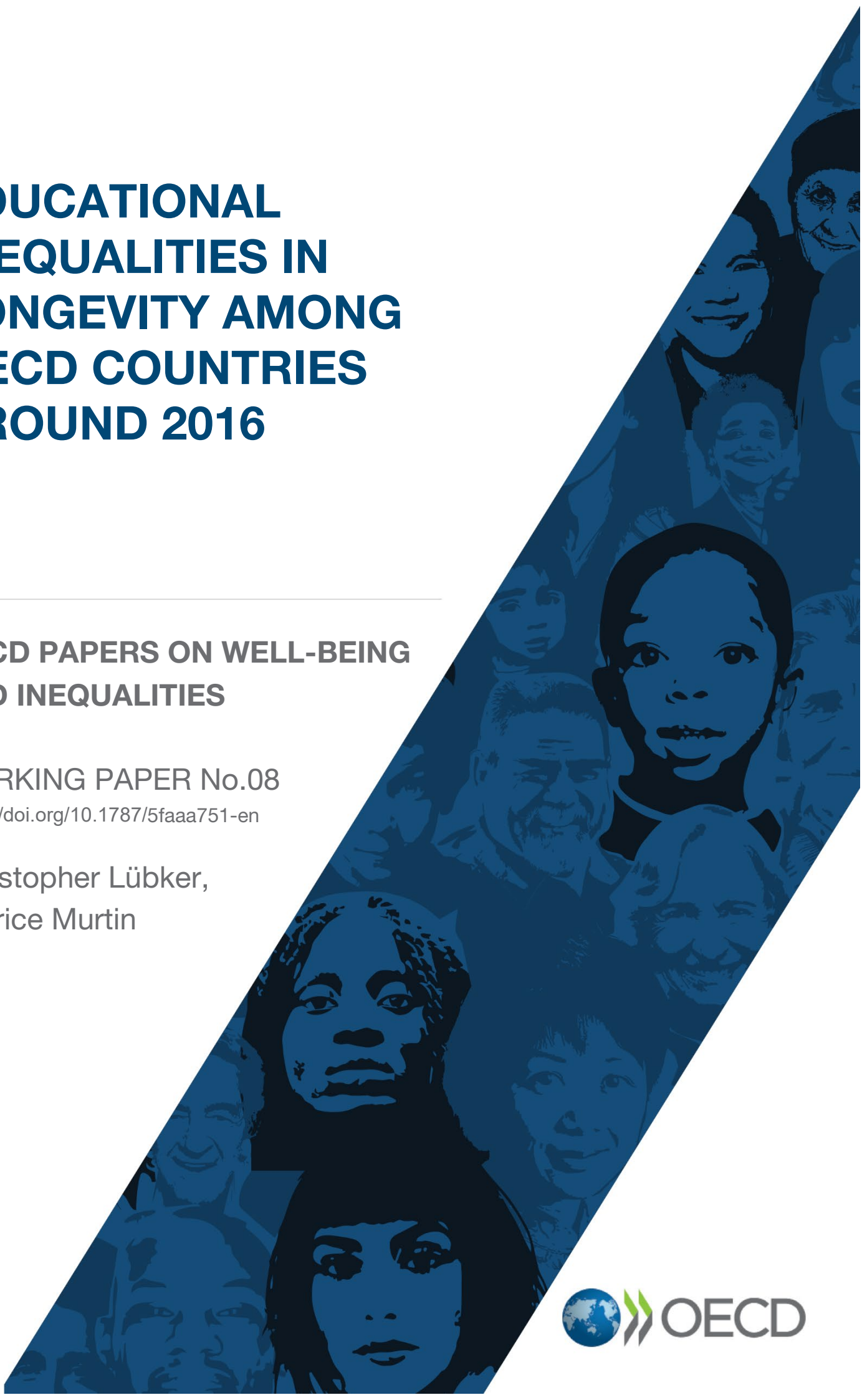
EDUCATIONAL INEQUALITIES IN LONGEVITY AMONG OECD COUNTRIES AROUND 2016



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Abstract

This study updates and extends the analysis of educational inequalities in longevity around 2011 by (Murtin et al., 2017[1]; 2021[2]). We estimate inequalities in life expectancy by educational status, age-standardised mortality rates, and age-at-death, using high-quality linked and supplementary unlinked data from 25 OECD countries in 2013-19, for a total coverage of over 1.4 billion person-years. We calculate relative and absolute inequalities, decompose between- and within-group components, and analyse inequalities by cause of death, including deaths of despair. Absolute gaps in life expectancy at age 25 between high and low education groups are on average equal to 5.2 years and 8.2 years for women and men, respectively. Differences between education groups account for approximately 4 and 8% of the total variation in age-at-death for women and men, respectively. Among women and men aged 25-64, deaths from causes other than circulatory disease, cancer, or external causes, contribute 47 and 35% to the difference in age-standardised mortality rates, respectively. Deaths of despair among women and men aged 25-64 contribute on average 7% and 11% to the total gap in life expectancy between high and low education groups, respectively. Comparing identical country-sources to the previous analysis, absolute gaps in life expectancy at age 25 have increased by 0.5 year and 0.4 year on average for women and men between 2011 and 2016.

