

## Supplementary information

*Belonging to:*

*Mackenbach, J.P. et al. Health inequalities before and after the financial crisis: trend study of 27 European countries.*

*Version 040418*

Contents:

Figure S1. Changes in crisis-related indicators, 2005-2007 vs. 2010-2012

Figure S2. Trends in all-cause mortality by education, women, ca. 1980-ca. 2014

Figure S3. Trends in inequalities in less-than-good self-assessed health and activity limitations

Figure S4. Trends in less-than-good self-assessed health among men in five crisis countries, by education

Figure S5. Changes between the early 2000s and early 2010s in cause-specific mortality, by country, sex and education

Table S1. Overview of the mortality data sources

Table S2. ICD-codes for the causes of death included in the analysis

Table S3. Overview of the survey data

Table S4. Comparison of trends in mortality and mortality inequalities between regional data for Barcelona and national data for Spain as a whole

Table S5. Results of interrupted time-series analysis of mortality

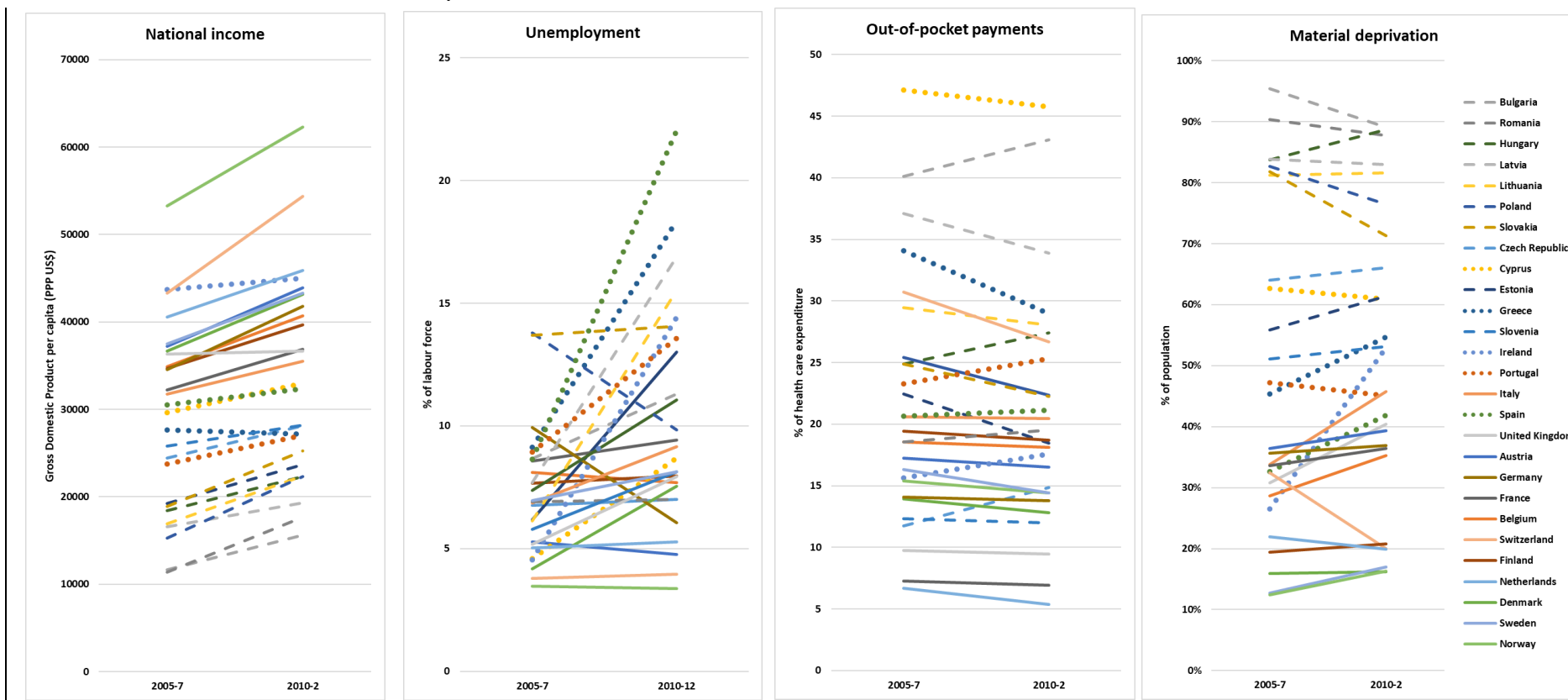
Table S6. Results of interrupted time-series analysis of less-than-good self-assessed health and activity limitations

Table S7. Relationship between crisis-related variables and mortality, less-than-good self-assessed health and activity limitations, by education, women

Box S1. Details on the regression analyses

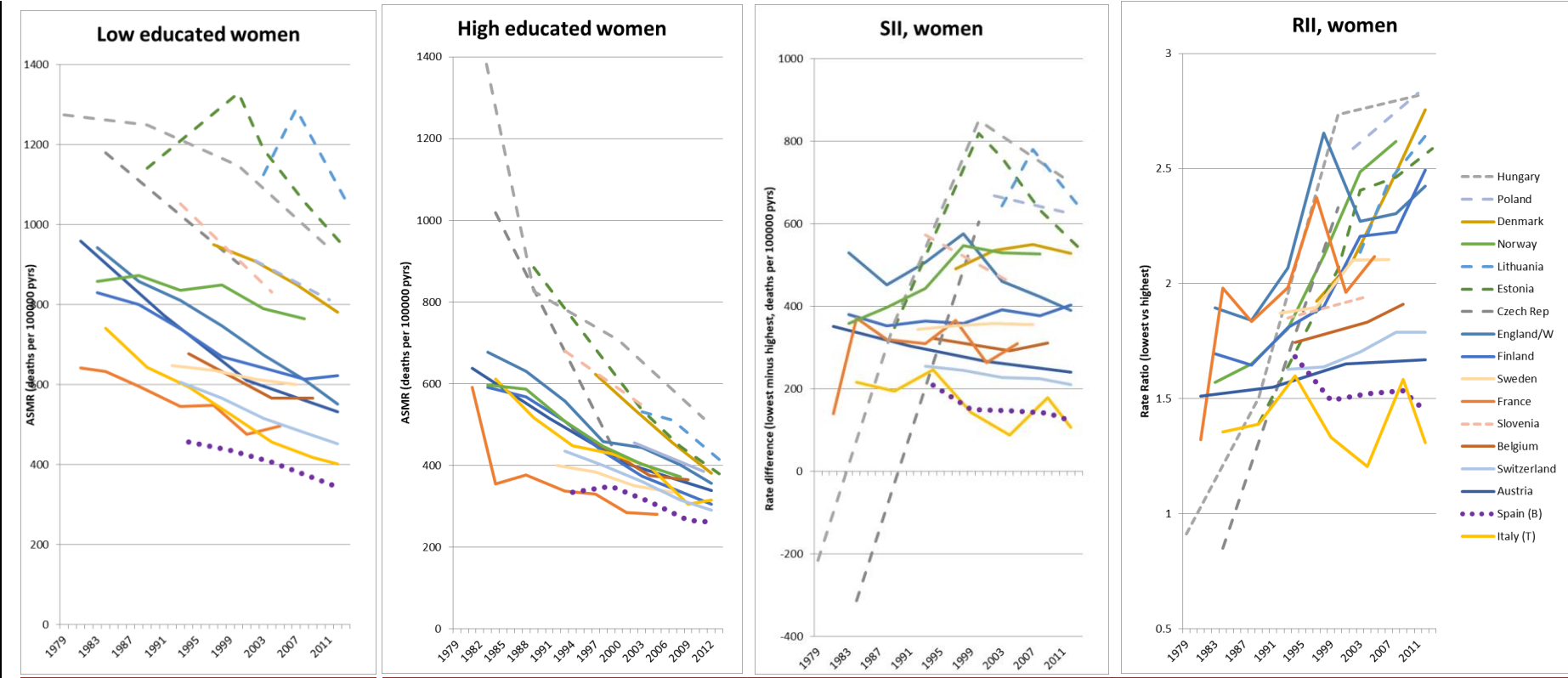
Box S2. Acknowledgements relating to data acquisition

Figure S1. Changes in crisis-related indicators, 2005-2007 vs. 2010-2012



Lines connect average values for 2005-2007 and 2010-2012. Dashed lines: Eastern Europe. Dotted lines: five Western European countries most severely hit by the crisis. Definition of material deprivation: see Data and methods section. Percentage of population with material deprivation applies to low educated men only.

