

Appendix chapter 4 - Decolonization and life expectancy in the Caribbean

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Timing of life expectancy changes coinciding with decolonization

The transition from a former colony to an independent state was not an abrupt change, but the conclusion of a process that has been in gestation since the establishment of the UN in 1945. The political landscape of the currently sovereign Caribbean states was relatively stable during the transition to independence. The leading political parties that drafted the independence constitutions and have led their state into independence were already in power two to fifteen years before the year of independence and, with the exception of Jamaica and St. Lucia, continued to govern in the years thereafter. The official date of independence was preceded by several constitutional and institutional changes that allowed for increasing internal political self-government, including the incubation of political parties, the holding of competitive elections and even changes in government while under colonial rule (Elkins, Ginsburg, & Blount, 2011). In this regard, the self-governing status of the affiliated states can be seen as a preparation, or postponement, of full independence.

In order to narrow the time period within which a trend change in life expectancy or GDP per capita could be expected down to the transition to independence in the join point regression analysis, we derived a 6-year period in which a change coinciding with independence could be expected; the year of independence, 1-year before and 4-years after. Since this selection is relatively arbitrary, we assessed different time-intervals and calculated the number of matches in both genders. A match was defined as the occurrence of a join point that indicated a negative trend change during the predefined time-interval.

Table A1 Results likelihood test for different 6-year time-intervals

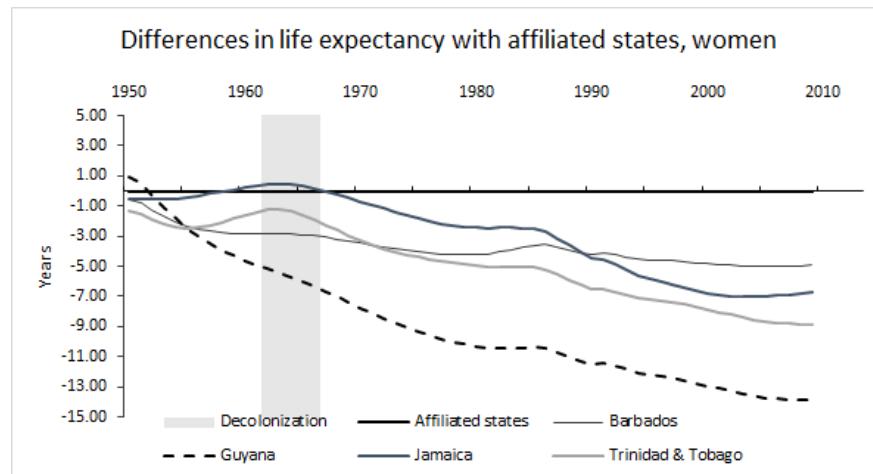
Time-interval 6 year-period for predefined period match	Observed number of matches of 22	P-value Fisher's exact test (one-sided)
Year of independence, and 5 years after	10	0.008
1 year before, 4 years after*	9	0.017
2 years before, 3 years after	7	0.066
3 years before, 2 years after	5	0.206
4 years before, 1 year after	6	0.120

*Time-interval used for analysis in this paper

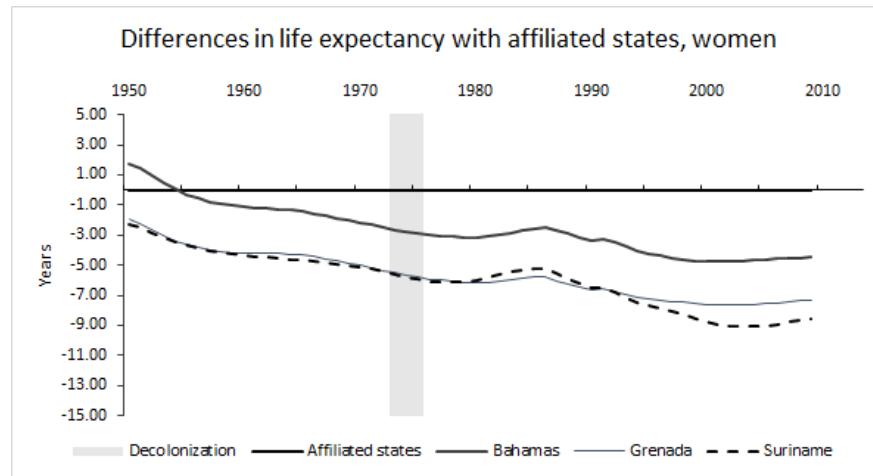
Additional results life expectancy analysis

