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Understanding mortality trends in East and West Germany before and after reunification: what harmonized cause-specific mortality data can tell us?

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Previous research: explanations for rapid East-West convergence

The adoption of the FRG **health care** system and improved access to modern drugs and technologies (Nolte and McKee, 2000; Vogt and Vaupel, 2015).

Improvement in **living standards** even at very advanced ages (Vaupel et al. 2003).

The role of **behavioural factors** (dietary habits, alcohol, and smoking) has received less attention (Gjonça, et al. 2000; Myrskyla and Scholz, 2013).

However, these are important determinants of the East-West mortality divide (Bobak and Marmot 1996), and largely responsible for the health progress in some post-communist countries (Zatonski and Boyle 1996).

The reduction in the **psychosocial stress** associated with the deprived socio-economic and political conditions in the GDR (Diehl 2008).
By contrast, stress resulting from the fall of the Berlin Wall could contribute to the short-term increase in adult male mortality (Häussler, et al. 1995).

'**Statistical artefact'** as unlikely explanation**.**
(Eberstadt, 1994; Häussler, et al. 1995; Diehl 2008).

Motivation

The factors underlying the marked improvement in East Germany are still not fully understood. **Changes in CoD** classifications and **coding practices** in particular (1990) complicate the interpretation of mortality trends.

Researchers from the Max Planck Institute for Demography (MPIDR) and the French Institute for Demographic Studies (INED) have been working on *the reconstruction of continuous mortality series by causes of death* for the GDR/East Germany.

The core of the project is the application of *the method of a posteriori bridge coding,* developed by French scholars Jacques Vallin and France Meslé (Meslé and Vallin 1996).

Using a methodology that was originally applied in France, long-term mortality series have been harmonised for a number of countries, including West Germany (Pechholdova 2008, 2009).

Objectives

To perform a comparative analysis of detailed mortality trends that focuses on the periods before and after German reunification.

Using these newly produced detailed mortality data we aim at providing a more accurate assessment of the factors that have contributed to the rapid convergence in the mortality levels of the two parts of Germany.

Data

CoD data collected for East and West Germany

	1952–1968	1969–1978	1979	1980–1990	1991–1997	Since 1998
GDR/East Germany	GDR–52 (301)	ICD–8 East (147)	ICD–9 East (35)	ICD–9 East (full list)	ICD–9 (full list)	ICD–10 (full list)
FRG/West Germany	DAS–52 (447)	ICD–8 (448)	ICD–9 (533)	ICD–9 (full list)		

New HMD data on population exposures accounting for the results of 2011 Census (Klüsener, Grigoriev, Scholz, Jdanov, 2017).

Main focus: transition to new coding practices in 1990 in East Germany, and mortality trends since 1980.

Methods

1. Special methods of data treatment

The shortlist of **186 causes** of death or M List (Pechholdova 2011) to bridge the periods 1980-1997 (ICD-9) and 1998-2013 (ICD-10). The list was designed to facilitate a smooth transition between the two ICD revisions.

Corrections for mis-classification of circulatory diseases and under-reporting of cancer in the GDR during 1980-1991.

Proportional redistribution of (small fraction) ill-defined causes.