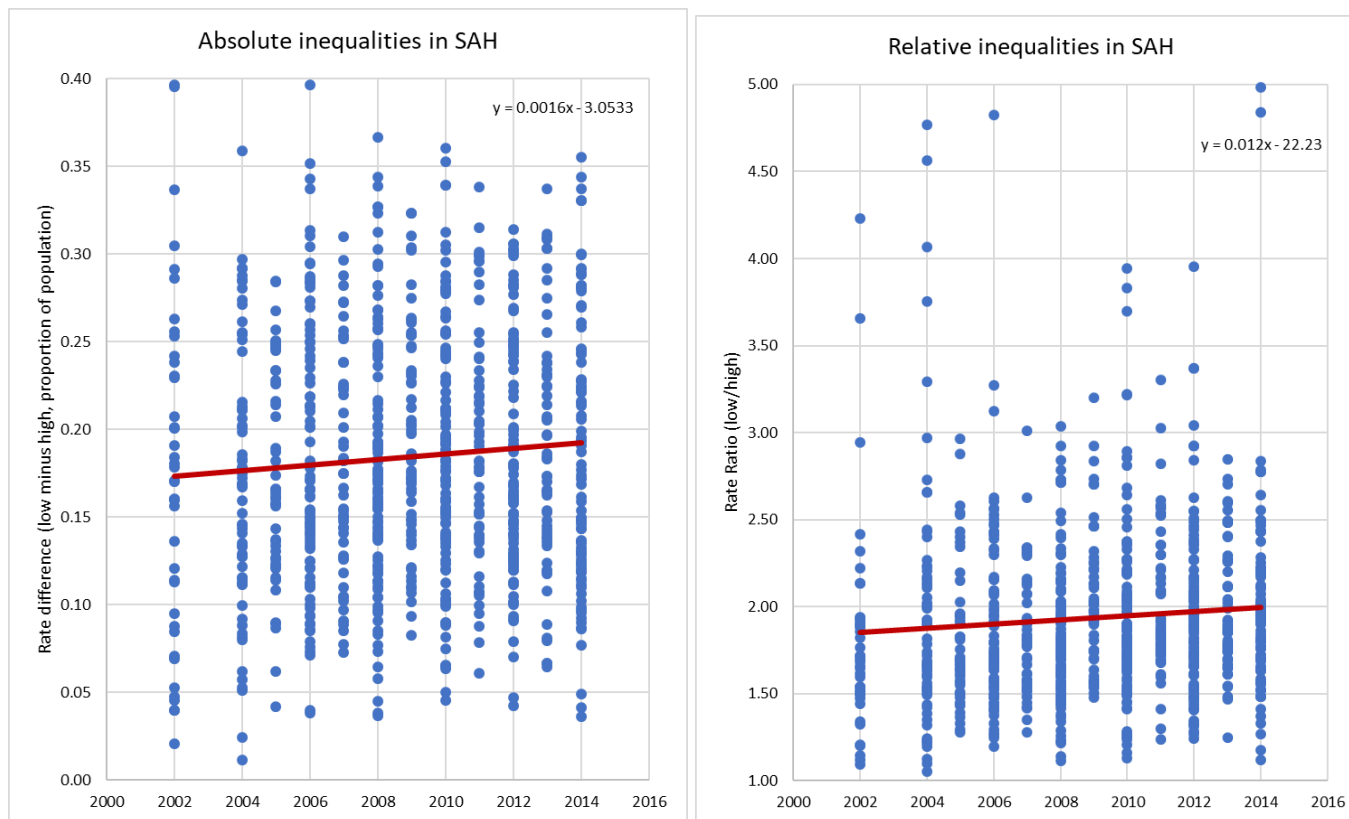
Figure S2. Trends in all-cause mortality by education, women, ca. 1980-ca. 2014



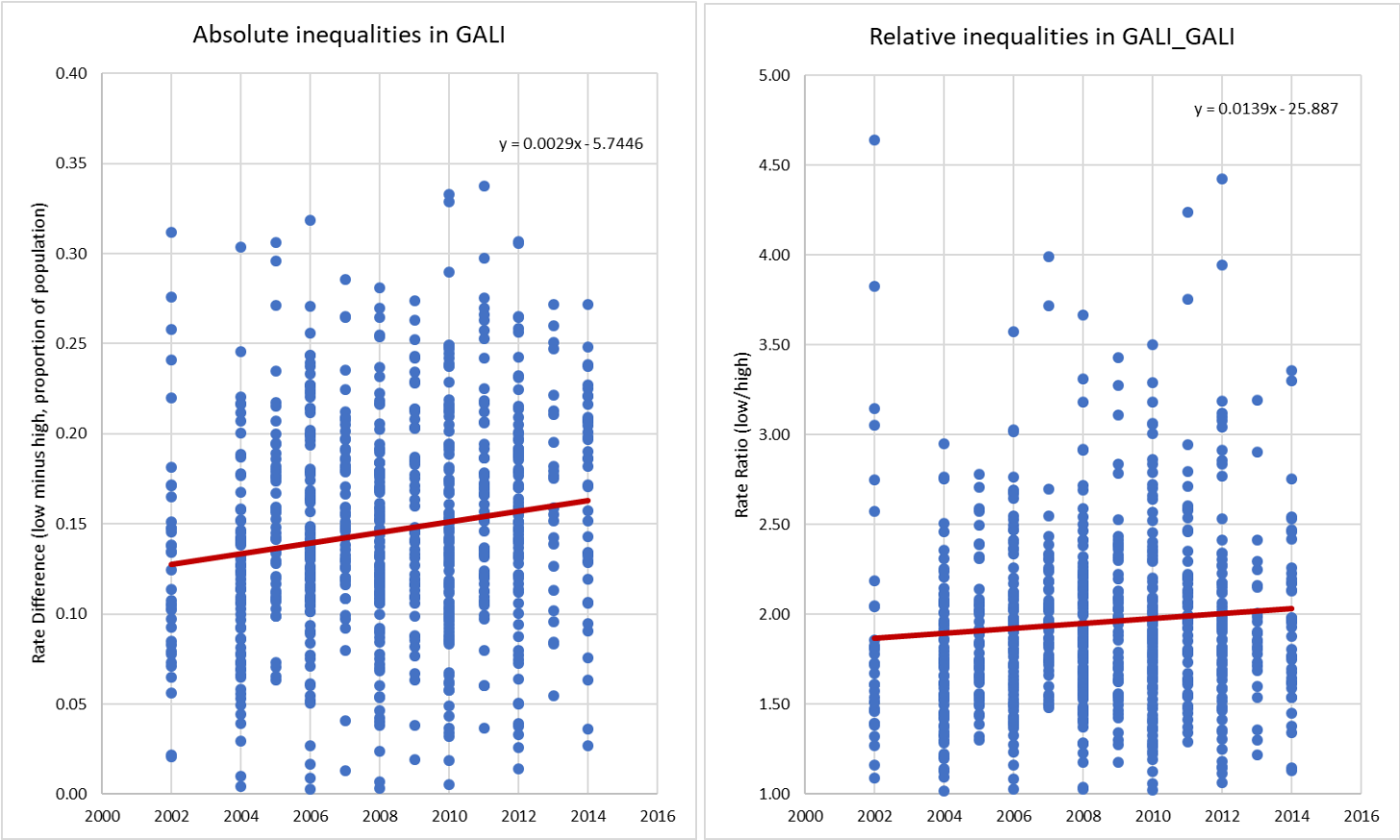
Dashed lines: Eastern Europe. Dotted line: Western European country most severely hit by the economic crisis. SII = Slope Index of Inequality. RII = Relative Index of Inequality. ASMR = age-standardized mortality rate.

