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Quality of mortality data in developed countries

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International seminar Demography and Health

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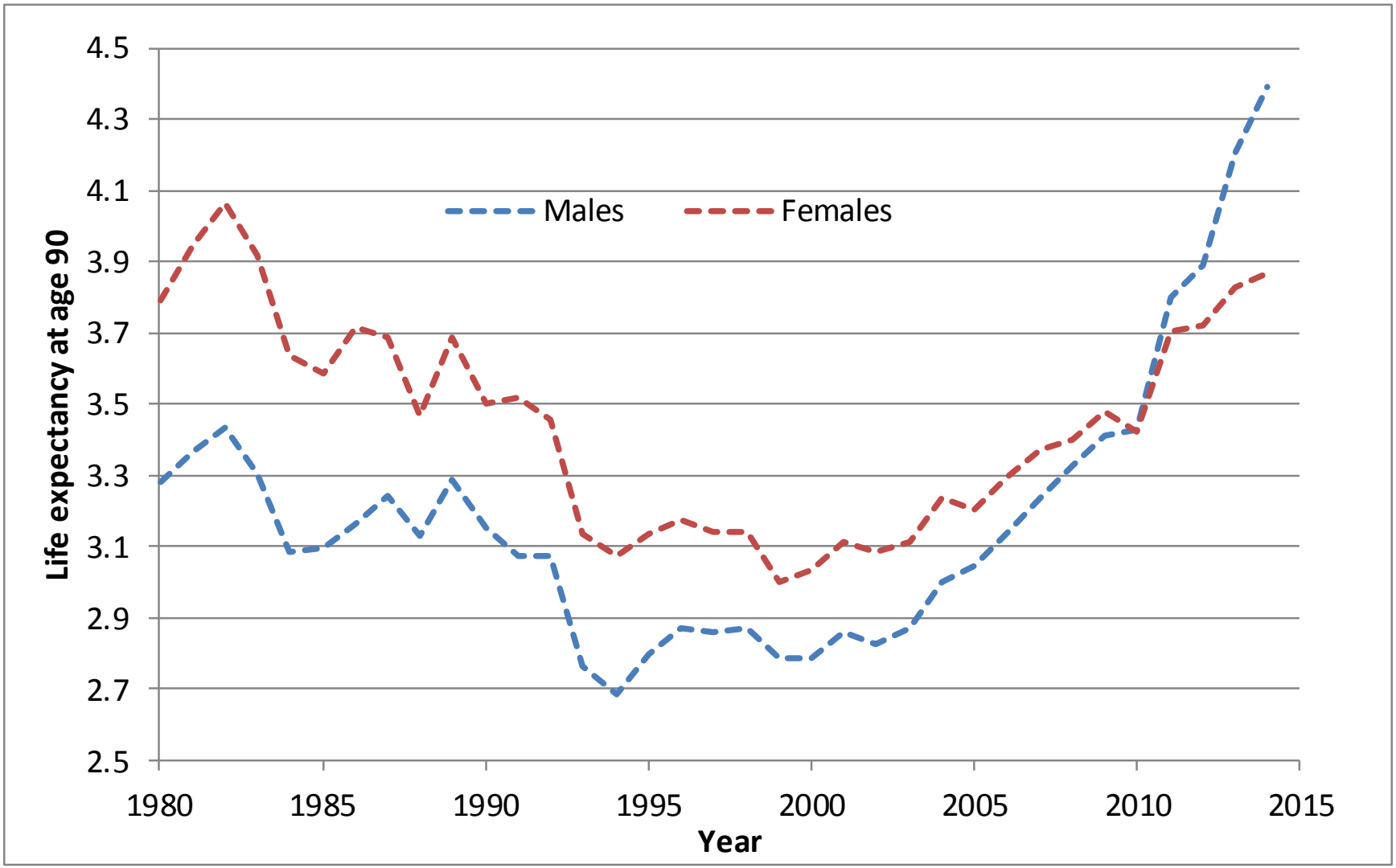
Availability of reliable population data across the globe

For most of the world population, complete and accurate data on mortality and fertility are not available.

To produce such data an expensive and well-organized system for registration of vital events and also censuses or population registers are needed. This is something that majority of developing nations have been unable to achieve. Good death registration does not exist or is very fragmentary in most of the developing world including its most populated parts (China, India, Indonesia) and also in countries that are facing the greatest health challenges (Sub-Saharan Africa).

Vital registration that can be used to calculate life tables over the whole range of ages exist in about 60-65 countries. In about 15 to 20 of these countries, quality of these data is a serious concern. For other **45-50** countries, data quality can still be problematic during some time periods or at some ages. That is why one should care about data quality even when working on data from an industrialized country.

Human Mortality Database, Russia: update 2015



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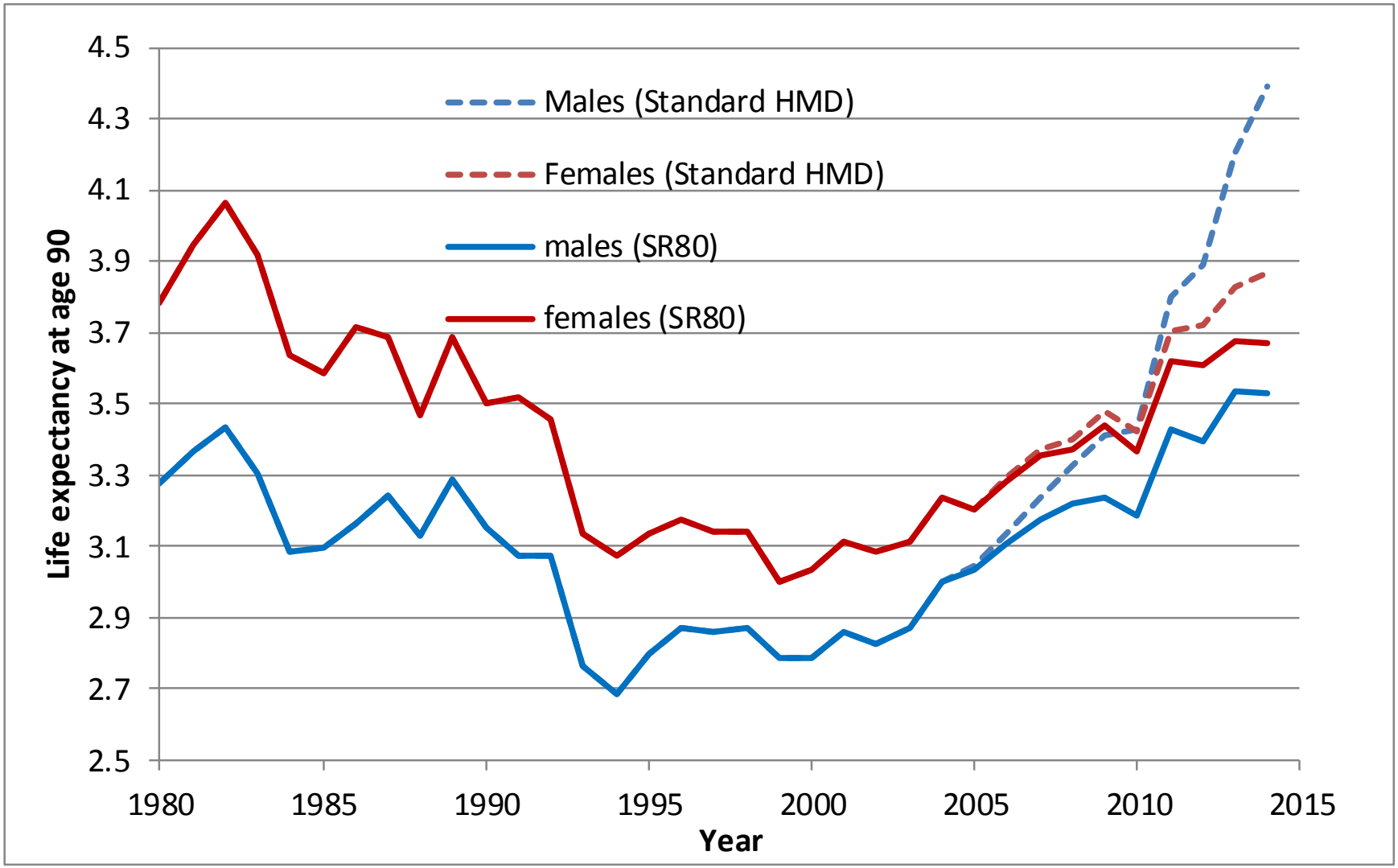

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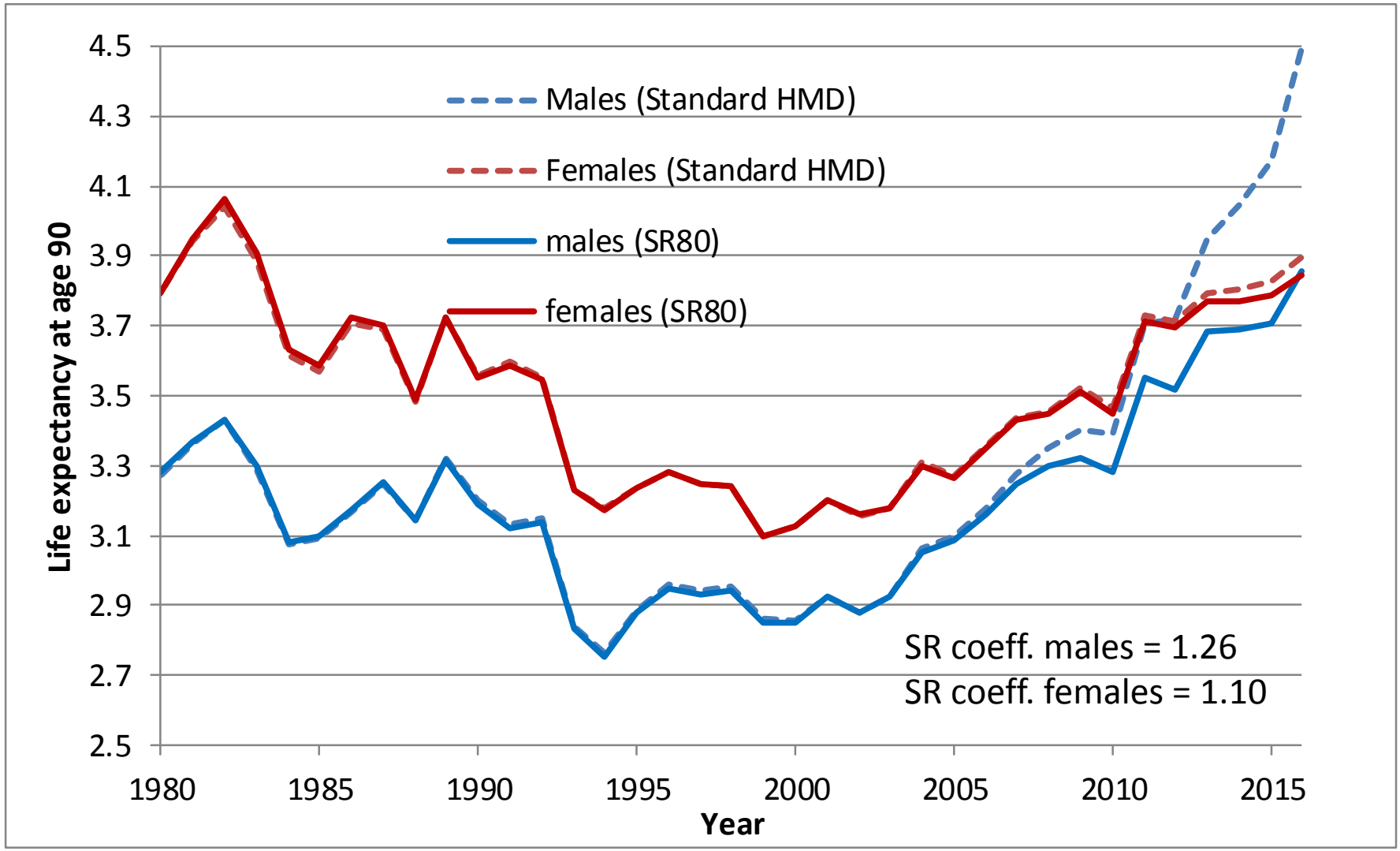

