Supplementary information

Belonging to:

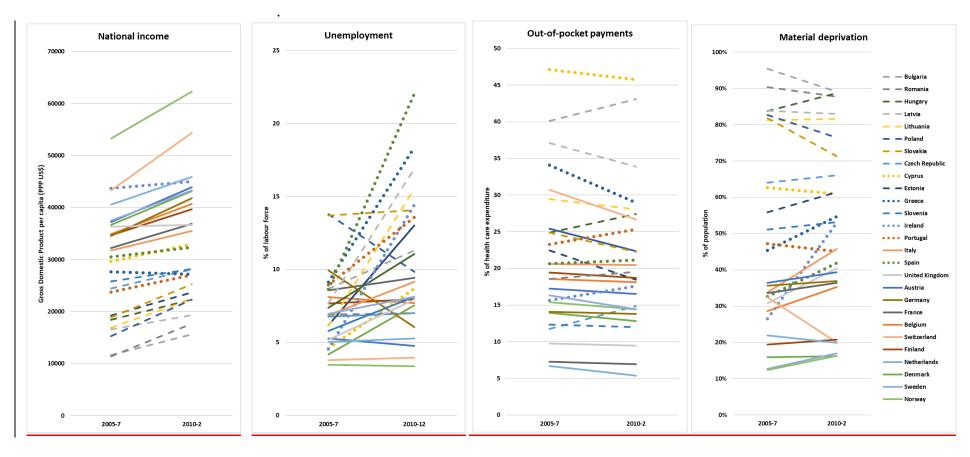
Mackenbach, J.P. et al. Health inequalities before and after the financial crisis: trend study of 27 European countries.

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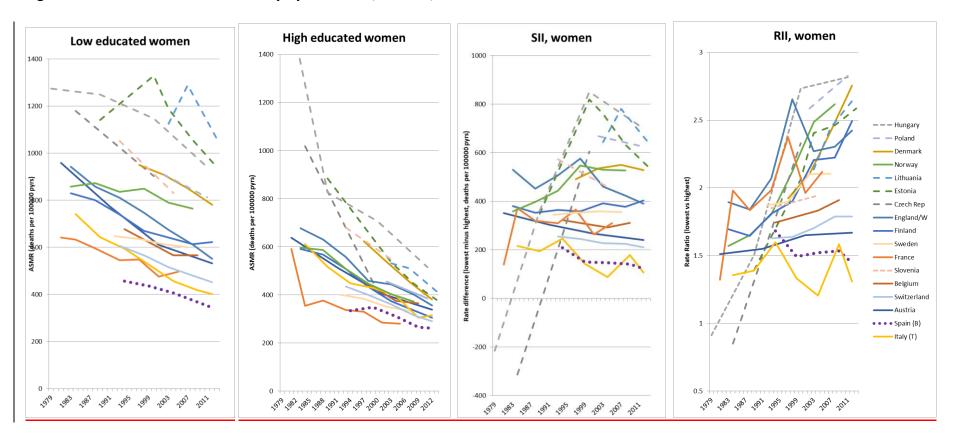
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Figure S1. Changes in crisis-related indicators, 2005-2007 vs. 2010-2012



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.

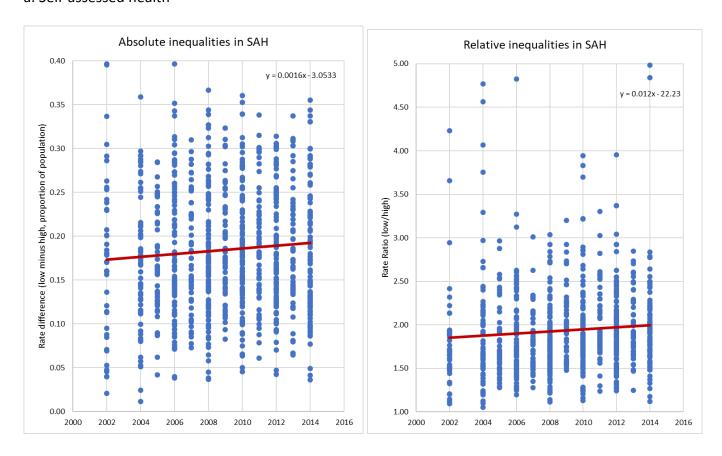
Figure S2. Trends in all-cause mortality by education, women, ca. 1980-ca. 2014



