

# Mortality Data at a Glance: [www.mortalitytrends.org](http://www.mortalitytrends.org)

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## **Summary**

A web application has been developed for visualization, comparison and dissemination of national mortality data: [www.mortalitytrends.org](http://www.mortalitytrends.org). The website provides access to the complete annual life tables for about 200 individual countries or areas together with the frequently requested indicators such as infant mortality rates, adult mortality rates, life expectancies at birth among others. The life tables are either compiled from various sources or computed from available empirical data by the standard demographic methods. Exploring and comparison of mortality trends between countries is facilitated by online interactive plots.

## **Country Pages**

A country page provides access to a country-specific data, plots of mortality indicators and links to the 2-way comparisons of various mortality quantities between the current country and other countries at this website. This is an example of a country page for United States (<http://www.mortalitytrends.org/data/usa/>):

## United States

[Documentation](#) [Sources](#) [Contributors](#) [Citation](#)

### Mortality Statistics

Years = 1933-2010

Period indicators				
Life expectancy at birth	<a href="#">Males</a>	<a href="#">Females</a>	<a href="#">Total</a>	$e_0$
Life expectancy at selected ages, Total	<a href="#">10</a>	<a href="#">65</a>	<a href="#">80</a>	$e_x$
Life expectancy at selected ages, Males	<a href="#">10</a>	<a href="#">65</a>	<a href="#">80</a>	$e_x$
Life expectancy at selected ages, Females	<a href="#">10</a>	<a href="#">65</a>	<a href="#">80</a>	$e_x$
Sex difference in life expectancy	<a href="#">0</a>	<a href="#">10</a>	<a href="#">65</a>	$e_{x,f} - e_{x,m}$
Infant mortality rate	<a href="#">Males</a>	<a href="#">Females</a>	<a href="#">Total</a>	$1q_0 \times 1000$
Child mortality between ages 1-5	<a href="#">Males</a>	<a href="#">Females</a>	<a href="#">Total</a>	$4q_1 \times 1000$
Under-five mortality	<a href="#">Males</a>	<a href="#">Females</a>	<a href="#">Total</a>	$5q_0 \times 1000$
Adult mortality	<a href="#">Males</a>	<a href="#">Females</a>	<a href="#">Total</a>	$45q_{15} \times 1000$

### Life Tables

Complete life tables for single calendar years	<a href="#">Males</a>	<a href="#">Females</a>	<a href="#">Total</a>
Abridged life tables for 5-year periods	<a href="#">Males</a>	<a href="#">Females</a>	<a href="#">Total</a>

### Plots

Life expectancy at birth	<a href="#">Plot</a>
Time trends in death rates	<a href="#">Plot</a>
Age-specific schedules of death rates	<a href="#">Plot</a>
Lexis maps of death rates	<a href="#">Males</a> <a href="#">Females</a>
Lexis map of sex ratio of death rates	<a href="#">Plot</a>

### Comparisons with external estimates

Life expectancy, Males	<a href="#">At birth</a>	<a href="#">65</a>	<a href="#">80</a>	<a href="#">100</a>
Life expectancy, Females	<a href="#">At birth</a>	<a href="#">65</a>	<a href="#">80</a>	<a href="#">100</a>
Infant mortality rate	<a href="#">Males</a>	<a href="#">Females</a>	<a href="#">Total</a>	
Under-five mortality	<a href="#">Males</a>	<a href="#">Females</a>	<a href="#">Total</a>	
Adult mortality	<a href="#">Males</a>	<a href="#">Females</a>		

### Comparison Reports

#### Africa

<a href="#">Algeria</a>	<a href="#">Angola</a>	<a href="#">Benin</a>	<a href="#">Botswana</a>	<a href="#">Burkina Faso</a>	<a href="#">Burundi</a>
<a href="#">Cameroon</a>	<a href="#">Cape Verde</a>	<a href="#">Central African Rep.</a>	<a href="#">Chad</a>	<a href="#">Comoros</a>	<a href="#">Congo</a>
<a href="#">Côte d'Ivoire</a>	<a href="#">Dem. Rep. of the Congo</a>	<a href="#">Djibouti</a>	<a href="#">Egypt</a>	<a href="#">Equatorial Guinea</a>	<a href="#">Eritrea</a>
<a href="#">Ethiopia</a>	<a href="#">Gabon</a>	<a href="#">Gambia</a>	<a href="#">Ghana</a>	<a href="#">Guinea</a>	<a href="#">Guinea-Bissau</a>
<a href="#">Kenya</a>	<a href="#">Lesotho</a>	<a href="#">Liberia</a>	<a href="#">Libya</a>	<a href="#">Madagascar</a>	<a href="#">Malawi</a>
<a href="#">Mali</a>	<a href="#">Mauritania</a>	<a href="#">Mauritius</a>	<a href="#">Mayotte</a>	<a href="#">Morocco</a>	<a href="#">Mozambique</a>

## Period indicators

A section on period indicators provides access to frequently requested mortality quantities:

Period indicators				
Life expectancy at birth	<a href="#">Males</a>	<a href="#">Females</a>	<a href="#">Total</a>	$e_0$
Life expectancy at selected ages, Total	<a href="#">10</a>	<a href="#">65</a>	<a href="#">80</a>	$e_x$
Life expectancy at selected ages, Males	<a href="#">10</a>	<a href="#">65</a>	<a href="#">80</a>	$e_x$
Life expectancy at selected ages, Females	<a href="#">10</a>	<a href="#">65</a>	<a href="#">80</a>	$e_x$
Sex difference in life expectancy	<a href="#">0</a>	<a href="#">10</a>	<a href="#">65</a>	$e_{x,f} - e_{x,m}$
Infant mortality rate	<a href="#">Males</a>	<a href="#">Females</a>	<a href="#">Total</a>	$1q_0 \times 1000$
Child mortality between ages 1-5	<a href="#">Males</a>	<a href="#">Females</a>	<a href="#">Total</a>	$4q_1 \times 1000$
Under-five mortality	<a href="#">Males</a>	<a href="#">Females</a>	<a href="#">Total</a>	$5q_0 \times 1000$
Adult mortality	<a href="#">Males</a>	<a href="#">Females</a>	<a href="#">Total</a>	$45q_{15} \times 1000$

The mortality indicators are derived from complete period life tables and thus completely internally consistent.