Résumé

Cette étude constitue une mise à jour et une extension des analyses au sujet des inégalités de longévité liées à l'éducation réalisée vers 2011 par (Murtin et al., 2017[1]; 2021[2]). Nous estimons les inégalités en matière d'éducation en terme d'espérance de vie, de taux de mortalité normalisés par âge et d'âge de décès en nous appuyant sur des données provenant de 25 pays membres de l'OCDE sur la période 2013-2019, couvrant un total de plus de 1.4 milliard de personnes-ans. Nous calculons des inégalités absolues et relatives ; nous les décomposons en composantes inter et intra-groupes, ainsi que par cause de décès (en incluant les morts de désespoir). Nous trouvons des écarts absolus d'espérance de vie de 5.2 ans pour les femmes et 8.2 ans pour les hommes. Les différences entre groupes de niveau éducatif contribuent pour environ 4 % chez les femmes et 8 % chez les hommes de la variation totale de l'âge de décès. Chez les femmes et les hommes âgés de 25 à 64 ans, les morts dues à d'autres causes que les maladies cardiovasculaires, les cancers et les causes externes représentent respectivement 47 % et 35 % des différences de risques en termes de mortalité normalisée par l'âge. Les morts de désespoir des femmes et des hommes de 25 à 64 ans causent respectivement 7 % et 11 % de la différence totale d'espérance de vie entre les groupes de niveau éducatif. En se fondant sur les mêmes sources que les analyses précédentes, les différences d'espérance de vie à 25 ans ont augmenté de 0.5 an pour les femmes et de 0.4 an pour les hommes en moyenne entre 2011 et 2016.

Table of contents

Tables

Figures

1. Introduction

1. Virtually all studies on inequalities in health have found that individuals with lower educational attainment tend to live shorter lives in worse health conditions (Marmot and Wilkinson, 2006[3]; Mackenbach and al., 2008[4]). Longevity is an essential component of well-being and therefore a policy concern in its own right. Moreover, the economic losses associated with premature and avoidable deaths have been estimated to cost 1.4% of gross domestic product annually in the European Union (EU) (Mackenbach, Meerding and Kunst, 2011[5]).

2. International organisations and their member countries are increasingly concerned about health inequalities (OECD, 2015[6]). Some countries have set targets on health inequalities associated with socio-economic status (e.g. income, education, and occupation) as proxies for "unfair" health inequalities (Bauld, Day and Judge, 2008[7]). Cross-country studies monitoring (socio-economic) health inequalities allow us to track progress towards these goals and inform evidence-based policy-making and target-setting. However, international studies encounter data limitations and methodological challenges, which have made comprehensive studies rare, including in high-income countries (van Raalte and al., 2011[8]; van Raalte and al., 2012[9]; Mackenbach et al., 2018[10]) and especially outside Europe (van Hedel et al., 2015[11]; Ho and Hendi, 2018[12]; Tanaka and al., 2019[13]).

3. This paper updates the analysis of educational inequalities in longevity by (Murtin et al., 2017[1]; Murtin et al., 2021[2]) in 25 countries around 2016, drawing on data from diverse regions (North America, Oceania, East Asia, and Europe), sources (OECD, Eurostat, and United Nations), and collection methodologies (linked and unlinked mortality data). The paper describes educational inequalities in life expectancy, age-standardised mortality rates, and age-at death, using appropriate inequality metrics; it also estimates between-group contributions of educational attainment to overall inequalities in age-at-death and decomposes absolute longevity gaps by cause of death, including deaths of despair (i.e. deaths from drug overdose, alcohol poisoning, liver cirrhosis and suicide).