Figure S3. Trends in inequalities in less-than-good self-assessed health and activity limitations.

a. Self-assessed health

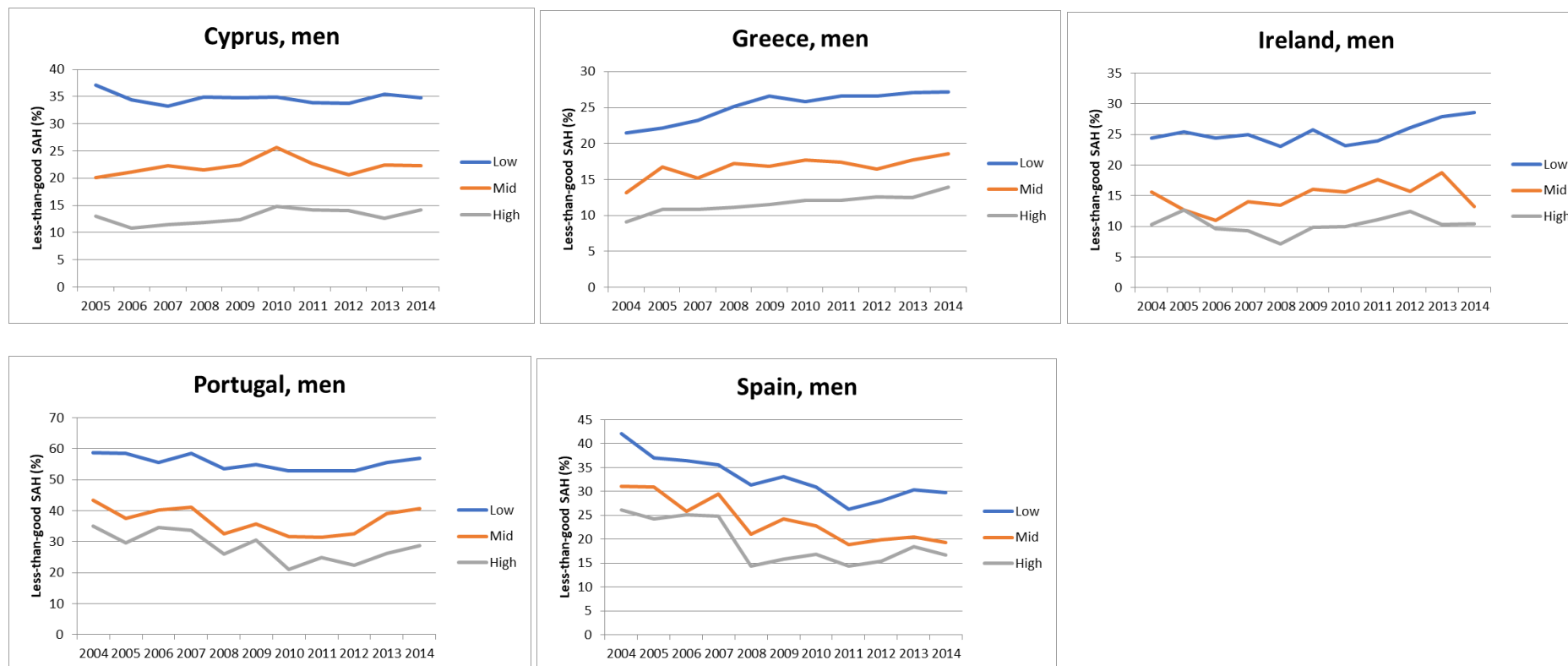


b. GALI limitations



RD = Rate Difference. RR = Rate Ratio. The red line represents a simple linear regression line of the RD or RR on calendar-year. Pooled data for men and women and two surveys (ESS and EU-SILC).

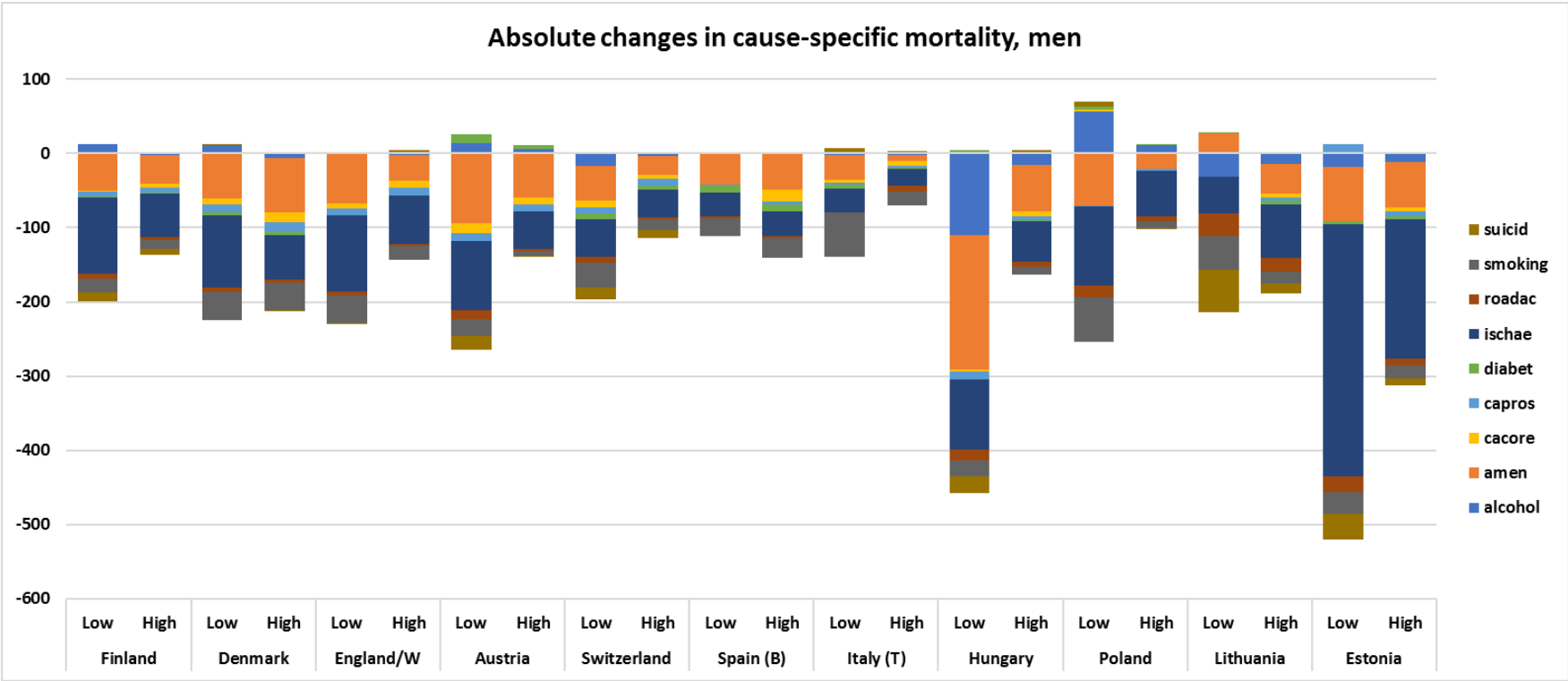
**Figure S4. Trends in less-than-good self-assessed health among men in five crisis countries, by education**