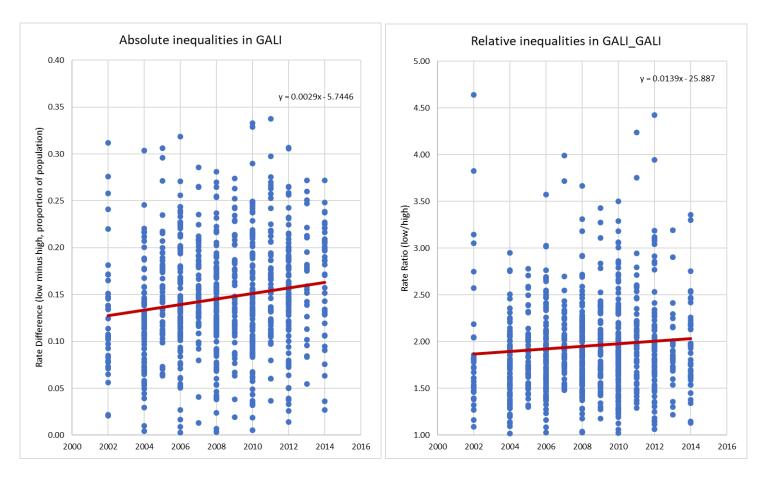
Dashed lines: Eastern Europe. Dotted line: Western European country most severely hit by the economic crisis. <u>SII = Slope Index of Inequality</u>. RII = Relative Index of Inequality. ASMR = agestandardized mortality rate.

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

a. Self-assessed health



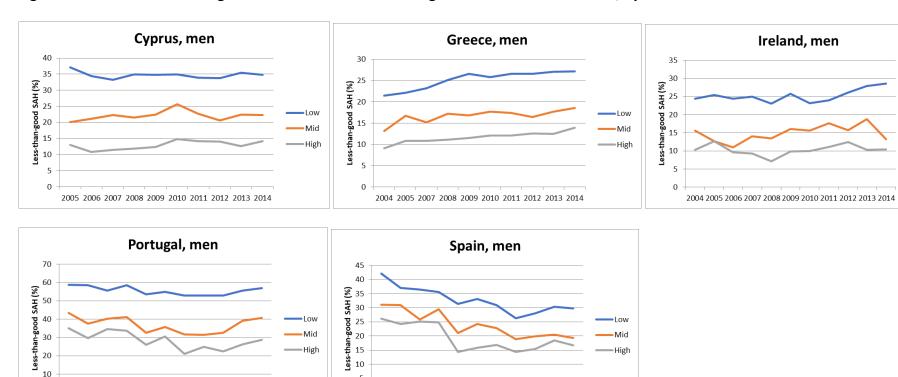
b. GALI limitations



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

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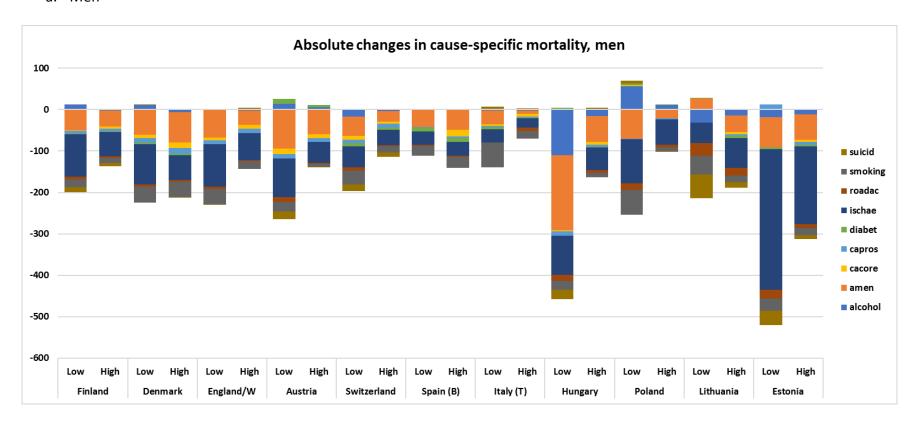
Age-standardized prevalence of less-than-good self-assessed health as reported in EU-SILC.

