Appendix to:

Widening educational inequalities in mortality in more-recent birth-cohorts: a study of 14 European countries

Journal of Epidemiology and Community Health, 2023

Di Long[1], Johan P. Mackenbach[1], Silvia S. Klokgieters[2], Ramunė Kalėdienė[3], Patrick Deboosere[4], Pekka T. Martikainen[5], Kristian Heggebø[6,7], Mall Leinsalu[8,9], Matthias Bopp[10], Henrik Brønnum-Hansen[11], Giuseppe Costa[12], Terje A. Eikemo[6], Wilma J. Nusselder[1]

Correspondent author:
Di Long
Department of Public Health, Erasmus MC. P.O. Box 2040, 3000 CA Rotterdam

Affiliations:
1. Department of Public health, Erasmus MC, P.O. Box 2040, 3000 CA, Rotterdam, The Netherlands
2. Department of Sociology, Faculty of Social Sciences, Vrije Universiteit, Amsterdam, The Netherlands
3. Department of Health Management, Lithuanian University of Health Sciences, Kaunas, Lithuania
4. Department of Sociology, Vrije Universiteit Brussel, Brussels, Belgium
5. Population Research Unit, Faculty of Social Sciences, University of Helsinki, Helsinki, Finland
6. Department of Sociology and Political Science, Norwegian University of Science and Technology, Trondheim, Norway
7. NOVA, Oslo Metropolitan University
8. Department of Epidemiology and Biostatistics, National Institute for Health Development, Tallinn, Estonia
9. Stockholm Centre for Health and Social Change, Södertörn University, Huddinge, Sweden
10. Epidemiology, Biostatistics and Prevention Institute, University of Zurich, Zurich, Switzerland
11. Department of Public Health, University of Copenhagen, Copenhagen, Denmark
12. Department of Clinical Medicine and Biology, University of Turin, Torino, Italy

List of tables and figures:

Appendix 1

Table 1. Data sources

Country	Type	Years	Length of follow-up (years)	Geographic coverage	Inclusion
Austria	Longitudinal	May 12, 1981 – May 11, 1982	1	National	All population groups
		May 15, 1991 – May 14, 1992	1	National	All population groups
		May 15, 2001 – May 14, 2002	1	National	All population groups
		Oct 31, 2011 – Oct 31 2013	2	National	All population groups
Belgium	Longitudinal	March 1, 1991 – Dec 31, 1997	6y, 10m	National	All population groups
		Oct 1, 2001 –Dec 31, 2011	10y, 3m	National	All population groups
Denmark	Longitudinal	Jan 1, 1995- Dec 31, 1999	5	National	All population groups
		Jan 1, 2000- Dec 31, 2004	5	National	All population groups
		Jan 1, 2005- Dec 31, 2009	5	National	All population groups
		Jan 1, 2010- Dec 31, 2014	5	National	All population groups
England/ Wales	Longitudinal	April 25, 1971 – April 4, 1981	10	National	1% representative sample
		April 5, 1981 – April 20, 1991	10	National	1% representative sample
		April 21, 1991 – April 28, 2001	10	National	1% representative sample
		April 29, 2001 – Dec 31, 2009	8.7	National	1% representative sample
		April 2001 – March 2011	10	National	1% representative sample
		March 2011 – Dec 2013	2y, 10m	National	1% representative sample
Estonia	Longitudinal	2001 – 2011	10y, 3m	National	All population groups
		2012 – 2015	4	National	All population groups
Finland	Longitudinal	Dec 31, 1970 – Dec 31, 1980	10	National	All population groups
		Dec 31, 1980 – Dec 31, 1990	10	National	All population groups
		Dec 31, 1990 – Dec 31, 2000	10	National	All population groups
		Dec 31, 2000 – Dec 31, 2010	10	National	All population groups
		Dec 31, 2010 – Dec 31, 2014	4	National	80% representative sample
France	Longitudinal	Jan 10, 1975 – Jan 9, 1982	7	National	1% representative sample
		Jan 10, 1982 – Jan 9, 1990	8	National	1% representative sample
		Jan 10, 1990 – Jan 9, 1999	9	National	1% representative sample
		Jan 10, 1999 – Dec 31, 2007	9	National	1% representative sample
Hungary	CS, unlinked	1971 – 1974	4	National	All population groups
		1978 – 1981	4	National	All population groups
		1988 – 1991	4	National	All population groups
		1999 – 2002	4	National	All population groups
		2010 – 2012	3	National	All population groups
Italy, Turin	Longitudinal	Oct 24, 1971 – Oct 24, 1981	10	City	All population groups
		Oct 25, 1981 – Oct 19, 1991	10	City	All population groups
		Oct 20, 1991 – Oct 20, 2001	10	City	All population groups
		Oct 21, 2001 – Dec 31, 2010	9.2	City	All population groups
		Oct 21, 2001 – Oct 9, 2011	10	City	All population groups
		Oct 10, 2011 –Dec 12, 2013	2y, 3m	City	All population groups

Lithuania	Longitudinal	Apr 6, 2001 – Dec 12, 2009	8.8	National	All population groups
		March 1, 2011 – Dec 31, 2014	4	National	All population groups
Norway	Longitudinal	Nov 1970 – Dec 1980	10	National	All population groups
		Nov 1980 – Dec 1990	10	National	All population groups
		Nov 1990 – Dec 2001	11	National	All population groups
		Nov 2001 – Dec 2009	8	National	All population groups
Spain, Barcelona	CS, repeated	1992 – 1996	5	City	All population groups
		1997 – 2001	5	City	All population groups
		2002 – 2006	5	City	All population groups
		2007 – 2010	4	City	All population groups
		2011 – 2013	3	City	All population groups
Sweden	Longitudinal	Jan 1990 – Dec 1999	10	National	All population groups
		Jan 2000 – Dec 2008	9	National	All population groups
Switzerland	Longitudinal	Dec 4, 1990 – Dec 5, 2000	10	National	Swiss nationals
		Dec 31, 2000 – Dec 31, 2010	10	National	Swiss nationals
		Dec 31, 2010 – Dec 31, 2014	4	National	Swiss nationals

Note to table 1: CS = cross-sectional

Table 2. Harmonization of education in the data

Country	Label in original dataset		ISCED level	3-level education classification used in this analysis	Comments
Austria (< 2001)	1	Compulsory schooling (in German: Pflichtschule)	0-2	1	
	2	Apprenticeship (Lehre)	3	2	
	3	Intermediate technical and vocational school (Fachschule ohne Matura)	3	2	
	4	Academic secondary school, higher technical and vocational college (Höhere Schule mit Matura)	3-4	2	
	5	University, Fachhochschule, post-secondary college (Hochschule, hochschulverwandte Ausbildung)	5-6	3	
Austria, 2001 – 2002; 2011-2013	1	ISCED 0-2	0-2	1	
	2	ISCED 3	3	2	
	3	ISCED 4	4	2	
	4	ISCED 5-6	5-6	3	
Belgium, 1991–1997	1	ISCED 0	0	1	
	2	ISCED 1	1	1	
	3	ISCED 2	2	1	

	4	ISCED 3	3	2	
	5	ISCED 5	5	3	
Belgium, 2001-2011	1	ISCED 0	0	1	
	2	ISCED 1	1	1	
	3	ISCED 2	2	1	
	4	ISCED 3	3	2	
	5	ISCED 4	4	2	
	6	ISCED 5	5	3	
	7	ISCED 6	6	3	
Czech Republic, all periods	1	Basic and incomplete or without education ISCED=1+2A+2B	1-2	1	For comparability with other Central and Eastern European countries, vocational education was coded as lower secondary education
	2	Lower Secondary ISCED=3C	3C	1	
	3	Upper secondary ISCED=3A+3B+4	3A-3B-4	2	
	4	University ISCED=5+	5-6	3	
Denmark: All periods		ISCED0-1	0-1	1	
		ISCED2	2	1	
		ISCED3-4	3-4	2	
		ISCED0-5-6	4-6	3	
England/ Wales, 1971-1981	-1	Missing/none stated	-1	-1	
	1	No qualification	0-2	1	
	2	A-level and equivalent	3	1	
	3	Qualification higher than A-level but below first degree level	4	3	
	4	First degree level of equivalent	5	3	
	5	Higher degree level or equivalent	5	3	
England/ Wales, 1981-1991; 1991-2001	-1	Missing/not stated	-1	-1	
	1	No qualifications	0-3	1	
	2	Qualification higher than A-level but below first degree level	4	3	
	3	First degree level or equivalent	5	3	
	4	Higher degree level or equivalent	5	3	
	-1	Missing/not applicable/none stated	-1	-1	
	0	No qualifications	0-1	1	

England/ Wales, 2001-2009 England Wales. 2001-2011	1	CSEs (grades 2-5), GCSEs (grades D-G), 1-4 CSEs (grade 1), 1-4 GCSEs (grades A-C), 1-4 O levels, NVQ level 1, Foundation GNVQ	2	1	
	2	5+O levels, 5+CSEs (grade1), 5+GCSEs (grades A-C) etc, 1 A level, 1-3 AS levels, NVQ level 2, Intermediate GNVQ	3C	1	
	3	2+ A levels, 4+ AS levels, Higher School Certificate, NVQ level 3, Advanced GNVQ	3AB	1	
	4	First degree, Higher degree, NVQ levels 4-5, HNC, HND, Qualified Teacher status, Qualified Medical Doctor, Qualified Dentist, Qualified Nurse, Midwife, Health Visitor	5-6	3	
	5	Other qualifications/ level unknown: Other qualifications (eg City and Guilds etc), Other Professional qualifications	-1	-1	
England Wales, 2011-2013	-1	Missing/not applicable	-1	-1	
	0	No qualifications	0-1	1	
	1	Level 1: 1-4 O Levels/CSE/GCSEs (any grades), Entry Level, Foundation Diploma, NVQ level 1, Foundation GNVQ, Basic/Essential Skills (England & Wales & Northern Ireland)	2	1	
	2	Level 2: 5+ O Level (Passes)/CSEs (Grade 1)/GCSEs (Grades A*-C), School Certificate, 1 A Level/ 2-3 AS Levels/VCEs, Intermediate/Higher Diploma, Welsh Baccalaureate, Intermediate Diploma, NVQ level 2, Intermediate GNVQ, City and Guilds Craft, BTEC First/G	3C	1	
	3	Level 3: 2+ A Levels/VCEs, 4+ AS Levels, Higher School Certificate, Progression/Advanced Diploma, Welsh Baccalaureate Advance Diploma, NVQ Level 3; Advanced GNVQ, City and Guilds Advanced Craft, ONC, OND, BTEC National, RSA Advanced Diploma (England & Wales	3AB	1	
	4	Level 4+: Degree (BA, BSc), Higher Degree (MA, PhD, PGCE), NVQ Level 4-5, HNC, HND, RSA Higher Diploma, BTEC Higher level, Foundation degree (NI), Professional, Qualifications (Teaching, Nursing, Accountancy) (England & Wales & Northern Ireland)	5-6	3	
	5	Apprenticeship (England & Wales & Northern Ireland) or Other: Vocational/Work-related Qualifications, Foreign Qualifications/ Qualifications gained outside the UK (NI) (Not stated/ level unknown) (England & Wales & Northern Ireland)	-1	-1	
	-1	Missing	-1		
	1	Primary (ISCED11=1)	1	1	

Estonia 2001-2011, 2012-2015	2	Lower secondary (24, 25)	2	1	
	3	Upper secondary (34, 35)	3	2	
	4	Post sec non-tertiary (4)	4	2	
	5	Secondary specialized (5)	3	2	
	6	First stage tertiary (6, 7)	5	3	
	7	Second stage tertiary (8)	6	3	
Finland, all periods	1	ISCED levels 0-2 or education level unknown	0-2	1	Post-secondary education (ISCED 4-6) is assumed to be comparable to tertiary education
	2	ISCED levels 3	3	2	
	3	ISCED levels 4-6	4-6	3	
France	-1	Missing	-	-1	
	1	ISCED 0-1: primary level (no diploma or CEP)	0-1	1	
	2	ISCED 2 (BEPC)	2	1	
	3	ISCED 3C (CAP or BEP)	3C	2	
	4	ISCED 3AB (Baccalauréat)	3A-3B	2	
	5	ISCED 5-6	5-6	3	
Hungary, 1971-1974, 1978-1981	2	Less than elementary	0	1	For comparability with other Central and Eastern European countries, vocational education was coded as lower secondary education
	3	Elementary	1	1	
	4	Vocational training	3C	1	
	5	Maturation	3A-3B	2	
	6	Tertiary education	5-6	3	
	9	Missing	-1	-1	
Hungary, 1988-1991, 1999-2002	1	less than 6 classes	0	1	For comparability with other Central and Eastern European countries, vocational education was coded as lower secondary education
	2	6 (or 7) classes	1	1	
	3	8 classes	1	1	
	4	vocational training without maturation (9, 10 or most frequently 11 classes)	3C	1	
	5	maturation with or without vocation training	3A-3B	2	
	6	Tertiary	5-6	3	
	9	Unknown	-1	-1	
Hungary 2010-2012	1	No or only primary education (ISCED 0+1)	1	1	
	2	Lower secondary (ISCED 2)	2	1	