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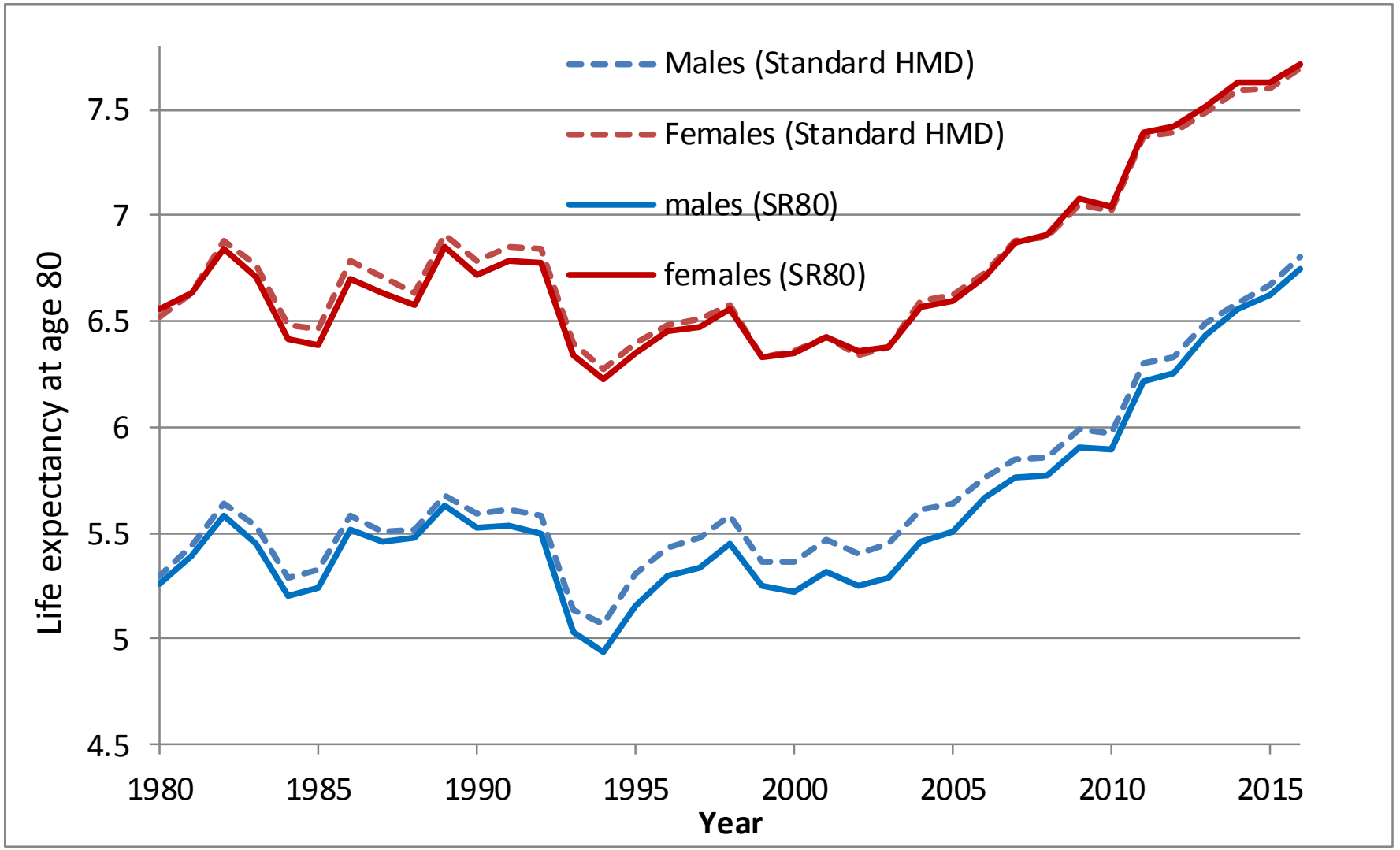
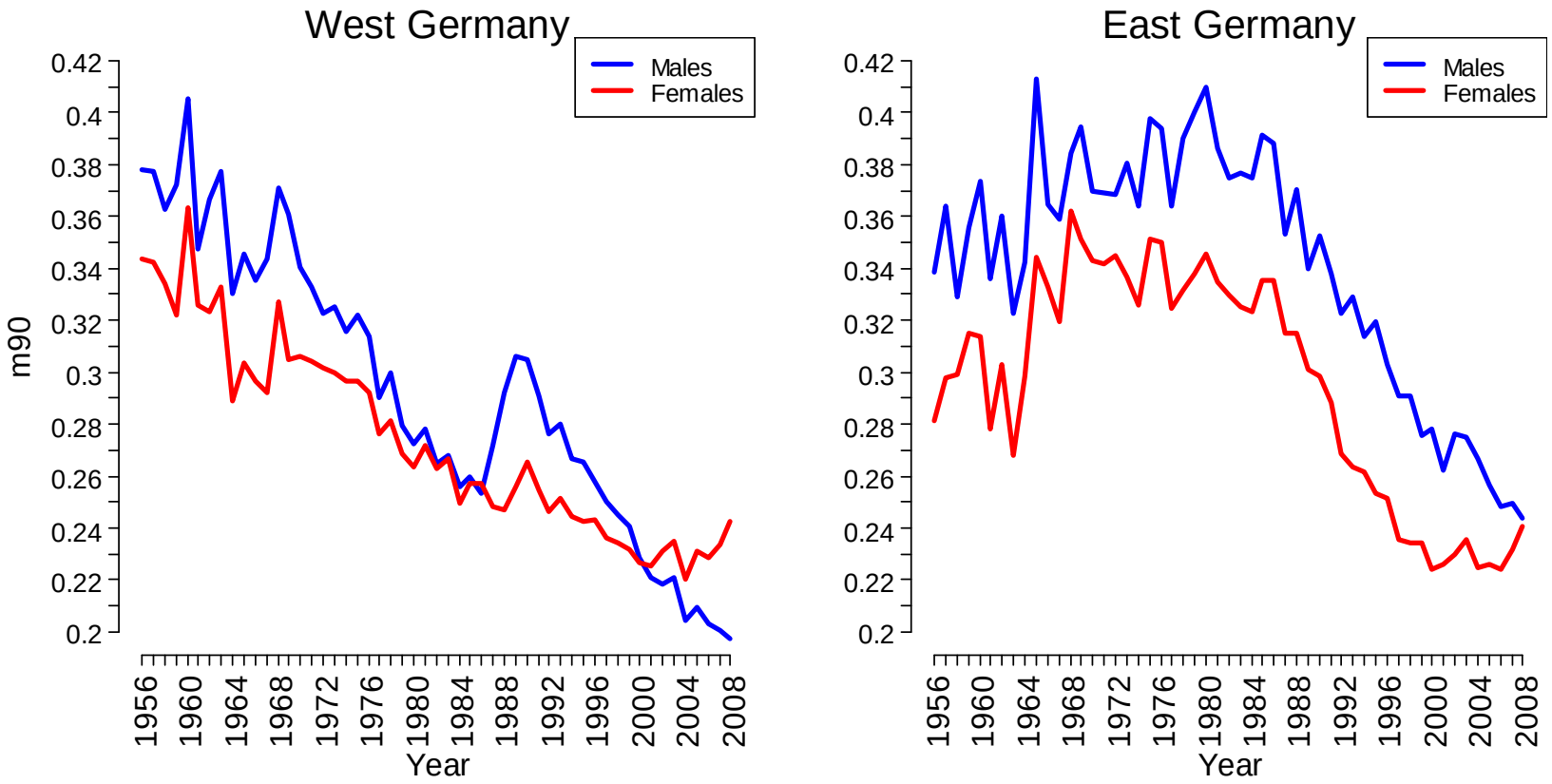


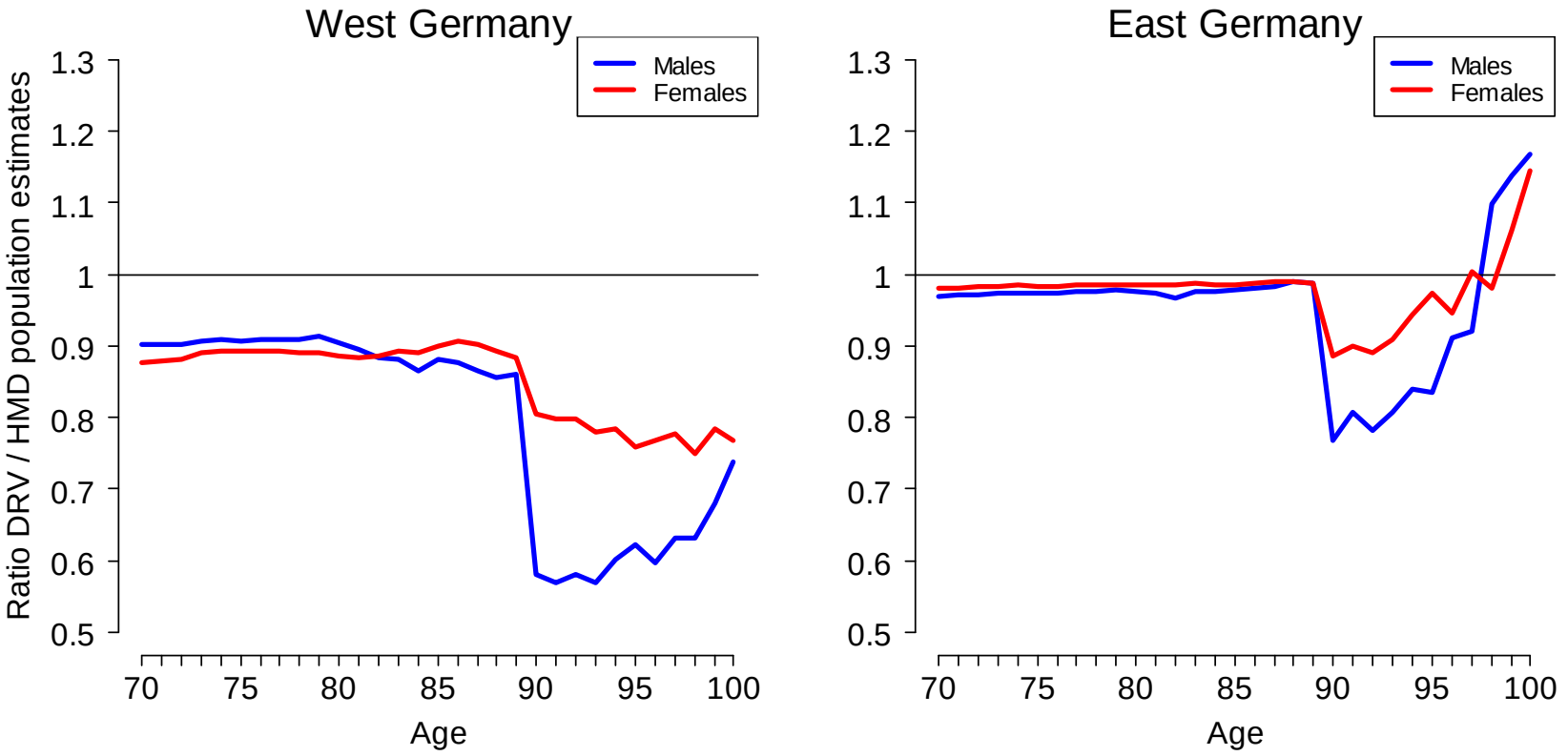
Germany: old ages



Trends in death rates at age 90+, calculated from the official population estimates, for the West and East Germany, males and females, 1956-2008.

