

Understanding excess child and adolescent mortality in the United Kingdom compared with EU15+ countries

Supplementary Material

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Garbage code redistribution methodology

Level 1 garbage codes were defined as deaths unable to be assigned level 1 GBD category. These deaths were redistributed within each country, year, sex and age group *across all causes*. Level 2 garbage codes were defined as causes of death where level 1 GBD category could be determined, but not level 2 category (e.g unspecified injuries). These deaths were assigned a level 1 GBD category (see table S2) and then redistributed within each country, year, sex, age group and level 1 GBD category. For level 3 garbage codes, (deaths where a level 2 category could be determined, but level 3 was unknown) and level 4 (deaths where a level 3 category could be determined, but level 4 was unknown), each cause was assigned a level 1 and level 2 GBD category (see table S3). These deaths were then proportionately redistributed within each country, year, sex, age group, level 1 and level 2 category. Where there were no appropriately coded deaths within a level 2 category for a country, year, sex, age-group, deaths were redistributed within their level 1 category only. Where there were no appropriately coded deaths within a level 1 category for a country, year, sex, age group, garbage codes were proportionately redistributed across all causes. Where there were no deaths in *any* cause group for a country, year, sex, age-group, we were unable to use proportional redistribution, and these deaths were excluded (n=9).

Sensitivity analysis

Table S1 Incidence rate ratio (IRR) with 95% confidence intervals for three year lagged mean number of deaths in the UK compared with EU15+ in 2015ⁱ for 1-9 year olds both sexes. All garbage coded deaths excluded

	Both sexes 1 to 4				Both sexes 5 to 9			
	IRR	p	lower CI	upper CI	IRR	p	lower CI	upper CI
Communicable / neonatal								
Common infections	2.13	<0.001	1.51	3.00	2.02	0.03	1.07	3.82
Neonatal disorders	1.39	0.42	0.63	3.08	1.15	0.84	0.28	4.74
Other communicable	2.25	0.15	0.76	6.67	1.29	0.77	0.24	7.01
Non-communicable diseases								
Neoplasms	0.98	0.87	0.76	1.25	0.95	0.63	0.76	1.19
Cardiovascular diseases	1.23	0.52	0.66	2.28	1.53	0.23	0.77	3.06
Chronic respiratory diseases	1.08	0.87	0.42	2.75	2.98	0.01	1.34	6.63
Digestive diseases	1.73	0.19	0.77	3.94	2.36	0.06	0.95	5.86
Neurological disorders	1.32	0.11	0.94	1.86	0.93	0.78	0.55	1.57
DUBE ⁱⁱ	1.06	0.74	0.75	1.49	1.18	0.47	0.75	1.86
Other NCD	1.06	0.65	0.82	1.37	1.28	0.21	0.87	1.89
Injuries								
Transport injuries	0.48	0.02	0.26	0.88	0.62	0.10	0.35	1.09
Unintentional injuries	0.60	0.004	0.43	0.85	0.45	0.01	0.25	0.82
Interpersonal Violence	0.38	0.06	0.14	1.06	0.47	0.21	0.14	1.53

Causes with very low numbers of death in both sexes are not shown. Causes where there were significant differences in mortality between the UK and EU15+ are highlighted in red.

ⁱFor EU15+ countries without data to 2015, we used lagged mean number of deaths over the three years prior to the latest available data year in poisson regression models for all countries except Greece, where data were only available for 2014. ⁱⁱMean annual number of deaths between 2013 and 2015 in the UK. ⁱⁱⁱDiabetes, urogenital, blood, endocrine disorders; ^{iv}Musculoskeletal disorders.

Table S2 Incidence rate ratio (IRR) with 95% confidence intervals for three year lagged mean number of deaths in the UK compared with EU15+ in 2015ⁱ for 10-14 year olds by sex. All garbage coded deaths excluded

	Males 10 to 14				Females 10 to 14			
	IRR	p	lower CI	upper CI	IRR	p	lower CI	upper CI
Communicable / maternal								
Common infections	2.55	0.05	0.98	6.64	1.81	0.32	0.56	5.84
Non-communicable diseases								
Neoplasms	1.00	0.98	0.72	1.37	0.80	0.26	0.54	1.18
Cardiovascular diseases	0.90	0.82	0.36	2.23	1.04	0.94	0.39	2.78
Chronic respiratory diseases	4.39	<0.001	1.88	10.22	4.35	<0.001	1.68	11.28
Digestive diseases	2.65	0.19	0.63	11.20	4.08	0.04	1.08	15.41
Neurological disorders	1.24	0.52	0.65	2.37	1.35	0.41	0.66	2.75
DUBE ⁱⁱ	1.32	0.39	0.70	2.46	1.38	0.31	0.74	2.57
Other NCD	1.12	0.72	0.61	2.03	1.15	0.65	0.64	2.06
Injuries								
Transport injuries	0.84	0.51	0.49	1.43	0.69	0.35	0.32	1.49
Unintentional injuries	0.61	0.18	0.29	1.26	0.71	0.51	0.26	1.93
Self harm	0.40	0.04	0.16	0.95	0.44	0.07	0.18	1.06
Interpersonal Violence	0.43	0.41	0.06	3.23	0.40	0.38	0.05	3.06

Causes with very low numbers of death in both sexes are not shown. Causes where there were significant differences in mortality between the UK and EU15+ are highlighted in red.