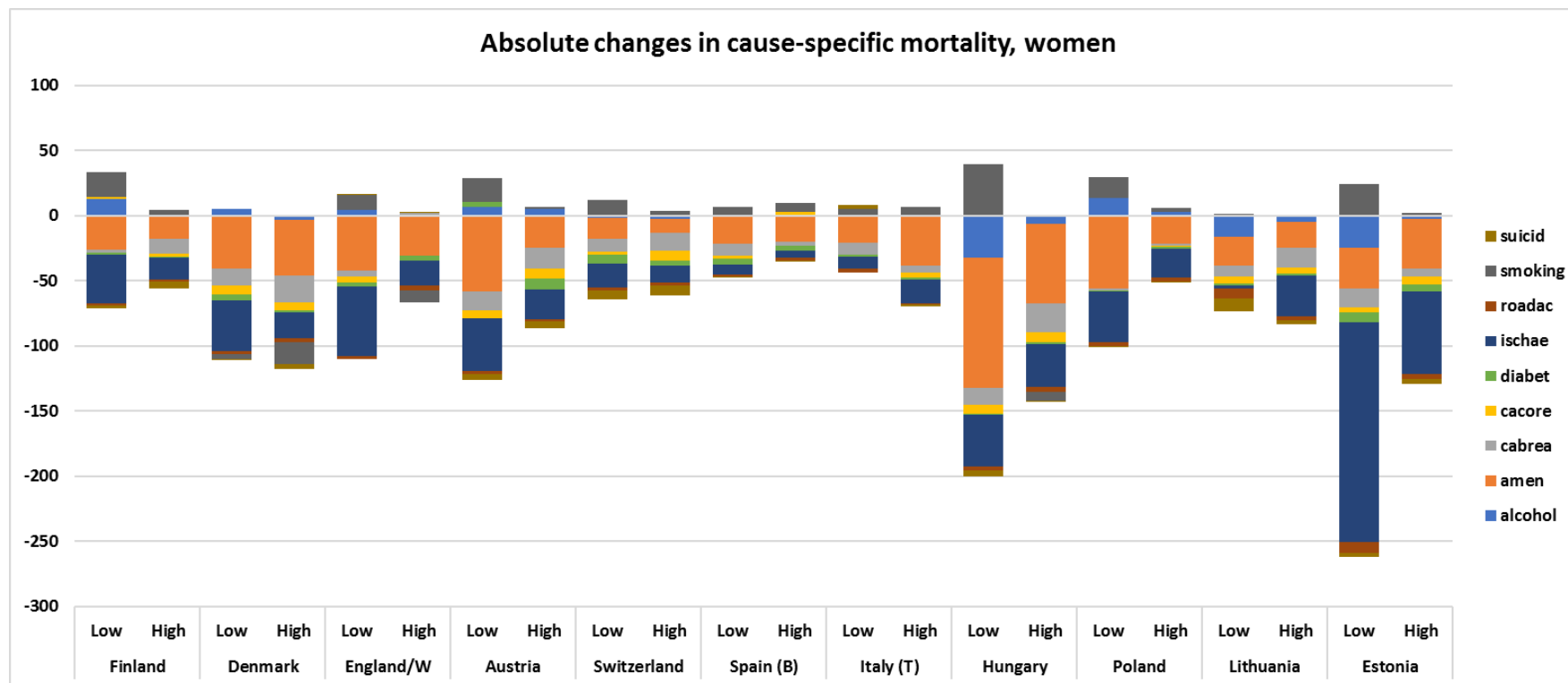
Age-standardized prevalence of less-than-good self-assessed health as reported in EU-SILC.

Figure S5. Changes between the early 2000s and early 2010s in cause-specific mortality, by country, sex and education.

a. Men



b. Women



Notes: suicide = suicide, smoking = smoking-related causes, roadacc = road traffic injuries, ischae = ischemic heart disease, diabet = diabetes mellitus, cacore = colorectal cancer, cabrea = breast cancer, amen = causes of death amenable to medical intervention, alcohol = alcohol-related causes of death. For ICD code numbers, see table S2.







**Table S2. ICD-codes for the causes of death included in the analysis**

	ICD-10 codes
<b>Total mortality, all causes</b>	A00-Y98
<b>Cardiovascular diseases</b>	<b>I00-I99</b>
<b>Cancer</b>	<b>C00-D48</b>
<b>Other diseases</b>	<b>Rest (A00-U85)</b>
<b>External causes</b>	<b>V01-Y98</b>
<i>Smoking-related causes*</i>	C33-C34;C32;J40-J44; J47
<i>Alcohol-related causes**</i>	F10; I42.6; K70; X45
<i>Amenable causes***</i>	A15-19, B90; J10-J18; Rest (A00-B99); C53; C62; C18-C21; C81; C91-C95; I60-I69; I00-I09; I10-I15; J45-J46; I98; K35-K38; K40-K46; K56; K80-K83; K25-K28; B20-B24; N40; O00-O99; Q20-Q24; P00-P96
Ischaemic heart disease	I20-I25
Cerebrovascular disease	I60-I69
Stomach cancer	C16
Colorectal cancer	C18-C21
Cancer of trachea, bronchus and lung	C33-C34
Breast cancer	C50
Prostate cancer	C61
Tuberculosis	A15-19, B90
Diabetes mellitus	E10-E14
Pneumonia	J10-J18
Chronic obstructive pulmonary disease	J40-J44; J47
Road traffic injuries	V01-V89, Y85
Suicide	X60-X84, Y87.0
* Cancer of trachea, bronchus and lung; Cancer of larynx and oropharynx; Chronic obstructive pulmonary disease	
** Alcoholic psychosis, dependence and abuse; Alcoholic cardiomyopathy; Alcoholic cirrhosis of the liver; Accidental poisoning by alcohol	
*** Tuberculosis; Pneumonia/influenza; Other infectious and parasitic diseases; Cancer of cervix uteri; Cancer of testis; Cancer of colon-rectum; Hodgkin's disease; Leukemia; Cerebrovascular disease; Rheumatic heart disease; Hypertension; Asthma; Other heart disease (not listed as Hypertension or Ischaemic heart disease); Appendicitis, hernia, cholecystitis and lithiasis; Peptic ulcer; HIV/AIDS; Prostate hyperplasia; Maternal deaths; Congenital heart disease; Conditions originating in the perinatal period	



**Table S4. Comparison of trends in mortality and mortality inequalities between regional data for Barcelona and national data for Spain as a whole.**