4. The key findings of the paper are the following:

- Absolute (relative) gaps in life expectancy at age 25 between high and low education groups are 5.2 and 8.2 years (9.6 and 17.8%) for women and men, respectively. Absolute (relative) estimates are lowest in Japan, at 1.0 and 2.2 years (1.6% and 3.9%), and highest in the Slovak Republic, at 11.1 and 16.9 years (21.8% and 42.2%), for women and men, respectively.
- Between-group educational inequalities account for approximately 4 and 8% of the total variation in age-at-death for women and men, respectively. Between-group group components are lowest in Italy, at 1 and 2%, and highest in the Slovak Republic, at 11 and 28%, for women and men, respectively. Between-group components are above 7.5% (20%) for women (men) in Hungary and the Slovak Republic, and below 2% for both women and men in Italy and New Zealand.
- For women and men aged 25-64, deaths from causes other than circulatory disease, neoplasm, or external causes account for over 47% and 35% of the difference in age-standardised mortality rates on average, respectively. Among women and men aged 65-89, deaths from circulatory

diseases account for 49% and 41% of the differences in age-standardised mortality rates, respectively.

- For women and men aged 25-64, deaths of despair account for 7% and 11% of the total gap in life expectancy at 25 between high and low education groups on average, respectively. Deaths of despair account for over 15% of the rate difference in age-standardised mortality rates among women and men aged 25-64 in the United States, Korea and Sweden, as well as among men aged 25-64 in Australia and Canada.
- Comparing identical country-sources to previous analysis, absolute (relative) gaps in life expectancy at age 25 have increased by 0.5 and 0.4 year, on average, for women and men, respectively. Between-group educational inequalities in longevity have decreased by 3.2%, on average. Absolute gaps in life expectancy have grown by more than 1 year in Australia (men only), Canada, Hungary, the Republic of Türkiye (hereafter “Türkiye”) (men only), and the United States.

5. The study is structured as follows. Section 2 introduces the data and their preparative treatment for analysis. Section 3 describes longevity outcomes and inequality measurement methods. Section 4 presents results on educational inequalities in longevity, the decomposition of these inequalities, and robustness checks. The last section discusses primary findings, strengths and weaknesses of the analysis, policy implications, and future research recommendations.

2. Data

2.1. Data collection

6. The OECD has collected country-level mortality and population exposure (in person-years) from OECD countries centered on 2016 (2013-2019) to calculate longevity by age, sex and education. Sex is recorded as a binary variable and age in single-year increments from age 25 to age 120 where possible, although some countries apply cut-offs beyond age 85, or report age in 5-year groups (see Table 2.1).

7. Education level is categorised according to the 2011 International Standard Classification of Education (ISCED-2011) into low (lower secondary education and below, ISCED 0-2), medium (upper secondary, ISCED 3-4), and high education (higher than upper-secondary, ISCED 5-8) (UNESCO Institute for Statistics, 2012).[1] Missing education was recorded for 9 countries, the treatment of which is discussed in Section 2.2. The education distributions of country-sources are available in Annex A, Table A.1 and Table A.2.

8. The data sources differ in their collection methodologies. For the purposes of this study, the key methodological difference relates to linking death certificates to educational qualification data. In linked data, death certificates are directly linked to administrative data containing educational qualifications of the deceased, either directly (via a social security number) or indirectly (via probabilistic linkage on individual characteristics, such as date of birth and address). In unlinked data, educational attainment is reported at the time of death by relatives or public officials, which may lead to misreporting bias (Sorlie and Johnson, 1996[14]; Jasilionis et al., 2012[15]; Rey et al., 2013[16]), such as "promoting the dead" (Gordis, 1982[17]).

Source: OECD

9. The OECD collected data from 17 national statistical agency contact points for this analysis, at least nine of which collected data using a linked methodology.[2] Cause of death was available in 14 countries, following to the 10th revision of the International Classification of Diseases (ICD-10) (WHO, 2004[18]). For the purposes of this study, cause of death consists of circulatory system diseases, neoplasms, external causes, and all other causes.[3] Deaths of despair are also recorded, comprising deaths by suicide, alcohol-related deaths, and drug-related deaths.[4]

[1] While the previous OECD analysis used ISCED 1997 levels, classification levels remain compatible.

[2] Collection methodologies for data from Netherlands and USA were not clear.

[3] Circulatory system diseases (Chapter IX): I00-I99. Neoplasms (Chapter II): C00-D48. External causes (Chapter XX): V01-Y98. Other diseases: All other causes. See https://icd.who.int/browse10/2016/en.

4 Deaths of Despair: Suicide (X60-X84, Y87.0), Alcohol-Related Deaths (E24.4, F10, G31.2, G62.1, G72.1, I42.6, K29.2, K70, K85.2, K86.0, O35.4, P04.3, Q86.0, R78.0, X45, Y15), and Drug-Related Deaths (F11-16, X40-44,

10. There is some heterogeneity in data collection methodologies and standardisations. Raw exposure and deaths data were not collected for Japan, where life expectancy estimates at 25 (for 2000-15) and 65 (for 2010) were provided directly for each sex-education group, with probabilistic matching-based linkages. Japanese estimates are included in this paper from 2013-15 for life expectancy at 25, and in 2010 for life expectancy at 65. Data from the Netherlands were provided in single-year age group mortality probabilities from birth to age 99 by sex and education, averaged across the period 2015-18 (Statistics_Netherlands, 2021[19]). These one-year probabilities are transformed to rates using standard probability-rate conversion methodologies. Finally, the Canadian data provided underreported mortality rates, since they exclude individuals living in institutions, collective housing, and the homeless (Tjepkema et al., 2019[20]). We applied corresponding average age-sex specific correction factors from 2011-16 to reflect the Canadian population, assuming the same correction factor for each education group.

