

Appendix

1. EU-15 averaging procedure

We calculated the average life expectancy of the EU-15 as: $m_{EU15}(x) = \frac{\sum_i m(x,i)}{I}$, where $m(x,i)$ corresponds to the age-specific death rate for age x , in country i , and I corresponds to the count of countries, so $I=15$. This averaging procedure is equivalent to giving the same weight to the risk of dying to each country included, irrespective of their population size.

2. Age- and Cause-decomposition methodology

The proportion of deaths at age x of cause j respect of all deaths, denoted as $c(x,j)$, was calculated and applied to the age-specific death rates at age x , $m(x)$, to obtain age- and cause-specific death rates: $m(x,j)=c(x,j) \cdot m(x)$. These age- and cause-specific death rates were used in the decomposition analysis explained below. We worked with two causes of death, namely homicide and the rest of the causes of death, to calculate their contributions to the difference in life expectancies between the EU-15 and LAC countries in 2009-14, and for the change over time for each LAC country from 2005-09 to 2010-14.

As mentioned above, the age-specific death rates from UN life tables[1], $m(x)$, are multiplied by the proportion of deaths by homicide over all deaths at that age from WHO,[2] $c(x,j)=Homicide(x)/AllDeaths(x)$, to obtain the age- and cause-specific death rates. However, UNODC[3] has re-assessed the number of homicides in the region and estimated new numbers publishing only values aggregated by age. Thus, we have further included the new counts of homicides from the UNODC to the age-pattern of homicide from WHO, by multiplying at every age the age- and cause specific death rates by the ratio of the two counts of homicides, from UNODC and WHO, as $H=HomicidesUNODC/HomicidesWHO$, or $m^*(x,j) = m(x,j)H$. These adjustments were not needed for the IHME[4] data since they do take into account the WHO, UNODC and many other sources of information to model their estimates. For the majority of the LAC countries with available causes of death data the IHME causes of death information differs from WHO simply by a procedure of distribution of the garbage codes (not defined causes of death) among the causes of death. However, for countries like Bolivia and Haiti where only partial or no information on vital statistics is available the IHME inputs are the available information in surveys, hospital records, as well as information from other countries in the region with similar background.[4,5]

Decomposition techniques are standard methods for comparing life expectancies across populations and time, and analyzing the age-contributions and cause-contributions to their differences.[6,7] These methods have been used before to assess changes over time and across countries for the LAC region.[8,9] We extracted age-specific death rates, numbers of survivors and persons-years from the life tables from United Nations.[10] These values, together with the proportion of deaths for each cause in every age group, were used to obtain the age and cause-specific death rates and contributions that make up the difference in life expectancies between EU-15 and LAC countries in 2010-14, and for the change over time for each LAC country from 2005-09 to 2010-14.

Arriaga's (1984) method to calculate the age- and cause-contribution to the difference in life expectancies is shown here. This method is calculated based on variables of the life table: numbers of survivors and persons-years lived. Let ℓ_x^i , ${}_nL_x^i$ and T_x^i be the survival functions at exact age x , person-years lived between ages x to $x+n$, and after age x respectively for a life table in population i . The overall age-contribution to the difference in life expectancies between populations 1 and 2 is obtained as:

$${}_n\Delta_x = \frac{\ell_x^1}{\ell_0^1} \left(\frac{{}_nL_x^2}{\ell_x^2} - \frac{{}_nL_x^1}{\ell_x^1} \right) + \frac{T_{x+n}^2}{\ell_0^1} \left(\frac{\ell_x^1}{\ell_x^2} - \frac{\ell_{x+n}^1}{\ell_{x+n}^2} \right)$$

Once the age-contribution is obtained the cause of death j contribution is derived from this as

$${}_n\Delta_x^j = {}_n\Delta_x * \left(\frac{m^2(x, j) - m^1(x, j)}{m^2(x) - m^1(x)} \right)$$

as before $m^i(x, j)$ is the death rate for age x , cause j in population i .

Several methods of cause-decomposition of changes in life expectancy exist, however, comparisons of these methods return negligible differences.[11]

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Table A1. Life Expectancy in Latin America and the Caribbean and homicide-contribution to gap with EU-15 and over time from 2005-09 to 2010-14. Homicides data from UNODC, and WHO.