## Complete life tables for single calendar years

For each country complete period life tables for single calendar years, ages from 0 to 110, and by sex are included in the section “Life Tables”:

Life Tables			
Complete life tables for single calendar years	<a href="#">Males</a>	<a href="#">Females</a>	<a href="#">Total</a>
Abridged life tables for 5-year periods	<a href="#">Males</a>	<a href="#">Females</a>	<a href="#">Total</a>

The life table dataset includes standard columns e.g.

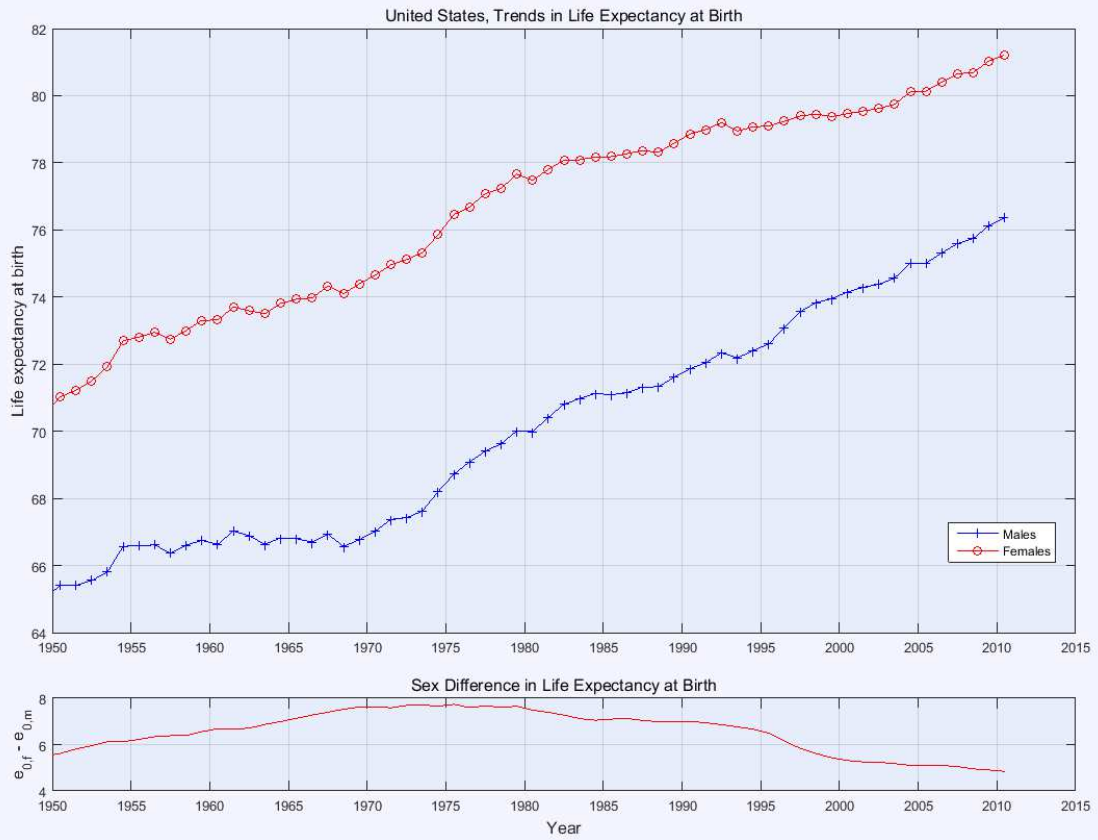
United States, Complete life tables, Males									
year	age	mx	ax	qx	lx	dx	Lx	Tx	ex
1933	0	0.068593	0.229100	0.065149	100000.00	6514.85	94977.73	5916977.72	59.1698
1933	1	0.010039	0.500000	0.009989	93485.15	933.79	93018.25	5821999.99	62.2773
1933	2	0.004671	0.500000	0.004660	92551.36	431.26	92335.73	5728981.74	61.9006
1933	3	0.003333	0.500000	0.003327	92120.10	306.50	91966.85	5636646.01	61.1880
1933	4	0.002537	0.500000	0.002533	91813.60	232.60	91697.29	5544679.16	60.3906
1933	5	0.002092	0.500000	0.002090	91580.99	191.38	91485.30	5452981.86	59.5427
1933	6	0.001898	0.500000	0.001896	91389.61	173.29	91302.97	5361496.56	58.6664
1933	7	0.001744	0.500000	0.001743	91216.32	158.99	91136.83	5270193.60	57.7769
1933	8	0.001614	0.500000	0.001612	91057.33	146.81	90983.93	5179056.77	56.8769
1933	9	0.001510	0.500000	0.001509	90910.53	137.21	90841.92	5088072.84	55.9679
1933	10	0.001436	0.500000	0.001435	90773.32	130.22	90708.21	4997230.92	55.0518
1933	11	0.001408	0.500000	0.001407	90643.10	127.55	90579.32	4906522.71	54.1301
1933	12	0.001457	0.500000	0.001456	90515.54	131.82	90449.64	4815943.39	53.2057
1933	13	0.001584	0.500000	0.001583	90383.73	143.06	90312.20	4725493.76	52.2826
1933	14	0.001774	0.500000	0.001773	90240.67	159.96	90160.69	4635181.56	51.3647
1933	15	0.002013	0.500000	0.002011	90080.71	181.16	89990.13	4545020.87	50.4550
1933	16	0.002254	0.500000	0.002251	89899.55	202.36	89798.37	4455030.74	49.5557
1933	17	0.002484	0.500000	0.002480	89697.19	222.49	89585.95	4365232.37	48.6663
1933	18	0.002708	0.500000	0.002705	89474.70	241.99	89353.71	4275646.42	47.7861
1933	19	0.002932	0.500000	0.002928	89232.71	261.23	89102.09	4186292.72	46.9143
1933	20	0.003151	0.500000	0.003146	88971.48	279.89	88831.53	4097190.62	46.0506
1933	21	0.003343	0.500000	0.003337	88691.59	296.00	88543.59	4008359.09	45.1944
1933	22	0.003501	0.500000	0.003495	88395.59	308.93	88241.12	3919815.50	44.3440
1933	23	0.003619	0.500000	0.003613	88086.66	318.25	87927.53	3831574.38	43.4978