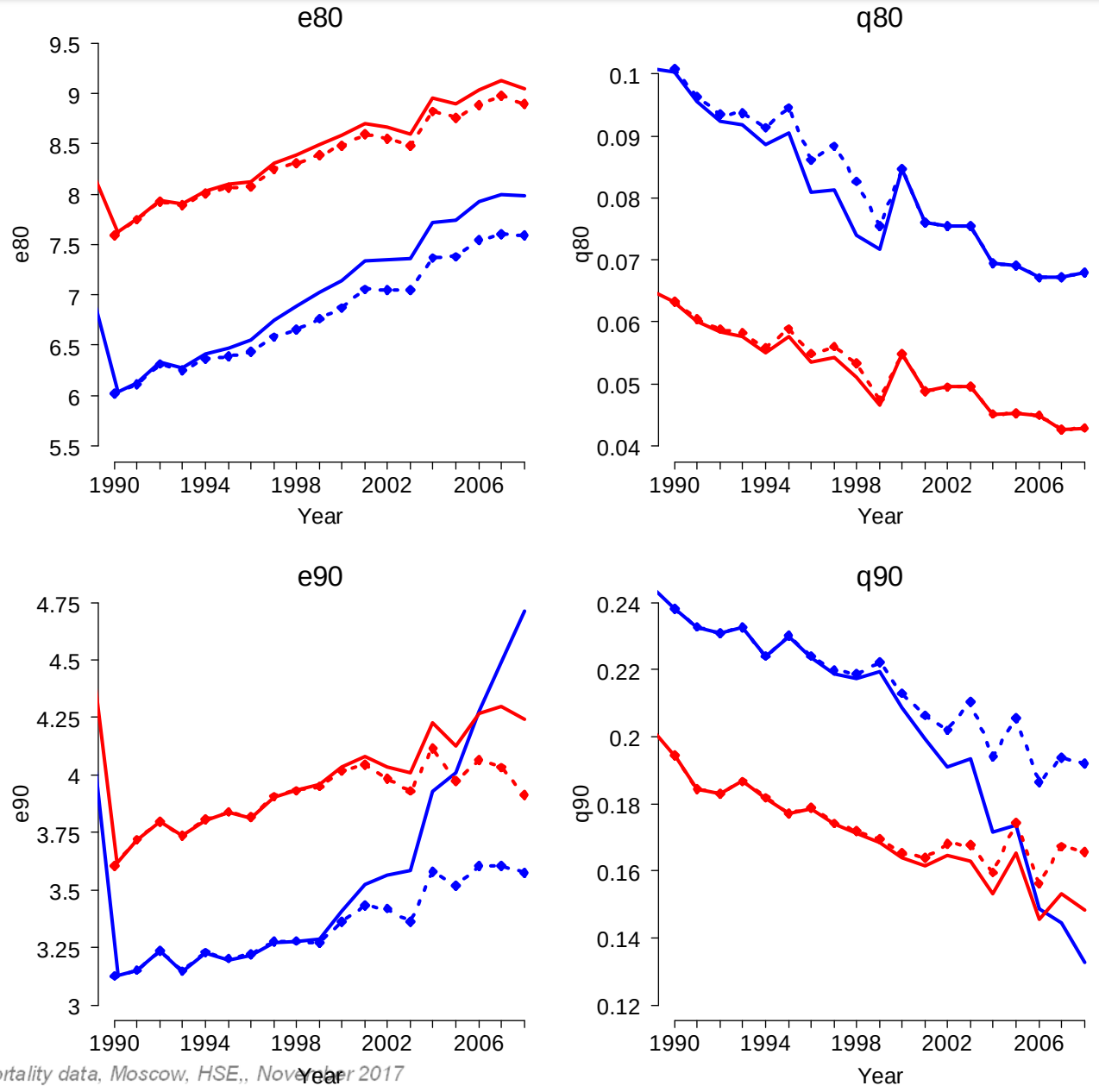
Germany: old ages (cont.)

To correct population estimates for West Germans at older ages in 2010, the HMD team used data by the *Deutscher Rentenversicherung Bund* (DRV), the German Pension Scheme.

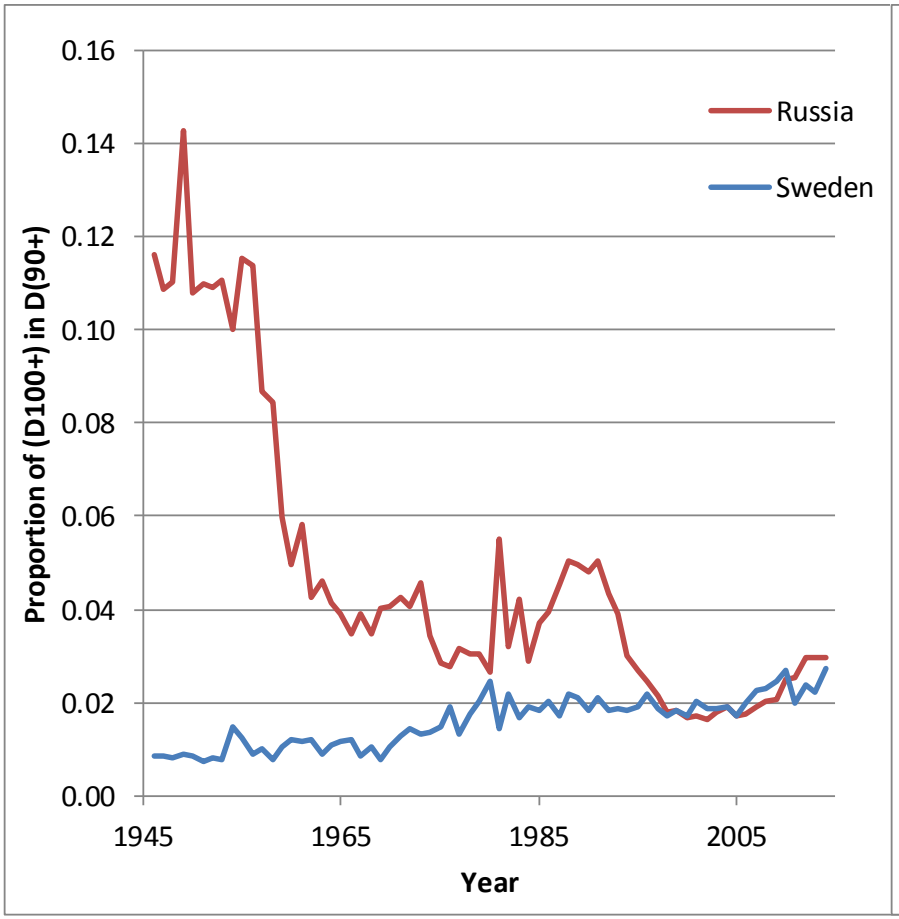


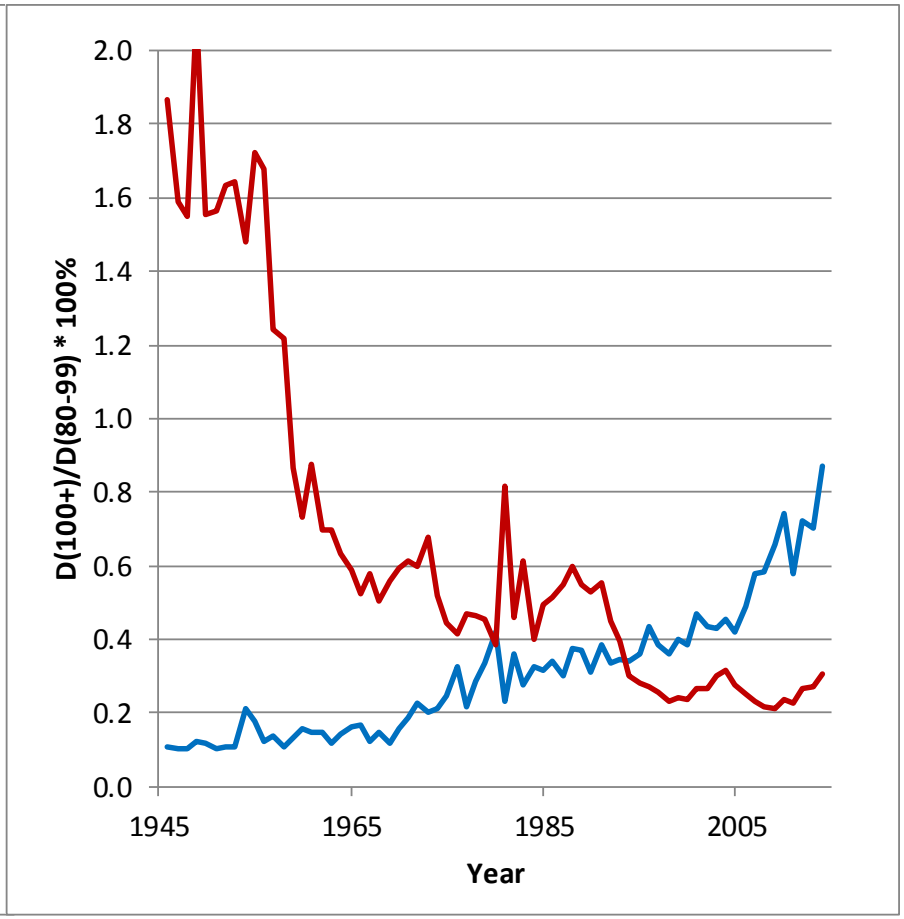
Ratio of DRV records by age based on own pensions to estimates based on official data, West and East Germany, 2009.

Life expectancy and probability of death for the corrected and the original data, W. Germany, 1990-2008



Russia: death count ratios at old ages





Year	*2000*	*2001*	*2002*	*2003*	*2004*	*2005*	*2006*	*2007*	*2008*	*2009*	*2010*	*2011*	*2012*	*2013*	*2014*	*2015*	*2016*
Deaths 100+																	
Females	2178	2018	2035	2107	2083	2120	2005	2006	2139	2136	2306	2242	2468	2634	2828	2901	2722
Males	236	250	250	281	296	268	255	257	266	276	337	320	395	398	452	504	438
Population 100+																	
Females	5904	4894	7194	5655	6692	6874	6647	6223	6348	6465	6335	6086	6754	7913	9016	10316	11114
Males	1445	1566	1749	1003	1201	1219	1199	1145	1194	1253	1332	1416	1760	2168	2682	3098	3556

Censuses and inter-censal population estimates

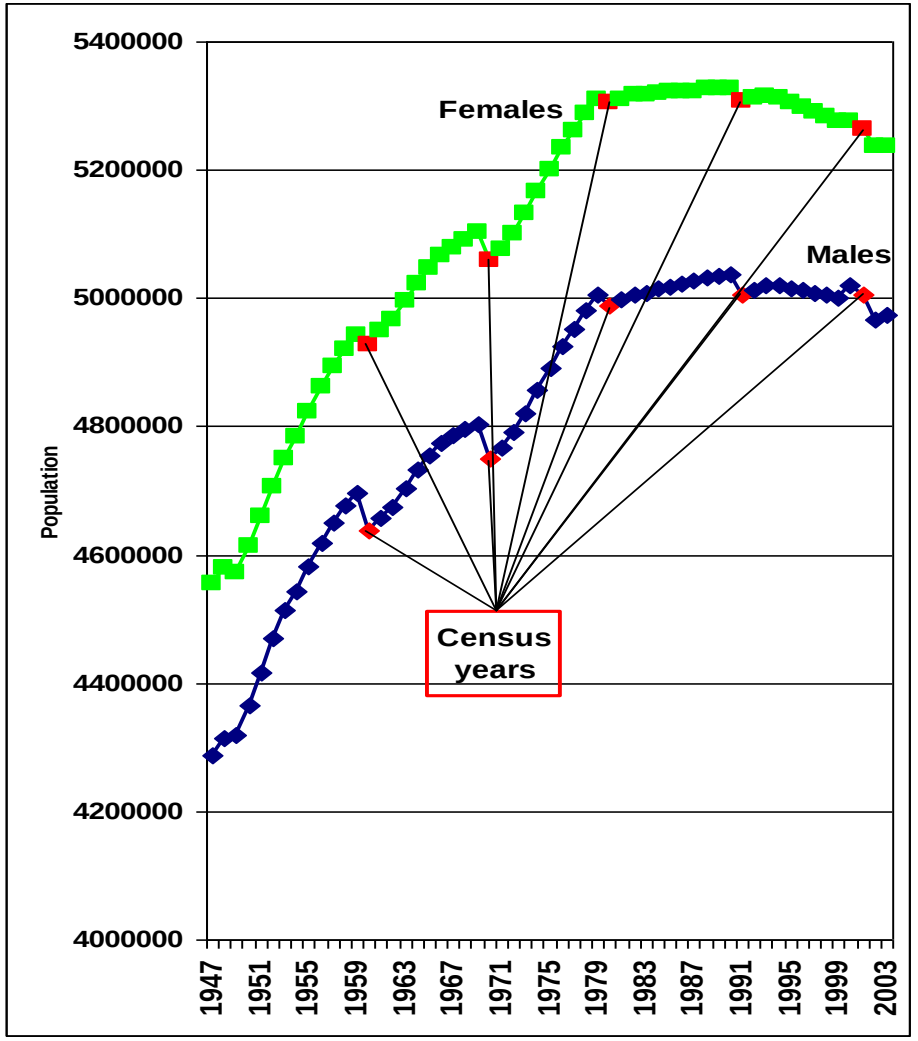
Assuming good quality of census data:

After a new census the post-censal population estimates should be replaced by inter-censal estimates (backward from this census).
Four components:

- Census counts
- Death counts
- Births
- Migration

Developed countries with high quality vital registration system which do/did NOT produce inter-censal estimates: Germany, Italy, Czech Republic, ….