Source: Eurostat

11. To maximise country coverage, unlinked data from the European Union's (EU) Eurostat databases are used to include 4 additional countries (EST, FIN, NOR, SVN) and to compare estimates across OECD and Eurostat data sources. Mortality and exposure data are available for 1-year age groups by country, education level (Eurostat, 2021a[21]; 2021c[22]). Beyond age 75, Eurostat data are censored and do not differentiate education-specific data, referring instead to the population-level data trends by sex.

Source: UN Database

12. For some countries, Eurostat databases contain single-year mortality data but not population exposure data. To further increase country coverage, these mortality data were supplemented with exposure data by 5-year age groups and education level from the UN census data around the corresponding year (UN_Demographic_Statistics_Database, 2021[23]). 5-year population exposure data from age 15 are linearly divided into 1-year data to utilise the 1-year mortality data from Eurostat. From these data, we calculate a rolling population exposure:

$$Exposure_{y,t} = Exposure_{y-1,t-1} - Deaths_{y-1,t}$$

where *y* is the year and *t* is the age-group. When the years of exposure and mortality data do not correspond, we assume that exposure data from around 2011 are equal to the exposure data of the most recent year with available Eurostat mortality data. This is the case for Belgium, Greece, and Spain (see Table 1). Limitations of rolling population exposure estimates are discussed in Section 5.3.

Country-Source Assessments

13. Overall data quality is assessed on a five-star scale for each country-source, where five stars indicates the highest quality and one star the lowest quality data available for this analysis. For all sources, one star was applied for each of the following cases: (1) unlinked mortality data, (2) cause of death unavailable, (3) use of rolling population estimates, and (4) use of asymmetrical rolling population estimates, where mortality and population exposure data do not refer to the same year. For each country, we use the highest quality data with three stars or more as primary sources for analyses, while secondary sources are retained for comparative purposes and included in complete results tables in

Y10-14). See https://www.jec.senate.gov/public/index.cfm/republicans/methodological-appendix-to-long-term-trends-in-deaths-of-despair/.

Annex A. The combination of sources results in 21 countries covered by primary sources, with a further four covered by secondary sources, for a total of 25 countries and 34 country-sources.

14. For each country-source, we pool available data between 2013-19 to maximise sample sizes and smooth random variation in mortality rates. Consequently, our analysis consists of 741 and 690 million person-years for women and men, respectively, for primary sources; and 1.95 billion person-years in total, including secondary sources.