2. Methods for analysing mortality trends

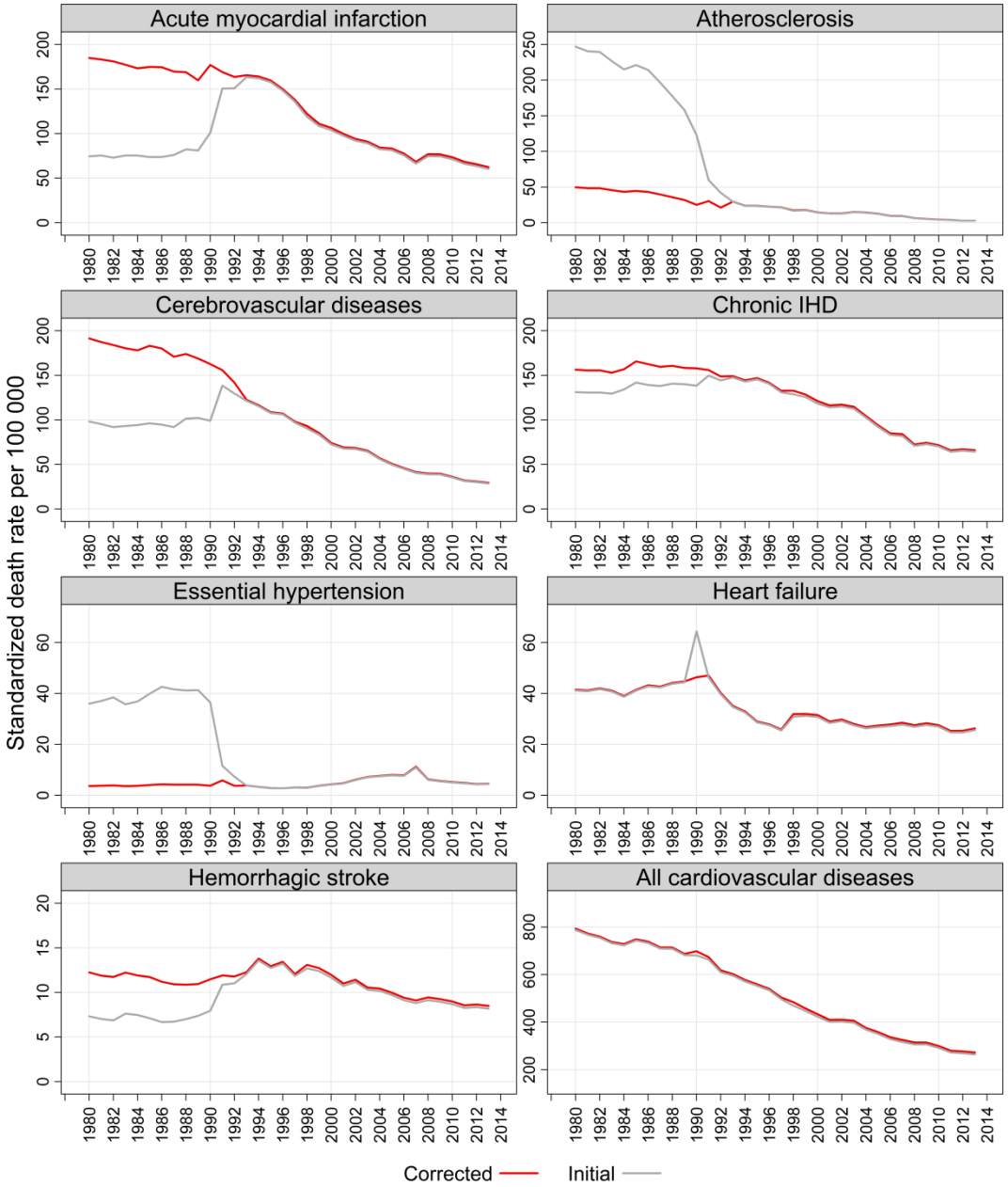
Age-cause decomposition life table technique (Andreev, 1982).

The required life tables (Chiang,1984) were constructed on the basis of reconstructed data.

Results

1. Corrections of CoD data for East Germany, 1980-1991

Corrections of mortality from cardiovascular diseases; East Germany, males [within CVD chapter]