Czech Republic, Official Population Estimates as of December 31



Changes in the definition of population: Poland

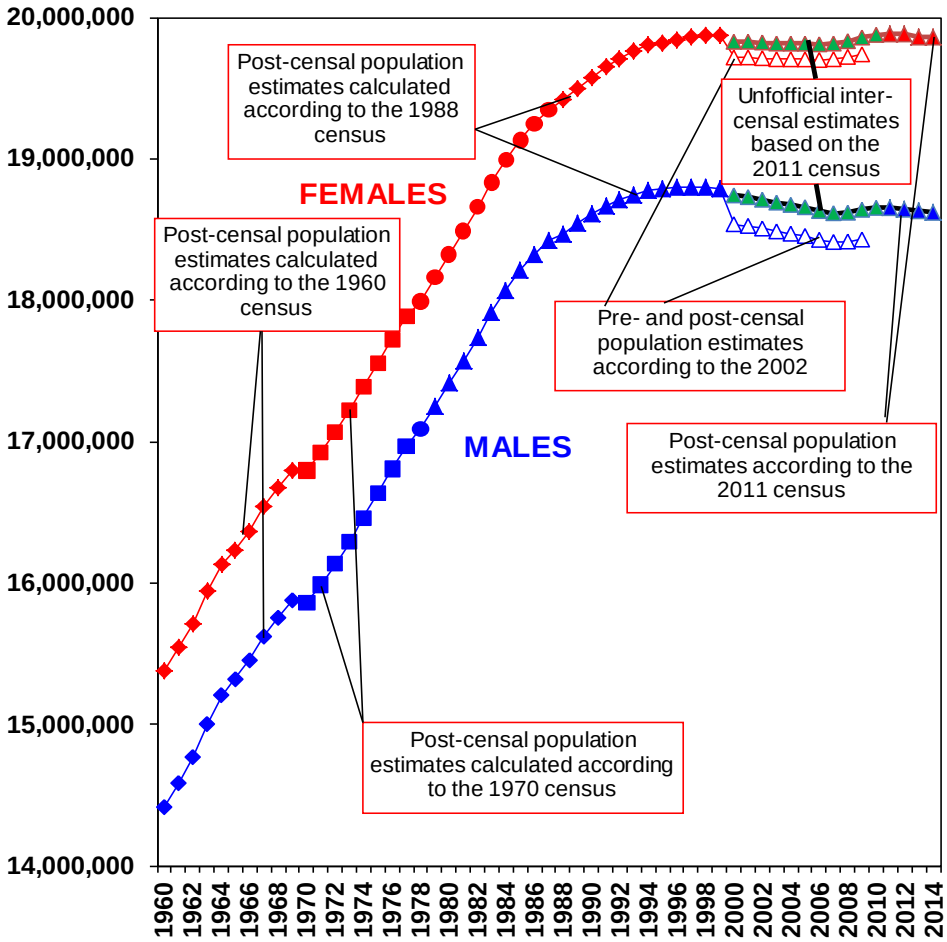
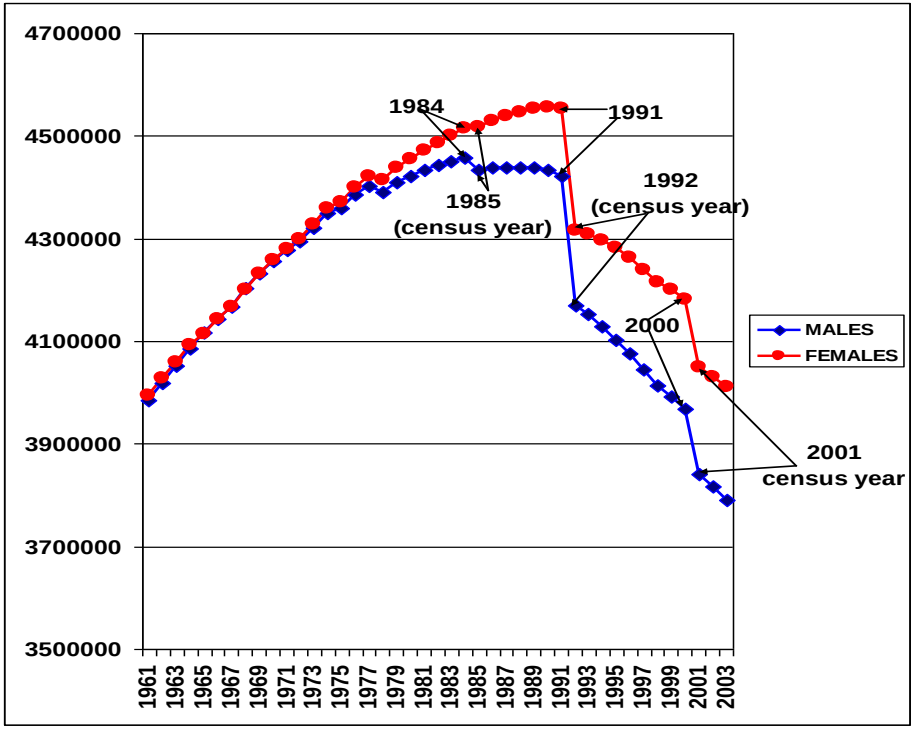


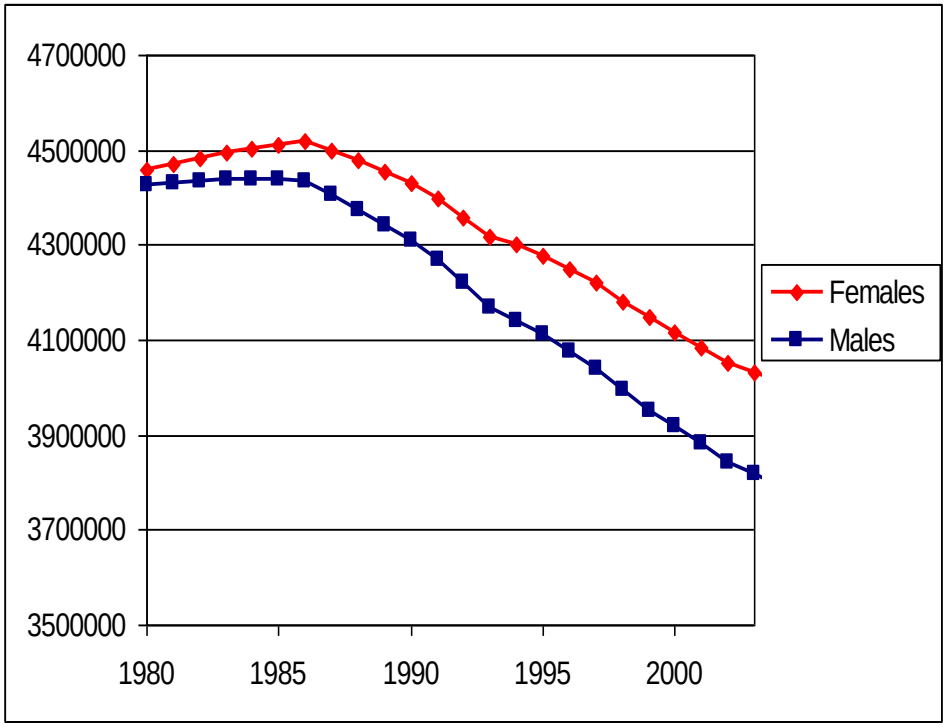
Figure: Official and adjusted (Tymicki et al. , 2015) estimates of population of Poland

In the 2000s, Poland faced a massive out-migration that followed the EU enlargement of 2004. It was expected that the population counts will be corrected downward after the next population census of 2011. But Statistics Poland has unexpectedly decided to change the official definition of the population status from the permanently resident (acting in 2010 and earlier) to the usually resident (from 2011 onward). *Statistics Poland did not re-estimate age-specific population counts back to previous census.* Due to irregular migration pattern the standard HMD inter-censal method for reconstruction of annual population estimates is not applicable.

Source: Jasilionis (2017)

Inter-censal estimates. Bulgaria: correction of population series over the 1990s and the 2000s





1961-2003. Official population estimates (left) and HMD data (right).

Germany: three decades between censuses

Before the 2011 census, East Germany had a census 30 years ago and West Germany - 24 years ago. Whereas before the 2011 census Germany's population was estimated to be 81.7 million, the census corrected this down to 80.2 millions, a difference of 1.5 million people (~ 1.8%). *The statistical office of Germany decided not to produce adjusted inter-censal population estimates by age.*