Figure A1 Differences in life expectancy between currently sovereign Caribbean states and affiliated states, women 1950-2010

a. First wave of decolonization, 1962 to 1966



b. Second wave of decolonization, 1973 to 1975



c. Third wave of decolonization, 1979 to 1981

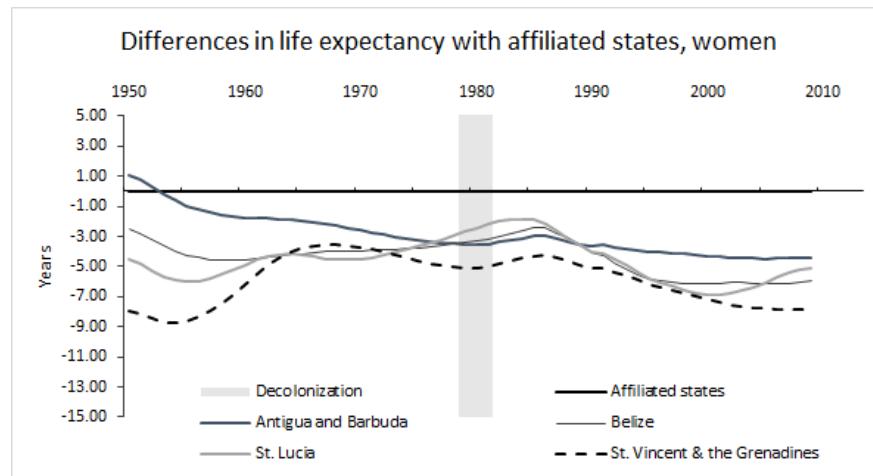


Table A2 Life expectancy growth before and after independence, by gender**a. Currently sovereign states n=11, men**

		Absolute life expectancy growth (years)		Median annual life expectancy growth (%)	
	Year of Indep	10 years before Indep	10 years after Indep	10 years before Indep	10 years after Indep
Antigua & Barbuda	1981	2.9	2.6	0.44	0.38
Bahamas	1973	2.4	2.0	0.37	0.31
Barbados	1966	4.6	3.6	0.75	0.57
Belize	1981	3.3	0.6	0.47	0.13
Grenada	1974	3.2	2.4	0.50	0.37
Guyana	1966	0.9	0.9	0.17	0.16
Jamaica	1962	7.0	3.6	1.09	0.53
St. Lucia	1979	5.7	3.6	0.94	0.51
St. Vincent & the Grenadines	1979	2.4	2.9	0.35	0.42
Suriname	1975	2.6	1.6	0.38	0.27
Trinidad & Tobago	1962	5.2	1.1	0.89	0.12
Median		3.18	2.36	0.47	0.37
<i>P</i> -value Wilcoxon Signed-rank test		0.012		0.006	
<i>Spearman's rho</i>		0.455		0.364	

b. Currently sovereign states n=11, women

		Absolute life expectancy growth (years)		Median annual life expectancy growth (%)	
	Year of Indep	10 years before Indep	10 years after Indep	10 years before Indep	10 years after Indep
Antigua & Barbuda	1981	3.1	2.5	0.43	0.34
Bahamas	1973	3.5	3.0	0.51	0.42
Barbados	1966	4.6	3.6	0.70	0.54
Belize	1981	4.6	1.5	0.64	0.23
Grenada	1974	3.5	2.6	0.51	0.38
Guyana	1966	1.7	1.6	0.27	0.25
Jamaica	1962	7.7	3.3	1.10	0.44
St. Lucia	1979	6.2	1.7	0.90	0.14
St. Vincent & the Grenadines	1979	2.8	2.8	0.39	0.43
Suriname	1975	3.6	3.3	0.54	0.49
Trinidad & Tobago	1962	7.2	2.3	1.21	0.30
Median		3.59	2.61	0.54	0.38
<i>P</i> -value Wilcoxon Signed-rank test		0.005		0.01	
<i>Spearman's rho</i>		0.151		0.014	