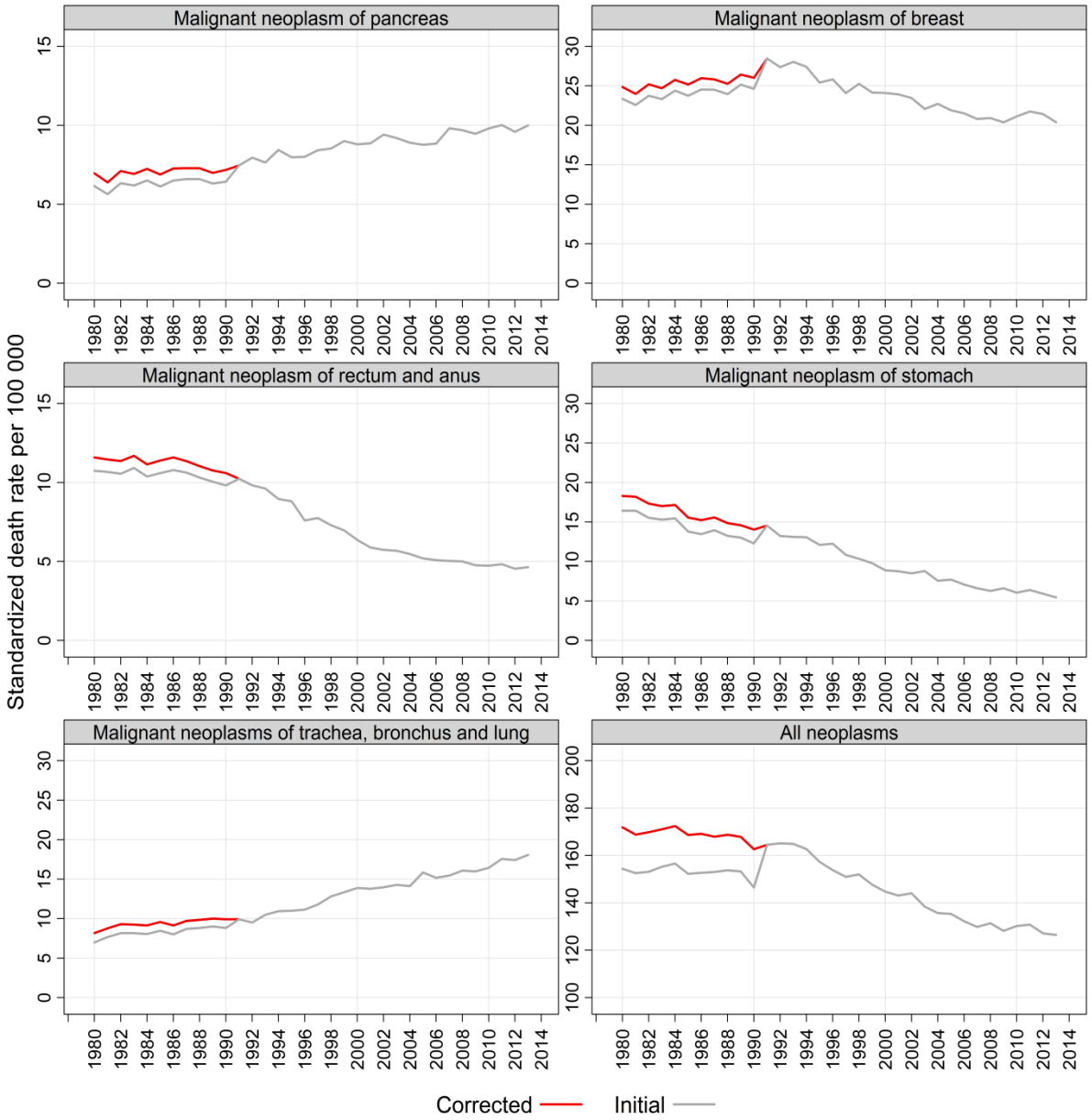


Approach

Careful reattribution of deaths from ill-defined source categories of 186 list (*atherosclerosis* and/or *essential hypertension*) to better defined circulatory conditions: *acute myocardial infarction*, *chronic ischemic heart disease*, *haemorrhagic stroke*, and *other cerebrovascular diseases*.

More details: Grigoriev and Pechholdová [forthcoming].

Corrections of selected cancers; East Germany, females [exchanges with other chapters]



Approach

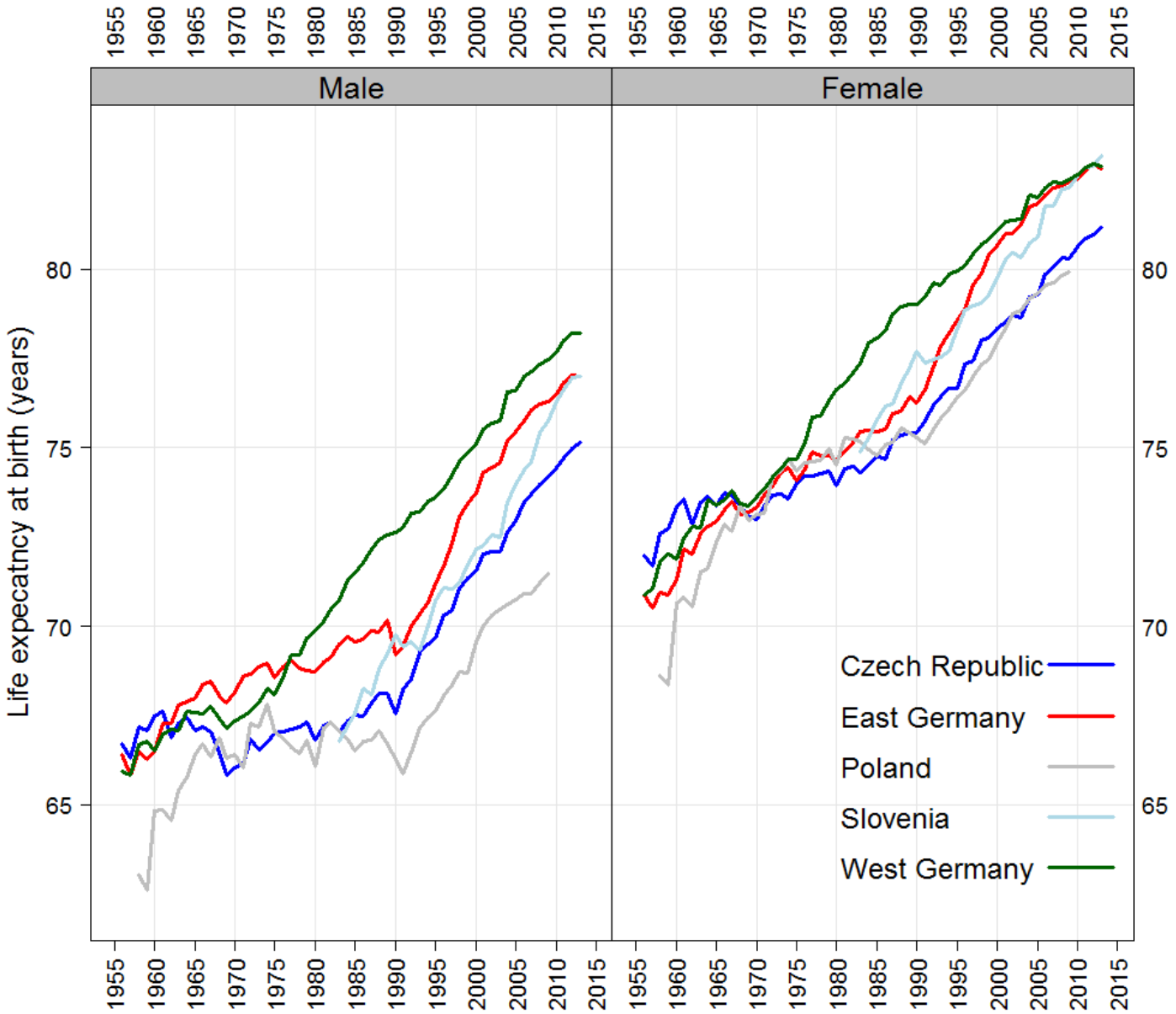
1) Thorough inspection of cause-specific trends known to be associated with cancers (from literature on multiple causes), and identification conditions symmetrical to the clear and sustained under-reporting of cancers (malnutrition, symptoms and signs, etc.)