Region and Country	Life Expectancy 2005-09		Life Expectancy 2010-14	
	Females	Males	Females	Males
LATIN AMERICA AND THE CARIBBEAN	76.8 (76.3, 77.1)	70.0 (69.5, 70.4)	77.9 (77.5, 78.2)	71.2 (70.7, 71.6)
Caribbean (6 countries)				
Cuba	80.7 (80.3, 81.0)	76.7 (76.3, 76.9)	81.3 (80.9, 81.5)	77.1 (76.7, 77.4)
Dominican Republic	75.5 (75.0, 75.8)	69.2 (68.7, 69.6)	76.5 (76.0, 76.8)	70.2 (69.7, 70.6)
Haiti	62.3 (61.7, 62.7)	58.2 (57.6, 58.6)	64.4 (63.8, 64.8)	60.2 (59.6, 60.6)
Jamaica	76.8 (76.4, 77.1)	71.7 (71.2, 72.0)	77.9 (77.4, 78.2)	73.1 (72.6, 73.4)
Puerto Rico	81.8 (81.4, 82.0)	73.8 (73.4, 74.1)	83.2 (82.8, 83.4)	75.2 (74.8, 75.5)
Trinidad and Tobago	73.0 (72.5, 73.3)	65.8 (65.4, 66.2)	73.8 (73.4, 74.1)	66.9 (66.4, 67.2)
Central America (7 countries)				
Costa Rica	80.8 (80.4, 81.1)	76.1 (75.6, 76.4)	81.7 (81.3, 81.9)	76.7 (76.3, 77.0)
El Salvador	75.6 (75.2, 75.9)	66.4 (65.9, 66.8)	77.1 (76.6, 77.4)	67.9 (67.4, 68.3)
Guatemala	73.8 (73.3, 74.2)	66.7 (66.2, 67.2)	75.0 (74.5, 75.4)	67.9 (67.4, 68.4)
Honduras	74.5 (74.0, 74.9)	69.6 (69.0, 69.9)	75.4 (74.9, 75.8)	70.4 (69.9, 70.8)
Mexico	78.1 (77.7, 78.4)	73.3 (72.8, 73.7)	78.9 (78.5, 79.2)	74.0 (73.6, 74.4)
Nicaragua	75.8 (75.4, 76.2)	69.8 (69.2, 70.1)	77.5 (77.0, 77.8)	71.4 (70.9, 71.7)
Panama	79.4 (79.0, 79.7)	73.5 (73.0, 73.9)	80.5 (80.1, 80.8)	74.3 (73.8, 74.7)
South America (10 countries)				
Argentina	79.0 (78.6, 79.3)	71.3 (70.9, 71.6)	79.8 (79.4, 80.1)	72.2 (71.7, 72.4)
Bolivia (Plurinational State of)	67.3 (66.7, 67.7)	62.7 (62.1, 63.2)	70.2 (69.6, 70.6)	65.3 (64.7, 65.8)
Brazil	76.4 (76.0, 76.7)	68.8 (68.3, 69.1)	77.9 (77.4, 78.1)	70.3 (69.8, 70.6)
Chile	82.7 (82.3, 82.9)	76.4 (76.0, 76.7)	84.1 (83.7, 84.4)	78.1 (77.7, 78.4)
Colombia	76.6 (76.2, 76.9)	69.2 (68.7, 69.6)	77.4 (77.0, 77.7)	70.2 (69.7, 70.6)
Ecuador	77.5 (77.1, 77.9)	71.7 (71.2, 72.1)	78.4 (77.9, 78.7)	72.8 (72.3, 73.2)
Paraguay	73.9 (73.5, 74.3)	69.7 (69.2, 70.1)	74.9 (74.5, 75.3)	70.7 (70.2, 71.1)
Peru	75.9 (75.4, 76.2)	70.5 (70.0, 70.9)	76.8 (76.4, 77.2)	71.5 (71.1, 71.9)
Uruguay	79.7 (79.3, 80.0)	72.5 (72.1, 72.8)	80.4 (80.0, 80.7)	73.2 (72.8, 73.5)
Venezuela (Bolivarian Republic of)	77.7 (77.2, 78.0)	69.4 (68.9, 69.7)	78.2 (77.8, 78.5)	69.9 (69.5, 70.3)

Source: 1) Life expectancies from UN database, 2) homicides from UNODC, and cause of death data from WHO database,

3) NA: not available detailed cause of death information

* Life expectancy for EU-15: females 83.49 (83.15, 83.67), males 78.57 (78.18, 78.75).

Table A1. Continue.