Results analysis complementary variables life expectancy

Table A3 Crude death rate growth before and after independence, men

Year of Independence	Absolute growth death rate (deaths per 1,000 population)		Relative annual crude death rate growth (%)	
	10 years <u>before</u> Independence	10 years <u>after</u> Independence	10 years <u>before</u> Independence	10 years <u>after</u> Independence
Antigua & Barbuda	1981	-0.6	1.4	-0.95
Bahamas	1973	-0.9	-0.5	-1.00
Barbados	1966	-2.5	-0.4	-2.34
Belize	1981	-1.4	-1.0	-1.93
Grenada	1974	-1.5	-0.1	-1.38
Guyana	1966	-1.3	0.1	-1.20
Jamaica	1962	-1.7	-1.5	-1.98
St. Lucia	1979	-2.5	-1.1	-3.04
St. Vincent & the Grenadines	1979	-0.9	-1.3	-1.17
Suriname	1975	-1.5	-0.5	-1.66
Trinidad & Tobago	1962	-2.8	-0.6	-2.92
Median		-1.5	-0.5	-1.66
P-value Wilcoxon		0.007		0.010
Signed-rank test				
Spearman's rho		0.326		0.500

Table A4 Crude death rate growth before and after independence, women

Year of Independence	Absolute growth death rate (deaths per 1,000 population)		Relative annual crude death rate growth (%)	
	10 years <u>before</u> Independence	10 years <u>after</u> Independence	10 years <u>before</u> Independence	10 years <u>after</u> Independence
Antigua & Barbuda	1981	-0.5	0.6	-0.54
Bahamas	1973	-1.2	-0.6	-1.72
Barbados	1966	-2.0	-1.0	-1.81
Belize	1981	-1.5	-1.1	-2.33
Grenada	1974	-1.4	-0.3	-1.32
Guyana	1966	-1.6	-0.5	-1.87
Jamaica	1962	-2.0	-0.9	-2.31
St. Lucia	1979	-2.3	-0.5	-3.58
St. Vincent & the Grenadines	1979	-1.1	-0.9	-1.42
Suriname	1975	-1.6	-0.7	-2.06
Trinidad & Tobago	1962	-3.7	-1.0	-4.36
Median		-1.6	-0.7	-1.87
P-value Wilcoxon		0.003		0.003
Signed-rank test				
Spearman's rho		0.402		0.355

Table A5 Infant mortality growth before and after independence

Year of Independence	Absolute infant mortality growth (per 1,000 live births)		Relative annual infant mortality growth (%)		
	10 years before Independence	10 years <u>after</u> Independence	10 years before Independence	10 years <u>after</u> Independence	
Antigua & Barbuda	1981	-12.8	-8.8	-3.97	-3.95
Bahamas	1973	-13.3	-9.5	-3.78	-3.80
Barbados	1966	-20.1	-14.6	-3.53	-3.55
Belize	1981	-17.6	-10.3	-3.94	-2.92
Grenada	1974	-20.8	-13.9	-4.45	-4.49
Guyana	1966	-3.7	-3.4	-0.64	-0.63
Jamaica	1962	-27.7	-16.5	-4.28	-3.03
St. Lucia	1979	-20.3	-9.7	-5.96	-3.72
St. Vincent & the Grenadines	1979	-24.5	-11.7	-5.14	-3.89
Suriname	1975	-8.9	-0.2	-2.08	0.11
Trinidad & Tobago	1962	-28.7	-7.3	-4.74	-1.60
Median		-20.1	-9.7	-3.97	-3.55
P-value Wilcoxon		0.003			0.062
Signed-rank test					
Spearman's rho		0.582			0.500