and abridged life tables are derived from the complete ones.

## Plots

The section “Plots” provides access to common plots of mortality indicators.

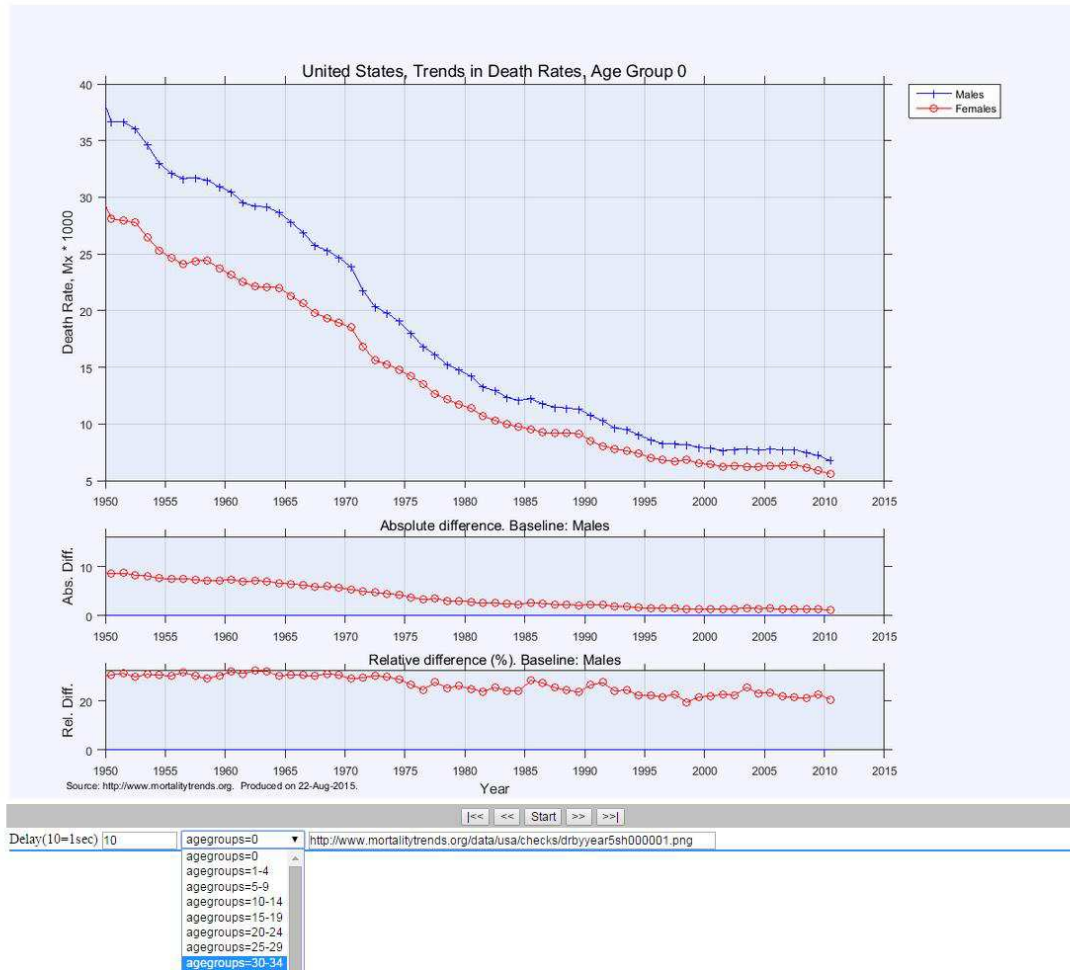
**Plot of trends in life expectancy at birth:**



Source: <http://www.mortalitytrends.org>. Produced on 22-Aug-2015.

The series “Males” and “Females” show trends in life expectancy at birth from the complete period life tables. The lower panel shows trends in sex difference in life expectancy at birth, “Males” – “Females”.