	3	Upper secondary and post-secondary non-tertiary (ISCED 3+4)	3-4	2	
	4	Tertiary education (ISCED 5+6)	5-6	3	
Italy (Turin), all periods	-1	Unknown (no cases)	-		
	1	ISCED level 0	0	1	
	2	ISCED level 1 (5 years completed, "licenza elementare")	1	1	
	3	ISCED level 2 (2-3 years, following level 1, corresponding to "licenza avviamento professionale" in the old system (up to 1963) and "licenza media inferiore" now)	2	1	
	4	ISCED level 3C (2-3 years courses, following level 2, corresponding to "diploma scuola professionale")	3C	2	
	5	ISCED level 3AB (4-5 years courses, following level 2, corresponding to "diploma scuola media superiore")	3AB	2	
	6	ISCED level 5 (2-3 years, following a 5 year course of level 3AB, "diploma universitario")	5	3	
	7	ISCED level 6 (4-6 years university degree ("laurea") following a 5 year course of level 3AB, and upper research qualifications, following "laurea")	6	3	
Lithuania, 2001 – 2009 2011-2014	-1	Missing	-	-1	
	1	Pre-primary education or no education at all	0	1	
	2	Primary education	1	1	
	3	Lower secondary (basic education, with or without some vocational ed.)	2	1	
	4	Upper secondary (secondary with or without some vocational ed.)	3	2	
	5	Post-secondary non-tertiary (special secondary with vocational ed., college, incomplete university)	4	2	
	6	Tertiary	5-6	3	
Norway, all periods	0	ISCED 0	0	1	
	1	ISCED 1	1	1	
	2	ISCED 2	2	1	
	3	ISCED 3	3	2	
	4	ISCED 4	4	2	
	5	ISCED 5	5	3	
	6	ISCED 6	6	3	
	-1	Unknown	-	-1	

Spain (Barcelona), all periods	1	No education at all	0	1	
	2	First stage of basic education, basic primary	1	1	
	3	Second stage of basic education, primary completed	2	1	
	4	Secondary education	3	2	
	5	Tertiary education, university	5-6	3	
Sweden, all periods	1	First stage of basic education	0-1	1	Post-secondary education (ISCED 4-6) is assumed to be comparable to tertiary education
	2	Second stage of basic education	2	1	
	3	Secondary education	3	2	
	4	Post-secondary education	4-6	3	
Switzerland, all periods	-1	No information	-	-1	
	1	ISCED=1 No education completed	1	1	
	2	ISCED=2 Mandatory education	2	1	
	3	ISCED=3 Upper secondary general	3A-3B	2	
	4	ISCED=3 Upper secondary vocational	3C	2	
	5	ISCED=5 Tertiary education	5	3	
	-1	No information			
	1	ISCED97 0+1	0-1	1	
	2	ISCED97 2	2	1	
	3	ISCED97 3	3	2	
	4	ISCED97 5+6	5-6	3	

Table 3. Population and deaths with missing education in the dataset

	Number of person-years with missing education (%)	Number of deaths with missing education (%)
Austria	0	0
Belgium	8.1	13.7
Denmark	2.3	2.8

UK (England & Wales)	6.4	9.8
Estonia	0.5	1.0
Hungary	0	2.2
Italy (Turin)	0.6	0.6
Lithuania	0.7	2.2
Sweden	3.1	15.4
Finland	0	0
Switzerland	3.6	13.6
France	0	0
Norway	1.0	2.2
Spain (Barcelona)	0.4	6.2

Table 4. Percentage of deaths with low education in each cohort

Country	Sex	Percentage of deaths with low education in each cohort (%)													
		1902-1910	1907-1915	1912-1925	1917-1925	1922-1930	1927-1935	1932-1940	1937-1945	1942-1950	1947-1950	1952-1960	1957-1965	1962-1970	1967-1975
Austria	Males					45	43	42	33	26	26	25	22		
Belgium	Males						77	73	67	62	58	56	52		
Denmark	Males						53	47	44	39	36	40	45	47	48
England & Wales	Males	96	96	94	93	92	90	88	87	85	83	81	85	81	
Estonia	Males							56	52	45	37	29	21	18	24
Finland	Males	88	86	84	82	81	77	69	60	52	46	37	34	36	39
France	Males		89	86	83	81	75	69	60	49	48	42	46		

Hungary	Males		89	86	84	83	82	82	79	77	79	81			
Italy (Turin)	Males	89	88	85	83	82	82	81	74	68	63	63	59	57	
Lithuania	Males							66	58	45	29	20	15	16	21
Norway	Males	66	64	60	55	52	48	46	40	35	35	37			
Spain (Barcelona)	Males					78	76	73	68	65	60	57	64	63	62
Sweden	Males					63	60	55	49	42	38	36	32		
Switzerland	Males					39	33	29	25	23	22	21	20	19	17
Austria	Females					72		68	56	43	44	40	36		
Belgium	Females						83	77	71	64	58	54	47		
Denmark	Females						71	66	59	51	45	47	44	42	38
England & Wales	Females	97	97	96	96	95	93	90	91	87	84	81	81	85	
Estonia	Females							51	41	32	25	18	14	16	18
Finland	Females	91	89	87	84	82	78	70	60	51	44	36	29	29	31
France	Females		95		90	88	84	82	71	63	54	51			
Hungary	Females		95	93	92	90	85	80	72	66	66	68			
Italy (Turin)	Females	94	95	93	91	88	87	85	81	73	64	55	52		
Lithuania	Females							67	54	38	22	14	9	11	14
Norway	Females	74	74	70	66	62	58	53	45	38	37	39			
Spain (Barcelona)	Females					89	87	84	77	70	62	55	53	54	55
Sweden	Females					70	64	56	47	38	33	30	27		
Switzerland	Females					64	59	52	45	40	36	34	32	27	23

Note to table: In this table we used a common label for the birth-cohorts. The exact label for each cohort can be found in Appendix 2 Table 5

Appendix 2

Table 5. Birth-cohorts included in the analysis

Country	Sex	Birth- cohort	Min age group	Max age group	Number of age groups	Age category	Age category	Age category	Age category	Age category	Age category	Age category	Age category	Age category	Age category
Austria	Males	1922-1927	55-59	75-79	3						55-59		65-69		75-79
Austria	Males	1927-1932	50-54	70-74	3					50-54		60-64		70-74	
Austria	Males	1932-1937	45-49	75-79	4				45-49		55-59		65-69		75-79
Austria	Males	1937-1942	40-44	70-74	4			40-44		50-54		60-64		70-74	
Austria	Males	1942-1947	35-39	65-69	4		35-39		45-49		55-59		65-69		
Austria	Males	1947-1952	30-34	60-64	4	30-34		40-44		50-54		60-64			
Austria	Males	1952-1957	35-39	55-59	3		35-39		45-49		55-59				
Austria	Males	1957-1962	30-34	50-54	3	30-34		40-44		50-54					
Austria	Females	1922-1927	55-59	75-79	3						55-59		65-69		75-79
Austria	Females	1932-1937	55-59	75-79	3						55-59		65-69		75-79
Austria	Females	1937-1942	50-54	70-74	3					50-54		60-64		70-74	
Austria	Females	1942-1947	45-49	65-69	3				45-49		55-59		65-69		
Austria	Females	1947-1952	40-44	60-64	3			40-44		50-54		60-64			
Austria	Females	1952-1957	35-39	55-59	3		35-39		45-49		55-59				
Austria	Females	1957-1962	30-34	50-54	3	30-34		40-44		50-54					
Belgium	Males	1927-1936	60-64	75-79	3							60-64		70-74	75-79
Belgium	Males	1932-1941	55-59	70-74	3						55-59		65-69	70-74	
Belgium	Males	1937-1946	50-54	65-69	3					50-54		60-64	65-69		
Belgium	Males	1942-1951	45-49	60-64	3				45-49		55-59	60-64			
Belgium	Males	1947-1956	40-44	55-59	3			40-44		50-54	55-59				
Belgium	Males	1952-1961	35-39	50-54	3		35-39		45-49	50-54					
Belgium	Males	1957-1966	30-34	45-49	3	30-34		40-44	45-49						
Belgium	Females	1927-1936	60-64	75-79	3							60-64		70-74	75-79
Belgium	Females	1932-1941	55-59	70-74	3						55-59		65-69	70-74	
Belgium	Females	1937-1946	50-54	65-69	3					50-54		60-64	65-69		
Belgium	Females	1942-1951	45-49	60-64	3				45-49		55-59	60-64			
Belgium	Females	1947-1956	40-44	55-59	3			40-44		50-54	55-59				
Belgium	Females	1952-1961	35-39	50-54	3		35-39		45-49	50-54					
Belgium	Females	1957-1966	30-34	45-49	3	30-34		40-44	45-49						
Denmark	Males	1926-1934	65-69	75-79	3								65-69	70-74	75-79

Country	Sex	Birth- cohort	Min age group	Max age group	Number of age groups	Age category	Age category	Age category	Age category	Age category	Age category	Age category	Age category	Age category	Age category
Denmark	Males	1931-1939	60-64	75-79	4							60-64	65-69	70-74	75-79
Denmark	Males	1936-1944	55-59	70-74	4						55-59	60-64	65-69	70-74	
Denmark	Males	1941-1949	50-54	65-69	4					50-54	55-59	60-64	65-69		
Denmark	Males	1946-1954	45-49	60-64	4				45-49	50-54	55-59	60-64			
Denmark	Males	1951-1959	40-44	55-59	4			40-44	45-49	50-54	55-59				
Denmark	Males	1956-1964	35-39	50-54	4		35-39	40-44	45-49	50-54					
Denmark	Males	1961-1969	30-34	45-49	4	30-34	35-39	40-44	45-49						
Denmark	Males	1966-1974	30-34	40-44	3	30-34	35-39	40-44							
Denmark	Females	1926-1934	65-69	75-79	3								65-69	70-74	75-79
Denmark	Females	1931-1939	60-64	75-79	4							60-64	65-69	70-74	75-79
Denmark	Females	1936-1944	55-59	70-74	4						55-59	60-64	65-69	70-74	
Denmark	Females	1941-1949	50-54	65-69	4					50-54	55-59	60-64	65-69		
Denmark	Females	1946-1954	45-49	60-64	4				45-49	50-54	55-59	60-64			
Denmark	Females	1951-1959	40-44	55-59	4			40-44	45-49	50-54	55-59				
Denmark	Females	1956-1964	35-39	50-54	4		35-39	40-44	45-49	50-54					
Denmark	Females	1961-1969	30-34	45-49	4	30-34	35-39	40-44	45-49						
Denmark	Females	1966-1974	30-34	40-44	3	30-34	35-39	40-44							
England & Wales	Males	1904-1913	65-69	75-79	3								65-69	70-74	75-79
England & Wales	Males	1909-1918	60-64	75-79	4							60-64	65-69	70-74	75-79
England & Wales	Males	1914-1923	55-59	75-79	5						55-59	60-64	65-69	70-74	75-79
England & Wales	Males	1919-1928	50-54	75-79	6					50-54	55-59	60-64	65-69	70-74	75-79
England & Wales	Males	1924-1933	45-49	75-79	7				45-49	50-54	55-59	60-64	65-69	70-74	75-79
England & Wales	Males	1929-1938	40-44	75-79	8			40-44	45-49	50-54	55-59	60-64	65-69	70-74	75-79
England & Wales	Males	1934-1943	35-39	75-79	9		35-39	40-44	45-49	50-54	55-59	60-64	65-69	70-74	75-79
England & Wales	Males	1939-1948	40-44	70-74	7			40-44	45-49	50-54	55-59	60-64	65-69	70-74	
England & Wales	Males	1944-1953	35-39	65-69	7		35-39	40-44	45-49	50-54	55-59	60-64	65-69		
England & Wales	Males	1949-1958	40-44	60-64	5			40-44	45-49	50-54	55-59	60-64			
England & Wales	Males	1954-1963	35-39	55-59	5		35-39	40-44	45-49	50-54	55-59				
England & Wales	Males	1959-1968	40-44	50-54	3			40-44	45-49	50-54					
England & Wales	Males	1964-1973	35-39	45-49	3		35-39	40-44	45-49						
England & Wales	Females	1904-1913	65-69	75-79	3								65-69	70-74	75-79
England & Wales	Females	1909-1918	60-64	75-79	4							60-64	65-69	70-74	75-79
England & Wales	Females	1914-1923	55-59	75-79	5						55-59	60-64	65-69	70-74	75-79
England & Wales	Females	1919-1928	50-54	75-79	6					50-54	55-59	60-64	65-69	70-74	75-79