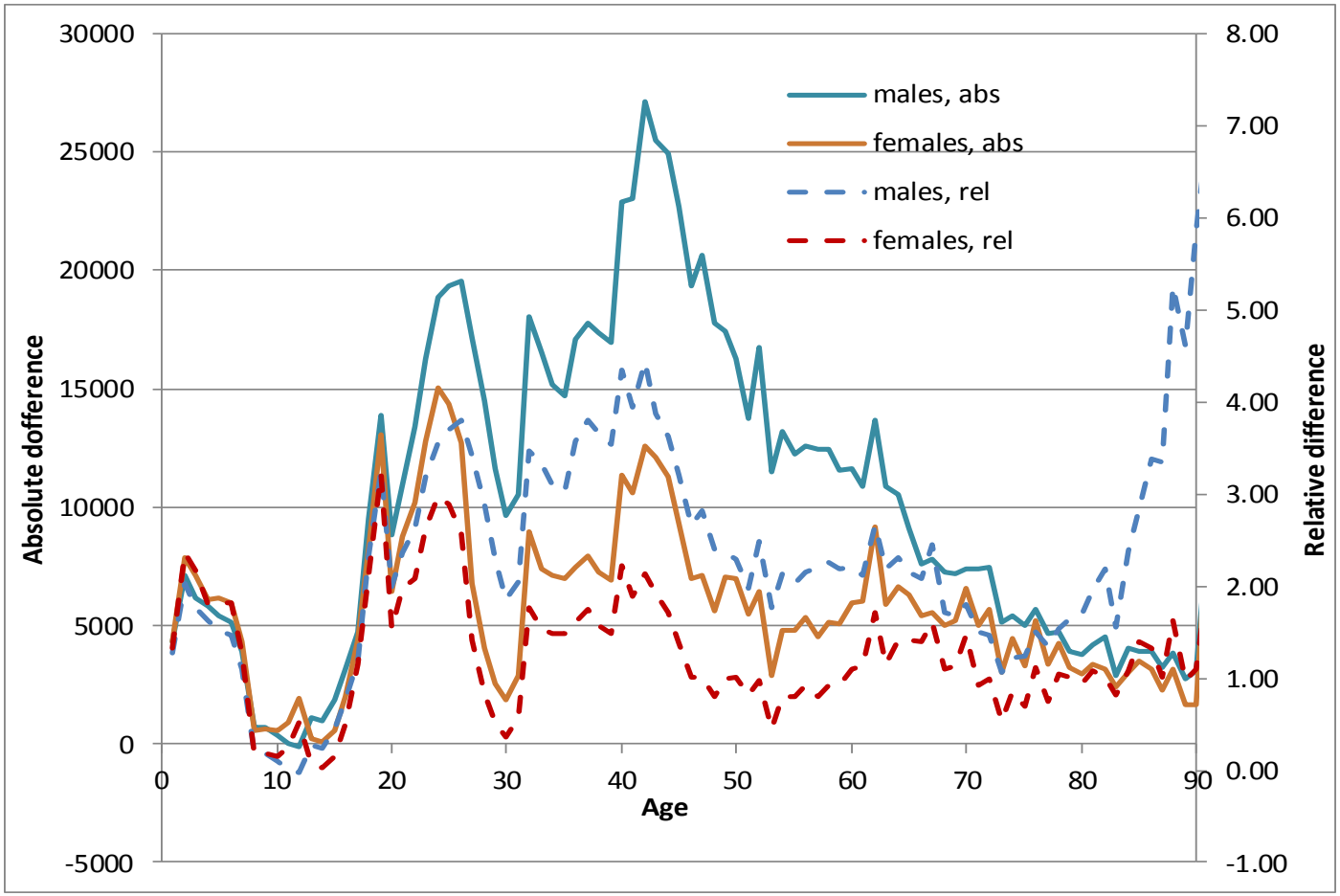
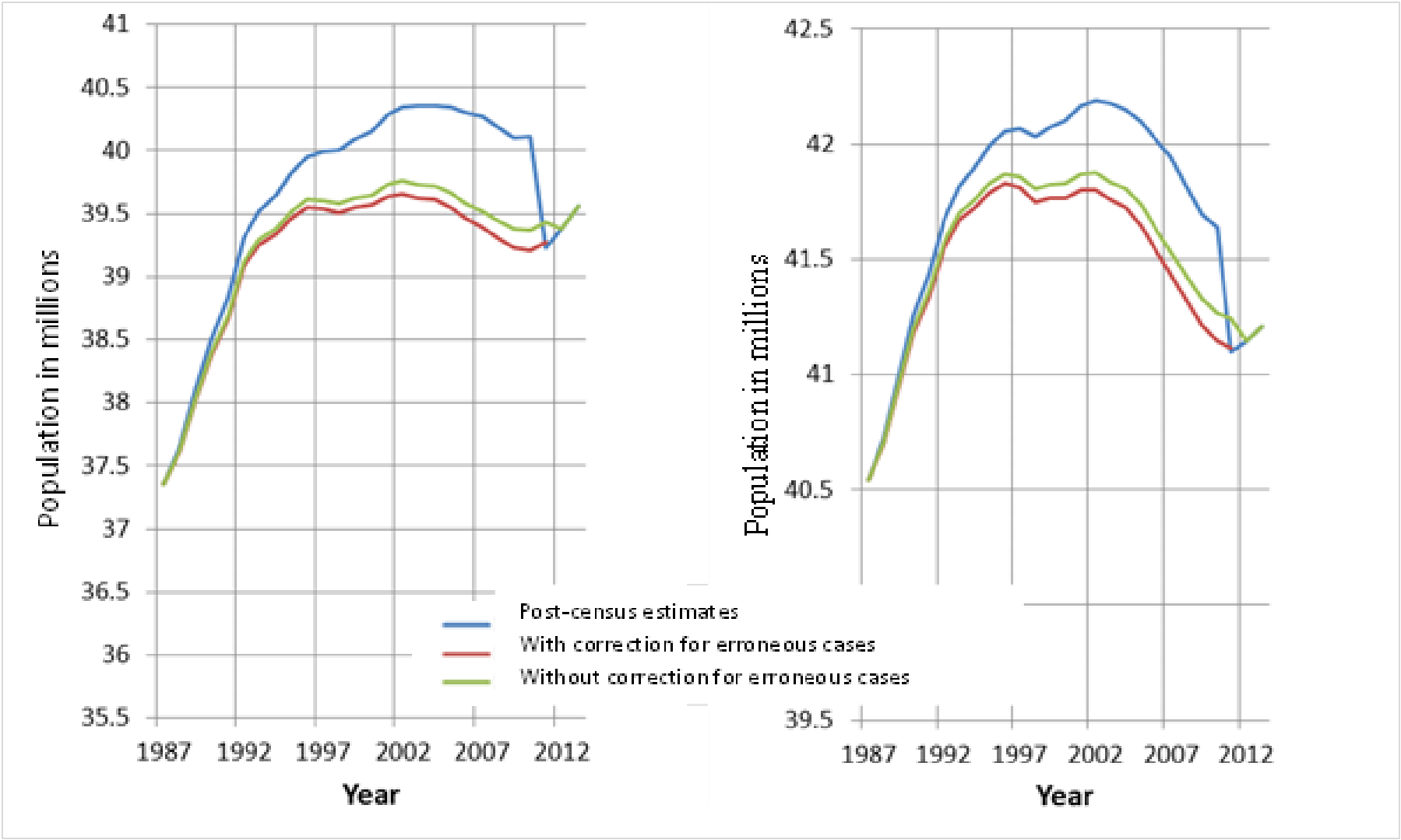
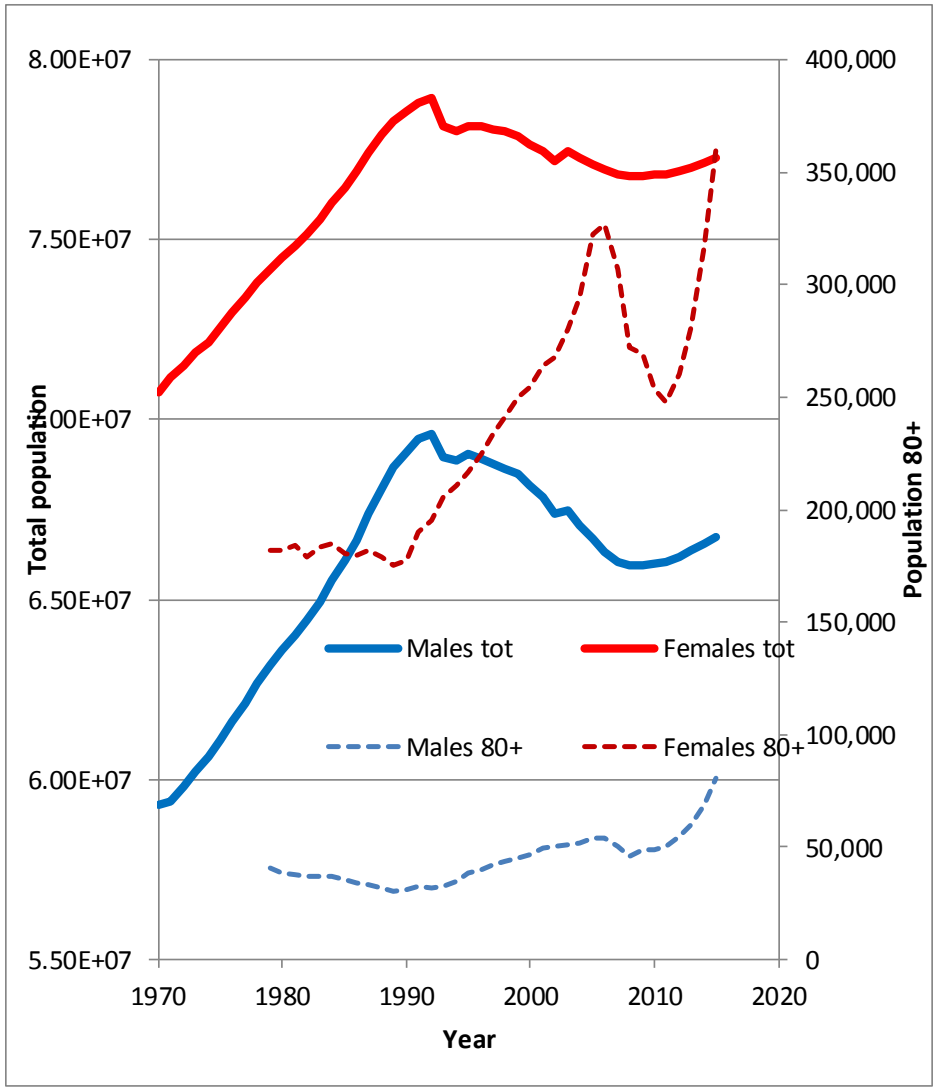


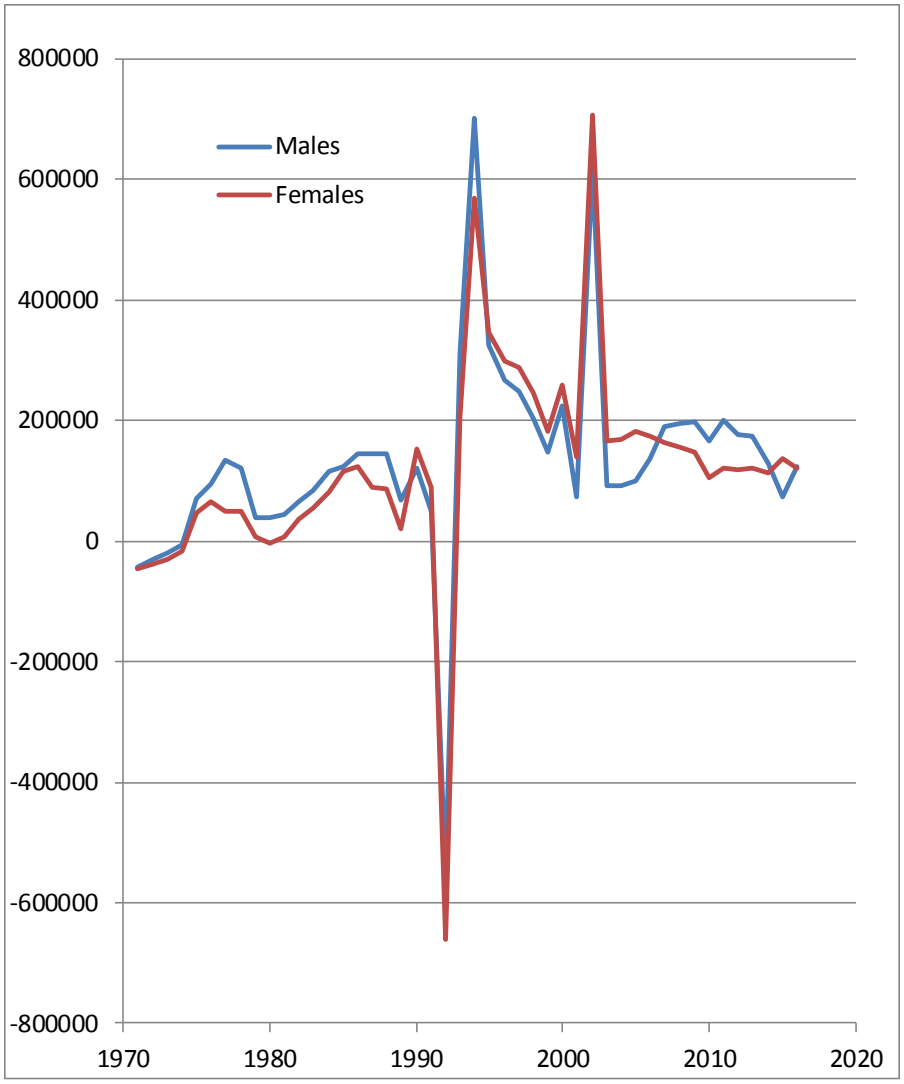
Figure: difference between current population estimates and census counts of 2011