Homicide-contribution (LAC vs EU-15)		Homicide-contribution (over time)		Years with cause of death data		
Females	Males	Females	Males	starting year	ending year	missing year
0.16 (0.16, 0.16)	1.22 (1.21, 1.23)	-0.01 (-0.02, 0.00)	-0.01 (-0.03, 0.01)			
0.08 (0.06, 0.10)	0.19 (0.17, 0.23)	-0.01 (-0.05, 0.04)	0.00 (-0.07, 0.07)	2005	2014	
0.31 (0.27, 0.35)	2.02 (1.92, 2.13)	0.01 (-0.07, 0.10)	0.06 (-0.14, 0.26)	2005	2012	
0.32 (0.25, 0.43)	2.12 (1.94, 2.33)	0.10 (-0.07, 0.27)	0.50 (0.12, 0.89)	2005	2011	2005-14
0.10 (0.06, 0.16)	1.18 (1.07, 1.32)	-0.02 (-0.11, 0.08)	-0.12 (-0.36, 0.12)	2005	2014	2007-08
0.23 (0.15, 0.36)	1.42 (1.20, 1.68)	-0.02 (-0.21, 0.18)	-0.07 (-0.46, 0.32)	2005	2010	
0.07 (0.04, 0.11)	0.49 (0.42, 0.58)	0.00 (-0.07, 0.07)	-0.01 (-0.19, 0.17)	2005	2014	
0.42 (0.36, 0.49)	3.70 (3.53, 3.88)	0.05 (-0.08, 0.17)	0.05 (-0.25, 0.36)	2005	2013	
0.33 (0.29, 0.37)	2.25 (2.16, 2.35)	0.02 (-0.06, 0.10)	0.14 (-0.04, 0.32)	2005	2014	
1.75 (1.64, 1.86)	6.30 (6.07, 6.53)	-0.26 (-0.80, 0.70)	-0.19 (-0.85, 0.52)	2008	2013	
0.12 (0.11, 0.13)	0.89 (0.87, 0.91)	-0.05 (-0.07, -0.04)	-0.32 (-0.36, -0.28)	2005	2014	
0.10 (0.07, 0.14)	0.87 (0.79, 0.97)	0.04 (-0.04, 0.11)	0.26 (0.07, 0.45)	2005	2013	
0.10 (0.07, 0.16)	1.23 (1.11, 1.36)	-0.02 (-0.11, 0.08)	-0.16 (-0.41, 0.09)	2005	2014	
0.03 (0.02, 0.04)	0.21 (0.19, 0.22)	0.00 (-0.01, 0.02)	0.02 (-0.02, 0.05)	2005	2014	
0.14 (0.13, 0.14)	1.25 (1.23, 1.26)	-0.01 (-0.02, 0.01)	0.06 (0.03, 0.09)	2005	2014	2005-14
0.02 (0.01, 0.03)	0.13 (0.11, 0.15)	0.01 (-0.02, 0.04)	0.04 (-0.01, 0.09)	2005	2014	
0.23 (0.21, 0.24)	2.70 (2.65, 2.75)	0.02 (-0.02, 0.05)	0.22 (0.12, 0.31)	2005	2013	
0.11 (0.09, 0.13)	0.87 (0.82, 0.93)	0.04 (-0.02, 0.09)	0.23 (0.12, 0.35)	2005	2014	
0.13 (0.09, 0.17)	0.69 (0.62, 0.77)	0.06 (-0.02, 0.15)	0.43 (0.26, 0.60)	2005	2014	
0.12 (0.11, 0.14)	0.51 (0.48, 0.54)	0.05 (0.01, 0.09)	0.20 (0.13, 0.27)	2005	2014	
0.07 (0.04, 0.13)	0.26 (0.20, 0.35)	-0.01 (-0.10, 0.08)	-0.01 (-0.15, 0.13)	2005	2014	2011
0.23 (0.21, 0.25)	2.09 (2.04, 2.15)	-0.01 (-0.06, 0.03)	0.00 (-0.10, 0.10)	2005	2013	

Table A2. Life Expectancy in Latin America and the Caribbean and homicide-contribution to gap with EU-15 and over time from 2005-09 to 2010-14. Homicides data from IHME.