Country	Sex	Birth- cohort	Min age group	Max age group	Number of age groups	Age category	Age category	Age category	Age category	Age category	Age category	Age category	Age category	Age category	Age category
England & Wales	Females	1924-1933	45-49	75-79	7				45-49	50-54	55-59	60-64	65-69	70-74	75-79
England & Wales	Females	1929-1938	40-44	75-79	7			40-44		50-54	55-59	60-64	65-69	70-74	75-79
England & Wales	Females	1934-1943	45-49	75-79	7				45-49	50-54	55-59	60-64	65-69	70-74	75-79
England & Wales	Females	1939-1948	40-44	70-74	7			40-44	45-49	50-54	55-59	60-64	65-69	70-74	
England & Wales	Females	1944-1953	45-49	65-69	5				45-49	50-54	55-59	60-64	65-69		
England & Wales	Females	1949-1958	40-44	60-64	5			40-44	45-49	50-54	55-59	60-64			
England & Wales	Females	1954-1963	35-39	55-59	5		35-39	40-44	45-49	50-54	55-59				
England & Wales	Females	1959-1968	40-44	50-54	3			40-44	45-49	50-54					
England & Wales	Females	1964-1973	35-39	45-49	3		35-39	40-44	45-49						
Estonia	Males	1933-1941	65-69	75-79	3								65-69	70-74	75-79
Estonia	Males	1938-1946	60-64	70-74	3							60-64	65-69	70-74	
Estonia	Males	1943-1951	55-59	65-69	3						55-59	60-64	65-69		
Estonia	Males	1948-1956	50-54	60-64	3					50-54	55-59	60-64			
Estonia	Males	1953-1961	45-49	55-59	3				45-49	50-54	55-59				
Estonia	Males	1958-1966	40-44	50-54	3			40-44	45-49	50-54					
Estonia	Males	1963-1971	35-39	45-49	3		35-39	40-44	45-49						
Estonia	Males	1968-1976	30-34	40-44	3	30-34	35-39	40-44							
Estonia	Females	1933-1941	65-69	75-79	3								65-69	70-74	75-79
Estonia	Females	1938-1946	60-64	70-74	3							60-64	65-69	70-74	
Estonia	Females	1943-1951	55-59	65-69	3						55-59	60-64	65-69		
Estonia	Females	1948-1956	50-54	60-64	3					50-54	55-59	60-64			
Estonia	Females	1953-1961	45-49	55-59	3				45-49	50-54	55-59				
Estonia	Females	1958-1966	40-44	50-54	3			40-44	45-49	50-54					
Estonia	Females	1963-1971	35-39	45-49	3		35-39	40-44	45-49						
Estonia	Females	1968-1976	30-34	40-44	3	30-34	35-39	40-44							
Finland	Males	1902-1910	65-69	75-79	3								65-69	70-74	75-79
Finland	Males	1907-1915	60-64	75-79	4							60-64	65-69	70-74	75-79
Finland	Males	1912-1920	55-59	75-79	5						55-59	60-64	65-69	70-74	75-79
Finland	Males	1917-1925	50-54	75-79	6					50-54	55-59	60-64	65-69	70-74	75-79
Finland	Males	1922-1930	45-49	75-79	7				45-49	50-54	55-59	60-64	65-69	70-74	75-79
Finland	Males	1927-1935	40-44	75-79	8			40-44	45-49	50-54	55-59	60-64	65-69	70-74	75-79
Finland	Males	1932-1940	35-39	75-79	9		35-39	40-44	45-49	50-54	55-59	60-64	65-69	70-74	75-79
Finland	Males	1937-1945	30-34	70-74	9	30-34	35-39	40-44	45-49	50-54	55-59	60-64	65-69	70-74	
Finland	Males	1942-1950	35-39	65-69	7		35-39	40-44	45-49	50-54	55-59	60-64	65-69		

Country	Sex	Birth- cohort	Min age group	Max age group	Number of age groups	Age category	Age category	Age category	Age category	Age category	Age category	Age category	Age category	Age category	Age category
Finland	Males	1947-1955	30-34	60-64	7	30-34	35-39	40-44	45-49	50-54	55-59	60-64			
Finland	Males	1952-1960	35-39	55-59	5		35-39	40-44	45-49	50-54	55-59				
Finland	Males	1957-1965	30-34	50-54	5	30-34	35-39	40-44	45-49	50-54					
Finland	Males	1962-1970	35-39	45-49	3		35-39	40-44	45-49						
Finland	Males	1967-1975	30-34	40-44	3	30-34	35-39	40-44							
Finland	Females	1902-1910	65-69	75-79	3								65-69	70-74	75-79
Finland	Females	1907-1915	60-64	75-79	4							60-64	65-69	70-74	75-79
Finland	Females	1912-1920	55-59	75-79	5						55-59	60-64	65-69	70-74	75-79
Finland	Females	1917-1925	50-54	75-79	6					50-54	55-59	60-64	65-69	70-74	75-79
Finland	Females	1922-1930	45-49	75-79	7				45-49	50-54	55-59	60-64	65-69	70-74	75-79
Finland	Females	1927-1935	40-44	75-79	8			40-44	45-49	50-54	55-59	60-64	65-69	70-74	75-79
Finland	Females	1932-1940	35-39	75-79	9		35-39	40-44	45-49	50-54	55-59	60-64	65-69	70-74	75-79
Finland	Females	1937-1945	30-34	70-74	9	30-34	35-39	40-44	45-49	50-54	55-59	60-64	65-69	70-74	
Finland	Females	1942-1950	35-39	65-69	7		35-39	40-44	45-49	50-54	55-59	60-64	65-69		
Finland	Females	1947-1955	30-34	60-64	7	30-34	35-39	40-44	45-49	50-54	55-59	60-64			
Finland	Females	1952-1960	35-39	55-59	5		35-39	40-44	45-49	50-54	55-59				
Finland	Females	1957-1965	30-34	50-54	5	30-34	35-39	40-44	45-49	50-54					
Finland	Females	1962-1970	35-39	45-49	3		35-39	40-44	45-49						
Finland	Females	1967-1975	30-34	40-44	3	30-34	35-39	40-44							
France	Males	1906-1914	65-69	75-79	3								65-69	70-74	75-79
France	Males	1911-1919	60-64	75-79	4							60-64	65-69	70-74	75-79
France	Males	1916-1924	55-59	75-79	5						55-59	60-64	65-69	70-74	75-79
France	Males	1921-1929	50-54	75-79	6					50-54	55-59	60-64	65-69	70-74	75-79
France	Males	1926-1934	50-54	75-79	6					50-54	55-59	60-64	65-69	70-74	75-79
France	Males	1931-1939	45-49	70-74	6				45-49	50-54	55-59	60-64	65-69	70-74	
France	Males	1936-1944	40-44	65-69	6			40-44	45-49	50-54	55-59	60-64	65-69		
France	Males	1941-1949	35-39	60-64	6		35-39	40-44	45-49	50-54	55-59	60-64			
France	Males	1946-1954	40-44	55-59	4			40-44	45-49	50-54	55-59				
France	Males	1951-1959	35-39	50-54	4		35-39	40-44	45-49	50-54					
France	Males	1956-1964	35-39	45-49	3		35-39	40-44	45-49						
France	Females	1906-1914	65-69	75-79	3								65-69	70-74	75-79
France	Females	1916-1924	60-64	75-79	4							60-64	65-69	70-74	75-79
France	Females	1921-1929	55-59	75-79	4						55-59		65-69	70-74	75-79
France	Females	1926-1934	60-64	75-79	4							60-64	65-69	70-74	75-79

Country	Sex	Birth- cohort	Min age group	Max age group	Number of age groups	Age category	Age category	Age category	Age category	Age category	Age category	Age category	Age category	Age category	Age category
France	Females	1931-1939	60-64	70-74	3							60-64	65-69	70-74	
France	Females	1936-1944	50-54	65-69	4					50-54	55-59	60-64	65-69		
France	Females	1941-1949	45-49	60-64	4				45-49	50-54	55-59	60-64			
France	Females	1946-1954	40-44	55-59	4			40-44	45-49	50-54	55-59				
France	Females	1951-1959	40-44	50-54	3			40-44	45-49	50-54					
Hungary	Males	1909-1916	60-64	75-79	3							60-64	65-69		75-79
Hungary	Males	1914-1921	55-59	70-74	3						55-59	60-64		70-74	
Hungary	Males	1919-1926	50-54	75-79	4					50-54	55-59		65-69		75-79
Hungary	Males	1924-1931	45-49	70-74	4				45-49	50-54		60-64		70-74	
Hungary	Males	1929-1936	40-44	75-79	5			40-44	45-49		55-59		65-69		75-79
Hungary	Males	1934-1941	35-39	70-74	5		35-39	40-44		50-54		60-64		70-74	
Hungary	Males	1939-1946	30-34	65-69	5	30-34	35-39		45-49		55-59		65-69		
Hungary	Males	1944-1951	30-34	60-64	4	30-34		40-44		50-54		60-64			
Hungary	Males	1949-1956	35-39	55-59	3		35-39		45-49		55-59				
Hungary	Males	1954-1961	30-34	50-54	3	30-34		40-44		50-54					
Hungary	Females	1909-1916	60-64	75-79	3							60-64	65-69		75-79
Hungary	Females	1914-1921	55-59	70-74	3						55-59	60-64		70-74	
Hungary	Females	1919-1926	50-54	75-79	4					50-54	55-59		65-69		75-79
Hungary	Females	1924-1931	45-49	70-74	4				45-49	50-54		60-64		70-74	
Hungary	Females	1929-1936	40-44	75-79	5			40-44	45-49		55-59		65-69		75-79
Hungary	Females	1934-1941	35-39	70-74	5		35-39	40-44		50-54		60-64		70-74	
Hungary	Females	1939-1946	30-34	65-69	5	30-34	35-39		45-49		55-59		65-69		
Hungary	Females	1944-1951	30-34	60-64	4	30-34		40-44		50-54		60-64			
Hungary	Females	1949-1956	35-39	55-59	3		35-39		45-49		55-59				
Hungary	Females	1954-1961	30-34	50-54	3	30-34		40-44		50-54					
Italy (Turin)	Males	1902-1911	65-69	75-79	3								65-69	70-74	75-79
Italy (Turin)	Males	1907-1916	60-64	75-79	4							60-64	65-69	70-74	75-79
Italy (Turin)	Males	1912-1921	55-59	75-79	5						55-59	60-64	65-69	70-74	75-79
Italy (Turin)	Males	1917-1926	50-54	75-79	6					50-54	55-59	60-64	65-69	70-74	75-79
Italy (Turin)	Males	1922-1931	45-49	75-79	7				45-49	50-54	55-59	60-64	65-69	70-74	75-79
Italy (Turin)	Males	1927-1936	45-49	75-79	7				45-49	50-54	55-59	60-64	65-69	70-74	75-79
Italy (Turin)	Males	1932-1941	35-39	75-79	9		35-39	40-44	45-49	50-54	55-59	60-64	65-69	70-74	75-79
Italy (Turin)	Males	1937-1946	40-44	70-74	7			40-44	45-49	50-54	55-59	60-64	65-69	70-74	
Italy (Turin)	Males	1942-1951	35-39	65-69	7		35-39	40-44	45-49	50-54	55-59	60-64	65-69		