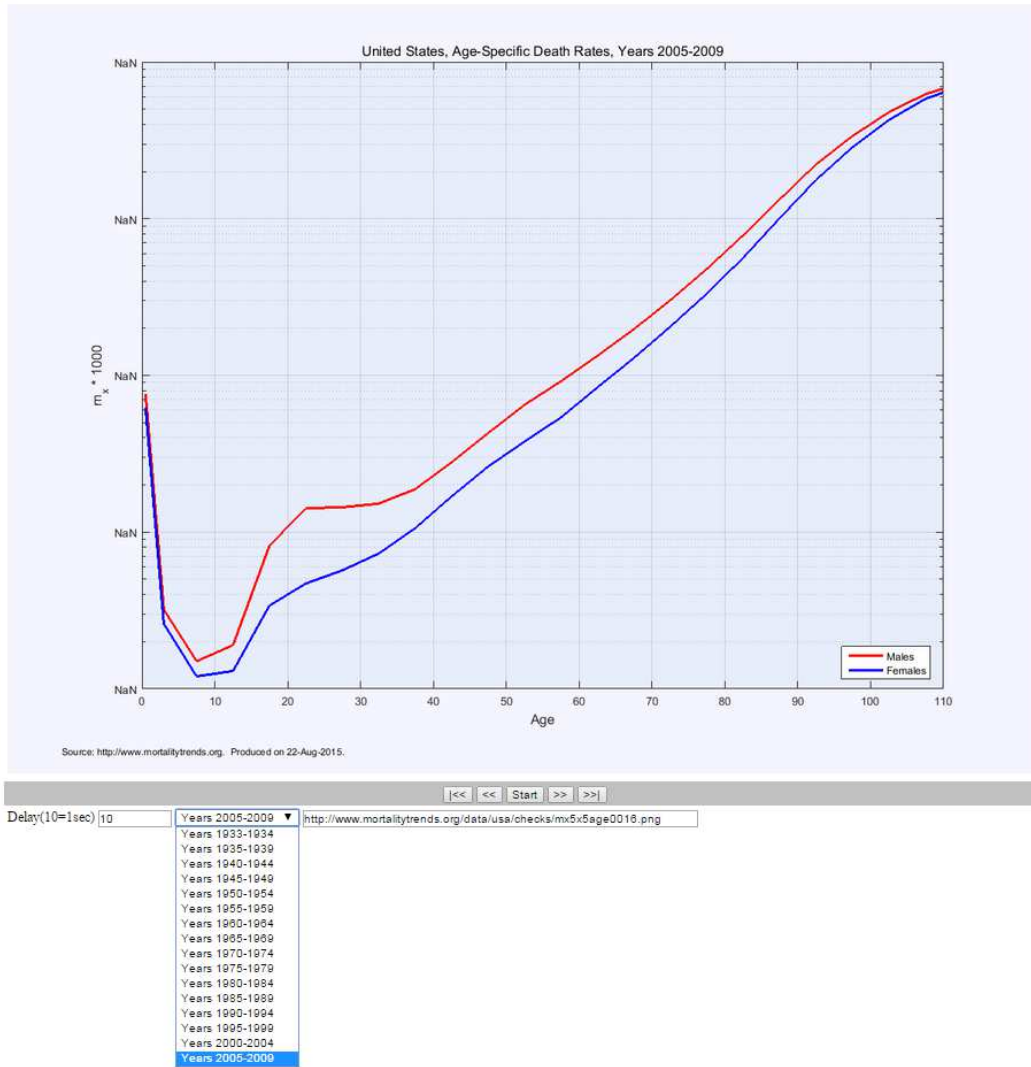
**Plots of trends in age-specific death rates:**



Plots of trends in age-specific death rates are organized in a slide show to simplify cycling through the age groups. They are available for 5-year age groups and for ages 0, 1-4, 5-9, ... 100+. The two low panels show absolute and relative (%) sex differences.

### Plots of age-specific death rates

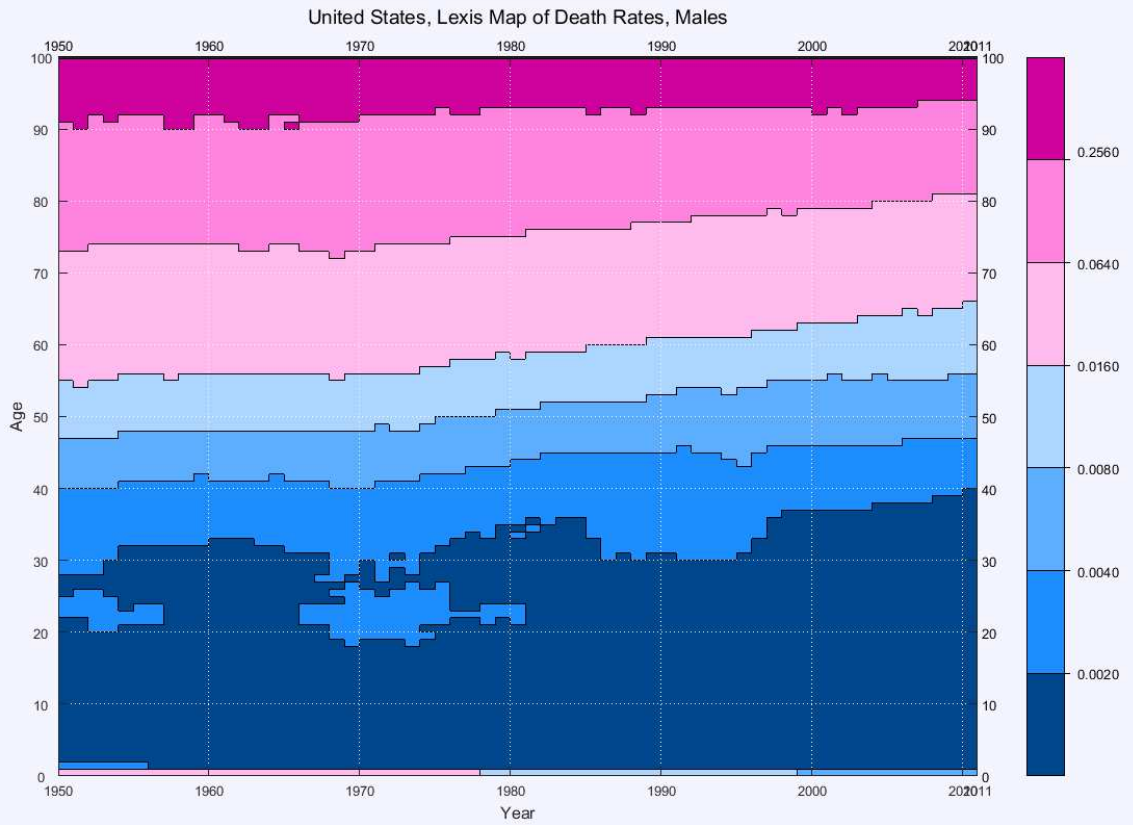
This set of plots presents age-specific schedules of death rates for quinquennial periods:



The plots are also organized in a slide show for an easy navigation.