Spain (Barcelona)																
		Low educated			Mid educated			High educated			Slope Index of Inequality		Relative Index of Inequality			
	period	ASMR	95% C.I		ASMR	95% C.I		ASMR	95% C.I		SII	95% C.I		RII	95% C.I	
males	1992-1996	1163	1145	1181	970	936	1006	784	752	815	600	544	656	1,81	1,70	1,92
	1997-2001	1124	1106	1142	959	925	993	754	724	783	571	518	624	1,76	1,66	1,87
	2002-2006	1001	983	1018	822	795	852	658	633	684	533	486	580	1,84	1,74	1,95
	2007-2010	894	875	913	739	711	769	555	531	580	516	469	564	1,95	1,82	2,09
	2011-2013	827	806	848	678	649	706	467	443	491	556	505	606	2,18	2,01	2,37
females	1992-1996	456	448	465	374	350	400	334	308	361	208	169	248	1,68	1,51	1,87
	1997-2001	435	426	444	373	351	396	349	325	372	150	113	188	1,49	1,35	1,65
	2002-2006	405	396	414	357	338	377	311	292	331	147	114	180	1,52	1,38	1,67
	2007-2010	368	358	378	345	325	366	265	248	284	142	109	175	1,53	1,38	1,70
	2011-2013	344	331	357	320	299	341	262	244	283	122	86	158	1,45	1,28	1,63
Spain (national)																
		Low educated			Mid educated			High educated			Slope Index of Inequality		Relative Index of Inequality			
	period	ASMR	95% C.I		ASMR	95% C.I		ASMR	95% C.I		SII	95% C.I		RII	95% C.I	
males	2002-2006	1021	1018	1024	862	854	870	720	712	728	464	452	476	1,78	1,75	1,81
	2007-2011	918	915	921	748	742	755	614	608	620	473	463	484	1,89	1,86	1,92
females	2002-2006	438	437	440	372	366	378	336	329	343	169	159	179	1,56	1,52	1,60
	2007-2011	395	393	397	336	331	341	311	305	316	144	136	152	1,52	1,48	1,56

National data for Spain as a whole are only available after 2002, and are based on mortality follow-up of the population enumerated in the 2001 census (See: Regidor E, Vallejo F, Granados JAT, Viciano-Fernandez FJ, de la Fuente L, Barrio G. Mortality decrease according to socioeconomic groups during the economic crisis in Spain: a cohort study of 36 million people. Lancet. 2016;388(10060):2642-52).

**Table S5. Results of interrupted time-series analysis of mortality.**

		Total mortality			Cardiovascular diseases			Cancer			Other diseases			External causes		
		Estimate	Std. Error	Sig.	Estimate	Std. Error	Sig.	Estimate	Std. Error	Sig.	Estimate	Std. Error	Sig.	Estimate	Std. Error	Sig.
Western Europe	trend 1980-2008	-1.7%	0.1%	0.000	-3.4%	0.2%	0.000	-1.1%	0.1%	0.000	-0.4%	0.2%	0.068	-0.7%	0.3%	0.049
Low educated men	change in trend 2008	0.0%	0.0%	0.252	-0.1%	0.1%	0.074	-0.1%	0.0%	0.052	0.0%	0.1%	0.760	<b>-0.3%</b>	<b>0.1%</b>	<b>0.009</b>
Western Europe	trend 1980-2008	-2.7%	0.1%	0.000	-4.9%	0.2%	0.000	-1.6%	0.1%	0.000	-1.0%	0.3%	0.004	-1.8%	0.3%	0.000
High educated men	change in trend 2008	<b>-0.1%</b>	<b>0.0%</b>	<b>0.027</b>	-0.1%	0.1%	0.180	<b>-0.1%</b>	<b>0.0%</b>	<b>0.006</b>	-0.1%	0.1%	0.293	-0.2%	0.1%	0.254
Western Europe	trend 1980-2008	-1.3%	0.1%	0.000	-3.7%	0.1%	0.000	-0.4%	0.2%	0.006	0.3%	0.2%	0.284	-0.8%	0.4%	0.084
Low educated women	change in trend 2008	0.0%	0.0%	0.994	-0.1%	0.1%	0.125	0.0%	0.1%	0.997	0.0%	0.1%	0.971	<b>-0.3%</b>	<b>0.2%</b>	<b>0.049</b>
Western Europe	trend 1980-2008	-2.2%	0.1%	0.000	-4.8%	0.2%	0.000	-1.3%	0.1%	0.000	-0.7%	0.2%	0.001	-2.4%	0.4%	0.000
High educated women	change in trend 2008	-0.1%	0.1%	0.069	-0.1%	0.1%	0.354	-0.1%	0.1%	0.087	-0.2%	0.1%	0.094	<b>-0.6%</b>	<b>0.2%</b>	<b>0.009</b>
Eastern Europe	trend 1980-2008	-0.1%	0.3%	0.635	-0.9%	0.3%	0.018	0.9%	0.2%	0.001	0.2%	0.5%	0.714	-0.4%	0.6%	0.515
Low educated men	change in trend 2008	<b>-0.4%</b>	<b>0.1%</b>	<b>0.029</b>	-0.3%	0.2%	0.060	<b>-0.5%</b>	<b>0.1%</b>	<b>0.002</b>	-0.3%	0.3%	0.350	-0.5%	0.3%	0.090
Eastern Europe	trend 1980-2008	-3.3%	0.3%	0.000	-4.6%	0.4%	0.000	-2.1%	0.2%	0.000	-2.5%	0.6%	0.003	-2.3%	0.4%	0.001
High educated men	change in trend 2008	0.3%	0.2%	0.118	0.3%	0.2%	0.089	<b>0.2%</b>	<b>0.1%</b>	<b>0.029</b>	0.3%	0.3%	0.332	-0.2%	0.2%	0.278
Eastern Europe	trend 1980-2008	-0.9%	0.3%	0.007	-1.8%	0.3%	0.000	0.3%	0.1%	0.008	-0.2%	0.6%	0.790	-1.6%	0.5%	0.013
Low educated women	change in trend 2008	-0.1%	0.1%	0.364	-0.2%	0.2%	0.243	-0.1%	0.0%	0.072	0.0%	0.3%	0.901	-0.3%	0.3%	0.248
Eastern Europe	trend 1980-2008	-4.0%	0.5%	0.000	-5.1%	0.5%	0.000	-2.7%	0.4%	0.000	-3.2%	0.7%	0.002	-6.3%	0.6%	0.000
High educated women	change in trend 2008	0.4%	0.2%	0.112	0.2%	0.2%	0.332	0.3%	0.2%	0.072	0.3%	0.3%	0.309	0.3%	0.3%	0.293