ⁱ For EU15+ countries without data to 2015, we used lagged mean number of deaths over the three years prior to the latest available data year in poisson regression models for all countries except Greece, where data were only available for 2014.. ⁱⁱⁱ Diabetes, urogenital, blood, endocrine disorders; ^{iv} Musculoskeletal disorders.

Table S3 Incidence rate ratio (IRR) with 95% confidence intervals for three year lagged mean number of deaths in the UK compared with EU15+ in 2015ⁱ for 15-19 year olds by sex. All garbage coded deaths excluded

	Males 15 to 19				Females 15 to 19			
	IRR	p	lower CI	upper CI	IRR	p	lower CI	upper CI
Communicable / maternal								
Common infections	1.26	0.63	0.49	3.23	2.24	0.06	0.95	5.28
Non-communicable diseases								
Neoplasms	0.95	0.70	0.73	1.23	1.06	0.69	0.79	1.44
Cardiovascular diseases	1.25	0.39	0.75	2.09	1.17	0.66	0.58	2.34
Chronic respiratory diseases	1.42	0.47	0.55	3.68	3.03	0.02	1.18	7.77
Digestive diseases	2.33	0.09	0.87	6.19	3.43	0.01	1.28	9.23
Neurological disorders	1.63	0.01	1.12	2.38	2.14	<0.001	1.32	3.49
DUBE ⁱⁱ	1.79	0.01	1.14	2.82	1.90	0.01	1.21	2.98
MSK ^{iv}	2.59	0.12	0.79	8.47	3.42	0.06	0.93	12.55
Other NCD	0.88	0.66	0.50	1.56	1.21	0.51	0.69	2.13
Injuries								
Transport injuries	0.69	<0.001	0.56	0.86	0.79	0.19	0.56	1.12
Unintentional injuries	0.74	0.10	0.52	1.06	0.86	0.68	0.42	1.76
Self harm	0.84	0.09	0.69	1.03	0.57	0.00	0.40	0.81
Interpersonal Violence	0.37	0.03	0.15	0.92	0.16	0.07	0.02	1.17

Causes with very low numbers of death in both sexes are not shown. Causes where there were significant differences in mortality between the UK and EU15+ are highlighted in red.

ⁱ For EU15+ countries without data to 2015, we used lagged mean number of deaths over the three years prior to the latest available data year in poisson regression models for all countries except Greece, where data were only available for 2014. ⁱⁱⁱ Diabetes, urogenital, blood, endocrine disorders; ^{iv} Musculoskeletal disorders.

Table S4 UK rank for three year lagged mean mortality rate per 100,000 compared with 17 EU15+ countries in 2015ⁱ. All garbage coded deaths excluded

	1 to 4 Both sexes	5 to 9 Both sexes	10 to 14 Male	10 to 14 Female	15 to 19 Male	15 to 19 Female
Communicable / maternal						
Common infections	17	17	16	14	14	17
Neonatal disorders	15	10				
Other communicable	15					
Non-communicable diseases						
Neoplasms	12	9	10	7	9	13
Cardiovascular diseases	12	16	9	11	13	12
Chronic respiratory diseases	12	18	18	18	16	18
Digestive diseases	17	17	17	16	16	18
Neurological disorders	17	9	14	14	17	17
DUBE ⁱⁱ	11	14	14	15	17	17
MSK ⁱⁱⁱ						17
Other NCD	11	13	13	13	7	13
Injuries						
Transport injuries	5	5	5	7	5	6
Unintentional injuries	4	2	5	7	5	7
Self harm			2	5	6	5
Interpersonal violence	2	6	6	8	5	

Causes contributing to less than 1% of total deaths are not shown. Cells are shaded according to UK mortality rank compared with 17 EU15+ countries from green (1 = lowest mortality) to yellow/orange (9.5 = median mortality) to red (18 = highest mortality) ⁱ Rank was calculated using three year lagged mean mortality rate per 100,000 for 2015 in the UK compared with all EU15+ countries except Greece. For EU15+ countries without data to 2015, we used lagged mean mortality rate over the three years prior to the latest available data year. ⁱⁱDiabetes, urogenital, blood, endocrine disorders; ⁱⁱⁱMusculoskeletal disorders.

Difference in number of deaths where the UK has significantly higher mortality

Table S5 Difference in three year lagged mean number of deaths in the UK compared to the EU15+ median [95% confidence intervals] for conditions where the UK had significantly higher mortality.

	1 to 4 Both Sexes	5 to 9 Both Sexes	10 to 14 Males	10 to 14 Females	15 to 19 Females	Total
Common infections						
Difference in deaths compared to EU15	49 [56 – 36]	15 [21 – 13]	8 [12 – 7]		13 [17 – 9]	85 [106 – 65]
Chronic respiratory diseases						
Difference in deaths compared to EU15		10 [14 – 8]	8 [11 – 6]	9 [9 – 7]		27 [34 – 21]
Digestive conditions						
Difference in deaths compared to EU15					7 [8 – 5]	7 [8 – 5]
Neurological disorders						
Difference in deaths compared to EU15					14 [19 – 19]	14 [19 – 9]
DUBE						
Difference in deaths compared to EU15					12 [17 – 7]	12 [17 – 7]
					Total	146 [184 – 107]