Region and Country	Life Expectancy 2005-09		Life Expectancy 2010-14	
	Females	Males	Females	Males
LATIN AMERICA AND THE CARIBBEAN	76.8 (76.3, 77.1)	70.0 (69.5, 70.4)	77.9 (77.5, 78.2)	71.2 (70.7, 71.6)
Caribbean (6 countries)				
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Dominican Republic	75.5 (75.0, 75.8)	69.2 (68.7, 69.6)	76.5 (76.0, 76.8)	70.2 (69.7, 70.6)
Haiti	62.3 (61.7, 62.7)	58.2 (57.6, 58.6)	64.4 (63.8, 64.8)	60.2 (59.6, 60.6)
Jamaica	76.8 (76.4, 77.1)	71.7 (71.2, 72.0)	77.9 (77.4, 78.2)	73.1 (72.6, 73.4)
Puerto Rico	81.8 (81.4, 82.0)	73.8 (73.4, 74.1)	83.2 (82.8, 83.4)	75.2 (74.8, 75.5)
Trinidad and Tobago	73.0 (72.5, 73.3)	65.8 (65.4, 66.2)	73.8 (73.4, 74.1)	66.9 (66.4, 67.2)
Central America (7 countries)				
Costa Rica	80.8 (80.4, 81.1)	76.1 (75.6, 76.4)	81.7 (81.3, 81.9)	76.7 (76.3, 77.0)
El Salvador	75.6 (75.2, 75.9)	66.4 (65.9, 66.8)	77.1 (76.6, 77.4)	67.9 (67.4, 68.3)
Guatemala	73.8 (73.3, 74.2)	66.7 (66.2, 67.2)	75.0 (74.5, 75.4)	67.9 (67.4, 68.4)
Honduras	74.5 (74.0, 74.9)	69.6 (69.0, 69.9)	75.4 (74.9, 75.8)	70.4 (69.9, 70.8)
Mexico	78.1 (77.7, 78.4)	73.3 (72.8, 73.7)	78.9 (78.5, 79.2)	74.0 (73.6, 74.4)
Nicaragua	75.8 (75.4, 76.2)	69.8 (69.2, 70.1)	77.5 (77.0, 77.8)	71.4 (70.9, 71.7)
Panama	79.4 (79.0, 79.7)	73.5 (73.0, 73.9)	80.5 (80.1, 80.8)	74.3 (73.8, 74.7)
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Bolivia (Plurinational State of)	67.3 (66.7, 67.7)	62.7 (62.1, 63.2)	70.2 (69.6, 70.6)	65.3 (64.7, 65.8)
Brazil	76.4 (76.0, 76.7)	68.8 (68.3, 69.1)	77.9 (77.4, 78.1)	70.3 (69.8, 70.6)
Chile	82.7 (82.3, 82.9)	76.4 (76.0, 76.7)	84.1 (83.7, 84.4)	78.1 (77.7, 78.4)
Colombia	76.6 (76.2, 76.9)	69.2 (68.7, 69.6)	77.4 (77.0, 77.7)	70.2 (69.7, 70.6)
Ecuador	77.5 (77.1, 77.9)	71.7 (71.2, 72.1)	78.4 (77.9, 78.7)	72.8 (72.3, 73.2)
Paraguay	73.9 (73.5, 74.3)	69.7 (69.2, 70.1)	74.9 (74.5, 75.3)	70.7 (70.2, 71.1)
Peru	75.9 (75.4, 76.2)	70.5 (70.0, 70.9)	76.8 (76.4, 77.2)	71.5 (71.1, 71.9)
Uruguay	79.7 (79.3, 80.0)	72.5 (72.1, 72.8)	80.4 (80.0, 80.7)	73.2 (72.8, 73.5)
Venezuela (Bolivarian Republic of)	77.7 (77.2, 78.0)	69.4 (68.9, 69.7)	78.2 (77.8, 78.5)	69.9 (69.5, 70.3)

Source: 1) Life expectancies from UN database, 2) homicides from IHME database

* Life expectancy for EU-15: females 83.49 (83.15, 83.67), males 78.57 (78.18, 78.75).

Table A2. Continue.

Homicide-contribution (LAC vs EU-15)		Homicide-contribution (over time)	
Females	Males	Females	Males
0.10 (0.08, 0.13)	0.24 (0.20, 0.28)	-0.03 (-0.08, 0.03)	-0.03 (-0.11, 0.05)
0.30 (0.26, 0.35)	1.53 (1.44, 1.63)	0.01 (-0.08, 0.09)	-0.25 (-0.41, -0.08)
0.12 (0.10, 0.15)	0.36 (0.32, 0.41)	-0.01 (-0.06, 0.03)	-0.03 (-0.10, 0.04)
0.42 (0.33, 0.54)	1.95 (1.76, 2.16)	0.26 (0.03, 0.50)	0.47 (0.08, 0.87)
0.16 (0.11, 0.23)	1.05 (0.93, 1.19)	-0.01 (-0.13, 0.11)	-0.05 (-0.29, 0.19)
0.44 (0.31, 0.63)	1.61 (1.37, 1.92)	-0.05 (-0.32, 0.23)	0.03 (-0.42, 0.49)
0.09 (0.06, 0.15)	0.55 (0.47, 0.64)	-0.01 (-0.09, 0.08)	-0.08 (-0.27, 0.11)
0.53 (0.46, 0.61)	3.76 (3.59, 3.95)	0.16 (0.01, 0.32)	0.43 (0.10, 0.75)
0.40 (0.35, 0.45)	2.12 (2.03, 2.22)	0.14 (0.04, 0.24)	0.77 (0.58, 0.97)
1.15 (1.05, 1.25)	2.64 (2.50, 2.79)	-0.37 (-0.54, -0.19)	-0.68 (-0.93, -0.42)
0.18 (0.17, 0.18)	0.99 (0.97, 1.01)	-0.06 (-0.08, -0.04)	-0.35 (-0.39, -0.31)
0.09 (0.06, 0.14)	0.72 (0.64, 0.81)	0.07 (-0.01, 0.16)	0.29 (0.11, 0.47)
0.15 (0.10, 0.22)	1.54 (1.41, 1.70)	0.04 (-0.09, 0.16)	-0.32 (-0.60, -0.04)
0.08 (0.07, 0.09)	0.33 (0.31, 0.35)	-0.01 (-0.03, 0.01)	-0.03 (-0.07, 0.01)
0.18 (0.14, 0.22)	0.59 (0.54, 0.65)	-0.03 (-0.09, 0.04)	-0.10 (-0.20, 0.00)
0.20 (0.19, 0.21)	1.60 (1.58, 1.62)	0.01 (-0.01, 0.02)	0.08 (0.04, 0.12)
0.03 (0.02, 0.05)	0.23 (0.20, 0.26)	0.00 (-0.03, 0.04)	0.02 (-0.04, 0.09)
0.34 (0.32, 0.36)	3.07 (3.02, 3.13)	0.08 (0.04, 0.13)	0.09 (-0.02, 0.19)
0.15 (0.13, 0.18)	0.96 (0.90, 1.02)	0.05 (-0.02, 0.11)	0.35 (0.22, 0.47)
0.15 (0.12, 0.20)	0.68 (0.61, 0.77)	0.05 (-0.04, 0.14)	0.22 (0.06, 0.38)
0.07 (0.06, 0.09)	0.23 (0.21, 0.25)	0.00 (-0.03, 0.03)	0.01 (-0.03, 0.06)
0.08 (0.05, 0.14)	0.29 (0.22, 0.38)	-0.01 (-0.10, 0.09)	-0.07 (-0.21, 0.08)
0.21 (0.19, 0.23)	2.63 (2.57, 2.70)	0.08 (0.03, 0.13)	-0.08 (-0.20, 0.04)