Table A6 Under-5 mortality growth before and after independence

Year of Independence	Absolute under-5 mortality growth (per 1,000 live births)		Median annual under-5 mortality growth (%)		
	10 years before Independence	10 years <u>after</u> Independence	10 years before Independence	10 years <u>after</u> Independence	
Antigua & Barbuda	1981	-15.7	-10.8	-3.97	-3.93
Bahamas	1973	-18.2	-13.1	-3.62	-3.64
Barbados	1966	-30.8	-21.3	-3.96	-3.94
Belize	1981	-23.4	-14.0	-4.11	-3.15
Grenada	1974	-27.0	-18.1	-4.38	-4.41
Guyana	1966	-6.3	-5.8	-0.78	-0.77
Jamaica	1962	-38.3	-22.3	-4.57	-3.19
St. Lucia	1979	-29.5	-12.5	-6.15	-3.42
St. Vincent & the Grenadines	1979	-29.9	-12.1	-5.44	-3.40
Suriname	1975	-13.4	-8.1	-2.06	-1.54
Trinidad & Tobago	1962	-39.2	-10.2	-4.94	-1.74
Median		-27.0	-12.5	-4.11	-3.40
P-value Wilcoxon		0.003			0.021
Signed-rank test					
Spearman's rho		0.527			0.209

Table A7 Overview matches in join point regression analysis, 1 year before and 4 years after independence

	Life expectancy at birth, men	Life expectancy at birth, women	Death rate, men	Death rate, women	Infant mortality	Under-5 mortality
Antigua & Barbuda						
Bahamas						
Barbados			Match			
Belize		Match				
Grenada						
Guyana	Match	Match	Match	Match		
Jamaica	Match	Match		Match		Match
St. Lucia		Match				Match
St. Vincent & the Grenadines						
Suriname	Match			Match	Match	
Trinidad & Tobago	Match	Match	Match	Match	Match	Match

Results analysis GDP per capita

Table A8 GDP per capita in the Caribbean states from 1950 to 2010, by current political status*

Current political status	# of states	GDP per capita (in US\$, 2000 prices)									
		1960-1964	1965-1969	1970-1974	1975-1979	1980-1984	1985-1989	1990-1994	1995-1999	2000-2004	2005-2008
Sovereign		1341	1741	2019	2660	2465	2533	3422	3572	4196	4582
<i>Q1-Q3</i>	¹¹	<i>1034-3024</i>	<i>1071-3795</i>	<i>1275-4180</i>	<i>1633-4424</i>	<i>1907-5472</i>	<i>2017-5816</i>	<i>2576-6245</i>	<i>2749-6815</i>	<i>3320-8014</i>	<i>3760-9956</i>
Affiliated		4076	5588	7030	8016	8747	10514	12273	14441	16067	16331
<i>Q1-Q3</i>	⁷	<i>3795-5468</i>	<i>5116-7792</i>	<i>6811-7464</i>	<i>7653-9427</i>	<i>8333-11702</i>	<i>9632-13309</i>	<i>10816-16347</i>	<i>11730-17781</i>	<i>13588-18250</i>	<i>15464-18136</i>
Difference (in US\$)		2735	3848	5011	5356	6282	7982	8851	10869	11871	11750