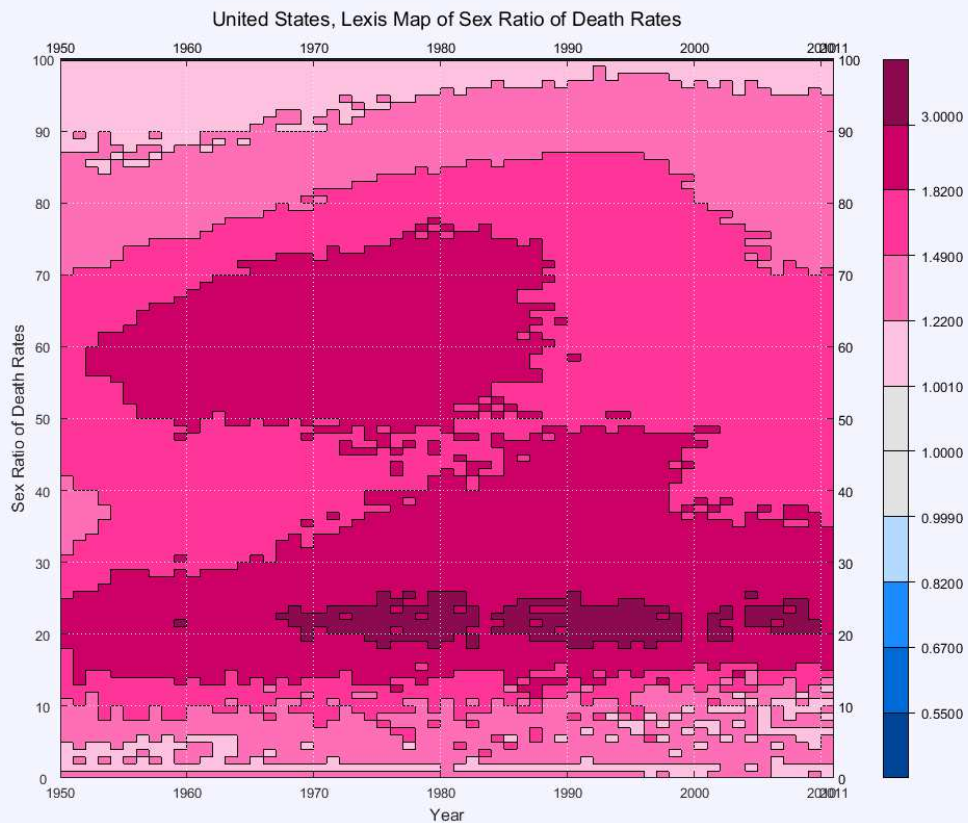
### Lexis maps of death rates and sex ratios of death rates

As discussed by Vaupel *et al.* (1997) a Lexis map display provides a device for picturing an array of demographic data in an intelligible and graphically striking way. For a given country, three Lexis maps are included: death rates over age and time, for males and females,



Source: <http://www.mortalitytrends.org>. Produced on 22-Aug-2015.

and sex ratios of death rates:



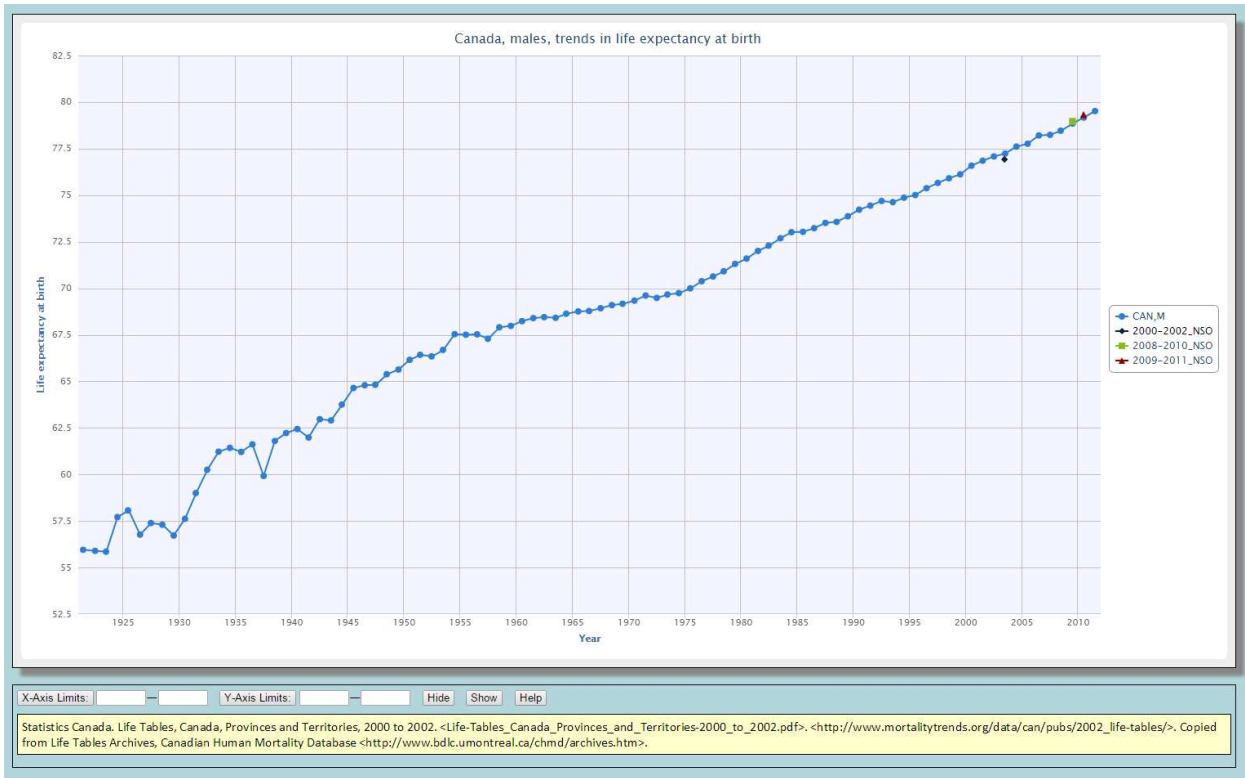
Source: <http://www.mortalitytrends.org>. Produced on 22-Aug-2015.