List of Figures in the Appendix

Figure A: Map of homicide rates in Latin America and the Caribbean countries in 2012 (or latest).

Figure Aa: Homicide rates and counts of women in Latin America and the Caribbean countries from 2010 to 2014, by life expectancy.

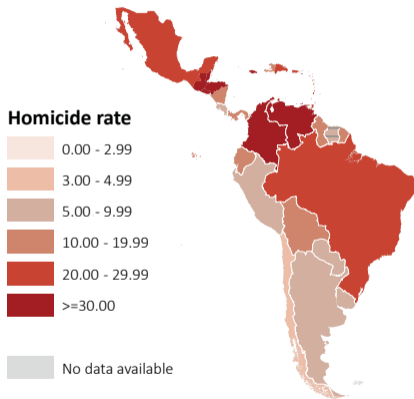
Figure Ab: Homicide rates and counts of men in Latin America and the Caribbean countries from 2010 to 2014, by life expectancy.

Figure A1: Life expectancy in Latin America and the Caribbean countries, and the average EU-15 from 1990 to 2014 by sex and level of life expectancy. Years of 2000-2004 and 2005-2009 highlighted.

Figure A2: Homicide contribution to the gap in life expectancy between Latin America and the Caribbean countries and EU-15 for women and men, 2010-2014.

Figure A3: Latin America and the Caribbean homicide contribution to the change in life expectancy between 2005-2009 to 2010-2014 for women and men, by life expectancy group.

Figure A. Homicide rates in Latin America and the Caribbean countries in 2012 (or latest)



Source: Adapted from UNODC Handbook on homicide (2014)

Figure Aa. Life expectancy by homicide rate per 100,000 in Latin America and the Caribbean, males.