The HMD inter-censal estimates for Gerrmany



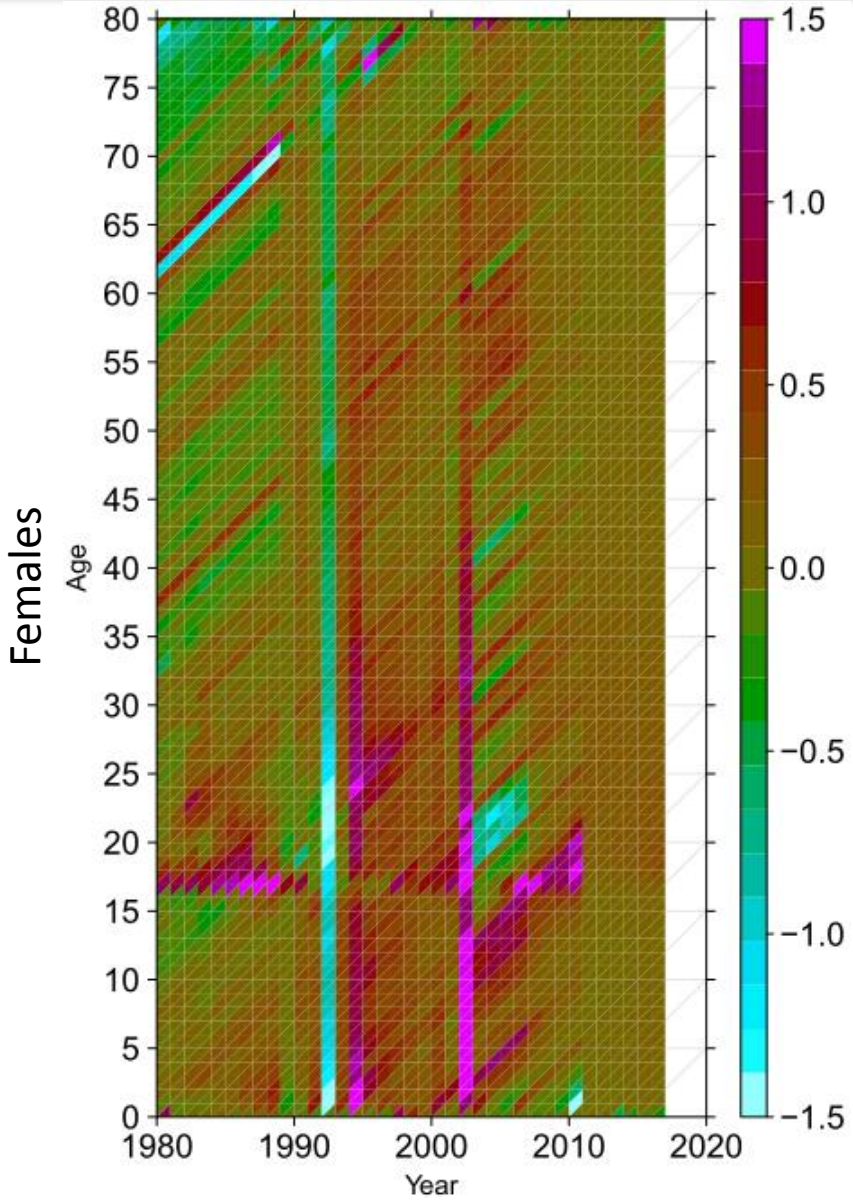
Russia: total population and net migration

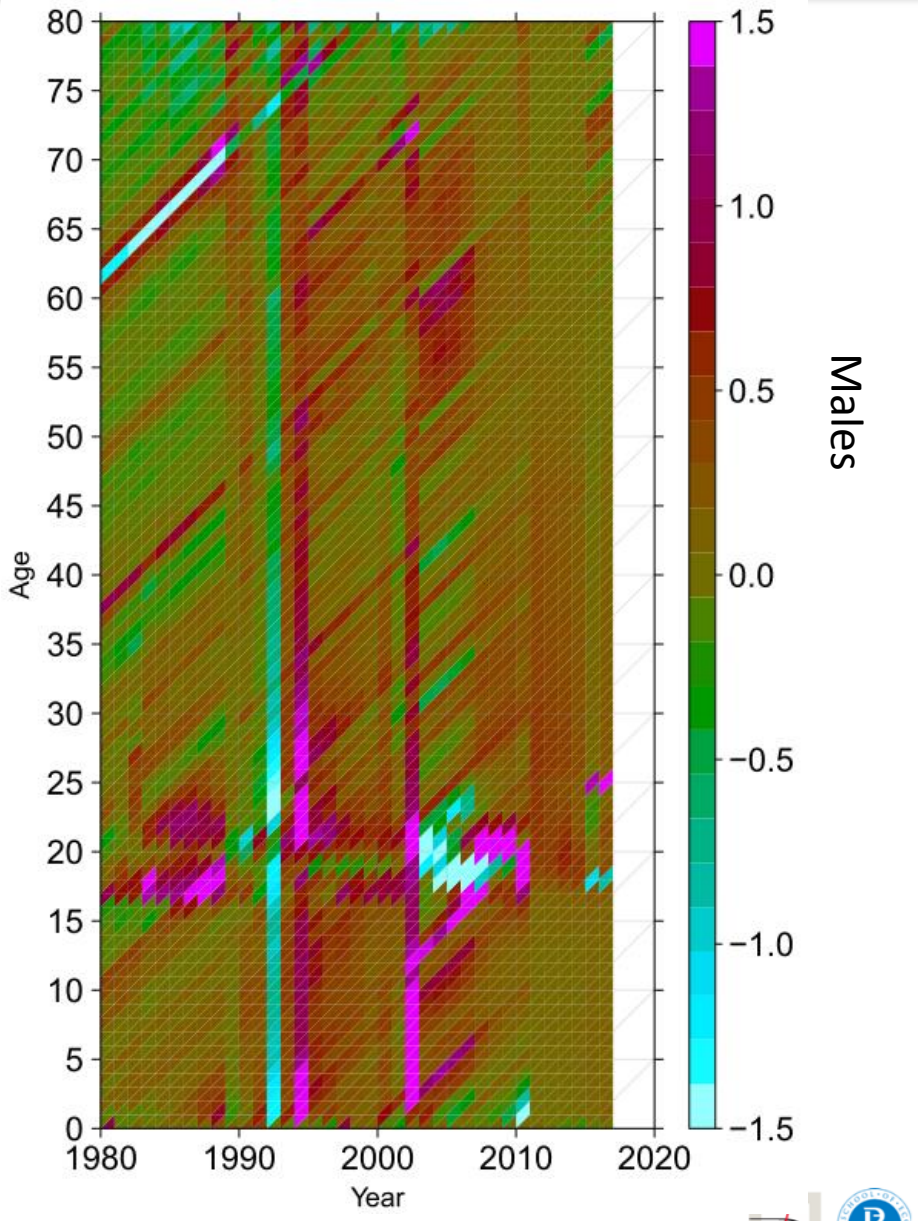




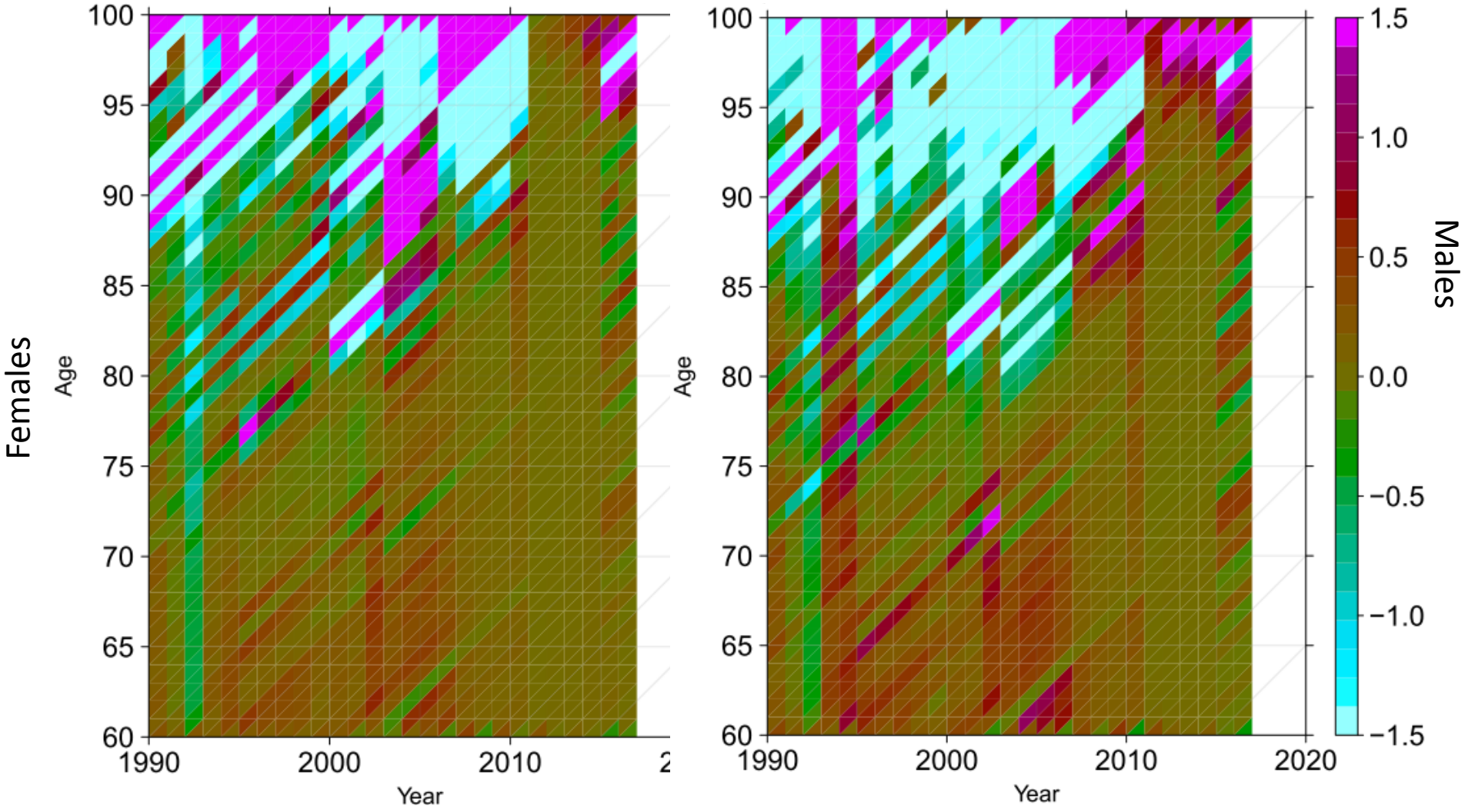
Note: In 1993-94, vital statistics exclude the Chechen-Ingush Republic. In 1995-2002, vital statistics exclude the Chechen Republic