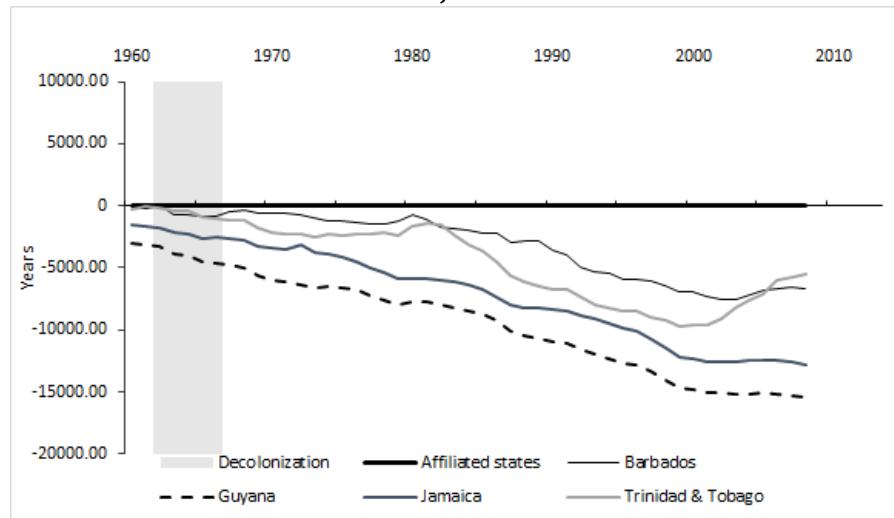
*Data refers to the selection of same states during the study-period, namely the 11 or 7 states of which the political status in 2015 is sovereign or affiliated respectively.

Q1 = first quartile

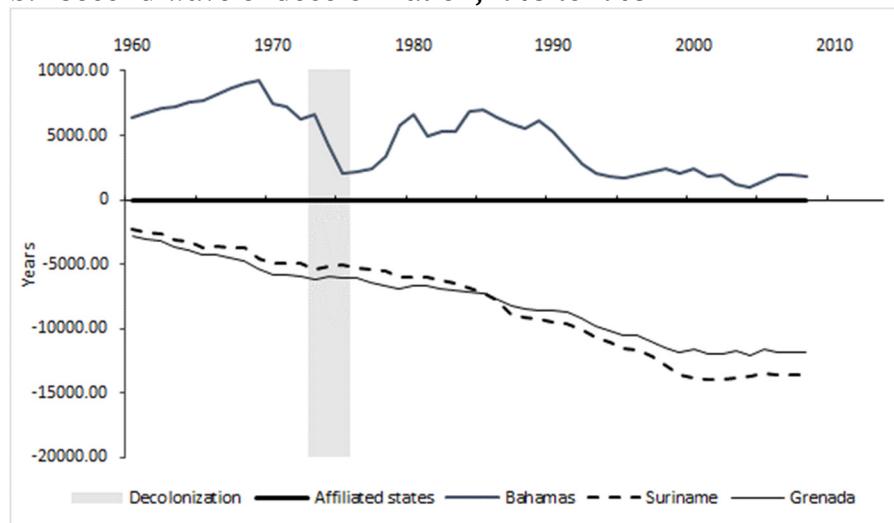
Q3 = third quartile

Figure A2 Differences in GDP per capita (in US\$, 2000 prices) between currently sovereign Caribbean states and affiliated states, 1960-2008