**Table S5. Results of interrupted time-series analysis of mortality (continued).**

		Smoking-related mortality			Alcohol-related mortality			Amenable mortality			Road traffic injuries			Suicide		
		Estimate	Std. Error	Sig.	Estimate	Std. Error	Sig.	Estimate	Std. Error	Sig.	Estimate	Std. Error	Sig.	Estimate	Std. Error	Sig.
Western Europe	trend 1980-2008	-1.4%	0.3%	0.000	2.2%	0.5%	0.000	-2.4%	0.2%	0.000	-2.5%	0.4%	0.000	-0.8%	0.5%	0.097
Low educated men	change in trend 2008	0.0%	0.1%	0.681	<b>-0.7%</b>	<b>0.2%</b>	<b>0.001</b>	0.0%	0.1%	0.775	<b>-0.6%</b>	<b>0.2%</b>	<b>0.005</b>	-0.3%	0.2%	0.104
Western Europe	trend 1980-2008	-2.6%	0.3%	0.000	1.1%	0.8%	0.181	-3.2%	0.1%	0.000	-3.3%	0.6%	0.000	-2.1%	0.6%	0.003
High educated men	change in trend 2008	-0.1%	0.1%	0.139	<b>-0.6%</b>	<b>0.3%</b>	<b>0.048</b>	<b>-0.2%</b>	<b>0.1%</b>	<b>0.021</b>	-0.6%	0.3%	0.059	0.1%	0.3%	0.734
Western Europe	trend 1980-2008	2.8%	0.4%	0.000	3.5%	0.6%	0.000	-2.6%	0.2%	0.000	-3.4%	0.7%	0.000	-1.3%	0.4%	0.004
Low educated women	change in trend 2008	-0.1%	0.1%	0.378	<b>-0.5%</b>	<b>0.2%</b>	<b>0.016</b>	0.1%	0.1%	0.410	<b>-1.4%</b>	<b>0.4%</b>	<b>0.002</b>	-0.1%	0.2%	0.718
Western Europe	trend 1980-2008	0.5%	0.3%	0.067	3.2%	1.3%	0.023	-3.2%	0.2%	0.000	-5.1%	0.6%	0.000	-2.9%	0.6%	0.000
High educated women	change in trend 2008	-0.1%	0.2%	0.479	-0.6%	0.4%	0.136	0.0%	0.1%	0.636	-0.5%	0.3%	0.075	-0.4%	0.3%	0.110
Eastern Europe	trend 1980-2008	0.4%	0.4%	0.353	10.6%	4.0%	0.024	-0.7%	0.3%	0.039	-2.8%	0.6%	0.003	6.1%	3.2%	0.091
Low educated men	change in trend 2008	-0.4%	0.2%	0.102	-1.9%	2.1%	0.386	-0.2%	0.2%	0.176	-0.6%	0.3%	0.102	-1.5%	1.8%	0.418
Eastern Europe	trend 1980-2008	-2.1%	0.4%	0.000	7.3%	3.2%	0.046	-3.9%	0.4%	0.000	-3.1%	1.0%	0.013	0.7%	2.6%	0.803
High educated men	change in trend 2008	0.2%	0.2%	0.396	-0.8%	1.5%	0.624	<b>0.5%</b>	<b>0.2%</b>	<b>0.044</b>	<b>-1.0%</b>	<b>0.4%</b>	<b>0.047</b>	-0.7%	1.3%	0.615
Eastern Europe	trend 1980-2008	2.1%	0.4%	0.000	10.9%	4.3%	0.031	-1.8%	0.3%	0.000	-3.2%	1.5%	0.063	3.0%	3.2%	0.380
Low educated women	change in trend 2008	0.2%	0.2%	0.281	-1.7%	2.3%	0.489	-0.1%	0.2%	0.560	-0.5%	0.8%	0.557	-1.7%	1.8%	0.368
Eastern Europe	trend 1980-2008	-2.1%	0.5%	0.003	9.4%	5.1%	0.109	-4.5%	0.6%	0.000	-5.5%	0.9%	0.000	-4.8%	2.8%	0.122
High educated women	change in trend 2008	<b>0.6%</b>	<b>0.2%</b>	<b>0.031</b>	-2.2%	1.3%	0.125	0.4%	0.3%	0.112	-0.3%	0.4%	0.396	0.3%	1.2%	0.841

**Table S5. Results of interrupted time-series analysis of mortality (continued).**

		35-39			40-44			45-49			50-54			55-59		
		Estimate	Std. Error	Sig.	Estimate	Std. Error	Sig.	Estimate	Std. Error	Sig.	Estimate	Std. Error	Sig.	Estimate	Std. Error	Sig.
Western Europe	trend 1980-2008	-0.5%	0.6%	0.416	-1.1%	0.3%	0.002	-0.9%	0.2%	0.000	-1.2%	0.2%	0.000	-1.5%	0.2%	0.000
Low educated men	change in trend 2008	-0.1%	0.2%	0.491	<b>-0.4%</b>	<b>0.1%</b>	<b>0.002</b>	<b>-0.2%</b>	<b>0.1%</b>	<b>0.042</b>	-0.1%	0.1%	0.107	0.0%	0.1%	0.496
Western Europe	trend 1980-2008	-2.5%	0.6%	0.000	-3.0%	0.5%	0.000	-2.3%	0.3%	0.000	-2.5%	0.2%	0.000	-2.5%	0.3%	0.000
High educated men	change in trend 2008	-0.3%	0.3%	0.273	-0.2%	0.1%	0.167	<b>-0.4%</b>	<b>0.2%</b>	<b>0.019</b>	<b>-0.3%</b>	<b>0.1%</b>	<b>0.033</b>	-0.1%	0.1%	0.162
Western Europe	trend 1980-2008	0.1%	0.4%	0.847	-0.4%	0.4%	0.365	0.1%	0.3%	0.814	-0.2%	0.3%	0.550	-0.6%	0.3%	0.018
Low educated women	change in trend 2008	<b>-0.5%</b>	<b>0.2%</b>	<b>0.013</b>	-0.2%	0.1%	0.087	-0.2%	0.2%	0.315	-0.2%	0.1%	0.125	0.1%	0.1%	0.477
Western Europe	trend 1980-2008	-2.4%	0.4%	0.000	-2.8%	0.4%	0.000	-2.1%	0.2%	0.000	-1.4%	0.3%	0.000	-1.4%	0.2%	0.000
High educated women	change in trend 2008	-0.4%	0.2%	0.069	-0.3%	0.2%	0.180	<b>-0.3%</b>	<b>0.1%</b>	<b>0.020</b>	<b>-0.3%</b>	<b>0.1%</b>	<b>0.014</b>	<b>-0.3%</b>	<b>0.1%</b>	<b>0.017</b>
Eastern Europe	trend 1980-2008	-1.5%	1.0%	0.160	-0.1%	0.8%	0.882	0.7%	0.5%	0.196	0.8%	0.3%	0.034	0.8%	0.3%	0.033
Low educated men	change in trend 2008	-0.5%	0.5%	0.373	-0.8%	0.4%	0.067	<b>-0.9%</b>	<b>0.3%</b>	<b>0.011</b>	<b>-0.6%</b>	<b>0.2%</b>	<b>0.007</b>	<b>-0.5%</b>	<b>0.2%</b>	<b>0.011</b>
Eastern Europe	trend 1980-2008	-2.8%	0.8%	0.006	-2.3%	0.8%	0.027	-1.5%	0.2%	0.000	-2.3%	0.4%	0.001	-2.7%	0.5%	0.000
High educated men	change in trend 2008	<b>-1.2%</b>	<b>0.4%</b>	<b>0.008</b>	-0.5%	0.4%	0.182	<b>-0.7%</b>	<b>0.1%</b>	<b>0.000</b>	-0.2%	0.2%	0.332	-0.1%	0.2%	0.693
Eastern Europe	trend 1980-2008	-0.6%	0.8%	0.475	0.9%	0.7%	0.234	1.1%	0.6%	0.105	1.0%	0.5%	0.069	0.3%	0.5%	0.627
Low educated women	change in trend 2008	-0.7%	0.4%	0.156	<b>-1.0%</b>	<b>0.4%</b>	<b>0.020</b>	-0.7%	0.3%	0.056	-0.4%	0.2%	0.106	-0.2%	0.3%	0.520
Eastern Europe	trend 1980-2008	-2.4%	0.9%	0.025	-4.1%	0.6%	0.000	-2.7%	0.3%	0.000	-3.5%	0.4%	0.000	-3.9%	0.4%	0.000
High educated women	change in trend 2008	-0.7%	0.3%	0.065	0.2%	0.2%	0.403	-0.2%	0.2%	0.184	0.0%	0.2%	0.995	0.4%	0.2%	0.061