Russia: net migration in 1980 – 2010, ages 80-10

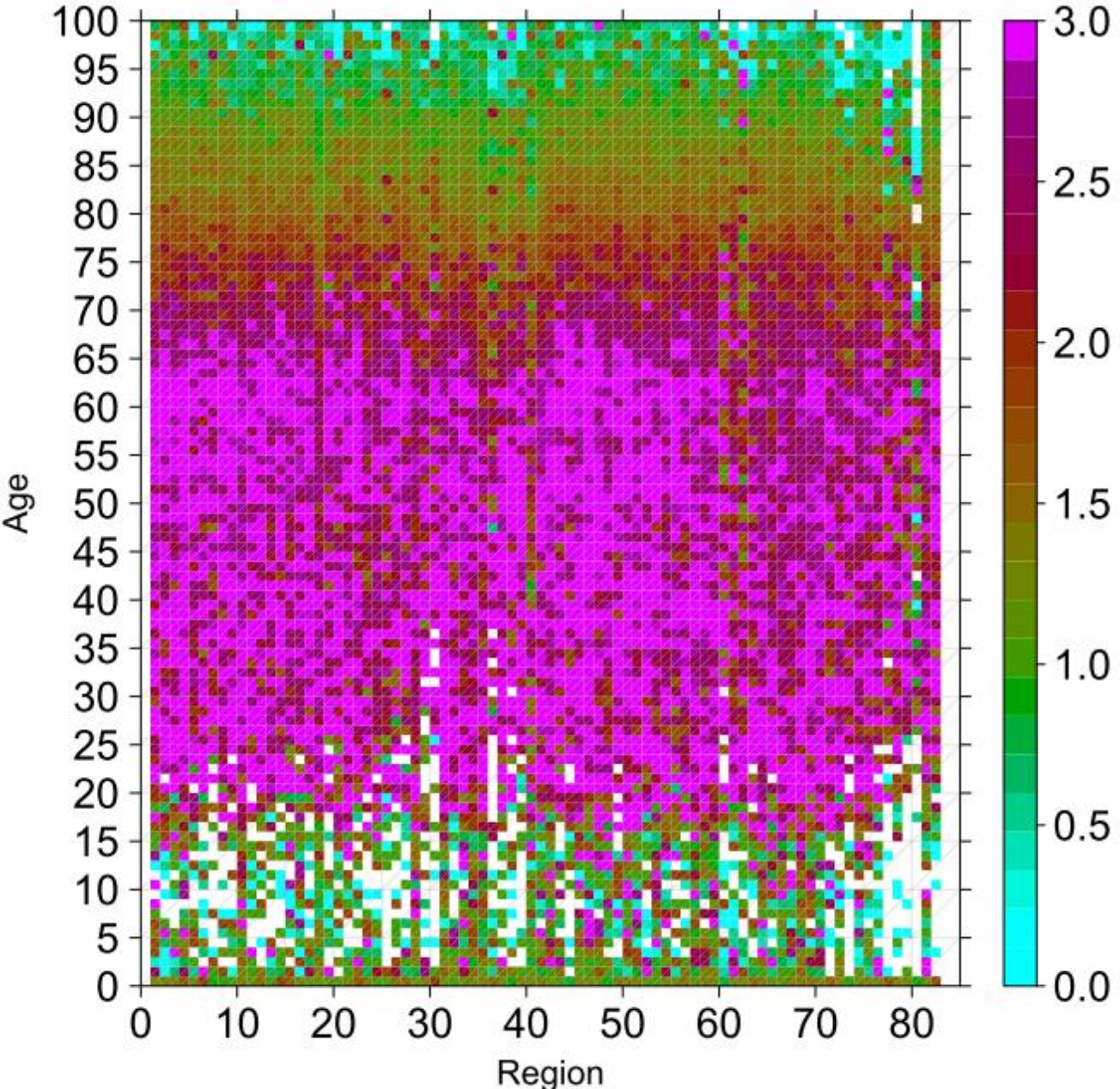




Russia: net migration in 1980 – 2010, ages 60-10



Mortality rate sex ratio by region, 2016



1	Belgorod oblast	42	Republic of Bashkortostan
2	Bryansk oblast	43	Republic of Mariy El
3	Vladimir oblast	44	Republic of Mordovia
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38	Karachaev-Cherc. Rep.	79	Jewish autonomous obl
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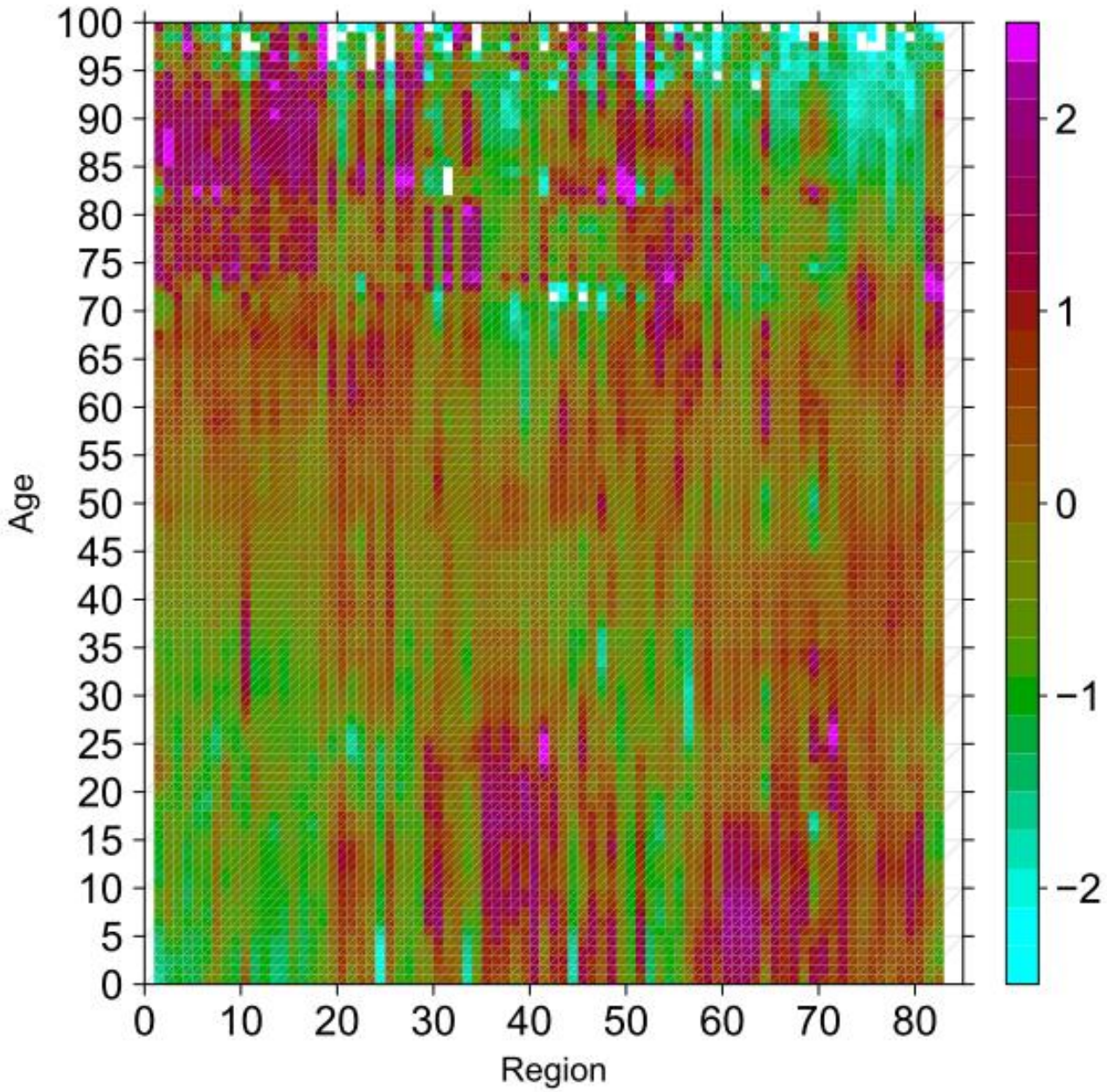
40	Chechen Republic	81	Republic of Crimea
41	Stavropol kray	82	Sevastopol

Normalized deviation from the average proportion in total population, females, 2016



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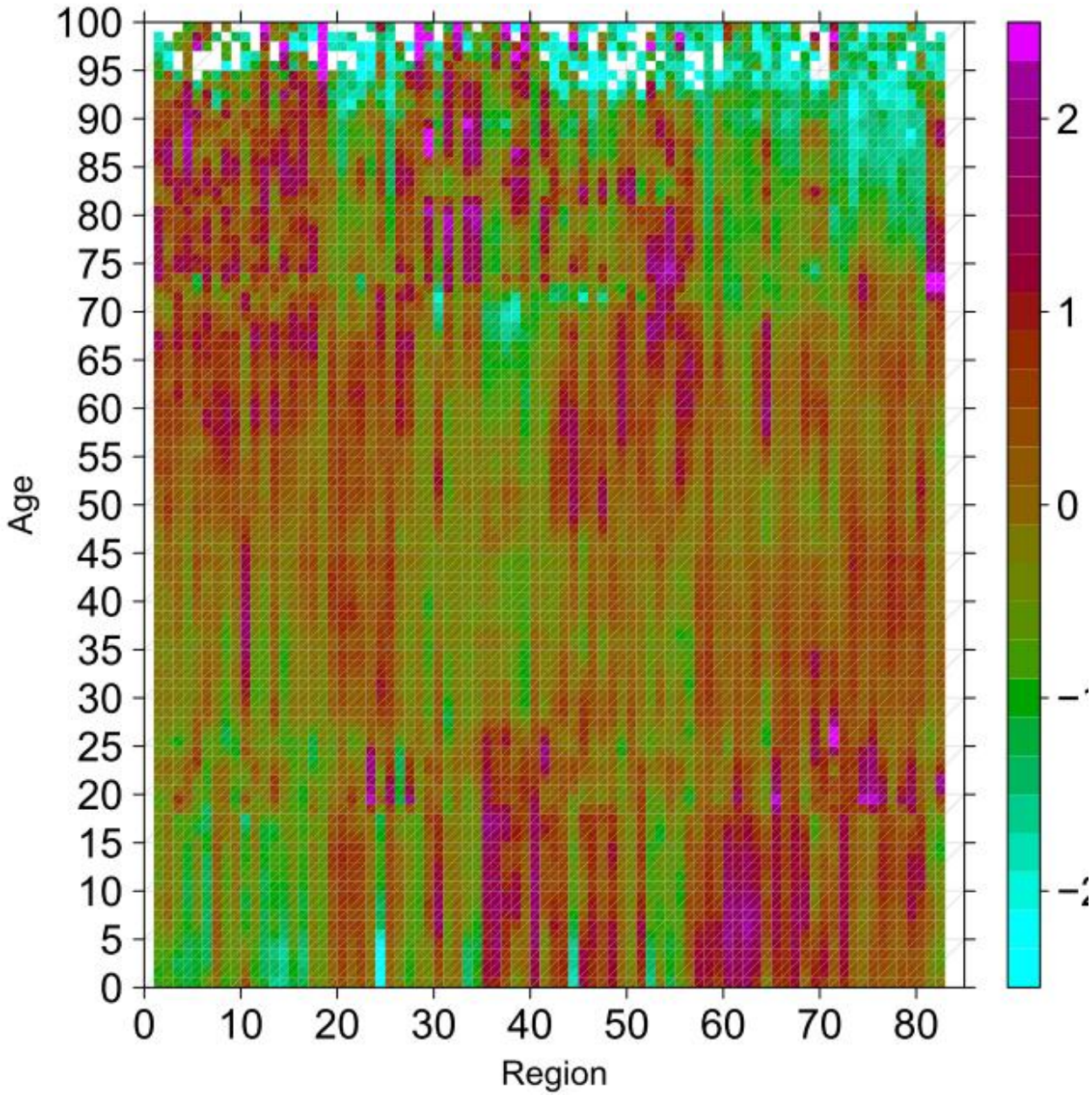
Normalized deviation from the average proportion in total population, males, 2016