See Vaupel *et al.* (1997) for further information on use of Lexis maps in population research.

### Section “Comparisons with external estimates”

In this section, plots of mortality indicators from the complete life tables are contrasted with the mortality indicators from external sources. For countries with mortality statistics based on vital registration, the external mortality estimates are available typically from official life tables. For example, in this figure, a snapshot of an interactive plot, trends in Canadian life expectancy at birth plotted together with estimates of life expectancy at birth from the national Canadian life tables:





The yellow note box at the bottom provides reference information about the external mortality data. If the life tables are from a secondary source, it is included in the reference as well<sup>1</sup>.

## Two-way comparison reports

A two-way comparison report provides a quick and easy way to compare trends in mortality indicators between two countries. To compare, for example, mortality in United States and Canada, one needs to click the link [Canada](#) at the page for the United States:

<sup>1</sup> For Canada a bulk of national life tables have been compiled and made available via Canadian Human Mortality Database (<http://www.bdc.umontreal.ca/chmd/index.htm>) by Robert Bourbeau and Nadine Ouellette.

www.mortalitytrends.org/data/usa/

Adult mortality Males Females

### Comparison Reports

**Africa**

<a href="#">Algeria</a>	<a href="#">Angola</a>	<a href="#">Benin</a>	<a href="#">Botswana</a>	<a href="#">Burkina Faso</a>	<a href="#">Burundi</a>
<a href="#">Cameroon</a>	<a href="#">Cape Verde</a>	<a href="#">Central African Rep.</a>	<a href="#">Chad</a>	<a href="#">Comoros</a>	<a href="#">Congo</a>
<a href="#">Côte d'Ivoire</a>	<a href="#">Dem. Rep. of the Congo</a>	<a href="#">Djibouti</a>	<a href="#">Egypt</a>	<a href="#">Equatorial Guinea</a>	<a href="#">Eritrea</a>
<a href="#">Ethiopia</a>	<a href="#">Gabon</a>	<a href="#">Gambia</a>	<a href="#">Ghana</a>	<a href="#">Guinea</a>	<a href="#">Guinea-Bissau</a>
<a href="#">Kenya</a>	<a href="#">Lesotho</a>	<a href="#">Liberia</a>	<a href="#">Libya</a>	<a href="#">Madagascar</a>	<a href="#">Malawi</a>
<a href="#">Mali</a>	<a href="#">Mauritania</a>	<a href="#">Mauritius</a>	<a href="#">Mayotte</a>	<a href="#">Morocco</a>	<a href="#">Mozambique</a>
<a href="#">Namibia</a>	<a href="#">Niger</a>	<a href="#">Nigeria</a>	<a href="#">Rwanda</a>	<a href="#">Réunion</a>	<a href="#">Sao Tome and Princip</a>
<a href="#">Senegal</a>	<a href="#">Seychelles</a>	<a href="#">Sierra Leone</a>	<a href="#">Somalia</a>	<a href="#">South Africa</a>	<a href="#">South Sudan</a>
<a href="#">Sudan</a>	<a href="#">Swaziland</a>	<a href="#">Tanzania</a>	<a href="#">Togo</a>	<a href="#">Tunisia</a>	<a href="#">Uganda</a>
<a href="#">Western Sahara</a>	<a href="#">Zambia</a>	<a href="#">Zimbabwe</a>			

**Asia**

<a href="#">Afghanistan</a>	<a href="#">Armenia</a>	<a href="#">Azerbaijan</a>	<a href="#">Bahrain</a>	<a href="#">Bangladesh</a>	<a href="#">Bhutan</a>
<a href="#">Brunei Darussalam</a>	<a href="#">Cambodia</a>	<a href="#">China</a>	<a href="#">Cyprus</a>	<a href="#">Georgia</a>	<a href="#">Hong Kong</a>
<a href="#">India</a>	<a href="#">Indonesia</a>	<a href="#">Iran</a>	<a href="#">Iraq</a>	<a href="#">Israel</a>	<a href="#">Japan</a>
<a href="#">Jordan</a>	<a href="#">Kazakhstan</a>	<a href="#">Kuwait</a>	<a href="#">Kyrgyzstan</a>	<a href="#">Laos</a>	<a href="#">Lebanon</a>
<a href="#">Macao</a>	<a href="#">Malaysia</a>	<a href="#">Maldives</a>	<a href="#">Mongolia</a>	<a href="#">Myanmar</a>	<a href="#">Nepal</a>
<a href="#">North Korea</a>	<a href="#">Oman</a>	<a href="#">Pakistan</a>	<a href="#">Palestine</a>	<a href="#">Philippines</a>	<a href="#">Qatar</a>
<a href="#">Saudi Arabia</a>	<a href="#">Singapore</a>	<a href="#">South Korea</a>	<a href="#">Sri Lanka</a>	<a href="#">Syria</a>	<a href="#">Taiwan</a>
<a href="#">Tajikistan</a>	<a href="#">Thailand</a>	<a href="#">Timor-Leste</a>	<a href="#">Turkey</a>	<a href="#">Turkmenistan</a>	<a href="#">United Arab Emirates</a>
<a href="#">Uzbekistan</a>	<a href="#">Viet Nam</a>	<a href="#">Yemen</a>			