2) Estimation of total number of 'excess' deaths for 1980-1990 for the identified 'over-reported' causes.

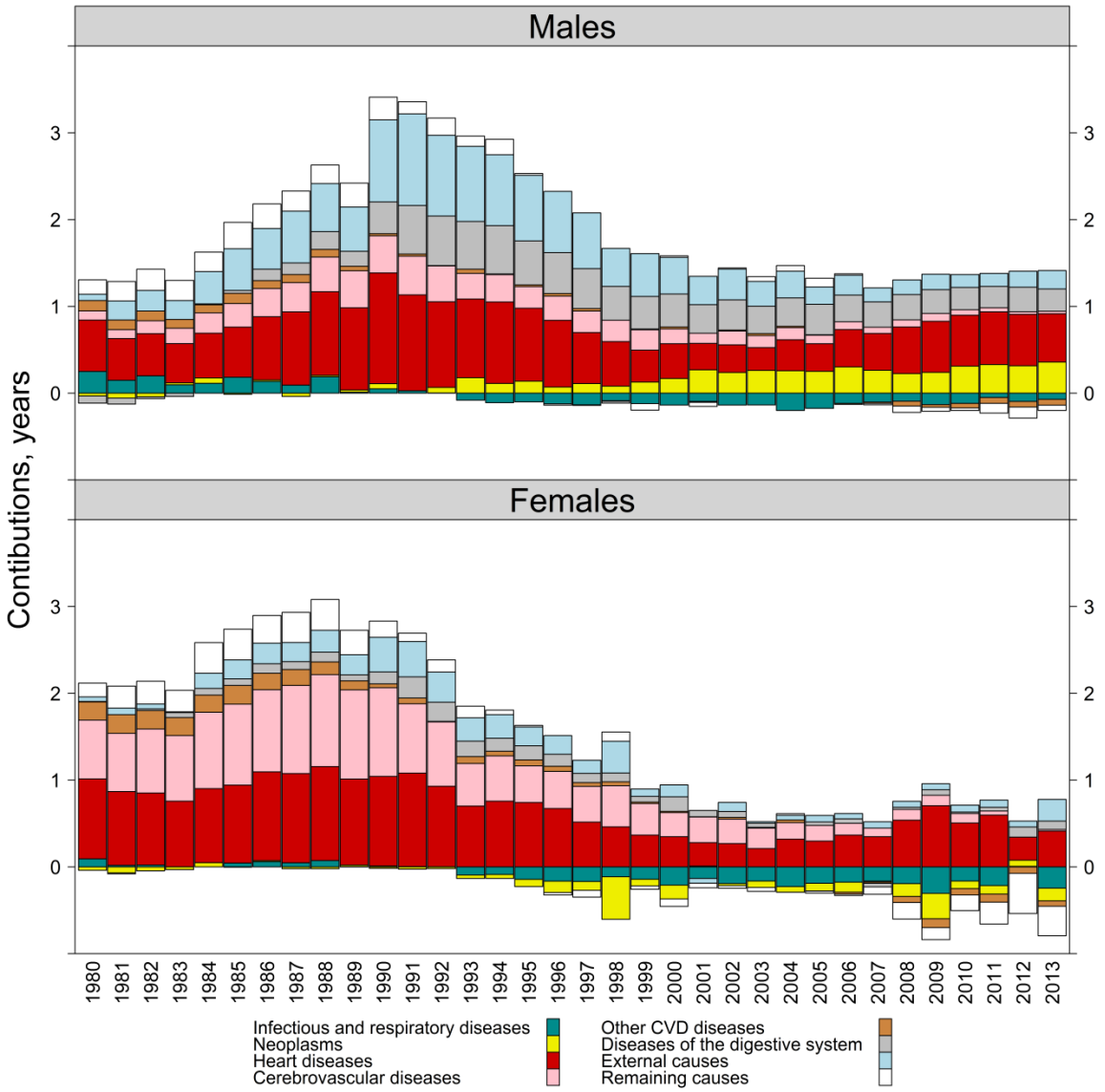
3) Age-sex specific redistribution of the 'excess' across individual cancer sites based on the relative size of the trend disruption.