Table 2.1. Data overview

Country	Source	Data Quality	Primary Source	Death Registers	Population Exposure	Analysis Period	Age Range	Linked	Cause of Death	Notes
AUS	OECD	*****	Yes	2016-17	2016	2016	25-100+	Yes	Yes	1
AUT	OECD	****	Yes	2016-17	2016	2017	25-95+	Yes	No	
BEL	UN	*	No	2014	2011	2014	15-99	No	No	2
CAN	OECD	****	Yes	2012-16	2012-16	2013-16	25-90+	Yes	Yes	1.3
CZE	UN	**	No	2011-17	2011	2013-17	15-99	No	No	
DNK	OECD	****	Yes	2013-17	2013-17	2014-17	25-120	No	Yes	
ESP	OECD	****	Yes	2016-18	2016-18	2016-18	25-100	Yes	Yes	
ESP	UN	*	No	2014-18	2011	2016-18	15-99	No	No	2
EST	Eurostat	***	Yes	2011-18	2015-20	2015-18	25-99	No	No	
EST	UN	**	No	2011-18	2011	2015-18	15-99	No	No	
FIN	Eurostat	***	Yes	2011-18	2011-20	2013-18	25-99	No	No	
GRC	UN	*	No	2013-18	2011	2013-18	15-99	No	No	2
HUN	OECD	****	Yes	2011-19	2016	2016-19	25-120	No	Yes	
HUN	UN	**	No	2011-18	2011	2016-18	15-99	No	No	
ITA	OECD	*****	Yes	2012-16	2012-16	2013-16	25-120	Yes	Yes	
JPN	OECD	***	Yes			2010; 13-15	25; 65	Yes	No	4
KOR	OECD	***	Yes	2015-18	2015	2015-18	25-84	No	Yes	
LTU	OECD	****	Yes	2015-19	2015-19	2015-19	25-120	Yes	Yes	
NLD	OECD	***	Yes			2015-2018	25-99+	?	No	5
NOR	Eurostat	***	Yes	2011-18	2011-20	2013-18	25-99	No	No	
NOR	UN	**	No	2011-18	2011	2013-18	15-99	No	No	
NZL	OECD	*****	Yes	2013-18	2013-18	2013-18	25-95+	Yes	Yes	1
POL	OECD	****	Yes	2014-19	2011	2014-19	25-120	No	Yes	
POL	UN	**	No	2011-18	2011	2014-18	15-99	No	No	
PRT	UN	**	No	2011-18	2011	2013-18	15-99	No	No	
SVK	OECD	****	Yes	2015-18	2015-18	2015-18	25-120	No	Yes	
SVK	Eurostat	***	No	2011-18	2011-20	2015-18	25-99	No	No	
SVN	Eurostat	***	Yes	2011-18	2011-12; 14-20	2015-18	25-99	No	No	
SVN	UN	**	No	2011-18	2011	2015-18	15-99	No	No	
SWE	OECD	*****	Yes	2015-18	2015-18	2015-18	25-120	Yes	Yes	
SWE	Eurostat	***	No	2011-18	2010-20	2015-18	25-99	No	No	
SWE	UN	**	No	2011-18	2011	2015-18	15-99	No	No	
TUR	OECD	****	Yes	2014-15	2014-15	2014-15	25-100+	No	Yes	
USA	OECD	****	Yes	2018-19	2018-19	2018-19	25-85+	?	Yes	1

Note: (1) Data provided in 5-year age-groups; (2) Exposure and mortality data are asymmetrical. We assume exposure values are equal to those in the first available year with mortality data; (3) Mortality data from CanCHEC are adjusted to reflect the structure of the Canadian population; (4) Raw exposure and mortality data not provided and probabilistic matching performed to link data; (5) Raw exposure and mortality data were not provided, 1-year mortality probabilities converted to rates. Countries are reported in International Organization for Standardization (ISO) three-letter codes.

2.2. Data treatment

Missing data

15. 20 countries report missing education data. According to Eurostat guidance and the methodology of (Murtin et al., 2017[1]), missing education data are proportionally assigned according to the observed exposure in low, middle, and high education groups, respectively, for each country-age-sex group. Alternatively, all missing education data may be assigned to the low education category, on the assumption that missing education data are more likely to be attributable to low education individuals. We explore the impact of imputing all missing data to the low education group in Section 4.5.

Correcting mortality rates

16. In some instances, country-age-sex-education specific mortality rates were corrected to: (1) predict missing data points beyond country-specific age cut-offs; (2) smooth the random variation mortality rates, which may result in volatile trends between age-groups; and/or (3) prevent implausible cross-overs between education group mortality trends. Correction 1 ensures comparability across countries. Correction 2 standardises results according to Gompertz's law, predicting that log mortality rates rise linearly from age 30 in each successive age group (Gompertz, 1825[24]). Correction 3 is imposed sparingly when small samples may spuriously lead to lower mortality rates for lower education groups than higher education groups, a pattern most commonly occurring above age 85. In such cases, we impose a simple convergence rule, whereby the mortality rate of the low education group cannot fall below that of the middle education group, and the mortality rate of the middle education group cannot fall below that of the high education group. These corrections are applied for the sake of consistency and have small impacts on longevity estimates, since they occur at high age. We correct mortality rates by extrapolating log-linear trends:

$$\log m_{i,j,t} = a_{i,j} + b_{i,j}.t + \varepsilon_{i,j,t}$$

where $m_{i,j,t}$ is the the mortality rate of sex-education-age group, *i*, *j*, and *t*, respectively. We use the five preceding five-year age-group data points to infer the predicted log mortality rates from a given age. Raw and predicted log mortality rate figures by age, sex, education, country, and source are available in Annex B and Annex C, respectively.

3. Methods

3.1. Longevity outcomes

Life expectancy

17. Abridged life tables are used to calculate period life expectancy using the Chiang method (Chiang, 1984[25]). Pooling observations in 5-year age groups is advantageous as it leads to larger sample sizes, thereby decreasing volatility of mortality rates. Volatile mortality rates are likely to arise in higher age groups with lower exposure levels as small changes in the number of deaths results in large changes in mortality rates.

Age-standardised mortality rates

18. This paper relies on age-standardised mortality rates (ASMR) to account for individual country-level variations in population structures over time and to control for age as a confounder of the education-longevity relationship (Mackenbach et al., 2015[26]). Mortality rates are adjusted directly using the 2010 OECD standard population.