a. First wave of decolonization, 1962 to 1966



b. Second wave of decolonization, 1973 to 1975



c. Third wave of decolonization, 1979 to 1981

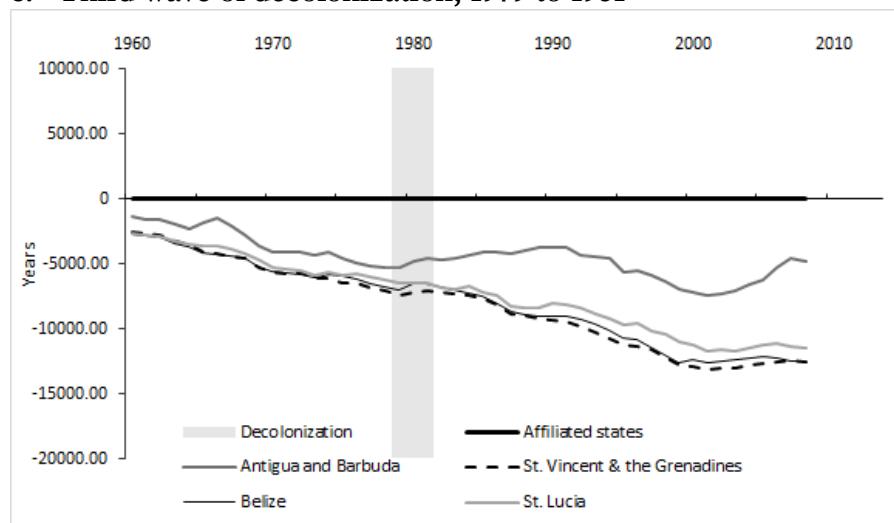


Table A9 GDP per capita growth before and after independence

	Absolute GDP per capita growth (US\$)		Relative annual GDP per capita growth (%)	
	Period <u>before</u> Indep*	10 years <u>after</u> Indep	Period <u>before</u> Indep*	10 years <u>after</u> Indep
Antigua & Barbuda	117	400	5.6	8.4
Bahamas	238	23	4.4	3.6
Barbados	184	183	7.4	3.5
Belize	81	72	4.3	4.2
Grenada	56	58	7.2	3.2
Guyana	4	18	2.1	2.1
Jamaica	64	168	2.8	4.5
St. Lucia	59	66	3.3	2.5
St. Vincent & the Grenadines	29	81	1.8	4.5
Suriname	98	-31	3.1	-3.2
Trinidad & Tobago	228	105	4.6	2.3
Median	105.2	103.9	4.5	3.5
<i>P</i> -value Wilcoxon				
Signed-rank test		0.929		0.248
<i>Spearman's rho</i>		0.282		0.055

*Calculation of absolute and relative GDP per capita growth before independence was subject to data availability, the first available data year was 1960. For Jamaica and Trinidad & Tobago, who became independent in 1962, three years were included (1960 to 1962). Barbados and Guyana became independent in 1966 and calculation of GDP per capita growth before independence included seven years (1960 to 1966).

Table A10 Results join point regression analysis GDP per capita and count of matches

	Year of Indep	Year of closest join point (95% CI)	Change in APC before and after joint point*	Timing of start closest trend change (years)	Match (1 year before, 4 years after indep)
Antigua & Barbuda	1981	1977 (1974-1977)	9.3	-4	No
Bahamas	1973	1976 (1974-1978)	17.1	3	No, positive trend change
Barbados	1966	1971 (1968-1973)	-4.3	5	No
Belize	1981	1982 (1979-1984)	-7	1	Yes
Grenada	1974	1977 (1973-1991)	-4	3	Yes
Guyana	1966	1977 (1974-1979)	-4.6	11	No
Jamaica	1962	1972 (1971-1973)	-7.5	10	No
St. Lucia	1979	1987 (1981-1989)	9.1	8	No
St. Vincent & the Grenadines	1979	1975 (1974-1976)	9.7	-4	No
Suriname	1975	1979 (1977-1981)	-8.9	4	Yes
Trinidad & Tobago	1962	1982 (1981-1984)	-8.9	20	No

*APC is the Annual Percentage Change in the years before or after a join point occurred. Depicted is the difference in APC before and after the join point closest to year of independence occurred. A negative number therefore indicates decreased GDP per capita growth.

Table A11 Results likelihood test GDP per capita*

Length of observation period	49 years
Length of period expected effect	6 years
Theoretical probability of a match	0.12
Maximum number of matches (both genders)	11
Expected number of matches	1.3
Observed number of matches	4
Observed probability of a match	0.36
P-value Fisher's exact test (one-sided)	0.155

*Under the assumption that join points occur randomly during the 49-year study-period, the theoretical probability of a join point occurring in the predefined period of 1-year before and 4-years after the year of independence (6 years) is 1 in 8. Of 11 possible matches (11 states), the expected number of matches by chance would be 1. Based on the Fisher's exact test (one-sided), the number of matches found in the join point analysis was not significantly different to that would be the case by pure chance.