2. Analysis of mortality trends

Life expectancy at birth by sex; East, West Germany and selected post-communist countries, 1956–2013



Cause-specific contributions to East-West mortality gap, 1980–2013



Steady East-West mortality gap about one year for males and two years for females until the mid-1980s. Then, it started growing.

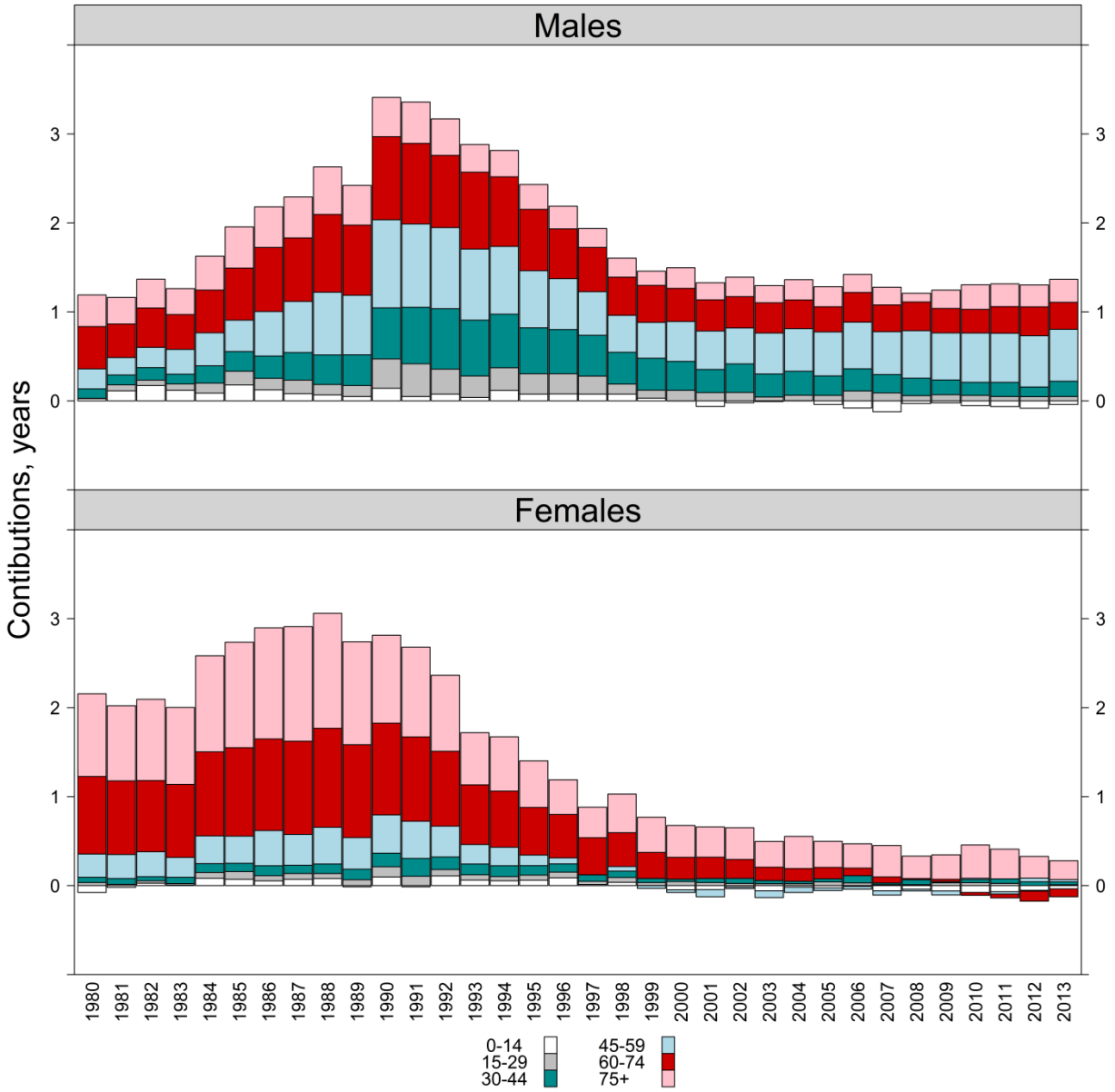
Historically, the biggest gap between East and West was observed in the years around reunification; not in the 1970s or the early 1980s.

Immediately after reunification, the role of mortality from external causes of death among adult males became particularly important.