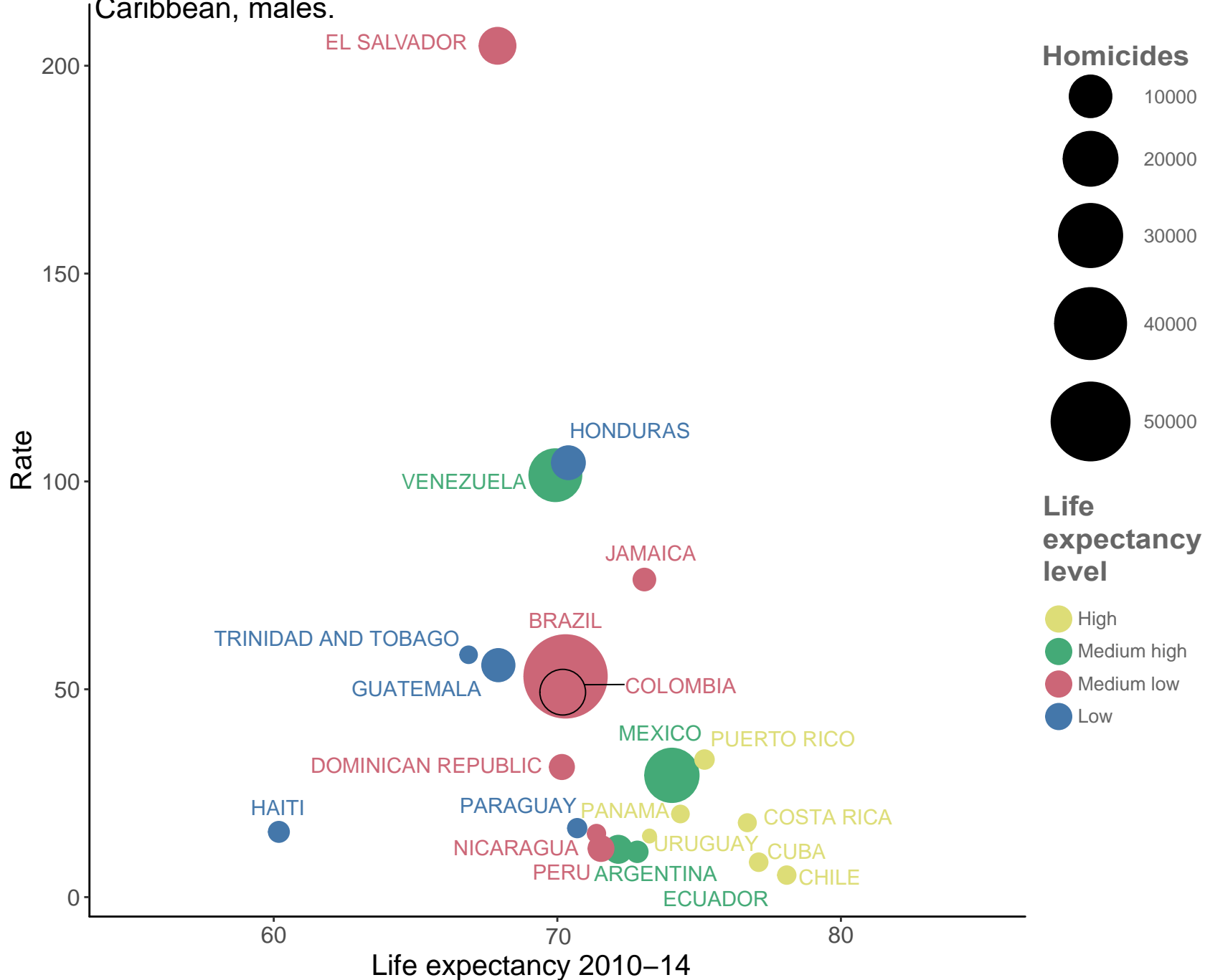


Figure Ab. Life expectancy by homicide rate per 100,000 in Latin America and the Caribbean, females.