2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014

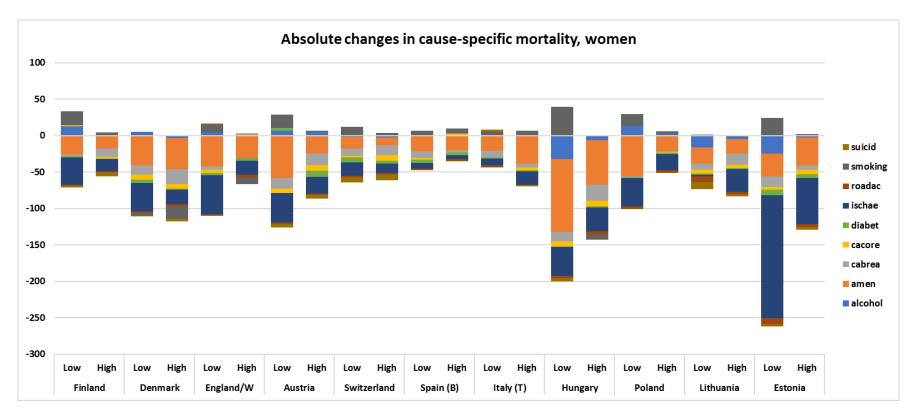
 $2004\ 2005\ 2006\ 2007\ 2008\ 2009\ 2010\ 2011\ 2012\ 2013\ 2014$

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 S1. Overview of the mortality data sources

		Overview of data sour	ces											
	Region	Country	Design	Inclusion	Age-range			Pe	riods cove	red			Person-years	Deaths
	North	Finland	Longitudinal	All	35–79	1980-85	1985-90	1990-95	1995-00	2000-05	2005-10	2010-14	86,372,562	910,462
		Sweden	Longitudinal	All	35–79			1990-94	1995-99	2000-04	2005-08		79,581,506	721,551
_		Norway	Longitudinal	All	40-79	1980-85	1985-90	1990-95	1995-01	2001-06	2006-09		44,227,581	597,316
Europe"		Denmark	Longitudinal	All	35-79				1995-99	2000-04	2005-09	2010-14	56,660,834	573,220
on	West	UK (England&Wales)	Longitudinal	1% sample	35–79	1981-86	1986-91	1991-96	1996-01	2001-06	2006-11	2011-13	8,633,256	99,183
	Continental	Belgium	Longitudinal	All	35–79			1991-97		2001-06	2006-11		88,350,917	877,393
"Western		France	Longitudinal	1% sample	35–79	1980-82*	1987-90	1990-95	1995-99	1999-04	2004-07		6,421,659	60,793
We		Switzerland	Longitudinal	Swiss nationals	35–79			1990-95	1995-00	2000-05	2005-10	2010-14	69,650,105	556,354
=		Austria	Longitudinal	All	35–79	1981-82		1991-92		2001-02		2011-13	20,763,929	204,534
	South	Spain (Barcelona)	Cross-sectional	All (city region)	35–79			1992-96	1997-01	2002-06	2007-10	2011-13	19,031,232	158,105
		Italy (Turin)	Longitudinal	All (city region)	35-79	1981-86	1986-91	1991-96	1996-01	2001-06	2006-11	2011-13	15,581,775	152,868
-	West Balkans	Slovenia	Longitudinal	All	35–79			1991-95		2002-06			9,401,372	118,682
Europe"	Centre-East	Czech Republic	Cross-sectional	All	35-79	1982-85			1998-03				49,927,496	775,843
ü		Hungary	Cross-sectional	All	35–79	1978-81		1988-91		1999-02		2010-12	78,295,786	1,381,457
Ē		Poland	Cross-sectional	All	35-64					2001-03		2010-12	169,460,088	2,037,875
"Eastern	Baltic	Estonia	Longitudinal**	All	35-79			1987-91	1998-02	2000-05	2006-11	2011-15	17,578,018	271,138
		Lithuania	Longitudinal	All	35–79					2001-05	2006-09	2011-14	21,294,140	329,818
		* Data also available for	1982-87											
		** Cross-sectional in 198	37-91 and 1998-02											