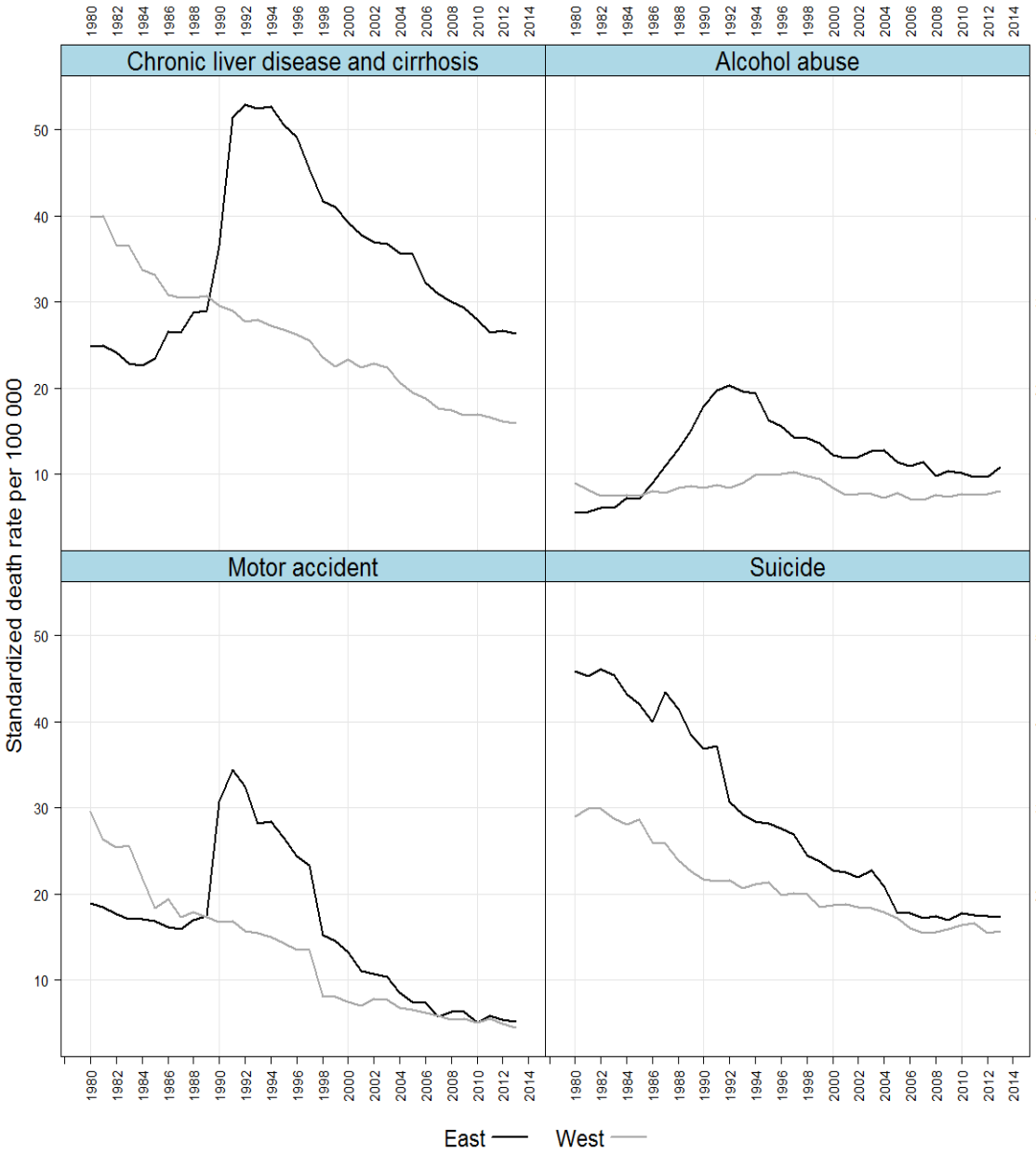
In more recent years, the persisting gap in male mortality has been largely due to higher mortality from heart diseases in East Germany.

Now, the gap in male mortality is still at the same level as it was in the early 1980s!

Age-specific contributions to East-West mortality gap, 1980–2013



SDR from selected alcohol-related and external causes of death; East and West Germany, 1980–2013, males



Mortality from the causes of death that are directly attributable to alcohol consumption (liver cirrhosis and alcohol abuse) has increased rapidly since the late 1980s.