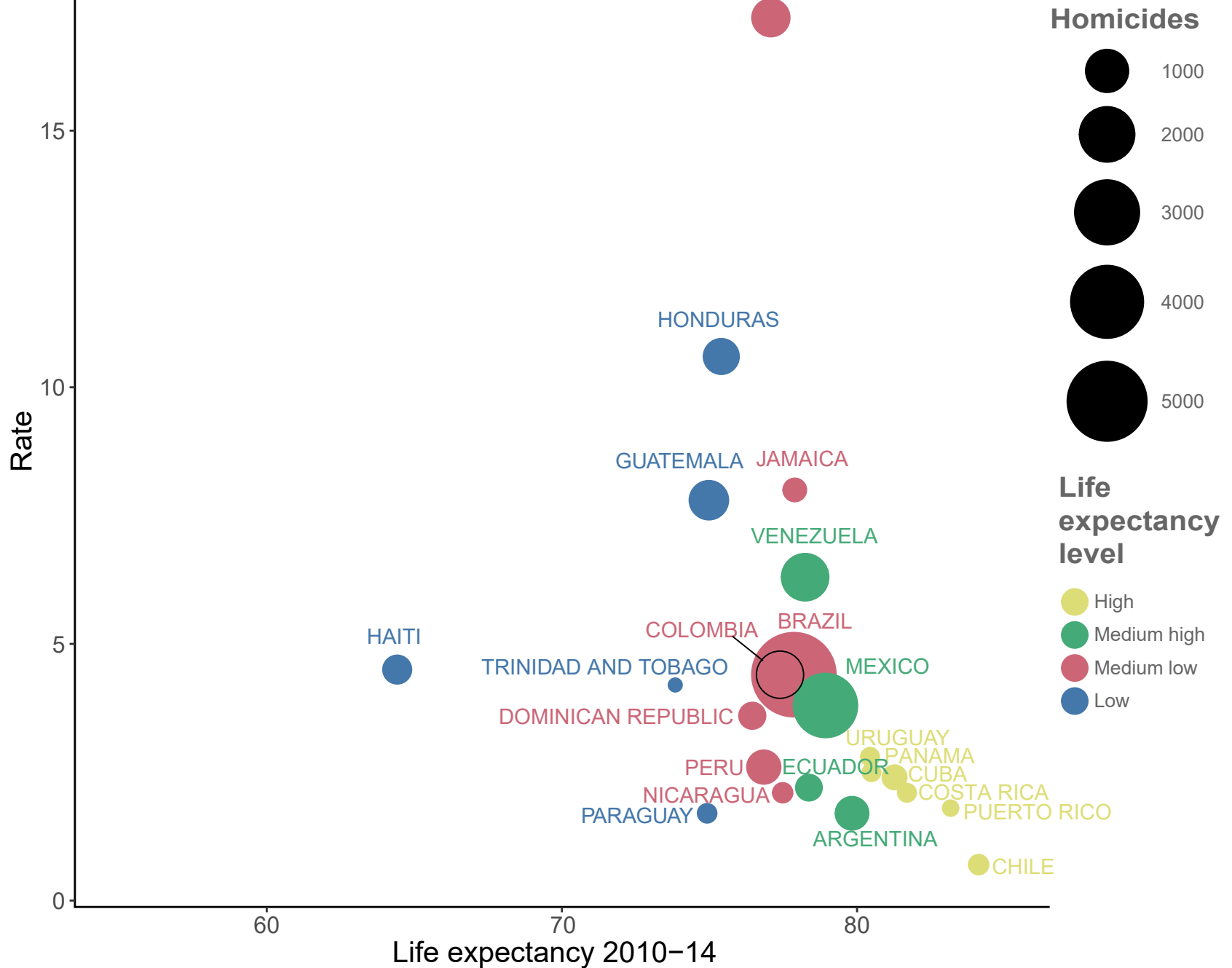


Figure A1: Life expectancy in Latin America and the Caribbean countries, and the average EU-15 from 1990 to 2014 by sex and level of life expectancy. Years of 2000-2004 and 2005-2009 highlighted.