Most data stem from a longitudinal mortality follow-up after a census, in which socioeconomic information of the population-at-risk and of the deceased has been recorded in the census. In addition to all-cause mortality we distinguished four large cause-of-death groups (cardiovascular disease, cancer, all other diseases and injuries), three groups of causes pointing at specific determinants (smoking-related causes, alcohol-related causes, and causes amenable to medical care), and a number of specific causes suspected to be sensitive to economic crises (including road injuries and suicide). ICD-codes can be found in Supplementary table S2.

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

	ICD-10 codes
Total mortality, all causes	A00-Y98
Cardiovascular diseases	100-199
Cancer	C00-D48
Other diseases	Rest (A00-U85)
External causes	V01-Y98
Smoking-related causes*	C33-C34;C32;J40-J44; J47
Alcohol-related causes**	F10; I42.6; K70; X45
Amenable causes***	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	120-125
Cerebrovascular disease	160-169
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
Suicide	A00-A04, 187.0
* 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 S3. Overview of the survey data

				EU-SILC			ESS	
			Number of	Typical	Typical	Number of	Typical	Typical
			waves	sample	response	waves	sample	response
	Region	Country	(years)	size*	rate*	(years)	size*	rate*
	North	Finland	11 (2004-14)	21,131	82%	7 (2002-2014)	2,195	68%
		Sweden	11 (2004-14)	14,889	74%	7 (2002-2014)	1,830	62%
		Norway	11 (2004-14)	10.897	63%	7 (2002-2014)	1,370	60%
		Denmark	11 (2004-14)	11,545	55%	7 (2002-2014)	1,613	54%
	West	United Kingdom	10 (2005-14)	16,825	73%	7 (2002-2014)	2,352	56%
_		Ireland	11 (2004-14)	10,116	76%	7 (2002-2014)	1,764	52%
"Western Europe"	Continental	Netherlands	10 (2005-14)	19,519	82%	7 (2002-2014)	1,778	50%
ürc		Belgium	11 (2004-14)	12,154	64%	7 (2002-2014)	1,760	59%
E		Germany	10 (2005-14)	24,336	75%	7 (2002-2014)	2,751	48%
ste		Austria	11 (2004-14)	10,995	71%	4 (2002-2014)	2,178	60%
Š		Switzerland	6 (2008-14)	13,230	N/A	7 (2002-2014)	1,484	46%
=		France	11 (2004-14)	20,125	82%	7 (2002-2014)	2,073	49%
	South	Spain	11 (2004-14)	30,082	63%	7 (2002-2014)	2,570	67%
		Portugal	11 (2004-14)	10,101	91%	7 (2002-2014)	2,367	76%
		Italy	11 (2004-14)	44,286	85%	2 (2002-2012)	1,084	36%
		Greece	11 (2004-14)	14,123	89%	4 (2002-2010)	2,072	74%
		Cyprus	10 (2005-14)	8,090	91%	4 (2006-2012)	1,215	79%
	West Balkar	Slovenia	10 (2005-14)	25,005	76%	7 (2002-2014)	1,286	59%
		Croatia	5 (2010-14)	8,511	58%	2 (2008-2010)	1,484	46%
_	Centre-East	Czech Republic	10 (2005-14)	22,754	81%	6 (2002-2014)	2,018	69%
"Eastern Europe"		Slovakia	10 (2005-14)	14,098	92%	5 (2004-2012)	1,810	73%
on		Hungary	10 (2005-14)	18,710	80%	7 (2002-2014)	1,544	61%
'n		Poland	10 (2005-14)	33,801	76%	7 (2002-2014)	1,619	71%
ster	South-East	Bulgaria	8 (2008-14)	10,373	66%	4 (2006-2012)	2,230	75%
"Ea		Romania	8 (2007-14)	16,527	95%	1 (2008)	2,146	68%
	Baltic	Lithuania	10 (2005-14)	10,473	83%	3 (2010-2014)	2,109	50%
		Latvia	10 (2005-14)	10,910	75%	1 (2008)	1,980	58%
		Estonia	11 (2004-14)	10,851	78%	6 (2004-2014)	1,662	57%
	* figures for	2008						