**Table S5. Results of interrupted time-series analysis of mortality (continued).**

		60-64			65-69			70-74			75-79		
		Estimate	Std. Error	Sig.	Estimate	Std. Error	Sig.	Estimate	Std. Error	Sig.	Estimate	Std. Error	Sig.
Western Europe	trend 1980-2008	-1.8%	0.2%	0.000	-2.1%	0.1%	0.000	-2.1%	0.1%	0.000	-1.9%	0.1%	0.000
Low educated men	change in trend 2008	<b>0.1%</b>	<b>0.1%</b>	<b>0.029</b>	0.1%	0.1%	0.171	0.0%	0.0%	0.344	-0.1%	0.1%	0.057
Western Europe	trend 1980-2008	-2.8%	0.2%	0.000	-3.1%	0.2%	0.000	-2.9%	0.2%	0.000	-2.5%	0.1%	0.000
High educated men	change in trend 2008	0.0%	0.1%	0.733	0.0%	0.1%	0.581	0.0%	0.1%	0.916	<b>-0.2%</b>	<b>0.1%</b>	<b>0.007</b>
Western Europe	trend 1980-2008	-1.2%	0.2%	0.000	-1.8%	0.2%	0.000	-1.9%	0.2%	0.000	-1.8%	0.2%	0.000
Low educated women	change in trend 2008	<b>0.2%</b>	<b>0.1%</b>	<b>0.027</b>	<b>0.2%</b>	<b>0.1%</b>	<b>0.005</b>	0.0%	0.1%	0.700	0.0%	0.1%	0.706
Western Europe	trend 1980-2008	-2.0%	0.2%	0.000	-2.1%	0.2%	0.000	-2.7%	0.2%	0.000	-2.0%	0.2%	0.000
High educated women	change in trend 2008	-0.1%	0.1%	0.540	0.0%	0.1%	0.717	0.1%	0.1%	0.334	-0.1%	0.1%	0.238
Eastern Europe	trend 1980-2008	0.2%	0.3%	0.527	0.2%	0.2%	0.398	-0.3%	0.2%	0.103	-0.6%	0.1%	0.001
Low educated men	change in trend 2008	<b>-0.3%</b>	<b>0.1%</b>	<b>0.046</b>	<b>-0.3%</b>	<b>0.1%</b>	<b>0.009</b>	<b>-0.3%</b>	<b>0.1%</b>	<b>0.003</b>	<b>-0.2%</b>	<b>0.1%</b>	<b>0.021</b>
Eastern Europe	trend 1980-2008	-3.2%	0.3%	0.000	-2.7%	0.2%	0.000	-3.3%	0.2%	0.000	-2.8%	0.3%	0.000
High educated men	change in trend 2008	0.2%	0.1%	0.135	0.1%	0.1%	0.254	<b>0.4%</b>	<b>0.1%</b>	<b>0.002</b>	0.2%	0.1%	0.219
Eastern Europe	trend 1980-2008	-0.9%	0.3%	0.020	-0.8%	0.3%	0.033	-1.6%	0.2%	0.000	-1.3%	0.1%	0.000
Low educated women	change in trend 2008	0.1%	0.2%	0.385	-0.1%	0.2%	0.592	-0.1%	0.1%	0.416	<b>-0.2%</b>	<b>0.1%</b>	<b>0.010</b>
Eastern Europe	trend 1980-2008	-3.6%	0.4%	0.000	-2.8%	0.5%	0.000	-3.1%	0.4%	0.000	-2.4%	0.6%	0.005
High educated women	change in trend 2008	0.2%	0.2%	0.455	-0.1%	0.2%	0.767	0.1%	0.2%	0.481	-0.2%	0.3%	0.553

Percent annual change as estimated in interrupted time-series analyses (trend 1980-2008 based on  $\beta_1$ , change in trend after 2008 based on  $\beta_2$ ; see Data and methods section for details). In bold:  $\beta_2$  statistically significantly ( $p < .05$ ) different from 0. For distinction between Western and Eastern Europe, see Supplementary table S1.

**Table S6. Results of interrupted time-series analysis of less-than-good self-assessed health and activity limitations.**

			Low educated men			High educated men			Low educated women			High educated women		
			Estimate	Std. Error	Sig.	Estimate	Std. Error	Sig.	Estimate	Std. Error	Sig.	Estimate	Std. Error	Sig.
Western Europe	SAH	Trend 2002-08	-1.5%	0.5%	0.001	-2.7%	0.7%	0.000	-0.7%	0.4%	0.122	-2.0%	0.7%	0.004
		Change in trend 2008	0.4%	0.2%	0.057	0.7%	0.4%	0.066	0.3%	0.2%	0.128	0.0%	0.3%	0.970
	GALI	Trend 2002-08	1.4%	0.7%	0.037	1.6%	1.0%	0.109	2.4%	0.7%	0.000	0.9%	1.0%	0.347
		Change in trend 2008	-0.2%	0.4%	0.588	-0.1%	0.5%	0.800	-0.4%	0.3%	0.219	0.0%	0.5%	0.967
Eastern Europe	SAH	Trend 2002-08	-1.2%	0.4%	0.003	-2.5%	0.8%	0.002	-1.6%	0.4%	0.000	-3.2%	0.7%	0.000
		Change in trend 2008	<b>-0.5%</b>	<b>0.2%</b>	<b>0.006</b>	-0.3%	0.4%	0.416	-0.1%	0.2%	0.414	0.0%	0.3%	0.973
	GALI	Trend 2002-08	1.9%	1.0%	0.075	1.1%	1.7%	0.518	0.5%	1.4%	0.705	0.8%	1.9%	0.682
		Change in trend 2008	-0.7%	0.5%	0.144	-0.2%	0.9%	0.796	0.6%	0.7%	0.360	0.2%	0.9%	0.861
Five crisis countries	SAH	Trend 2002-08	-1.7%	0.8%	0.030	-3.2%	1.6%	0.055	-1.4%	0.8%	0.075	-2.2%	1.5%	0.150
		Change in trend 2008	<b>0.8%</b>	<b>0.3%</b>	<b>0.022</b>	1.3%	0.8%	0.119	0.5%	0.4%	0.215	0.1%	0.8%	0.915
	GALI	Trend 2002-08	0.1%	1.1%	0.920	0.0%	2.0%	0.981	0.3%	1.1%	0.773	-1.7%	2.0%	0.402
		Change in trend 2008	-0.2%	0.6%	0.763	0.1%	1.1%	0.950	-0.4%	0.6%	0.548	0.6%	1.0%	0.553

Percent annual change as estimated in interrupted time-series analyses (trend 2002-2008 based on  $\beta_1$ , change in trend after 2008 based on  $\beta_2$ ; see Data and methods section for details). In bold:  $\beta_2$  statistically significantly ( $p < .05$ ) different from 0. For distinction between Western and Eastern Europe, see Supplementary table S1.

**Table S7. Relationship between crisis-related variables and mortality, less-than-good self-assessed health and activity limitations, by education, women**