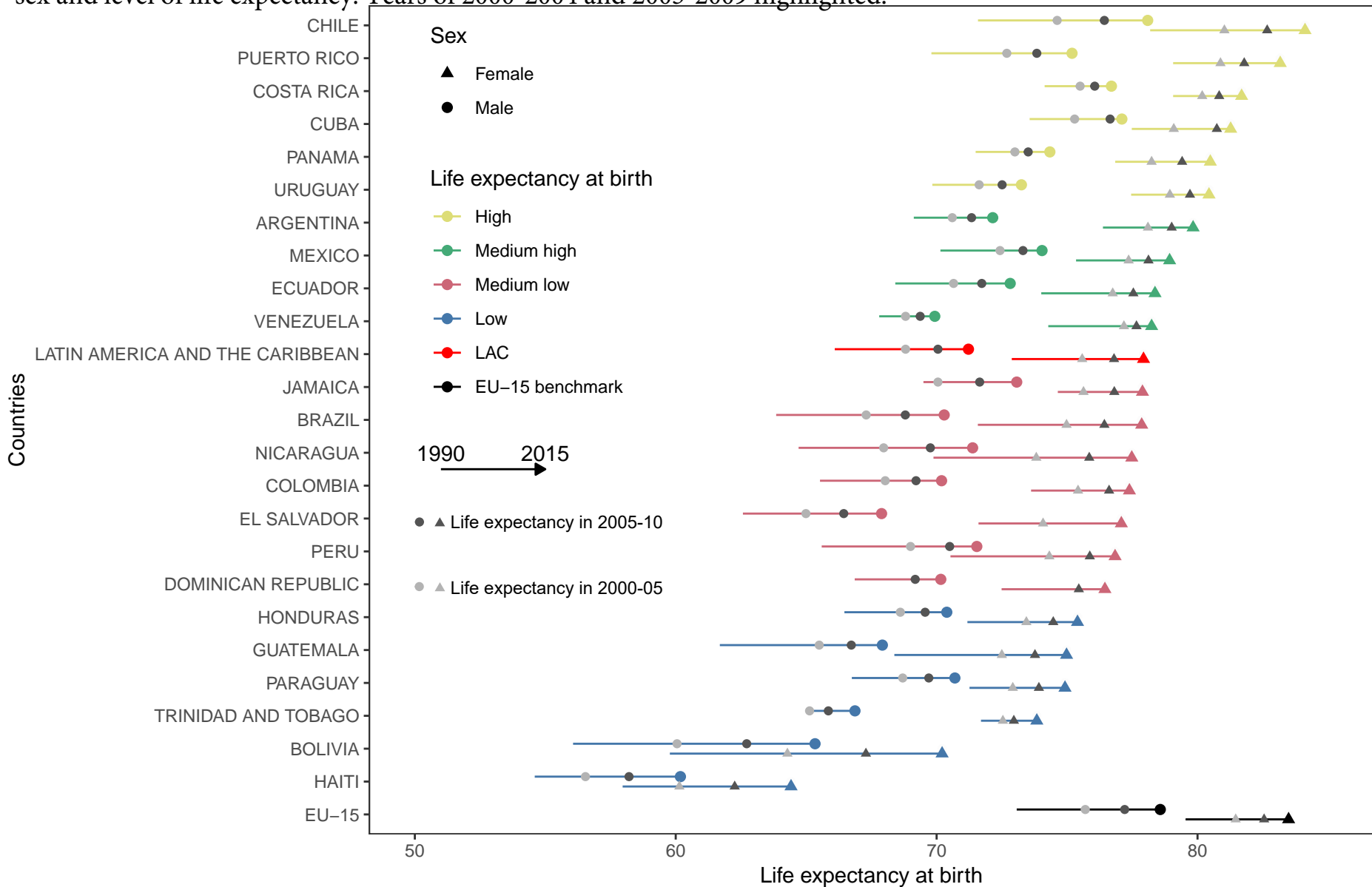


Figure A2. Life expectancy in Latin American and Caribbean countries and homicide contribution to the difference against EU-15 in 2010–2014

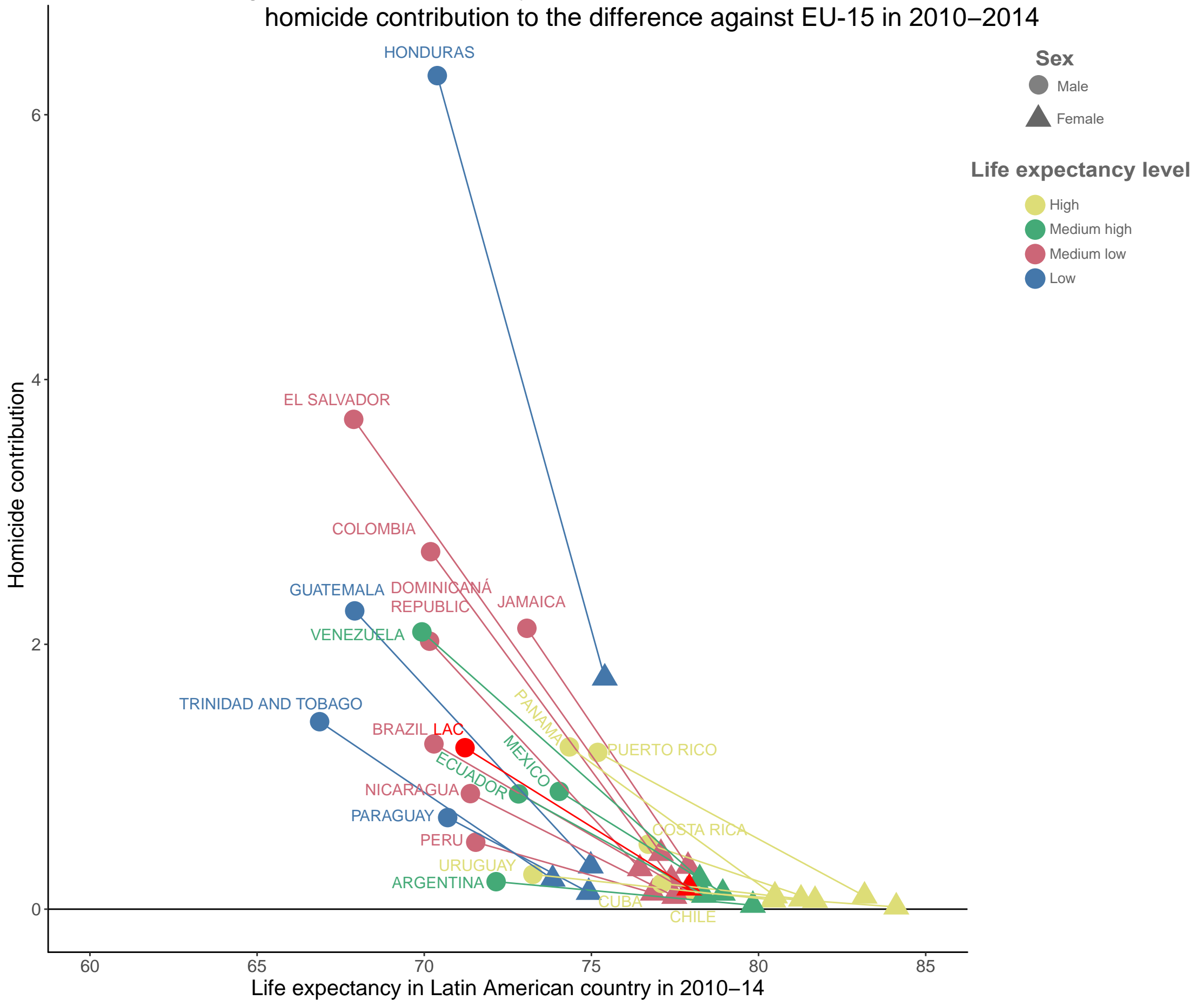


Figure A3. Life expectancy in 2010–14 and homicide contribution to the change between 2005–09 and 2010–2014 in Latin America and the Caribbean