Country	Sex	Birth- cohort	Min age group	Max age group	Number of age groups	Age category	Age category	Age category	Age category	Age category	Age category	Age category	Age category	Age category	Age category
Italy (Turin)	Males	1947-1956	40-44	60-64	5			40-44	45-49	50-54	55-59	60-64			
Italy (Turin)	Males	1952-1961	35-39	55-59	5		35-39	40-44	45-49	50-54	55-59				
Italy (Turin)	Males	1957-1966	40-44	50-54	3			40-44	45-49	50-54					
Italy (Turin)	Males	1962-1971	35-39	45-49	3		35-39	40-44	45-49						
Italy (Turin)	Females	1902-1911	65-69	75-79	3								65-69	70-74	75-79
Italy (Turin)	Females	1907-1916	60-64	75-79	4							60-64	65-69	70-74	75-79
Italy (Turin)	Females	1912-1921	60-64	75-79	4							60-64	65-69	70-74	75-79
Italy (Turin)	Females	1917-1926	50-54	75-79	6					50-54	55-59	60-64	65-69	70-74	75-79
Italy (Turin)	Females	1922-1931	45-49	75-79	7				45-49	50-54	55-59	60-64	65-69	70-74	75-79
Italy (Turin)	Females	1927-1936	45-49	75-79	7				45-49	50-54	55-59	60-64	65-69	70-74	75-79
Italy (Turin)	Females	1932-1941	50-54	75-79	6					50-54	55-59	60-64	65-69	70-74	75-79
Italy (Turin)	Females	1937-1946	40-44	70-74	7			40-44	45-49	50-54	55-59	60-64	65-69	70-74	
Italy (Turin)	Females	1942-1951	35-39	65-69	7		35-39	40-44	45-49	50-54	55-59	60-64	65-69		
Italy (Turin)	Females	1947-1956	40-44	60-64	5			40-44	45-49	50-54	55-59	60-64			
Italy (Turin)	Females	1952-1961	35-39	55-59	5		35-39	40-44	45-49	50-54	55-59				
Italy (Turin)	Females	1957-1966	40-44	50-54	3			40-44	45-49	50-54					
Lithuania	Males	1932-1940	65-69	75-79	3								65-69	70-74	75-79
Lithuania	Males	1937-1945	60-64	70-74	3							60-64	65-69	70-74	
Lithuania	Males	1942-1950	55-59	65-69	3						55-59	60-64	65-69		
Lithuania	Males	1947-1955	50-54	60-64	3					50-54	55-59	60-64			
Lithuania	Males	1952-1960	45-49	55-59	3				45-49	50-54	55-59				
Lithuania	Males	1957-1965	40-44	50-54	3			40-44	45-49	50-54					
Lithuania	Males	1962-1970	35-39	45-49	3		35-39	40-44	45-49						
Lithuania	Males	1967-1975	30-34	40-44	3	30-34	35-39	40-44							
Lithuania	Females	1932-1940	65-69	75-79	3								65-69	70-74	75-79
Lithuania	Females	1937-1945	60-64	70-74	3							60-64	65-69	70-74	
Lithuania	Females	1942-1950	55-59	65-69	3						55-59	60-64	65-69		
Lithuania	Females	1947-1955	50-54	60-64	3					50-54	55-59	60-64			
Lithuania	Females	1952-1960	45-49	55-59	3				45-49	50-54	55-59				
Lithuania	Females	1957-1965	40-44	50-54	3			40-44	45-49	50-54					
Lithuania	Females	1962-1970	35-39	45-49	3		35-39	40-44	45-49						
Lithuania	Females	1967-1975	30-34	40-44	3	30-34	35-39	40-44							
Norway	Males	1902-1910	65-69	75-79	3								65-69	70-74	75-79
Norway	Males	1907-1915	60-64	75-79	4							60-64	65-69	70-74	75-79

Country	Sex	Birth- cohort	Min age group	Max age group	Number of age groups	Age category	Age category	Age category	Age category	Age category	Age category	Age category	Age category	Age category	Age category
Norway	Males	1912-1920	55-59	75-79	5						55-59	60-64	65-69	70-74	75-79
Norway	Males	1917-1925	50-54	75-79	6					50-54	55-59	60-64	65-69	70-74	75-79
Norway	Males	1922-1930	45-49	75-79	7				45-49	50-54	55-59	60-64	65-69	70-74	75-79
Norway	Males	1927-1935	40-44	75-79	8			40-44	45-49	50-54	55-59	60-64	65-69	70-74	75-79
Norway	Males	1932-1940	40-44	70-74	7			40-44	45-49	50-54	55-59	60-64	65-69	70-74	
Norway	Males	1937-1945	40-44	65-69	6			40-44	45-49	50-54	55-59	60-64	65-69		
Norway	Males	1942-1950	40-44	60-64	5			40-44	45-49	50-54	55-59	60-64			
Norway	Males	1947-1955	40-44	55-59	4			40-44	45-49	50-54	55-59				
Norway	Males	1952-1960	40-44	50-54	3			40-44	45-49	50-54					
Norway	Females	1902-1910	65-69	75-79	3								65-69	70-74	75-79
Norway	Females	1907-1915	60-64	75-79	4							60-64	65-69	70-74	75-79
Norway	Females	1912-1920	55-59	75-79	5						55-59	60-64	65-69	70-74	75-79
Norway	Females	1917-1925	50-54	75-79	6					50-54	55-59	60-64	65-69	70-74	75-79
Norway	Females	1922-1930	45-49	75-79	7				45-49	50-54	55-59	60-64	65-69	70-74	75-79
Norway	Females	1927-1935	40-44	75-79	8			40-44	45-49	50-54	55-59	60-64	65-69	70-74	75-79
Norway	Females	1932-1940	40-44	70-74	7			40-44	45-49	50-54	55-59	60-64	65-69	70-74	
Norway	Females	1937-1945	40-44	65-69	6			40-44	45-49	50-54	55-59	60-64	65-69		
Norway	Females	1942-1950	40-44	60-64	5			40-44	45-49	50-54	55-59	60-64			
Norway	Females	1947-1955	40-44	55-59	4			40-44	45-49	50-54	55-59				
Norway	Females	1952-1960	40-44	50-54	3			40-44	45-49	50-54					
Spain (Barcelona)	Males	1923-1931	65-69	75-79	3								65-69	70-74	75-79
Spain (Barcelona)	Males	1928-1936	60-64	75-79	4							60-64	65-69	70-74	75-79
Spain (Barcelona)	Males	1933-1941	55-59	75-79	5						55-59	60-64	65-69	70-74	75-79
Spain (Barcelona)	Males	1938-1946	50-54	70-74	5					50-54	55-59	60-64	65-69	70-74	
Spain (Barcelona)	Males	1943-1951	45-49	65-69	5				45-49	50-54	55-59	60-64	65-69		
Spain (Barcelona)	Males	1948-1956	40-44	60-64	5			40-44	45-49	50-54	55-59	60-64			
Spain (Barcelona)	Males	1953-1961	35-39	55-59	5		35-39	40-44	45-49	50-54	55-59				
Spain (Barcelona)	Males	1958-1966	30-34	50-54	5	30-34	35-39	40-44	45-49	50-54					
Spain (Barcelona)	Males	1963-1971	30-34	45-49	4	30-34	35-39	40-44	45-49						
Spain (Barcelona)	Males	1968-1976	30-34	40-44	3	30-34	35-39	40-44							
Spain (Barcelona)	Females	1923-1931	65-69	75-79	3								65-69	70-74	75-79
Spain (Barcelona)	Females	1928-1936	60-64	75-79	4							60-64	65-69	70-74	75-79
Spain (Barcelona)	Females	1933-1941	55-59	75-79	5						55-59	60-64	65-69	70-74	75-79
Spain (Barcelona)	Females	1938-1946	50-54	70-74	5					50-54	55-59	60-64	65-69	70-74	

Country	Sex	Birth- cohort	Min age group	Max age group	Number of age groups	Age category	Age category	Age category	Age category	Age category	Age category	Age category	Age category	Age category	Age category
Spain (Barcelona)	Females	1943-1951	45-49	65-69	5				45-49	50-54	55-59	60-64	65-69		
Spain (Barcelona)	Females	1948-1956	40-44	60-64	5			40-44	45-49	50-54	55-59	60-64			
Spain (Barcelona)	Females	1953-1961	35-39	55-59	5		35-39	40-44	45-49	50-54	55-59				
Spain (Barcelona)	Females	1958-1966	30-34	50-54	5	30-34	35-39	40-44	45-49	50-54					
Spain (Barcelona)	Females	1963-1971	30-34	45-49	4	30-34	35-39	40-44	45-49						
Spain (Barcelona)	Females	1968-1976	30-34	40-44	3	30-34	35-39	40-44							
Sweden	Males	1921-1929	65-69	75-79	3								65-69	70-74	75-79
Sweden	Males	1926-1934	60-64	75-79	4							60-64	65-69	70-74	75-79
Sweden	Males	1931-1939	55-59	70-74	4						55-59	60-64	65-69	70-74	
Sweden	Males	1936-1944	50-54	65-69	4					50-54	55-59	60-64	65-69		
Sweden	Males	1941-1949	45-49	60-64	4				45-49	50-54	55-59	60-64			
Sweden	Males	1946-1954	40-44	55-59	4			40-44	45-49	50-54	55-59				
Sweden	Males	1951-1959	35-39	50-54	4		35-39	40-44	45-49	50-54					
Sweden	Males	1956-1964	30-34	45-49	4	30-34	35-39	40-44	45-49						
Sweden	Females	1921-1929	65-69	75-79	3								65-69	70-74	75-79
Sweden	Females	1926-1934	60-64	75-79	4							60-64	65-69	70-74	75-79
Sweden	Females	1931-1939	55-59	70-74	4						55-59	60-64	65-69	70-74	
Sweden	Females	1936-1944	50-54	65-69	4					50-54	55-59	60-64	65-69		
Sweden	Females	1941-1949	45-49	60-64	4				45-49	50-54	55-59	60-64			
Sweden	Females	1946-1954	40-44	55-59	4			40-44	45-49	50-54	55-59				
Sweden	Females	1951-1959	35-39	50-54	4		35-39	40-44	45-49	50-54					
Sweden	Females	1956-1964	30-34	45-49	4	30-34	35-39	40-44	45-49						
Switzerland	Males	1922-1930	65-69	75-79	3								65-69	70-74	75-79
Switzerland	Males	1927-1935	60-64	75-79	4							60-64	65-69	70-74	75-79
Switzerland	Males	1932-1940	55-59	75-79	5						55-59	60-64	65-69	70-74	75-79
Switzerland	Males	1937-1945	50-54	70-74	5					50-54	55-59	60-64	65-69	70-74	
Switzerland	Males	1942-1950	45-49	65-69	5				45-49	50-54	55-59	60-64	65-69		
Switzerland	Males	1947-1955	40-44	60-64	5			40-44	45-49	50-54	55-59	60-64			
Switzerland	Males	1952-1960	35-39	55-59	5		35-39	40-44	45-49	50-54	55-59				
Switzerland	Males	1957-1965	30-34	50-54	5	30-34	35-39	40-44	45-49	50-54					
Switzerland	Males	1962-1970	35-39	45-49	3		35-39	40-44	45-49						
Switzerland	Males	1967-1975	30-34	40-44	3	30-34	35-39	40-44							
Switzerland	Females	1922-1930	65-69	75-79	3								65-69	70-74	75-79
Switzerland	Females	1927-1935	60-64	75-79	4							60-64	65-69	70-74	75-79

Country	Sex	Birth- cohort	Min age group	Max age group	Number of age groups	Age category	Age category	Age category	Age category	Age category	Age category	Age category	Age category	Age category	Age category
Switzerland	Females	1932-1940	55-59	75-79	5						55-59	60-64	65-69	70-74	75-79
Switzerland	Females	1937-1945	50-54	70-74	5					50-54	55-59	60-64	65-69	70-74	
Switzerland	Females	1942-1950	45-49	65-69	5				45-49	50-54	55-59	60-64	65-69		
Switzerland	Females	1947-1955	40-44	60-64	5			40-44	45-49	50-54	55-59	60-64			
Switzerland	Females	1952-1960	35-39	55-59	5		35-39	40-44	45-49	50-54	55-59				
Switzerland	Females	1957-1965	30-34	50-54	5	30-34	35-39	40-44	45-49	50-54					
Switzerland	Females	1962-1970	35-39	45-49	3		35-39	40-44	45-49						
Switzerland	Females	1967-1975	30-34	40-44	3	30-34	35-39	40-44							

Appendix 3

Mortality trends among low and high educated and birth-cohorts: eight specific causes of death

We studied mortality from two specific cause of death from each group of causes, namely ischaemic heart disease and cerebrovascular diseases (cardiovascular diseases), lung cancer and breast cancer (neoplasm), road-traffic injuries and suicide (external causes), and Chronic Obstructive Pulmonary Disease (COPD) and alcohol-related conditions (other causes) (Appendix 3 Table 6 and Appendix 6 Figure 1-2).