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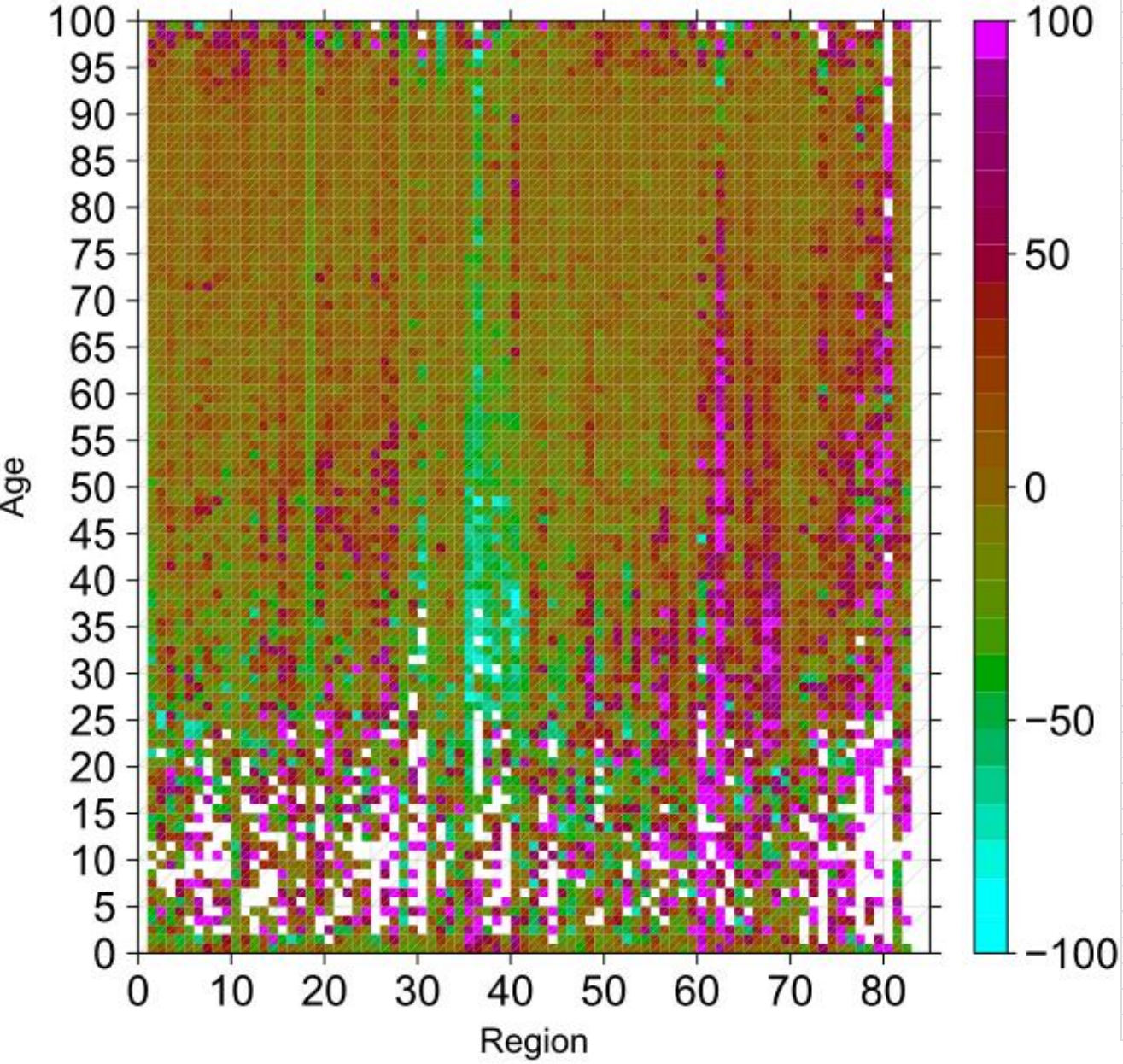
Mortality rates by region: deviation from the total population, females, per cent, 2016



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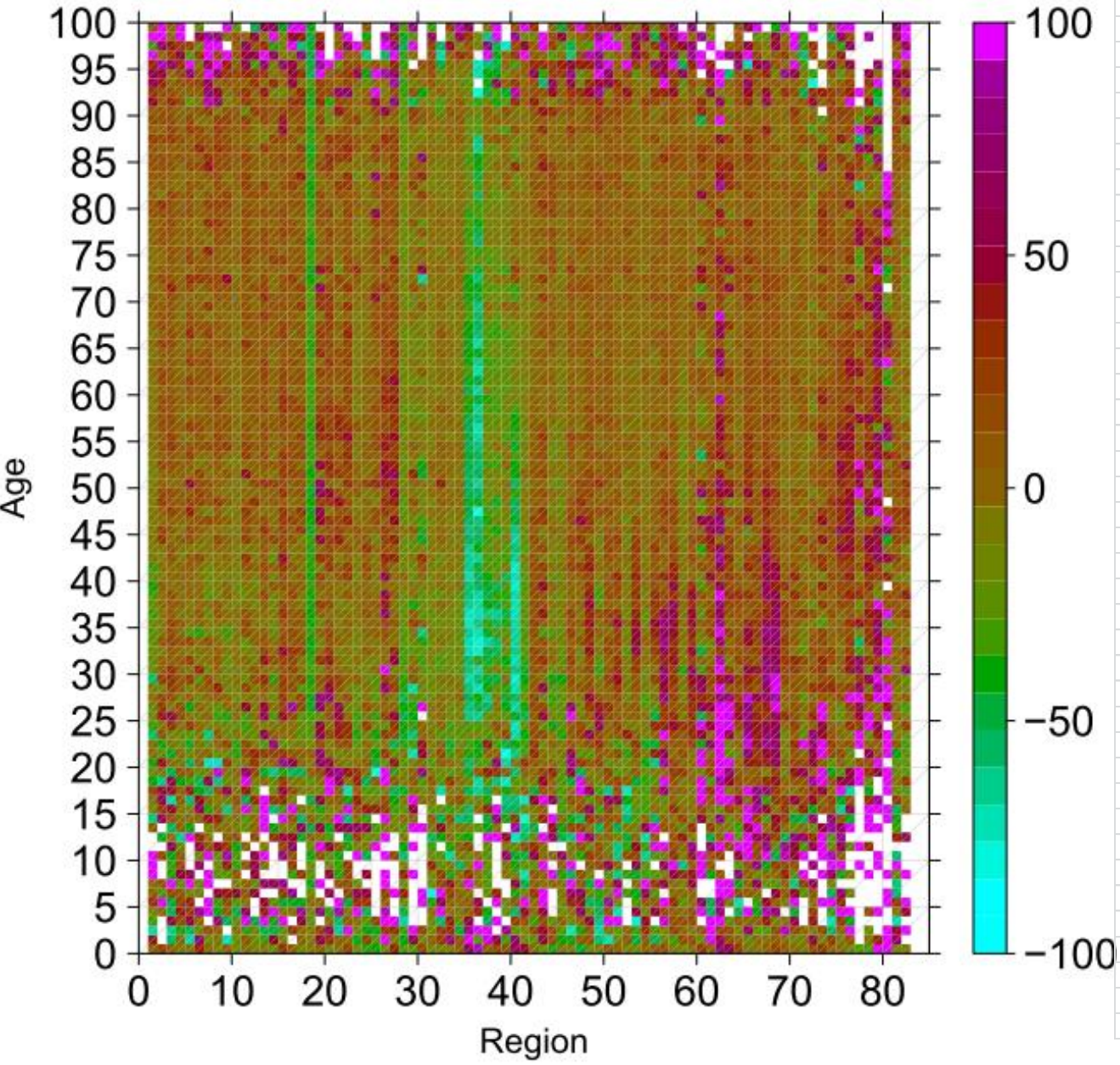
Mortality rates by region: deviation from the total population, males, per cent, 2016



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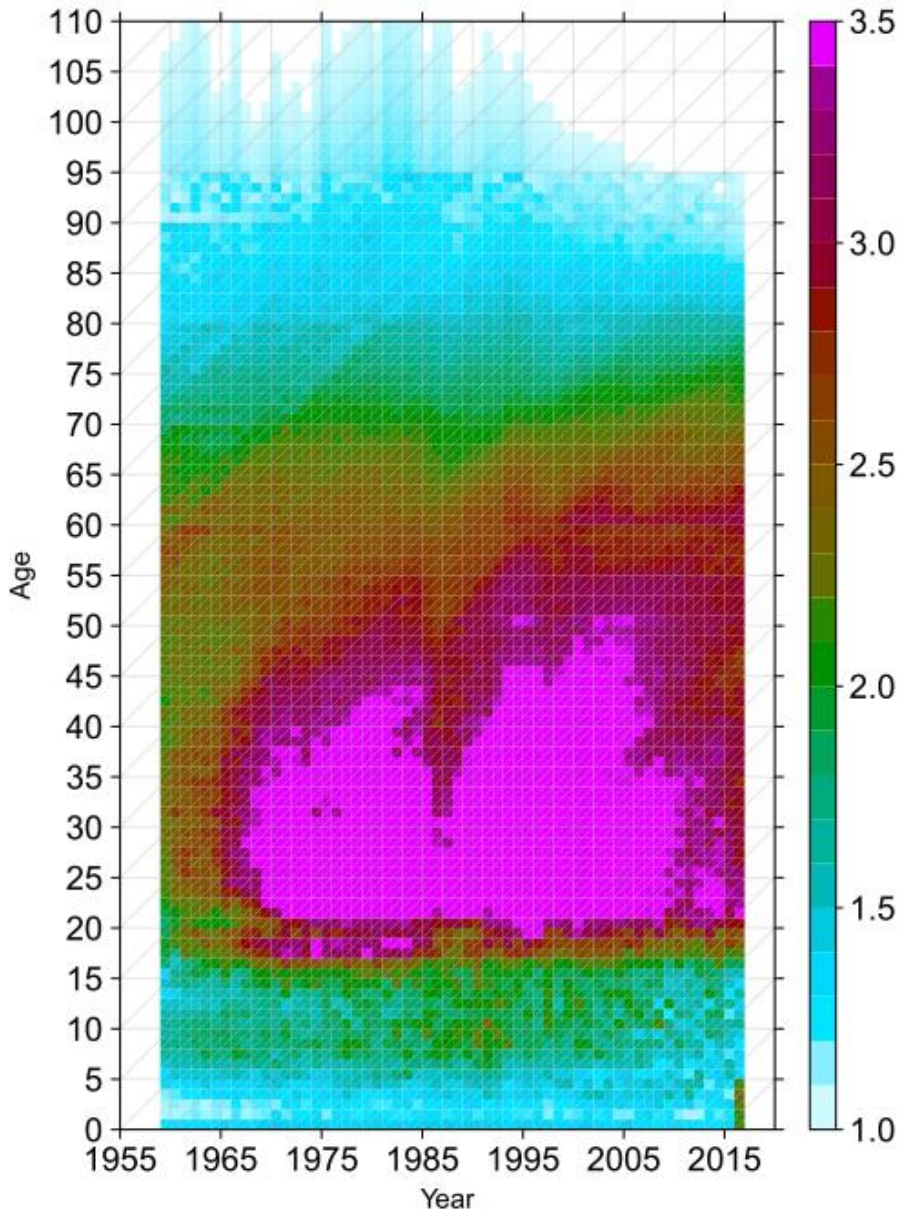
39	Republic of North Ossetia	80	Chukchi autonomous area
40	Chechen Republic	81	Republic of Crimea
41	Stavropol kray	82	Sevastopol

Mortality rate sex ratio, Russia, 1959-2016



Correction of LE in Moscow

Life expectancy at birth

Year	Males, official	Males, corrected	Diff	Females, official	Females, corrected	Diff
1990	64.9	64.7	-0.2	74.0	74.0	-0.0
2005	66.7	66.2	-0.5	76.3	76.1	-0.2
2010	69.9	69.1	-0.8	78.1	78.1	-0.0
2015	73.0	71.4	-2.6	80.3	79.9	-0.4

Life expectancy at age 60

Year	Males, official	Males, corrected	Diff	Females, official	Females, corrected	Diff
1990	14.9	14.6	-0.3	23.3	23.2	-0.1
2005	16.8	16.0	-0.8	25.2	25.0	-0.2
2010	18.5	17.4	-1.1	26.4	26.3	-0.1
2015	20.7	18.7	-2.0	28.3	27.7	-0.6

Source: Папанова et al. (2017)

Growing problems at advanced ages: emerging migrants

Sweden 2014:

Age group	Males	Females	Males foreign born (%)	Females foreign born (%)
90-94	23,648	52,869	0.00	0.00
95-99	3,941	12,585	0.05	0.02
100-104	309	1,558	0.97	0.19
105+	12	74	33.3	5.4

A steep increase in the proportion of foreign-born individuals in the population denominator that does not match with a similar increase in the death numerator is a signal of problematic population estimates, and of a numerator-denominator bias at extreme ages. In light of this new problem, Statistics Sweden has decided to use an aggregated open age interval 100+ instead of showing individual ages above 100.

Conclusion

- Data are of high quality if they are “Fit for Use” in their intended operational, decision-making and other roles (Juran and Godfrey, 1999). This is why the understanding of problems hidden in the data is important in any demographic estimation, forecast or study.

- We discussed several approaches which allow us to increase significantly utility of the data even if data quality is problematic.

- Standard demographic methods which work well with data from developing countries or historical data series are often not applicable to problematic data from countries with functioning statistical systems.

- Country-specific approaches in combination with usage of additional and alternative data sources are needed. They should be combined with certain general principles that are applied in all countries to ensure comparability of data series across time and space.