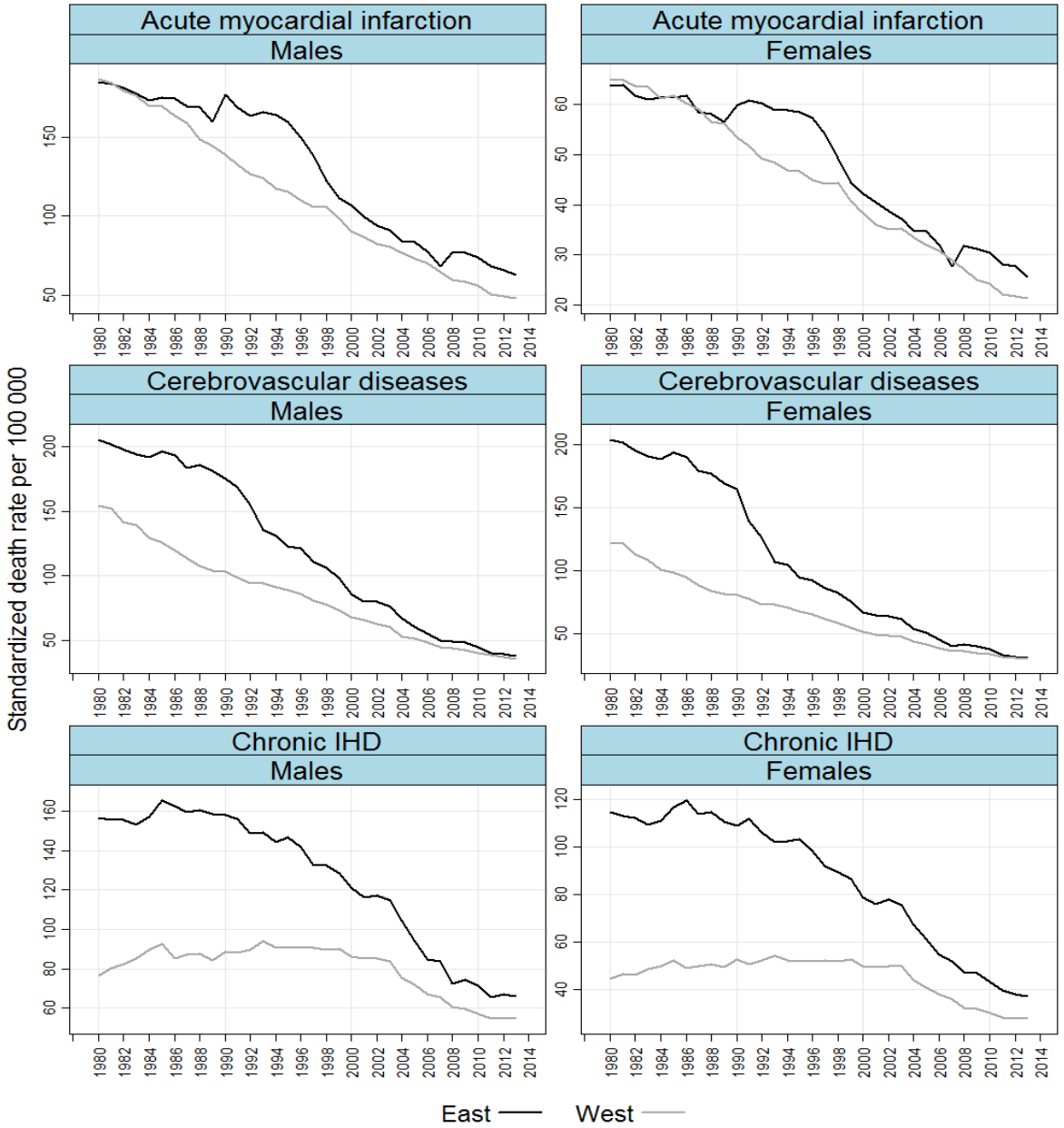
A similar pattern of an abrupt increase can be seen in transport accidents in the early 1990s.

However, no 'response' to socio-economic and political transition from suicide mortality.

Suicide mortality in East Germany declined rapidly until it converged to the level of West Germany in the mid-2000s.

A similar convergence pattern in mortality from transport accidents and alcohol abuse, but not in mortality from liver cirrhosis.