Table 6. ICD code numbers for the causes of death included in the analysis and possible social determinants

	ICD-8	**ICD-9**	**ICD-10**
Four large groups			
Cardiovascular diseases	390-458	390-459	I00-I99
Neoplasms	140-239	140-239	C00-C97, D00-D48
External causes	E800-E999	E800-E999	V01-Y98
All other diseases	All other	All other	All other
Eight specific causes			
Ischaemic heart disease	410-414	410-414	I20-I25
Cerebrovascular disease	430-438	430-438	I60-I69
Cancer of the lung	162	162	C33-C34
Cancer of the breast	174	170-175	C50
COPD	490-492,518	490-492, 494,496	J40-J47
Alcohol-related causes	291, 303, 425, 571, E860	291, 303, 305.0, 425.5, 571, E860	F10, I42.6, K70, X45, K74
Road traffic injuries	E800-E827	E800-E829	V01-V89, Y85
Suicide	E950-E959	E950-E959	X60-X84, Y87.0

Note to table ICD stands for International Classification of Diseases. Alcohol-related conditions refer to alcoholic psychosis, dependence, and abuse; alcoholic cardiomyopathy; alcoholic liver cirrhosis; and accidental poisoning by alcohol

Appendix 4

Calculations of cohort comparative mortality figures (CCMFs)

We followed *Gardner et al*[1]. with the following steps of calculations for each sex and cause-of-death:
Firstly, we summed the person-years in all countries by sex and age as the standard population in each sex-age group. We summed the observed number of deaths in all countries by sex and age as the standard number of deaths in each sex-age group ($\sum D$). Secondly, we calculated the expected number of deaths for each birth-cohort with the standard population and observed deaths rates in each country-sex-education level group ($\sum F$). Finally, we calculate the ratio of expected number deaths $\sum F$ in each country-sex-education level group, to the standard number of deaths $\sum D$, as the CCMF for every birth-cohort in each country-sex-education level group ($CCMF = \sum F / \sum D$).

Each step is as follows:

First use the following notations:

$i =$ number of age groups;
$j =$ number of calendar-periods of time;
$e =$ level of education;
$c =$ number of countries;
$k =$ number of cohorts;
$d_{ijec} =$ number of deaths in age group i during period j, level of education e, and country c;
$y_{ijec} =$ person-years in age group i during period j, level of education e, and country c;
$r_{ijec} = \frac{d_{ijec}}{y_{ijec}} =$ death rate in age group i during period j, level of education e, and country c.

Secondly, we define:

Population structure in standard population (Y_i): person-years summed across in all 14 countries by age;
Age-specific death rates in standard population (R_i): number of deaths summed in all 14 countries by age (D_i) divided by age-specific standard population ($R_i = D_i/Y_i$).

[1] Gardner, M. J., and C. Osmond. "Interpretation of time trends in disease rates in the presence of generation effects." *Statistics in medicine* 3.2 (1984): 113-130.

Then, we define:

$$f_{ijec} = Y_i r_{ijec}$$

to be the expected number of deaths if persons in age-group i of the standard population would have been exposed to the observed death rate in age group i during cohort k, level of education e, and country c;

$$F_{kec} = \sum_i f_{ikec}$$

To be the expected number of deaths for a specific birth-cohort k in level of education e, and country c;

and

$$D_k = \sum_i D_i$$

to be the expected number of deaths for a specific birth-cohort k if they had standard population structure and death rates in the same age group.

Finally, the CCMF for each birth-cohort is given by:

$$\frac{Expected\ deaths\ in\ standard\ population\ at\ death\ rates\ of\ cohort\ k, education\ level\ e, and\ country\ c}{Expected\ deaths\ in\ standard\ at\ standard\ rates}$$

=

$$\frac{F_{kec}}{D_k}$$

so that

$$CCMF = \frac{F_{kec}}{D_k} = \sum_i \frac{D_i}{D_k} \frac{r_{ijec}}{R_i}$$

as CCMF is the weighted arithmetic means of age-specific rate ratios.

Calculations of (period) comparative mortality figures (CMFs)

We further followed *Gardner et al*. with the following steps of calculations for each sex and cause-of-death using the same dataset as the cohort perspective:

Firstly, we summed the person-years in all countries by sex and age as the standard population in each sex-age group. We summed the observed number of deaths in all countries by sex and age as the standard number of deaths in each sex-age group ($\sum D$). Secondly, we calculated the expected number of deaths for each calendar-period with the standard population and observed deaths rates in each country-sex-education level group ($\sum F$). Finally, we calculate the ratio of expected number deaths $\sum F$ in each country-sex-education level group, to the standard number of deaths $\sum D$, as the CMF for every calendar-period in each country-sex-education level group ($CMF = \sum F / \sum D$).

Each step is as follows:

First use the following notations:

$i =$ number of age groups;
$j =$ number of calendar periods of time;
$e =$ level of education;
$c =$ number of countries;
$d_{ijec} =$ number of deaths in age group i during period j, level of education e, and country c;
$y_{ijec} =$ person-years in age group i during period j, level of education e, and country c;
$r_{ijec} = \frac{d_{ijec}}{y_{ijec}} =$ death rate in age group i during period j, level of education e, and country c.

Secondly, we define:

Population structure in standard population (Y_i): person-years summed across in all 14 countries by age;
Age-specific death rates in standard population (R_i): number of deaths summed in all 14 countries by age (D_i) divided by age-specific standard population ($R_i = D_i/Y_i$).

Then, we define:

$$f_{ijec} = Y_i r_{ijec}$$

to be the expected number of deaths if persons in age-group i of the standard population would have been exposed to the observed death rate in age group i during calendar-period p, level of education e, and country c;

$$F_{pec} = \sum_j f_{iec}$$

To be the expected number of deaths for a specific calendar-period p in level of education e, and country c;

and

$$D_p = \sum_j D_i$$

to be the expected number of deaths for a specific calendar-period p if they had standard population structure and death rates in the same age group.

Finally, the CMF for each calendar-period is given by:

$$\frac{Expected\ deaths\ in\ standard\ population\ at\ death\ rates\ of\ period\ j, education\ level\ e, and\ country\ c}{Expected\ deaths\ in\ standard\ at\ standard\ rates}$$

=

$$\frac{F_{pec}}{D_p}$$

so that

$$CMF = \frac{F_{pec}}{D_p} = \sum_j \frac{D_i}{D_j} \frac{r_{ijec}}{R_i}$$

as CMF is the weighted arithmetic means of age-specific rate ratios.

Appendix 5

The adjustment of overestimation in RR: Double standardization

When examining age-specific Rate Ratio (RR) between the low and high educated among each age group, we observed higher RR in younger than in older age groups. Take all-cause mortality among men as an example, RR ranges from 4.38 for the age group 30-34 to 1.95 for the age group 70-74. Similar declines in RR were also found for all-cause mortality among women and for other causes of death.

In our analysis, each cohort consisted of different age groups. This phenomenon suggested that more recently born generations, of which we observed only the younger age groups, are likely to have higher RRs simply because of the difference in age distribution. In order to mitigate this issue, we have used a 'double standardization' technique. Here we offer an example of the calculation of the 'double standardization' for all-cause mortality among men.

Say the standard population consists of age groups a to e, with person-year followed PY_a to PY_e, and all-cause deaths D_a to D_e. The mortality rates of age groups age a to e are therefore $M_a = \frac{D_a}{PY_a}$ to $M_e = \frac{D_e}{PY_e}$

A specific cohort we are interested only contains age a to c. For this cohort we observed $R_{obs} = \frac{CCMF_{low\ edu}}{CCMF_{high\ edu}}$

First, we calculate age-specific RR for the standard population, that is the ratio of mortality rates between the low and high educated. From this step we get age-specific RR_a to RR_e ($\frac{D_{low\ edu}}{PY_{low\ edu}} / \frac{D_{high\ edu}}{PY_{high\ edu}}$ for each age group).

Second, we calculate the age-standardized RR for the standard population, weighted by mortality rates of each age group in the standard population. That is

$$RR_{stand} = M_a * RR_a + M_b * RR_b + M_c * RR_c + M_d * RR_d + M_e * RR_e$$

Third, we calculate the age-standardized RR for age groups include in each cohort, similarly as the previous step but with limited age groups. That is

$$RR_{cohort} = M_a * RR_a + M_b * RR_b + M_c * RR_c$$

Finally, we take the ratio of RR_{cohort} and RR_{stand}

$$por_{cohort} = \frac{RR_{cohort}}{RR_{stand}}$$

as to calculate a proportion as an effect of to what extend it is influenced by the not-complete age groups. We divide RI_{obs} by this proportion as our final estimation of the double standardized RR:

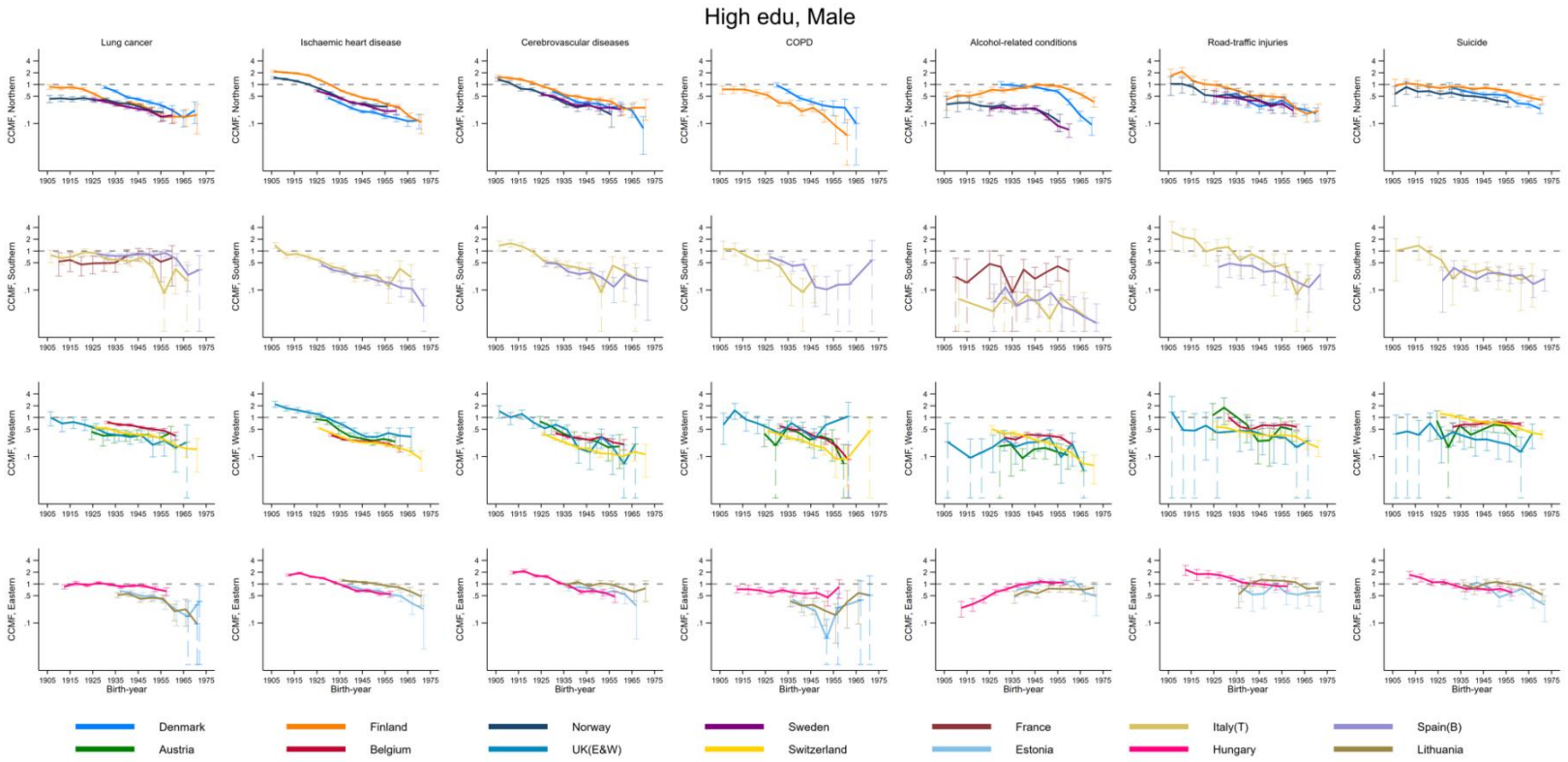
$$RR_{ds} = R_{obs}/por_{cohort}$$

The double standardization, therefore, can be simply understood as: the R_{obs} that could have been estimated if all other age groups were available.