Age-at-death

19. We derive the lifespan distribution, *f*, from age 25 using the corrected mortality rates, *m* and the corresponding survival function, *S*, based on the probability of death for each age-sex-education group.

$$f_i(t) = m_i(t).S_i(t)$$

$$S_i(t) = \prod_{a=1}^{t-1}\big(1 - m_i(t)\big), t > 25$$

$$S(25) = 1$$

where m_i is the mortality rate for subgroup *i* at age *t*. We interpolate 5-year abridged corrected mortality rates to reflect 1-year mortality rates and smooth the lifespan distribution. Lifespan distribution figures are available on request.

3.2. Inequality measurement

Absolute and relative gaps

20. Gaps are simple pairwise comparisons of longevity between two groups. In life expectancy estimates, the absolute (relative) gap refers to the difference (ratio) in life expectancy between the high and low education groups:

$$Absolute\ Gap = LifeExpectancy_{High} - LifeExpectancy_{Low}$$

$$Relative\ Gap = \frac{LifeExpectancy_{High}}{LifeExpectancy_{Low}}$$

In principle, other pairwise comparisons between education groups could also be conducted. We only present comparisons of low and high education groups for the sake of brevity.

21. When applied to standardised mortality rates, the same concepts are referred to as rate difference (RD) and rate ratio (RR), for absolute and relative inequality measurement, respectively.

$$Rate\ Difference = MortalityRate_{High} - MortalityRate_{Low}$$

$$Rate\ Ratio = \frac{MortalityRate_{High}}{MortalityRate_{Low}}$$

The absolute value of the RD and the inverse of the RR are presented below to maintain consistency in results interpretation.

Slope and relative indices of inequality

22. The slope and relative indices of Inequality (SII; RII) are used to account for the entire education distribution and to provide an overall assessment of inequality across education groups. For the SII, this is accomplished by regressing the longevity outcome on a fraction-ranked education weighted by the education distribution, using an ordinary least squares regression to measure absolute inequality and a logistic regression to measure relative inequality (Moreno-Betancur et al., 2015[27]). While Poisson distributions may, strictly speaking, be better to model mortality rates according to some authors, we have used the normal distribution as in the previous analysis (Murtin et al., 2017[1]), and checked that the differences in results between the two methods are minimal. Thus, the SII is:

$$y = g_\alpha(x) = y_0 + \alpha x$$

$$SII = \alpha = g_\alpha(1) - g_\alpha(0)$$

where α is the magnitude and sign of the linear association between *x* and *y*, the education and longevity variables, respectively, when education is fraction-ranked between 0 and 1. SII values greater than zero indicate that the more educated groups have greater longevity than less educated groups. Conversely, if the SII is less than zero, the less educated have greater longevity. A value of the SII of zero indicates no inequalities in longevity between education groups. For standardised mortality rates, the absolute value of the SII is presented to maintain consistency in results interpretation.

23. The RII is calculated as:

$$y = f_\beta(x) = y_0 \exp(\beta x)$$

$$RII = \exp(\beta) = \frac{f_\beta(1)}{f_\beta(0)}$$

where *exp(β)* is the magnitude of the linear association between *x* and *y*, the education and longevity variables, respectively, when education is fraction-ranked between 0 and 1. An RII estimate equal to one indicates no relative advantage between predicted low and high education groups. If the RII is greater than one, higher education is associated with relatively greater longevity and when RII is less than one, higher education is associated with relatively lesser longevity. For example, a RII of 1.1 indicates that the highest education group has 10%, or 1.1 times, greater longevity than the predicted lowest education group. For standardised mortality rates, the inverse of the RII is presented to maintain consistency in results interpretation.

Theil Index

24. The Theil Index is included to decompose overall inequality into within- and between-group inequalities in age-at-death, providing insights into the contribution of education to total inequalities in life expectancy (Theil, 1967[28]). We calculate the Theil Index, *T*, according to van Raalte and colleagues (2011; 2012):

$$T = \frac{1}{l_a}\sum_{x=a}^{\omega} d_x \left[\left(\frac{\overline{x_x}}{e_a}\right)\ln\left(\frac{\overline{x_x}}{e_a}\right)\right]$$

where *a* and *ω* are the youngest and oldest life table ages (25 and 120 in this case), l_a is the initial population size, e_a is the population average age at death, d_x is the life table number of deaths, and $\bar{x}_x$ is the average age at death in the age interval *x* to *x+n*.