**Europe**

<a href="#">Albania</a>	<a href="#">Austria</a>	<a href="#">Belarus</a>	<a href="#">Belgium</a>	<a href="#">Bosnia and Herzegovina</a>	<a href="#">Bulgaria</a>
<a href="#">Channel Islands</a>	<a href="#">Croatia</a>	<a href="#">Czech Rep.</a>	<a href="#">Denmark</a>	<a href="#">Estonia</a>	<a href="#">Finland</a>
<a href="#">France</a>	<a href="#">Germany</a>	<a href="#">Greece</a>	<a href="#">Hungary</a>	<a href="#">Iceland</a>	<a href="#">Ireland</a>
<a href="#">Italy</a>	<a href="#">Latvia</a>	<a href="#">Lithuania</a>	<a href="#">Luxembourg</a>	<a href="#">Macedonia</a>	<a href="#">Malta</a>
<a href="#">Moldova</a>	<a href="#">Montenegro</a>	<a href="#">Netherlands</a>	<a href="#">Norway</a>	<a href="#">Poland</a>	<a href="#">Portugal</a>
<a href="#">Romania</a>	<a href="#">Russia</a>	<a href="#">Serbia</a>	<a href="#">Slovakia</a>	<a href="#">Slovenia</a>	<a href="#">Spain</a>
<a href="#">Sweden</a>	<a href="#">Switzerland</a>	<a href="#">Ukraine</a>	<a href="#">United Kingdom</a>		

**Latin America and the Caribbean**

<a href="#">Antigua and Barbuda</a>	<a href="#">Argentina</a>	<a href="#">Aruba</a>	<a href="#">Bahamas</a>	<a href="#">Barbados</a>	<a href="#">Belize</a>
<a href="#">Bolivia</a>	<a href="#">Brazil</a>	<a href="#">Chile</a>	<a href="#">Colombia</a>	<a href="#">Costa Rica</a>	<a href="#">Cuba</a>
<a href="#">Curaçao</a>	<a href="#">Dominican Rep.</a>	<a href="#">Ecuador</a>	<a href="#">El Salvador</a>	<a href="#">French Guiana</a>	<a href="#">Grenada</a>
<a href="#">Guadeloupe</a>	<a href="#">Guatemala</a>	<a href="#">Guyana</a>	<a href="#">Haiti</a>	<a href="#">Honduras</a>	<a href="#">Jamaica</a>
<a href="#">Martinique</a>	<a href="#">Mexico</a>	<a href="#">Nicaragua</a>	<a href="#">Panama</a>	<a href="#">Paraguay</a>	<a href="#">Peru</a>
<a href="#">Puerto Rico</a>	<a href="#">Saint Lucia</a>	<a href="#">St. Vincent</a>	<a href="#">Suriname</a>	<a href="#">Trinidad and Tobago</a>	<a href="#">U.S. Virgin Islands</a>
<a href="#">Uruguay</a>	<a href="#">Venezuela</a>				

**Northern America**

<a href="#">Canada</a>	<a href="#">United States</a>				
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**Oceania**

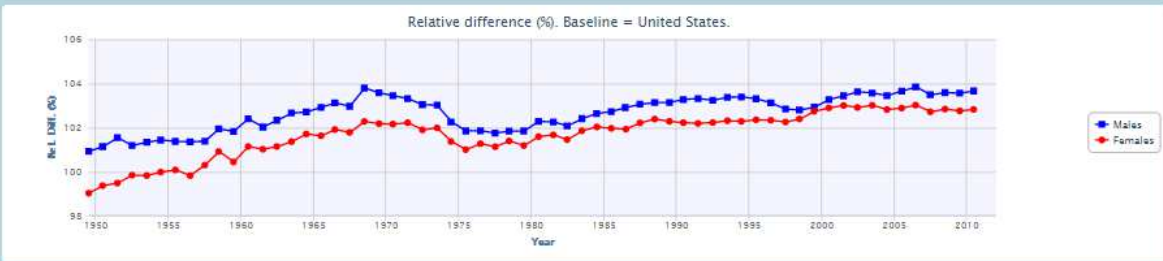
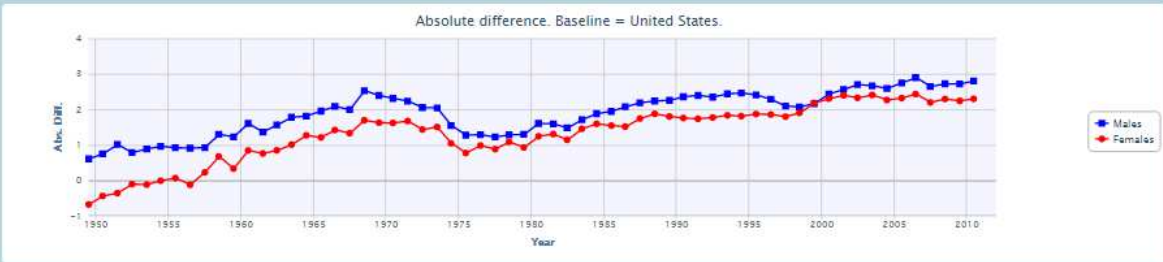
<a href="#">Australia</a>	<a href="#">Fiji</a>	<a href="#">French Polynesia</a>	<a href="#">Guam</a>	<a href="#">Kiribati</a>	<a href="#">Micronesia</a>
<a href="#">New Caledonia</a>	<a href="#">New Zealand</a>	<a href="#">Papua New Guinea</a>	<a href="#">Samoa</a>	<a href="#">Solomon Islands</a>	<a href="#">Tonga</a>
<a href="#">Vanuatu</a>					

A new web page with access to the interactive comparative plots will open. Currently, the following plots are available:

Comparison Report: United States vs. Canada

Period indicators	
Life expectancy	At birth 65 80
Time trends in death rates, 5-year age groups (5x1)	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 75-79 80-84 85-89 90-94 95-99 100+
Lexis map of ratios of death rates	Males Females