Appendix 6

Figure 1. Changes among high-educated by birth-year: eight specific causes of death

A. Male



B. Female

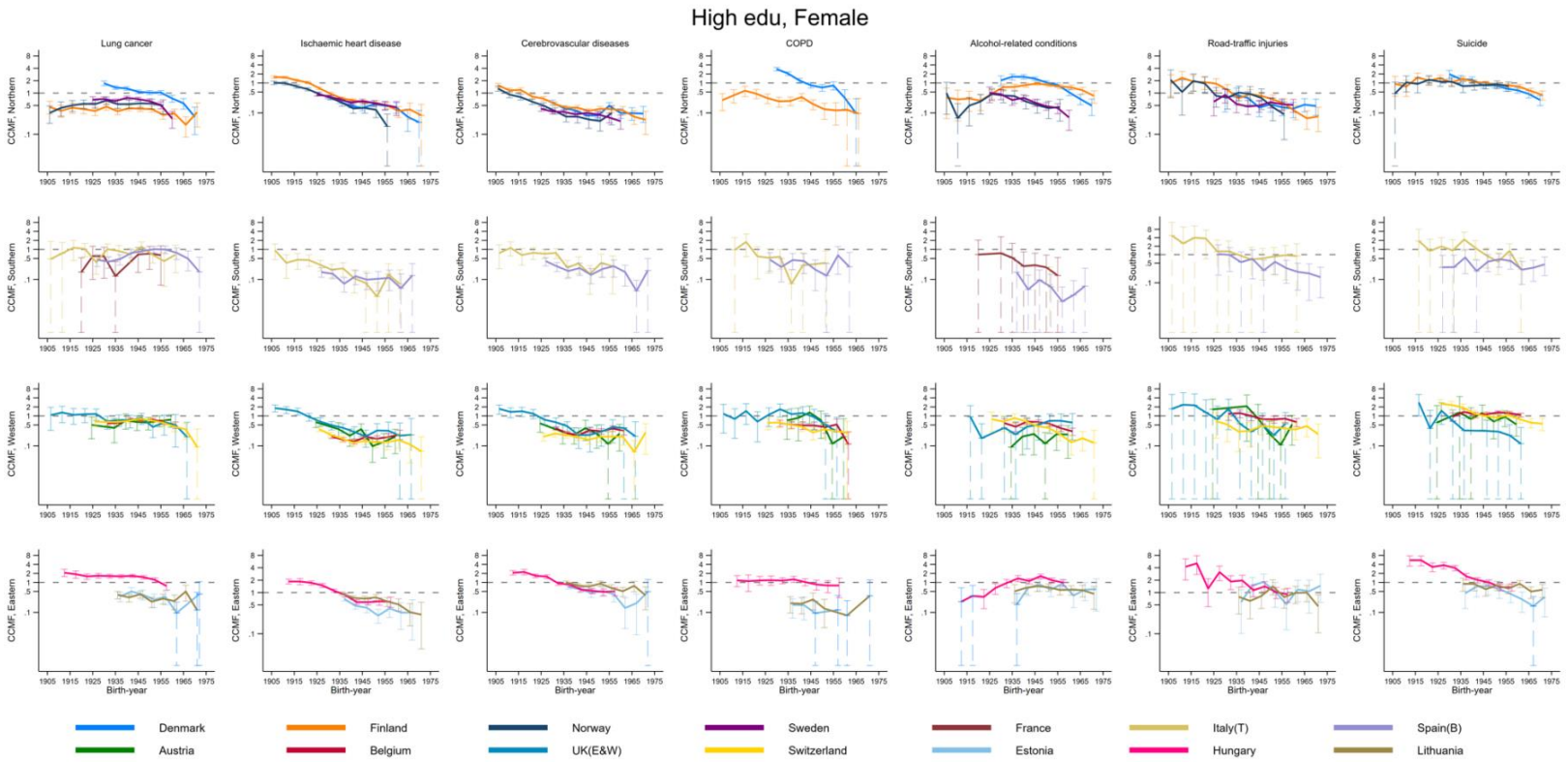
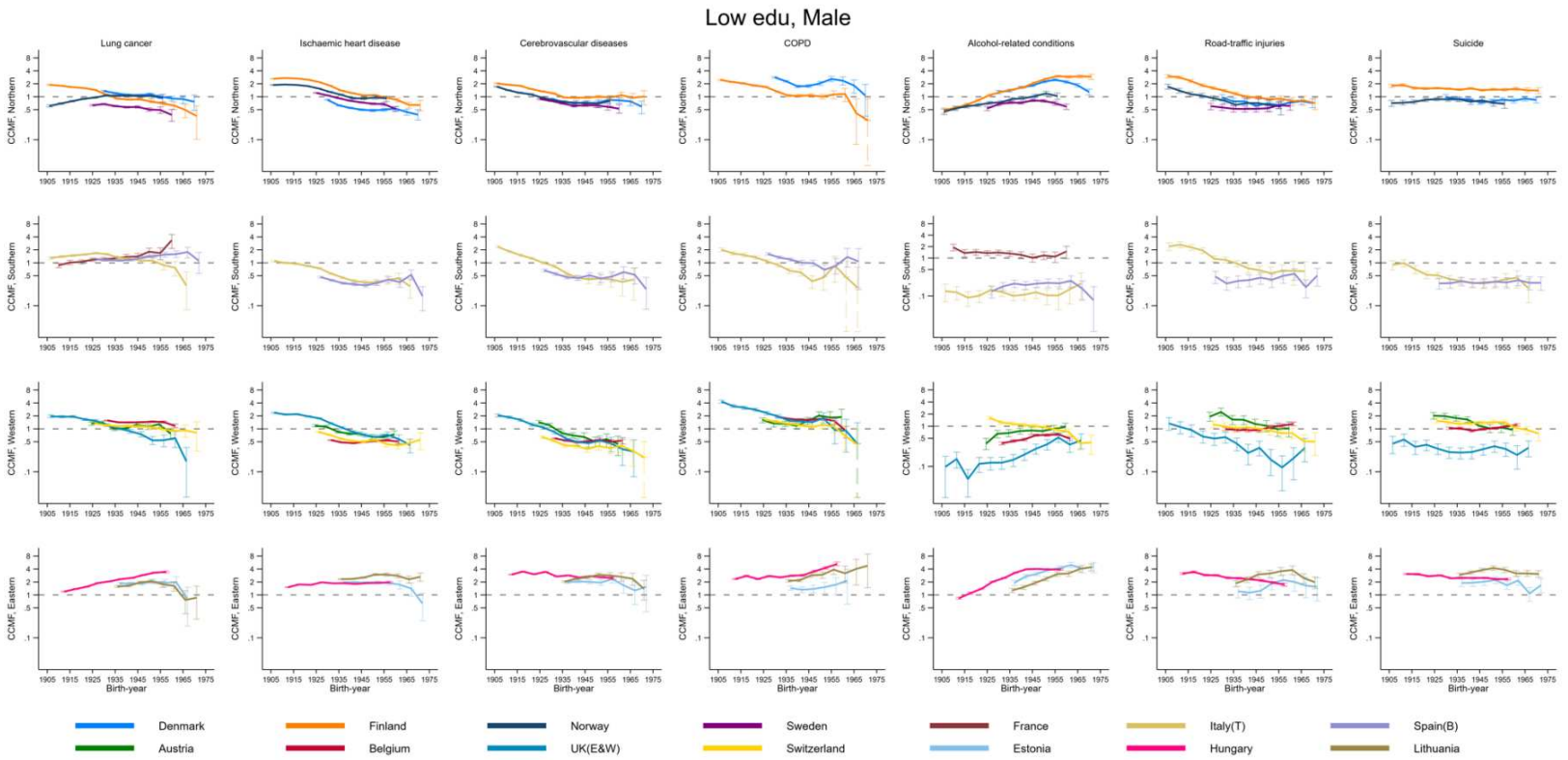
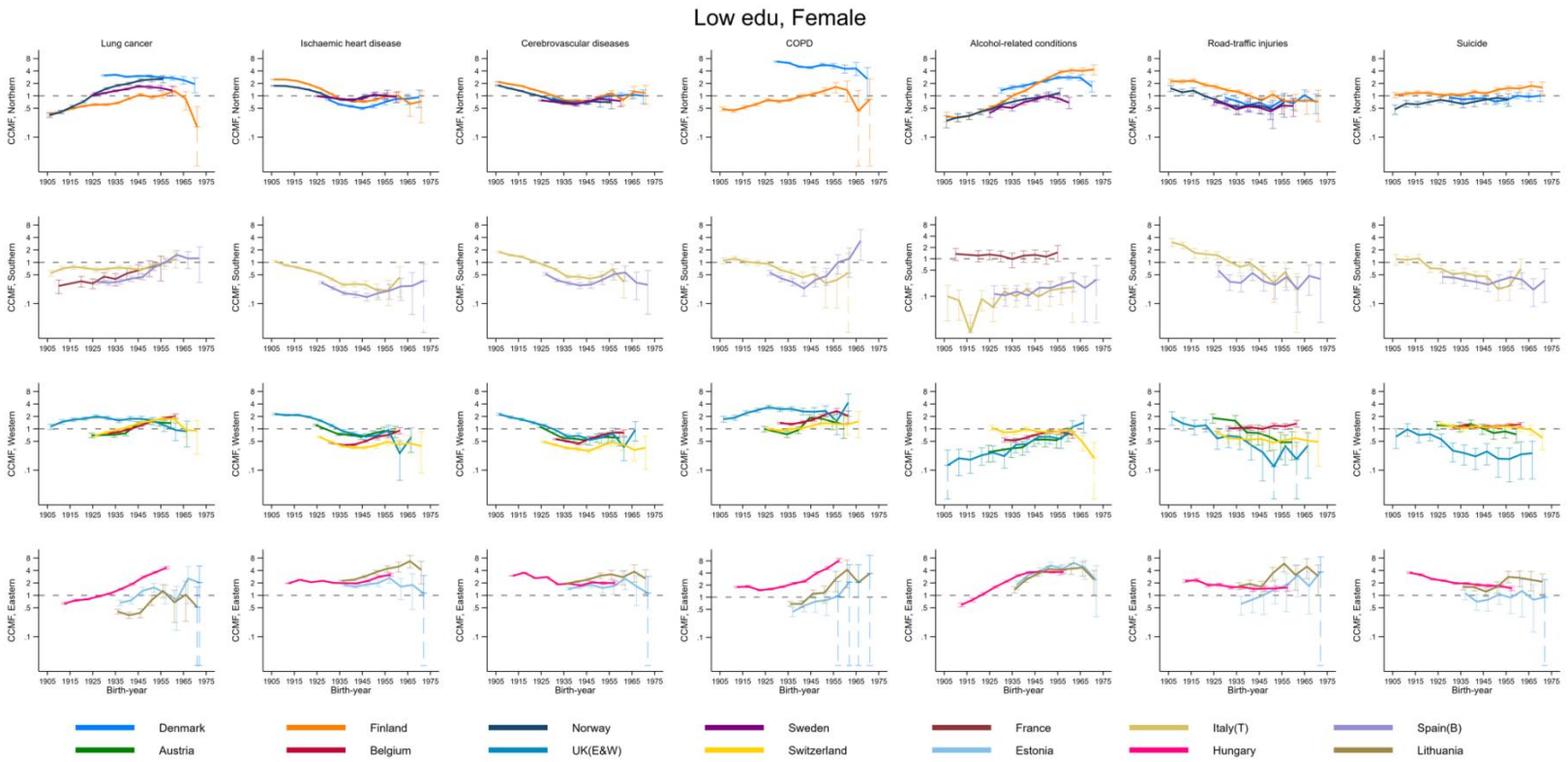


Figure 2. Changes among low-educated by birth-year: eight specific causes of death

A. Male


Low edu, Male
Lung cancer
Ischaemic heart disease
Cerebrovascular diseases
COPD
Alcohol-related conditions
Road-traffic injuries
Suicide
CCMF, Northern
CCMF, Southern
CCMF, Western
CCMF, Eastern
Birth-year
Denmark
Finland
Norway
Sweden
France
Italy(T)
Spain(B)
Austria
Belgium
UK(E&W)
Switzerland
Estonia
Hungary
Lithuania