SDR from selected cardiovascular causes; East and West Germany, 1980–2013

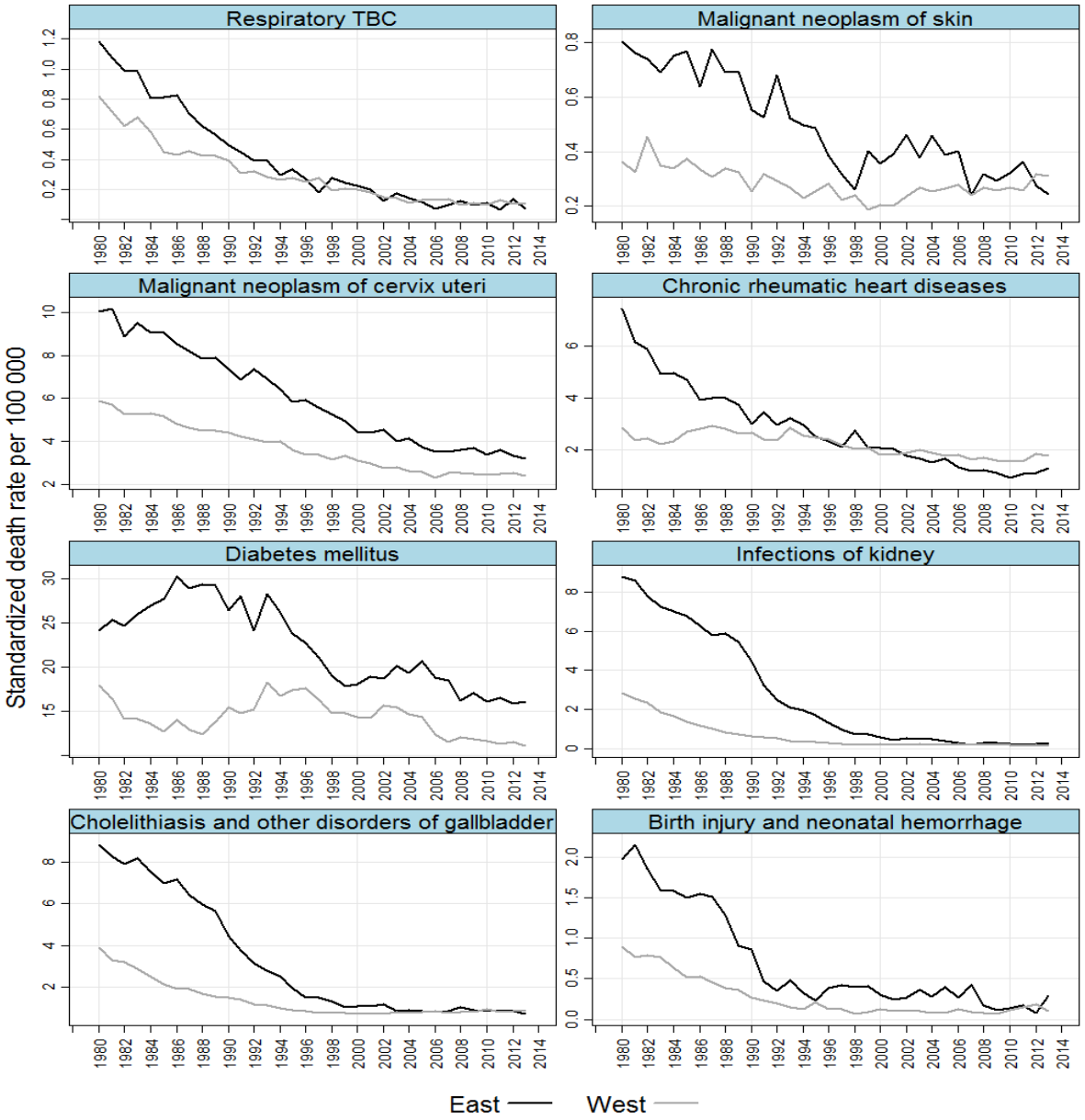


No East-West mortality gap from *acute myocardial infarction* in the 1980s. BUT it started growing in the 1990s because of both the rapid improvement in West Germany and the interruption in the declining trend in East Germany. The increase in 1990, was particularly pronounced among young males.

A notable disadvantage among East Germans for mortality from *cerebrovascular diseases*. BUT the steady improvements in the GDR since the 1980s which accelerated in the 1990s. The progress was driven by the reduction in mortality rates at very advanced age groups (85 plus in particular).

Very slow convergence in mortality from *chronic ischemic heart diseases.* Real progress in East Germany only since mid-2000s.

SDR from selected causes amenable to health interventions; East and West Germany, 1980–2013, females



The large differences in the initial mortality levels clearly suggest that medical care was more advanced in the FRG than in the GDR.

At the same time, the trends in these causes of death do not indicate that there was a serious crisis in health care provision in the GDR.

On the contrary: mortality from almost all selected conditions had been declining since 1980, with obvious acceleration occurring after reunification.

Conclusions

Three distinct processes taking place around the time of reunification:

1) continuous mortality reduction in the GDR since 1980 (mostly due to CVD)
2) temporary increase in male mortality in 1990-1991 related to the abrupt socioeconomic transition
3) reunification-driven process of convergence forcing the accelerated decline in mortality from cerebrovascular and chronic heart diseases.

The mortality trends in East and West Germany provide an illustrative example of the divergence-convergence cycles in mortality. Prior to reunification, the situation in East Germany was not deteriorating, but was even improving at a slow pace. The mortality gap was growing because of impressive progress in the West.

Mortality improvements in the GDR, which started in the 1980s, might be interpreted as first signs of a *cardiovascular revolution*, a historical process of CVD mortality reduction driven by both changes in individual behaviour and medical advances. Shifts in individual behaviour likely started before reunification, while the real progress in medical care occurred later with the implementation of the Western system of health care.

Thus, German reunification *per se* did not initiate the convergence process, but rather reinforced and accelerated the existing trends.

Acknowledgements

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Related publications

Grigoriev, P.; Pechholdová, M.: Health convergence between East and West Germany as reflected in long-term cause-specific mortality trends: how much was due to reunification? *European Journal of Population.* https://doi.org/10.1007/s10680-017-9455-z

Pechholdová, M.; Grigoriev, P.; Meslé, F.; Vallin, J.:
Have life expectancies in eastern and western Germany converged since reunification?
Population et Sociétés, 1-4 (2017)

Grigoriev, P.; Pechholdová, M. Harmonizing mortality series by causes of death for GDR/East Germany, 1960-2015: challenges and emerging research opportunities [Work in progress]