2,511
65 - 69	3,451	1,609	1,842	3,556	1,643	1,913	3,606	1,680	1,926
70 - 74	2,731	1,232	1,499	2,858	1,295	1,563	2,952	1,324	1,628
75 - 79	1,866	787	1,079	1,932	831	1,101	2,040	885	1,155
80 - 84	1,433	582	851	1,425	569	856	1,434	570	864
85+	1,093	321	772	1,156	351	805	1,216	363	853

Age Group	July 1, 2019			July 1, 2020		
	Total	Male	Female	Total	Male	Female
<b>Total</b>	61,592	29,422	32,170	61,566	29,415	32,151
0 - 4	2,986	1,506	1,480	2,951	1,494	1,457
5 - 9	2,976	1,459	1,517	2,916	1,418	1,498
10 - 14	2,895	1,502	1,393	2,883	1,492	1,391
15 - 19	2,721	1,381	1,340	2,649	1,361	1,288
20 - 24	2,906	1,386	1,520	2,868	1,354	1,514
25 - 29	3,709	1,765	1,944	3,718	1,775	1,943
30 - 34	3,973	1,924	2,049	4,034	1,966	2,068
35 - 39	4,234	2,111	2,123	4,158	2,089	2,069
40 - 44	4,079	2,070	2,009	4,075	2,053	2,022
45 - 49	4,532	2,266	2,266	4,377	2,205	2,172
50 - 54	4,850	2,362	2,488	4,714	2,296	2,418
55 - 59	5,344	2,555	2,789	5,296	2,544	2,752
60 - 64	4,752	2,136	2,616	4,864	2,200	2,664
65 - 69	3,714	1,747	1,967	3,898	1,810	2,088
70 - 74	3,041	1,373	1,668	3,106	1,399	1,707
75 - 79	2,144	917	1,227	2,243	967	1,276
80 - 84	1,444	568	876	1,474	584	890
85+	1,292	394	898	1,342	408	934

Source: Department of Statistics

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