Both surveys include two single-item health questions: self-assessed health ("How is your health in general" which we dichotomized into less-than-"good" versus "good"-or-"very good") and activity limitations (the Global Activity Limitations Indicator: "For at least the past six months, to what extent have you been limited in activities people usually do?" dichotomized into "yes, a lot" or "yes, a little" versus "no").

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

Spain (Ba	rcelona)										
		Low	educated	Mid	educated	High	educated	Slope Ind	ex of Inequality	Relative Inc	dex 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 (na	itional)										
		Low	educated	Mid	educated	High	educated	Slope Ind	ex of Inequality	Relative Inc	dex 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, Viciana-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 morta	lity		Cardiovasc	ılar diseas	es	Cancer			Other disea	ases		External ca	auses	
		Estimate S	td. Error S	ig.	Estimate S	td. Error S	ig.	Estimate	Std. Error S	ig.	Estimate S	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	-0.3%	0.1%	0.009
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	-0.1%	0.0%	0.027	-0.1%	0.1%	0.180	-0.1%	0.0%	0.006	-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 wome	n 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	-0.3%	0.2%	0.049
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 wome	er 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	-0.6%	0.2%	0.009
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	-0.4%	0.1%	0.029	-0.3%	0.2%	0.060	-0.5%	0.1%	0.002	-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	0.2%	0.1%	0.029	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 wome	n 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 wome	er 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-re	lated mort	ality	Alcohol-rel	ated morta	ality	Amenable	mortality		Road traffi	c injuries		Suicide		
		Estimate S	td. Error S	ig.	Estimate S	td. Error S	ig.	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%	0.09
Low educated men	change in trend 2008	0.0%	0.1%	0.681	-0.7%	0.2%	0.001	0.0%	0.1%	0.775	-0.6%	0.2%	0.005	-0.3%	0.2%	0.10
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	-0.6%	0.3%	0.048	-0.2%	0.1%	0.021	-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 wome	n change in trend 2008	-0.1%	0.1%	0.378	-0.5%	0.2%	0.016	0.1%	0.1%	0.410	-1.4%	0.4%	0.002	-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 wome	er 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	0.5%	0.2%	0.044	-1.0%	0.4%	0.047	-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 wome	n 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 wome	er change in trend 2008	0.6%	0.2%	0.031	-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 5	Std. Error S	ig.	Estimate	Std. Error S	ig.	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	-0.4%	0.1%	0.002	-0.2%	0.1%	0.042	-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	-0.4%	0.2%	0.019	-0.3%	0.1%	0.033	-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 wome	n change in trend 2008	-0.5%	0.2%	0.013	-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 wome	er change in trend 2008	-0.4%	0.2%	0.069	-0.3%	0.2%	0.180	-0.3%	0.1%	0.020	-0.3%	0.1%	0.014	-0.3%	0.1%	0.017
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	-0.9%	0.3%	0.011	-0.6%	0.2%	0.007	-0.5%	0.2%	0.011
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	-1.2%	0.4%	0.008	-0.5%	0.4%	0.182	-0.7%	0.1%	0.000	-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 wome	n change in trend 2008	-0.7%	0.4%	0.156	-1.0%	0.4%	0.020	-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 wome	er 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.									
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	0.1%	0.1%	0.029	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	-0.2%	0.1%	0.007
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 wome	change in trend 2008	0.2%	0.1%	0.027	0.2%	0.1%	0.005	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 wome	r 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	-0.3%	0.1%	0.046	-0.3%	0.1%	0.009	-0.3%	0.1%	0.003	-0.2%	0.1%	0.021
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	0.4%	0.1%	0.002	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 wome	change in trend 2008	0.1%	0.2%	0.385	-0.1%	0.2%	0.592	-0.1%	0.1%	0.416	-0.2%	0.1%	0.010
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 wome	r 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 β_1 , change in trend after 2008 based on β_2 ; see Data and methods section for details). In bold: β_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 <u>less-than-good</u> self-assessed health and activity limitations.