25. The Theil Index is a generalised entropy index, which varies from zero to infinity, where zero represents a state of perfect equality where every person dies at the same age. The further the Theil Index is from zero, the greater the total inequality in age-at-death. Between-group variation refers to differences in total variation in age-at-death associated with education groups. Within-group variation refers to all other variation associated with the many other predictors of age-at-death. Between- and within- group components, *BG* and *WG*, are then calculated as follows:

$$BG^T = \sum_{i=1}^{n}\left[w^i\left(\frac{e_a^i}{e_a^t}\right)\ln\left(\frac{e_a^i}{e_a^t}\right)\right]$$

$$WG^T = \sum_{i=1}^{n}\left[w^i T^i\left(\frac{e_a^i}{e_a^t}\right)\right]$$

where w^i is the population share of education subgroup, *i*, e_a^i is the average age at death conditional upon survival to age 25 for subgroup *i*, and e_a^t is this average age at death for all education groups combined.

Decomposition of life expectancy gaps

26. We use the Arriaga method to decompose cause- and age-specific contributions to life expectancy gaps (Arriaga, 1984[29]). The gap in life expectancy is decomposed into direct, indirect and interaction effects, which sum to the total effect, namely the absolute life expectancy gap in years. We follow the two-step calculation approach of (Auger et al., 2014[30]). The age-group total contribution to the life expectancy gap is the sum of the direct, indirect, and interaction effect:

$$nC_x = \left[l_x^{Low} \times \left(\frac{nL_x^{High}}{l_x^{High}} - \frac{nL_x^{Low}}{l_x^{Low}}\right)\right] + \left[\frac{T_{x+n}^{High}}{l_{25}} \times \left(\frac{l_x^{Low}}{l_x^{High}} - \frac{nl_{x+n}^{Low}}{l_{x+n}^{Low}}\right)\right]$$

where *High* and *Low* represent the high and low education groups, nC_x is the total contribution between ages *x* and *x+n*, l_x is the remaining cohort size at age *x*, nL_x is the person-years lived between ages *x* and *x+n*, l_{25} is the cohort size at age 25, and T_{x+n} is the person-years lived above age *x+n*. The cause-specific contribution to the life expectancy gap is then:

$$nC_x^i = nC_x \times \left[\frac{\left(nR_x^{i\,High} \times nM_x^{High}\right) - \left(nR_x^{i\,Low} \times nM_x^{Low}\right)}{nM_x^{High} \times nM_x^{Low}}\right]$$

where nR_xi is the proportion of deaths attributable to cause *i* at age *x* and nM_x is the all-cause mortality rate at age *x*.

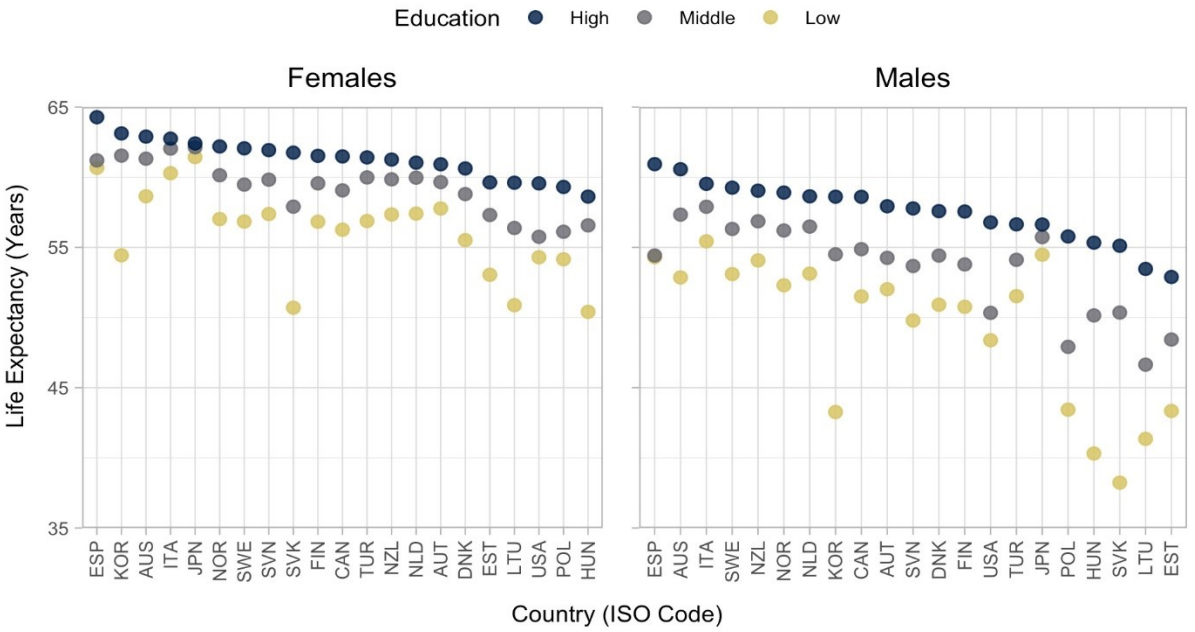
4. Results

27. Data were treated and results calculated using Stata v17.0. Tables and figures were produced using Microsoft Excel and R v4.1.2, respectively. All results are derived from OECD calculations unless otherwise stated.