Methodology and sources life expectancy estimates

A comprehensive description of the methodology and sources underlying the life expectancy estimates is available from the 2015 revision of the World Population Prospects (United Nations, n.d.; United Nations, Department of Economic and Social Affairs, & Population Division, 2014). Table A1 depicts the sources of the latest life expectancy at birth data as published by the United Nations². For the 18 Caribbean states analysed in this paper, life expectancy data of 11 states was based on mortality data by age and gender. This implies that our findings of life expectancy changes in these states are based on more reliable methods. For at least four currently sovereign states, Guyana, Jamaica, Trinidad & Tobago and Surinam, mortality data by age and gender were available before decolonization occurred (United Nations, 1986).

Table A12 Overview sources life expectancy data Caribbean states²

Latest life expectancy at birth data, summary:	
Affiliated states	
Aruba	Based on: (a) official estimates of life expectancy for 1972, 1981, 1991, 2000, and 2011; and (b) registered deaths by age and sex from 2002 to 2013.
Curaçao	Based on: (a) estimates from the 1981, 1992, 2001 and 2011 censuses, (b) estimates from the former Netherlands Antilles, and (c) official estimates of life expectancy through 2012-2013.
French Guiana	Based on official estimates of life expectancy from 2000 to 2013.
Guadeloupe	Based on: (a) official estimates from INSEE through 2013 (2009-2013 estimates correspond to Guadeloupe region), and (b) life tables derived from registered deaths and the population by age and sex through 2003.
Martinique	Based on: (a) official estimates of life expectancy at birth from 2000 to 2013, and (b) annual life tables for 1967, 2002 and 2007.
Puerto Rico	Based on: (a) registered deaths by age and sex through 2014 and underlying population by age and sex, and (b) official estimates of life expectancy available through 2010.
U.S. Virgin Islands	Based on: (a) number of deaths registered through 2010, (b) life expectancy estimates through 2010 and the assumption that the age pattern of mortality conforms to the Far Eastern model of the United Nations Model Life Tables.
Sovereign states	
Antigua and Barbuda	Based on official estimates of life expectancy from 2000 to 2010.
Bahamas	Derived from child and adult mortality estimates through 2013 by assuming that the age pattern of mortality conforms to the West model of the Coale-Demeny Model Life Tables.
Barbados	Derived from estimates of child mortality and adult mortality from vital registration data through 2007 by assuming that the age pattern of mortality conforms to the West model of the Coale-Demeny Model Life Tables.
Belize	Estimated using the West model of the Coale-Demeny Model Life Tables and two parameters: (a) estimates of child mortality; and (b) adjusted estimates of adult mortality from registered deaths and underlying population through 2009. From 1950 to 1995, estimated using adjusted registered deaths by age and sex and underlying population by age and sex.
Grenada	Derived from estimates of infant and child mortality by assuming that the age pattern of mortality conforms to the West model of the Coale-Demeny Model Life Tables.
Guyana	Derived from child and adult mortality estimates through 2010 by assuming that the age pattern of mortality conforms to the West model of the Coale-Demeny Model Life Tables. Adult mortality estimates based on the Global Burden of Disease Study 2010 were considered.
Jamaica	Based on: (a) registered deaths by age and sex through 2005, adjusted for underreporting of infant and child deaths; (b) official estimates for 1991, 2002, 2003 and 2006; and (c) estimates from the 2001 and 2011 censuses.
St. Lucia	Based on: (a) official estimates of life expectancy available through 2005; (b) registered deaths by age and sex through 2005 and underlying population by age and sex; and (c) estimates from the 1991 and 2001 censuses.
St. Vincent and the Grenadines	Derived from estimates of infant and child mortality by assuming that the age pattern of mortality conforms to the West model of the Coale-Demeny Model Life Tables. Registered deaths by age and sex through 2009 with underlying population by age and sex were considered.
Suriname	Based on: (a) registered deaths by age and sex through 2013 and underlying population by age and sex, and (b) official estimates for 1963, 1980, 2004 and 2006.
Trinidad & Tobago	Based on: (a) registered death by age and sex through 2005 and underlying population by age and sex, and (b) official estimates through 2000.

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