			Low educ	ated men		High educ	cated men		Low educ	ated wome	n	High edu	cated wome	n
			Estimate	Std. Error	Sig.	Estimate	Std. Error	Sig.	Estimate	Std. Error	Sig.	Estimate	Std. Error S	ig.
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%	5 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%	6 0.7%	0.000
		Change in trend 2008	-0.5%	0.2%	0.006	-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%	5 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%	5 1.5%	0.150
		Change in trend 2008	0.8%	0.3%	0.022	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%	5 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 β_1 , change in trend after 2008 based on β_2 ; see Data and methods section for details). In bold: β_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

			1	Mortality		Self-as	sessed h		Activi	ty limitat	ions
				95%	6 CI		959	% CI		95% CI	
Independent variable	Control variables	Education	Estimate	Lower	Upper	Estimate	Lower	Upper	Estimate	Lower	Uppe
national income (In)	country, period, (survey)	Low	-0.190	-0.264	-0.115	-0.175	-0.304	-0.046	0.309	0.065	0.553
national income (In)	country, period, (survey)	High	-0.290	-0.442	-0.138	-0.340	-0.541	-0.140	0.272	-0.082	0.627
unemployment (%)	country, period, (survey,) InGDP	Low	-0.007	-0.012	-0.003	-0.005	-0.010	-0.001	-0.002	-0.010	0.006
unemployment (%)	country, period, (survey,) InGDP	High	-0.005	-0.011	0.001	-0.007	-0.014	0.000	-0.013	-0.025	0.000
mat deprivation (%)	country, period, (survey,) InGDP	Low	-0.243	-0.669	0.183	0.229	0.036	0.423	0.269	-0.110	0.649
mat deprivation (%)	country, period, (survey,) InGDP	High	-0.677	-1.322	-0.031	0.042	-0.368	0.452	-0.861	-1.590	-0.13
social transfers (% GDP)	country, period, (survey,) InGDP	Low	-0.001	-0.008	0.006	-0.016	-0.027	-0.004	0.013	-0.009	0.035
social transfers (% GDP)	country, period, (survey,) InGDP	High	-0.007	-0.016	0.002	-0.019	-0.037	-0.001	0.007	-0.025	0.039
health expenditure (% GDP)	country, period, (survey,) InGDP	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,) InGDP	High	-0.034	-0.063	-0.006	-0.032	-0.070	0.007	-0.016	-0.084	0.053
out-of-pocket expenses (%)	country, period, (survey,) InGDP	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,) InGDP	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:

$$LnM_{ct} = \alpha + \beta_1 *T + \beta_2 *T *A_t + \varepsilon$$

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, α = intercept, β_1 = parameter indicating the change in LnM associated with one unit increase in T, β_2 = parameter indicating the change in trend of LnM after 2008, ϵ = error term, ϵ = 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:

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

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, α = intercept, β_1 and β_2 = parameters indicating differences in levels of LnM between countries and periods, β_3 = parameter indicating effect of economic variable on LnM, ϵ = 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

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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.