B. Female

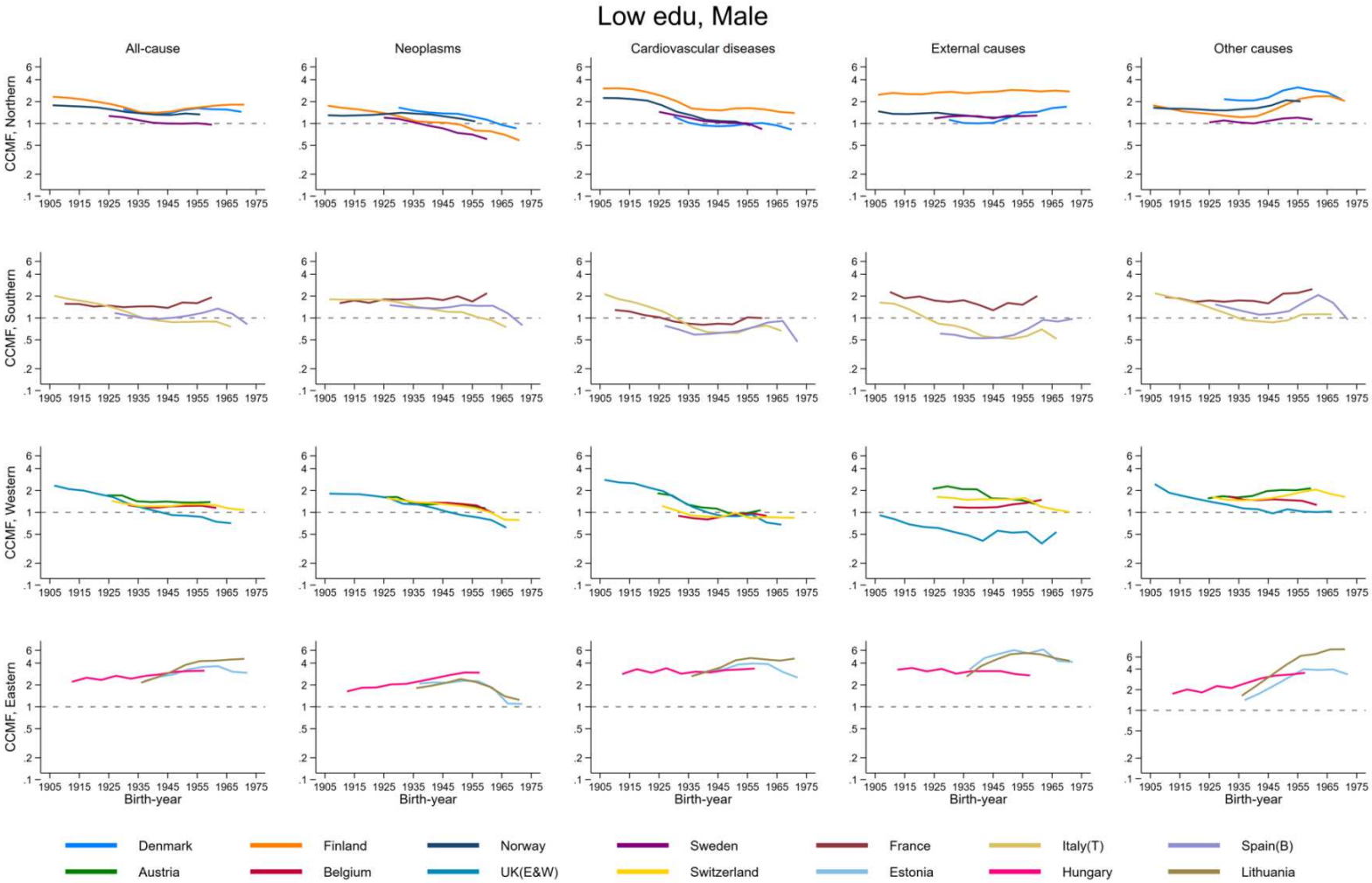

Low edu, Female
Lung cancer
Ischaemic heart disease
Cerebrovascular diseases
COPD
Alcohol-related conditions
Road-traffic injuries
Suicide
CCMF, Northern
CCMF, Southern
CCMF, Western
CCMF, Eastern
Birth-year
Denmark
Finland
Norway
Sweden
France
Italy(T)
Spain(B)
Austria
Belgium
UK(E&W)
Switzerland
Estonia
Hungary
Lithuania

Appendix 7

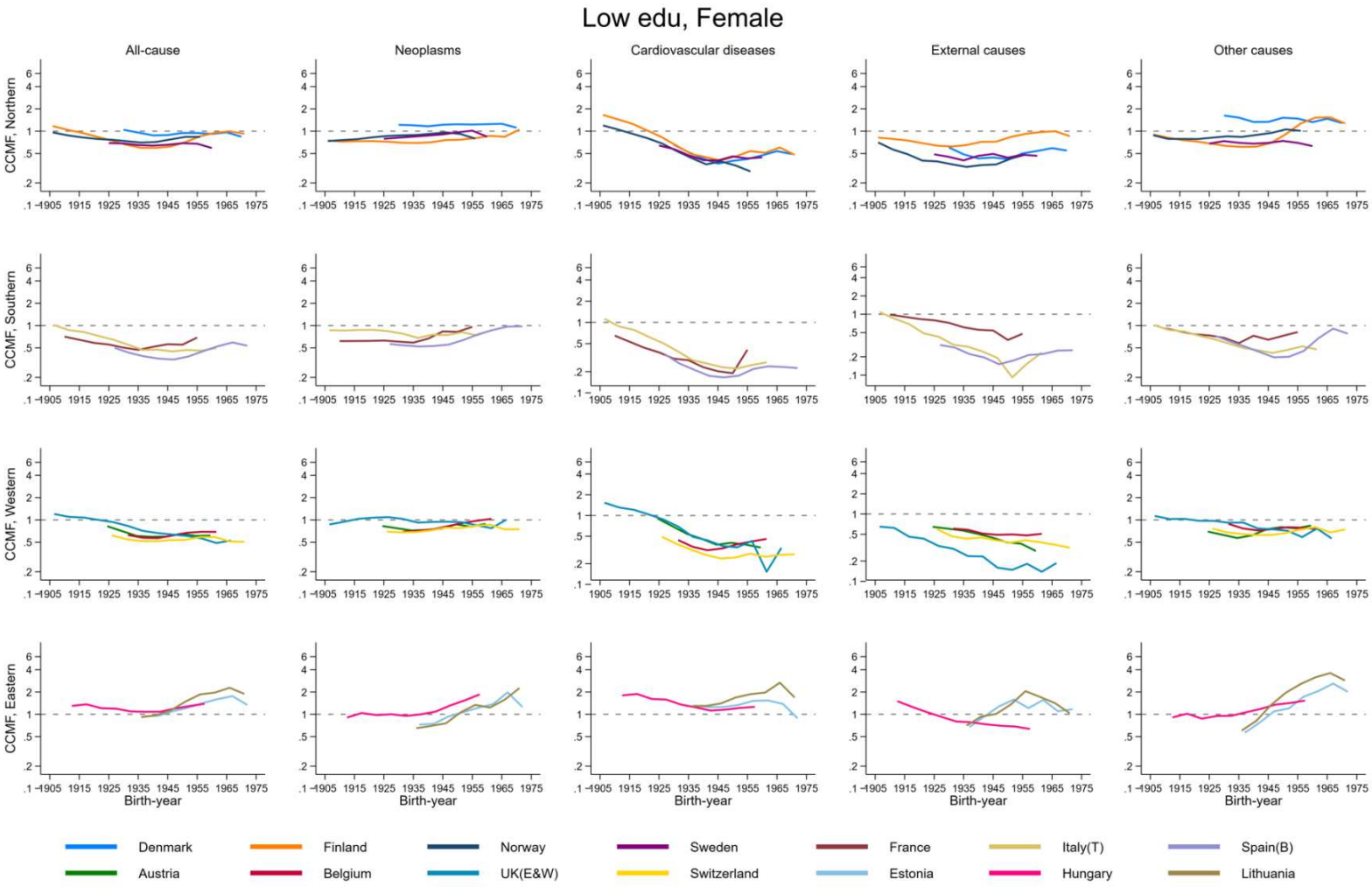
We calculated CCMF using a common standard population for both male and female. The results are in Figure 3 and 4. Because women in general have lower mortality, CCMF is often below 1, which makes it less easy to interpret educational differences, which is the focus of the paper. Nevertheless, the results on absolute and relative inequalities are very similar to the main results, because rate difference and rate ratios are not affected by the exact values of CCMFs but relative positions of CCMFs. Therefore, although in the main analysis, different standard populations are used for men and women separately, there are still certain levels of comparability to the results.
We present this as supplementary material where CCMFs for men and women are based on the same standard population and therefore can be directly better compared.

Figure 3. Change in mortality by birth-year: using a common standard population for both male and female

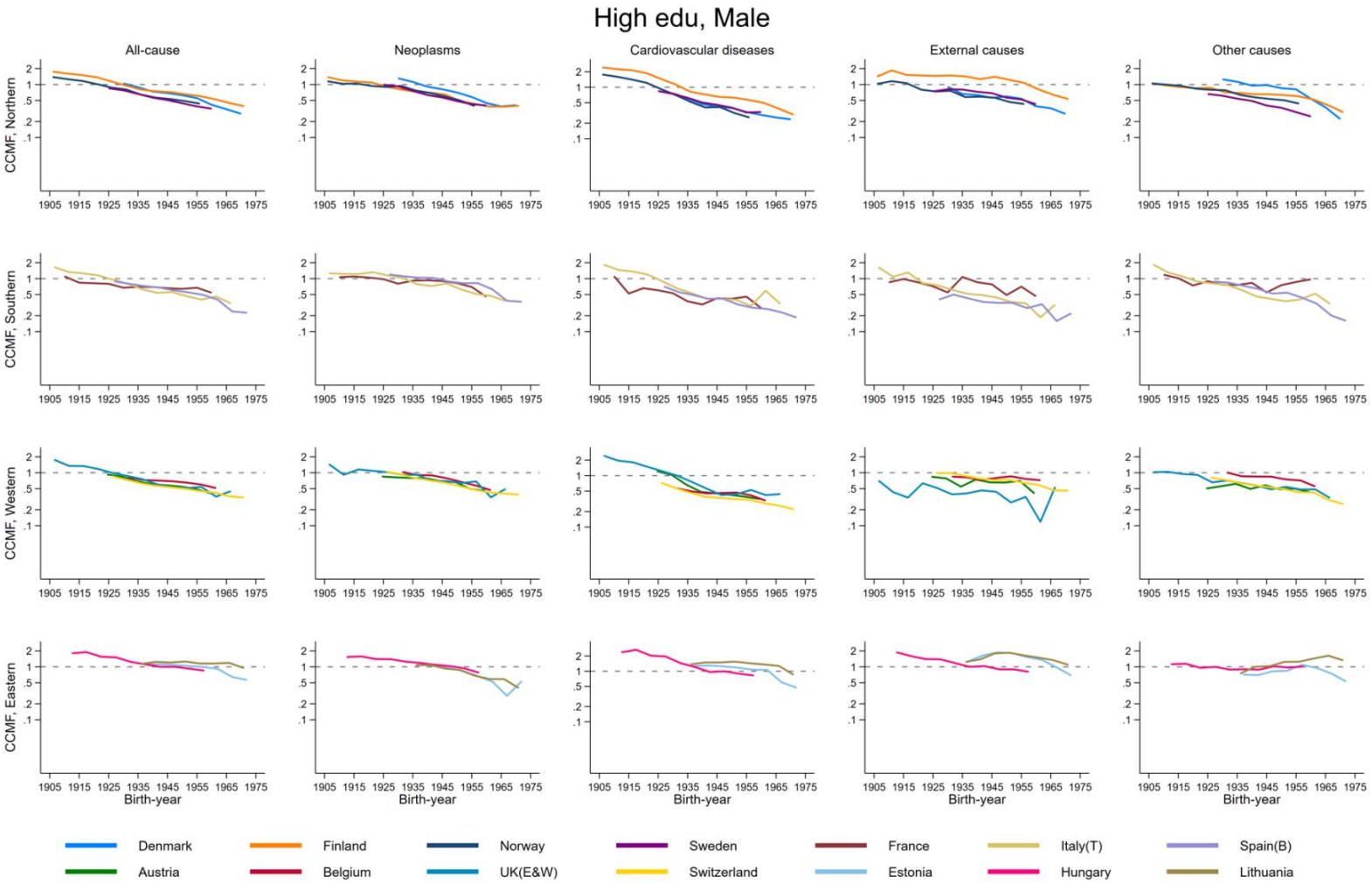
A. Male, low educated


Low edu, Male
All-cause
Neoplasms
Cardiovascular diseases
External causes
Other causes
CCMF, Northern
CCMF, Southern
CCMF, Western
CCMF, Eastern
Birth-year
Denmark
Finland
Norway
Sweden
France
Italy(T)
Spain(B)
Austria
Belgium
UK(E&W)
Switzerland
Estonia
Hungary
Lithuania

B. Female, low educated


Low edu, Female
All-cause
Neoplasms
Cardiovascular diseases
External causes
Other causes
CCMF, Northern
CCMF, Southern
CCMF, Western
CCMF, Eastern
Birth-year
Denmark
Finland
Norway
Sweden
France
Italy(T)
Spain(B)
Austria
Belgium
UK(E&W)
Switzerland
Estonia
Hungary
Lithuania

C. Male, high educated


High edu, Male
All-cause
Neoplasms
Cardiovascular diseases
External causes
Other causes
CCMF, Northern
CCMF, Southern
CCMF, Western
CCMF, Eastern
2
1
.5
.2
.1
1905 1915 1925 1935 1945 1955 1965 1975
Birth-year
Denmark
Finland
Norway
Sweden
France
Italy(T)
Spain(B)
Austria
Belgium
UK(E&W)
Switzerland
Estonia
Hungary
Lithuania