Independent variable	Control variables	Education	Mortality			Self-assessed health			Activity limitations		
			Estimate	95% CI		Estimate	95% CI		Estimate	95% CI	
				Lower	Upper		Lower	Upper		Lower	Upper
national income (ln)	country, period, (survey)	Low	<b>-0.190</b>	<b>-0.264</b>	<b>-0.115</b>	<b>-0.175</b>	<b>-0.304</b>	<b>-0.046</b>	<b>0.309</b>	<b>0.065</b>	<b>0.553</b>
national income (ln)	country, period, (survey)	High	<b>-0.290</b>	<b>-0.442</b>	<b>-0.138</b>	<b>-0.340</b>	<b>-0.541</b>	<b>-0.140</b>	0.272	-0.082	0.627
unemployment (%)	country, period, (survey,) lnGDP	Low	<b>-0.007</b>	<b>-0.012</b>	<b>-0.003</b>	<b>-0.005</b>	<b>-0.010</b>	<b>-0.001</b>	-0.002	-0.010	0.006
unemployment (%)	country, period, (survey,) lnGDP	High	<b>-0.005</b>	<b>-0.011</b>	<b>0.001</b>	<b>-0.007</b>	<b>-0.014</b>	<b>0.000</b>	<b>-0.013</b>	<b>-0.025</b>	<b>0.000</b>
mat deprivation (%)	country, period, (survey,) lnGDP	Low	-0.243	-0.669	0.183	<b>0.229</b>	<b>0.036</b>	<b>0.423</b>	0.269	-0.110	0.649
mat deprivation (%)	country, period, (survey,) lnGDP	High	<b>-0.677</b>	<b>-1.322</b>	<b>-0.031</b>	0.042	-0.368	0.452	<b>-0.861</b>	<b>-1.590</b>	<b>-0.131</b>
social transfers (% GDP)	country, period, (survey,) lnGDP	Low	-0.001	-0.008	0.006	<b>-0.016</b>	<b>-0.027</b>	<b>-0.004</b>	0.013	-0.009	0.035
social transfers (% GDP)	country, period, (survey,) lnGDP	High	-0.007	-0.016	0.002	<b>-0.019</b>	<b>-0.037</b>	<b>-0.001</b>	0.007	-0.025	0.039
health expenditure (% GDP)	country, period, (survey,) lnGDP	Low	-0.024	-0.054	0.005	0.000	-0.024	0.025	0.006	-0.042	0.053
health expenditure (% GDP)	country, period, (survey,) lnGDP	High	<b>-0.034</b>	<b>-0.063</b>	<b>-0.006</b>	-0.032	-0.070	0.007	-0.016	-0.084	0.053
out-of-pocket expenses (%)	country, period, (survey,) lnGDP	Low	0.003	-0.007	0.013	0.000	-0.005	0.006	0.002	-0.010	0.014
out-of-pocket expenses (%)	country, period, (survey,) lnGDP	High	0.004	-0.007	0.016	-0.006	-0.015	0.004	-0.006	-0.023	0.011

All dependent variables were log transformed. Multilevel model with correction for serial autocorrelation, stratified by gender and level of education. All determinants are national averages, with the exception of material deprivation which was available for low and high educated men and women separately.

### Box S1. Details on the regression analyses.

In order to quantify changes over time in mortality and self-reported morbidity and to assess whether a recent change in trend has occurred we conducted interrupted time-series analyses in which mortality and self-reported morbidity were modelled as a function of time, in the following way:

$$\text{LnM}_{ct} = \alpha + \beta_1 * T + \beta_2 * T * A_t + \varepsilon$$

in which Ln = natural logarithm, M = age-standardized mortality or self-reported morbidity rate, T = linear variable for calendar-year, A = dummy variable with values 0 and 1 before and after 2008,  $\alpha$  = intercept,  $\beta_1$  = parameter indicating the change in LnM associated with one unit increase in T,  $\beta_2$  = parameter indicating the change in trend of LnM after 2008,  $\varepsilon$  = error term, c = subscript denoting country, and t = subscript denoting calendar-year. We only modelled a gradual change in trend, because we did not expect sudden level changes in the health outcomes.

In order to more directly analyse the association between changes over time in health outcomes and the crisis we conducted panel (or pooled cross-sectional time series) analyses in which health outcomes were modelled as a function of crisis-related economic variables, in the following way:

$$\text{LnM}_{ct} = \alpha + \beta_1 * C + \beta_2 * P + \beta_3 * E_{ct} + \varepsilon$$

in which Ln = natural logarithm, M = age-standardized mortality or self-reported morbidity rate, C = a set of dummy variables representing country fixed effects, P = a set of dummy variables representing period fixed effects, E = economic variable,  $\alpha$  = intercept,  $\beta_1$  and  $\beta_2$  = parameters indicating differences in levels of LnM between countries and periods,  $\beta_3$  = parameter indicating effect of economic variable on LnM,  $\varepsilon$  = error term, c = subscript denoting country, and t = subscript denoting calendar-year. This analytical technique (with fixed effects for country and period) removes confounding by unmeasured country characteristics and unmeasured trends in background factors, and essentially quantifies the effect of a change in the economic variables on mortality or self-reported morbidity, net of other influences.

For self-assessed health and activity limitations we present results obtained in a dataset in which the age-standardized morbidity rates of ESS and EU-SILC were pooled. The main reason for taking the two surveys together is that pooling allows us to combine the strengths of both surveys: while EU-SILC has the highest number of respondents, ESS for many countries covers a longer time-period and has been more strictly

harmonized. To take into account differences between the surveys in levels of self-reported morbidity we added an additional dummy variable representing survey to our regression models.

All regression analyses were conducted for men and women and for the low and high educated separately, because preliminary analyses indicated that the effects of main and control variables often differed between these strata. In order to take into account heteroskedasticity, analyses of mortality were weighted by the square root of the number of deaths, and analyses of survey data by the number of respondents in the survey. Please note that because of the logarithmic transformation we quantify relative, not absolute, changes in mortality and self-reported morbidity, and relative, not absolute, effects of economic variables on mortality and self-reported morbidity.

All regression analyses were done with the SPSS 24 routine for linear mixed models. This allowed us to apply a multilevel framework and thus to take into account dependency of data within countries and (when using the pooled ESS-EU-SILC dataset) within surveys. We also used an autoregressive model of order 1 (AR(1)) to take into account the serial autocorrelation in the mortality and morbidity rates.

### **Box S1. Acknowledgements relating to data acquisition**

We gratefully acknowledge the contribution of the following persons to data collection: Prof. Giuseppe Costa (Department of Clinical Medicine and Biology, University of Turin, Italy), Dr. Johannes Klotz (Statistics Austria, Vienna, Austria), Prof. Olle Lundberg (Center for Health Equity Studies, Stockholm, Sweden), Bjørn Heine Strand (Division of Epidemiology, Norwegian Institute of Public Health, Oslo, Norway)

The permission of the Office for National Statistics to use the Longitudinal Study is gratefully acknowledged, as is the help provided by staff of the Centre for Longitudinal Study Information & User Support (CeLSIUS). CeLSIUS is supported by the ESRC Census of Population Programme (Award Ref: ES/K000365/1). The authors alone are responsible for the interpretation of the data. This work contains statistical data from ONS which is Crown Copyright. The use of the ONS statistical data in this work does not imply the endorsement of the ONS in relation to the interpretation or analysis of the statistical data. This work uses research datasets which may not exactly reproduce National Statistics aggregates.

The mortality data for Switzerland were obtained from the Swiss National Cohort, which is based on mortality and census data provided by the Federal Statistical Office and supported by the Swiss National Science Foundation (grant nos. 3347CO-108806, 33CS30\_134273 and 33CS30\_148415).

The following data from the European Social Survey were used: ESS Round 1: European Social Survey Round 1 Data (2002). Data file edition 6.5. ESS Round 2: European Social Survey Round 2 Data (2004). Data file edition 3.5. ESS Round 3: European Social Survey Round 3 Data (2006). Data file edition 3.6. ESS Round 4: European Social Survey Round 4 Data (2008). Data file edition 4.4. ESS Round 5: European Social Survey Round 5 Data (2010). Data file edition 3.3. ESS Round 6: European Social Survey Round 6 Data (2012). Data file edition 2.3. ESS Round 7: European Social Survey Round 7 Data (2014). Data file edition 2.1. NSD - Norwegian Centre for Research Data, Norway – Data Archive and distributor of ESS data for ESS ERIC.

This study is based on data from Eurostat, European Union Statistics on Income and Living Conditions survey, reference years 2004-2014. The responsibility for all conclusions drawn from the data lies entirely with the authors.