Here is an example of a plot for comparison of trends in life expectancy at birth:



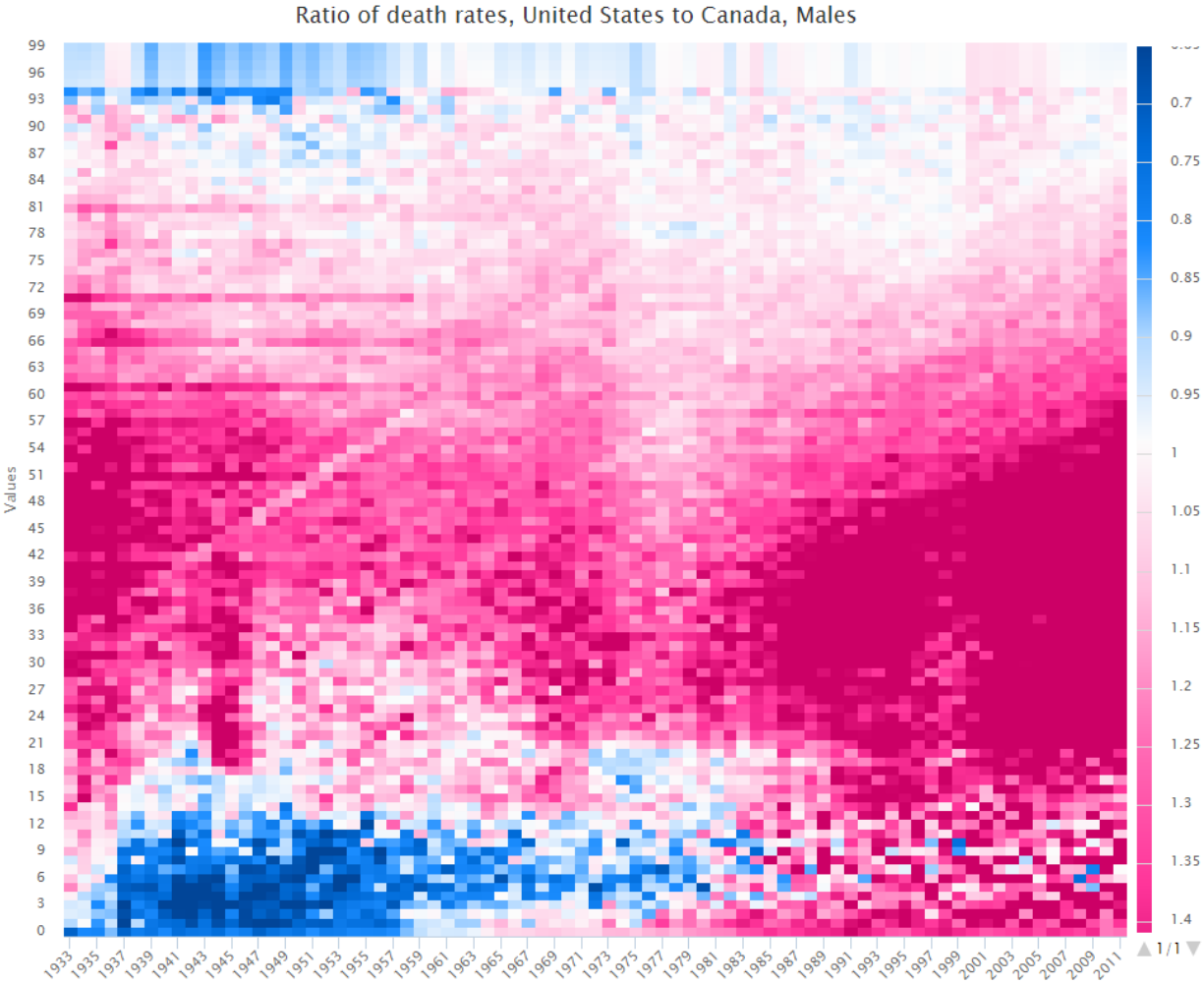
X-Axis Limits:  —  (1921.5 - 2011.5)

The upper panel shows the trends in life expectancy at birth for two countries and by sex. The lower two panels display differences, absolute and relative, between the series in the upper panel. X-axis limits can be changed with a control at the bottom of the page:

X-Axis Limits:  —  (1921.5 - 2011.5)

The control also displays complete range of years available for each mortality indicator (for the current country).

In addition to the trends in mortality indicators, the comparison report provides interactive Lexis maps of ratios of death rates by sex. This map, for example, shows ratio of death rates in the United States to that in Canada, Males:



The ratios above one are painted in magenta hues, the darker is hue the higher is value of a ratio, and the ratios below one are depicted in blue hues, again the lower is ratio the darker is the color. The magenta areas in this plot highlight years and ages with death rates in the United States are higher than in Canada. Similarly, the blue areas are years and ages with excess of Canadian male mortality. In both cases the lightness of color communicates value of ratios of death rates. As with any interactive plot, a

value of a ratio of death rates for given year and age is available via a tooltip. For more information on Lexis maps and color schemes used, see Vaupel *et al.* (1997) and Cleveland (1994).

### **Concluding Remarks**

As with any computer application the web application presented here is a work in progress. Some features may be removed and some features may be added over time. Please, visit the website for the most up-to-date information. Any requests for collaboration on this project or funding support are welcome.

### **References**

Cleveland, William S. *The Elements of Graphing Data*. Hobart Press, Summit, New Jersey; 1994; ISBN: 0-9634884.

James W. Vaupel, Wang Zhenglian, Kirill F. Andreev, and Anatoli I. Yashin. *Population Data at a Glance: Shaded Contour Maps of Demographic Surfaces over Age and Time*. Odense Monographs on Population Aging 4. University Press of Southern Denmark, Odense, DK, 1997. Available online at <http://www.demogr.mpg.de/Papers/Books/Monograph4/PopData1.htm>.