D. Female, high educated

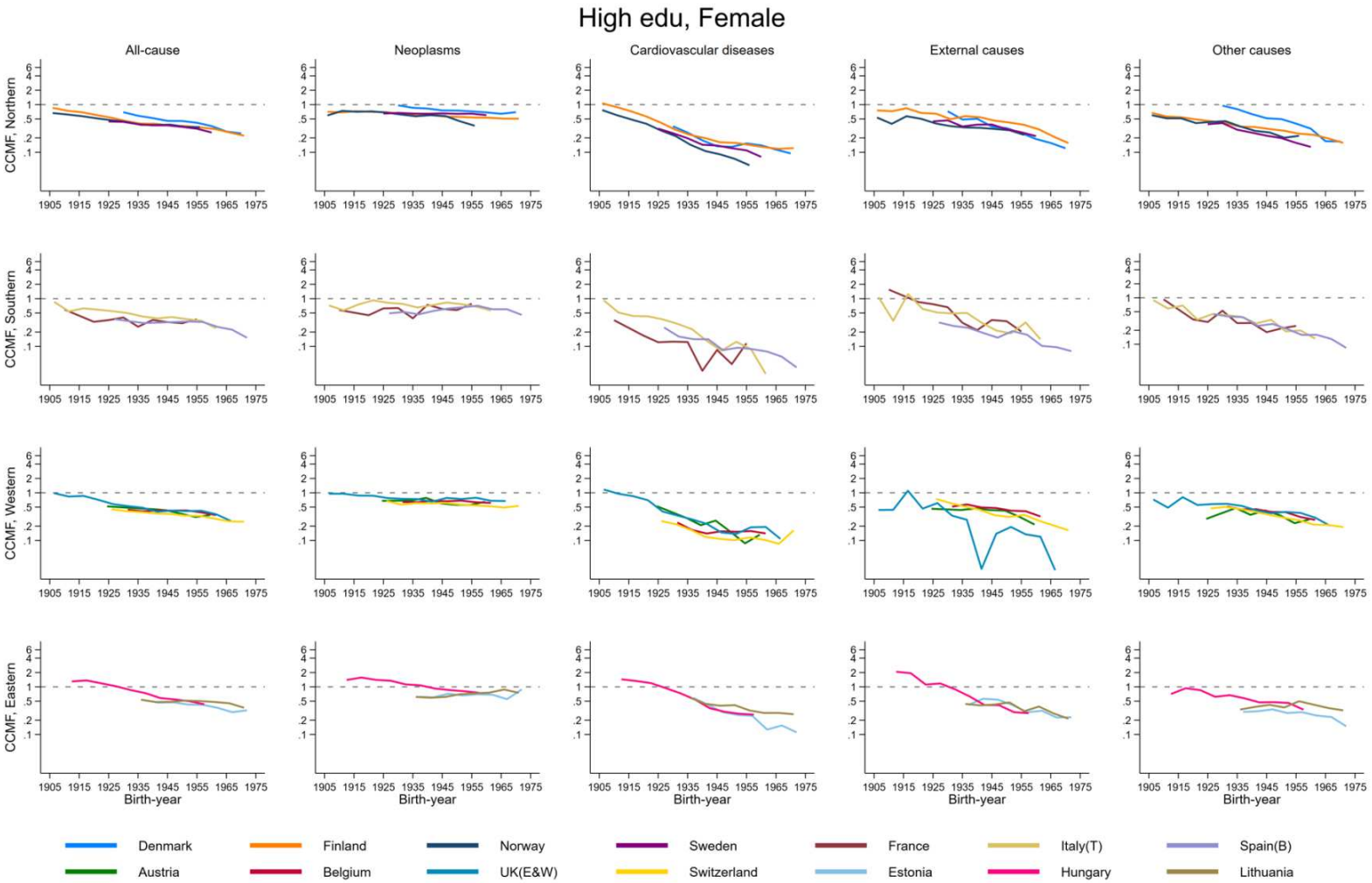
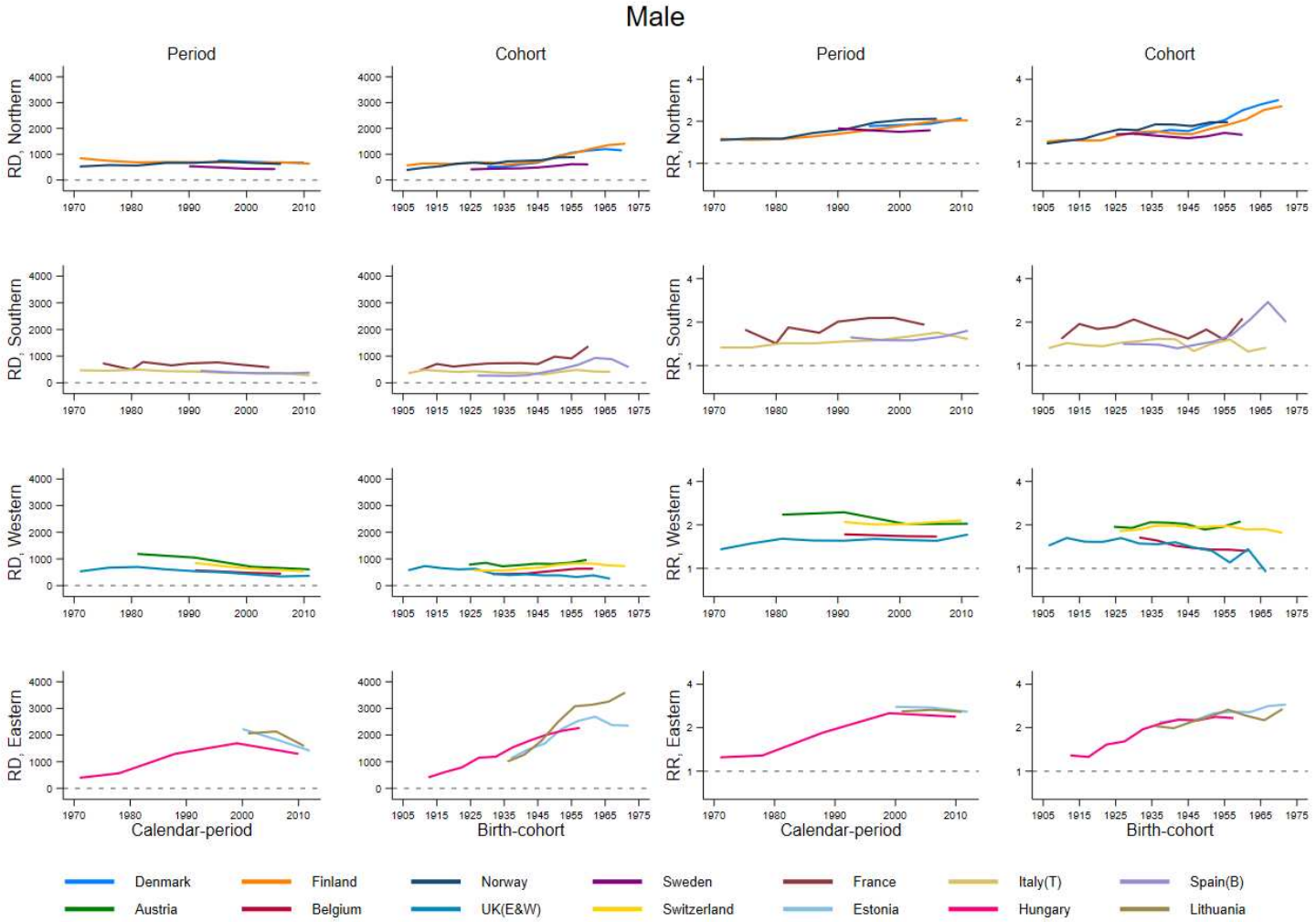
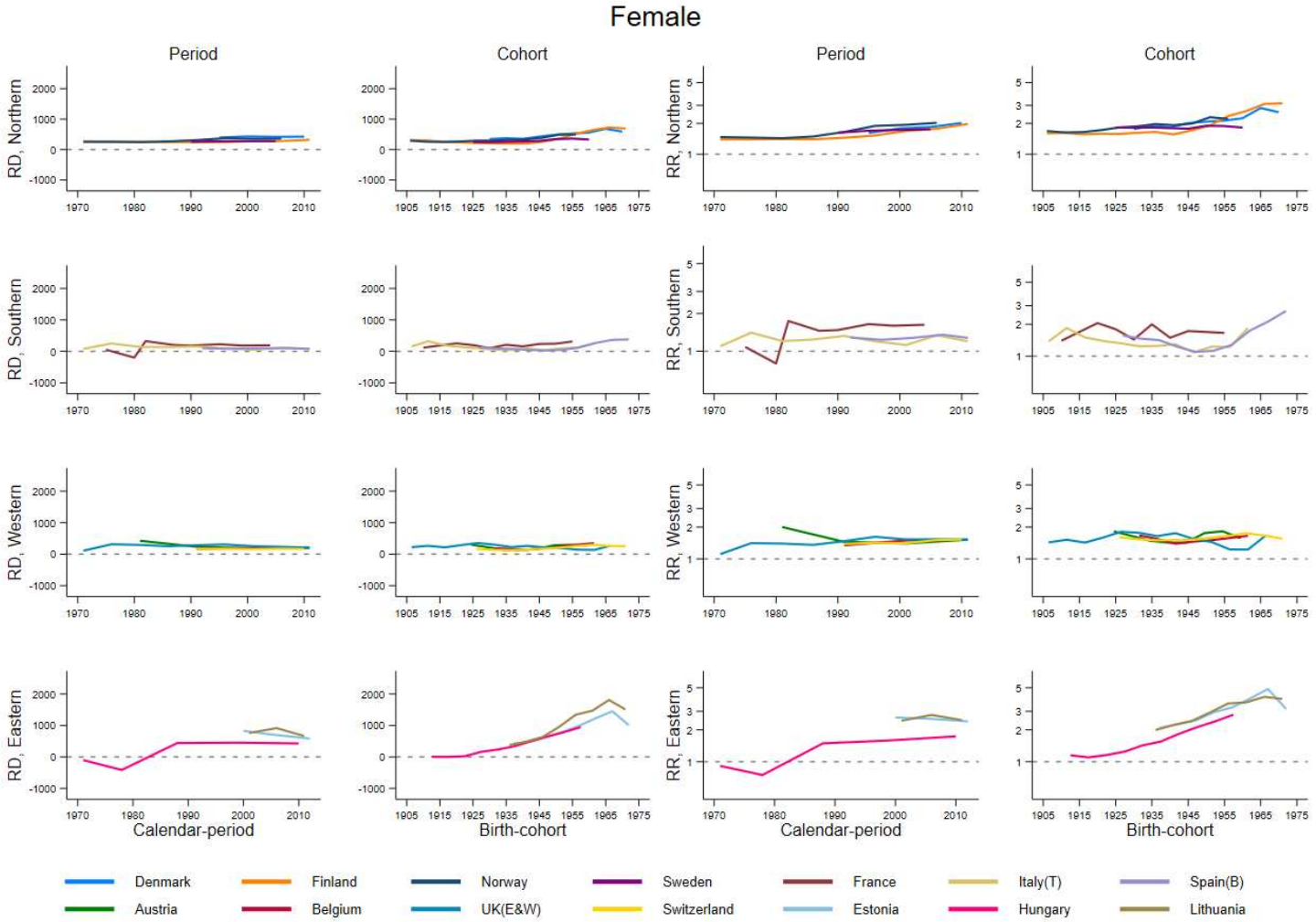

High edu, Female
All-cause
Neoplasms
Cardiovascular diseases
External causes
Other causes
CCMF, Northern
CCMF, Southern
CCMF, Western
CCMF, Eastern
Birth-year
Denmark
Finland
Norway
Sweden
France
Italy(T)
Spain(B)
Austria
Belgium
UK(E&W)
Switzerland
Estonia
Hungary
Lithuania

Figure 4. Changes in inequalities in all-cause mortality by period and cohort perspectives: using a common standard population for both male and female

A. Male


Male
Period
Cohort
Period
Cohort
RD, Northern
RR, Northern
RD, Southern
RR, Southern
RD, Western
RR, Western
RD, Eastern
RR, Eastern
Calendar-period
Birth-cohort
Calendar-period
Birth-cohort
Denmark
Finland
Norway
Sweden
France
Italy(T)
Spain(B)
Austria
Belgium
UK(E&W)
Switzerland
Estonia
Hungary
Lithuania

B. Female


Female
Period
Cohort
Period
Cohort
RD, Northern
RR, Northern
RD, Southern
RR, Southern
RD, Western
RR, Western
RD, Eastern
RR, Eastern
Calendar-period
Birth-cohort
Calendar-period
Birth-cohort
Denmark
Finland
Norway
Sweden
France
Italy(T)
Spain(B)
Austria
Belgium
UK(E&W)
Switzerland
Estonia
Hungary
Lithuania