4.1. Life expectancy

28. Figure 4.1 shows life expectancy at age 25 and 65, respectively, by country, sex, and education. Across the 21 primary analysis country-sources, the average life expectancy at age 25 among individuals with low education is 56.1 and 49.3 years for women and men, respectively. For middle education groups, the average life expectancy at 25 is 59.3 and 53.6 years for women and men, respectively. For high education groups the average life expectancy at 25 is 61.3 and 57.5 years for women and men, respectively. Countries with life expectancies in all education groups greater than corresponding OECD average for men and women are: Australia, Italy, Norway, and Spain. Countries with life expectancies below OECD average for men and women in all education groups are: Hungary, Poland, and USA. Results including secondary sources are available in Table A.3 (Annex A).

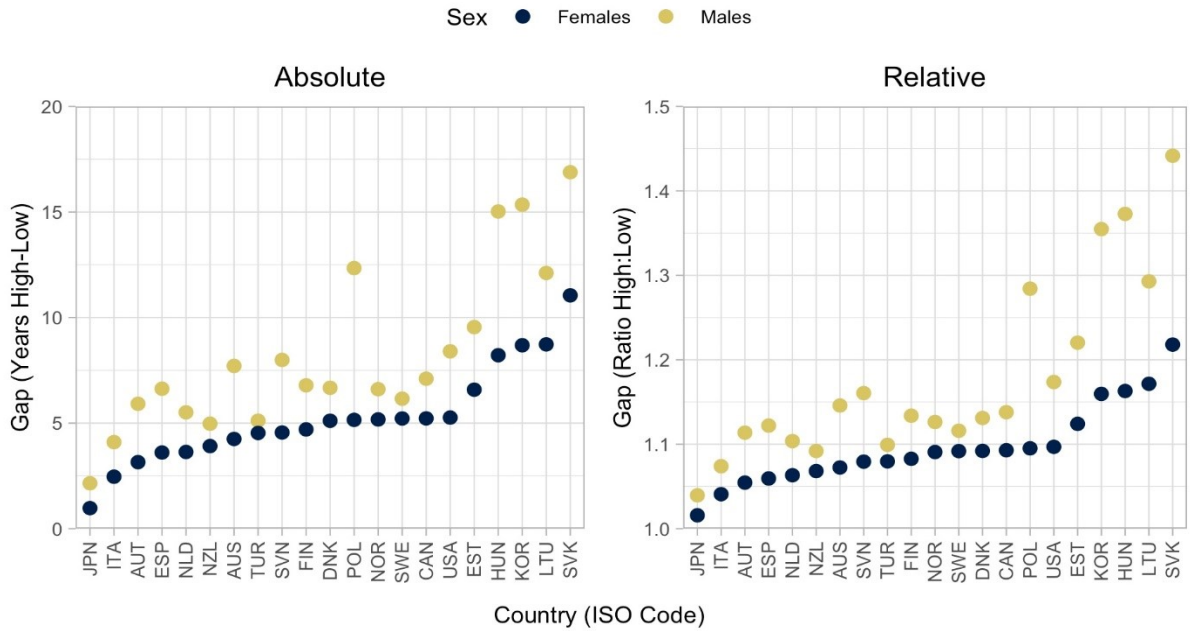
Figure 4.1. Life expectancy at age 25 by country, sex, and education around 2016



Note: Countries are reported in International Organization for Standardization (ISO) three-letter codes. Education is classified according to the 2011 International Standard Classification of Education (ISCED-2011) into low (lower secondary education and below, ISCED 0-2), medium (upper-secondary, ISCED 3-4), and high education (higher than upper-secondary, ISCED 5-8).

29. Figure 4.2 shows the absolute and relative gaps in life expectancy between high and low education groups. The average absolute gap in female and male life expectancy at age 25 is 5.2 and 8.2 years, respectively. Absolute gaps in male life expectancy are greater than 10 years in Poland, Lithuania, Hungary, Korea, and the Slovak Republic, and greater than 15 years in the latter three countries. Absolute gaps in female life expectancy are smaller than 4 years in Austria, Spain, Italy, Japan, Netherlands, New Zealand, and Slovenia.

Figure 4.2. Absolute and relative life expectancy gaps between high and low educated people at age 25 by country and sex around 2016

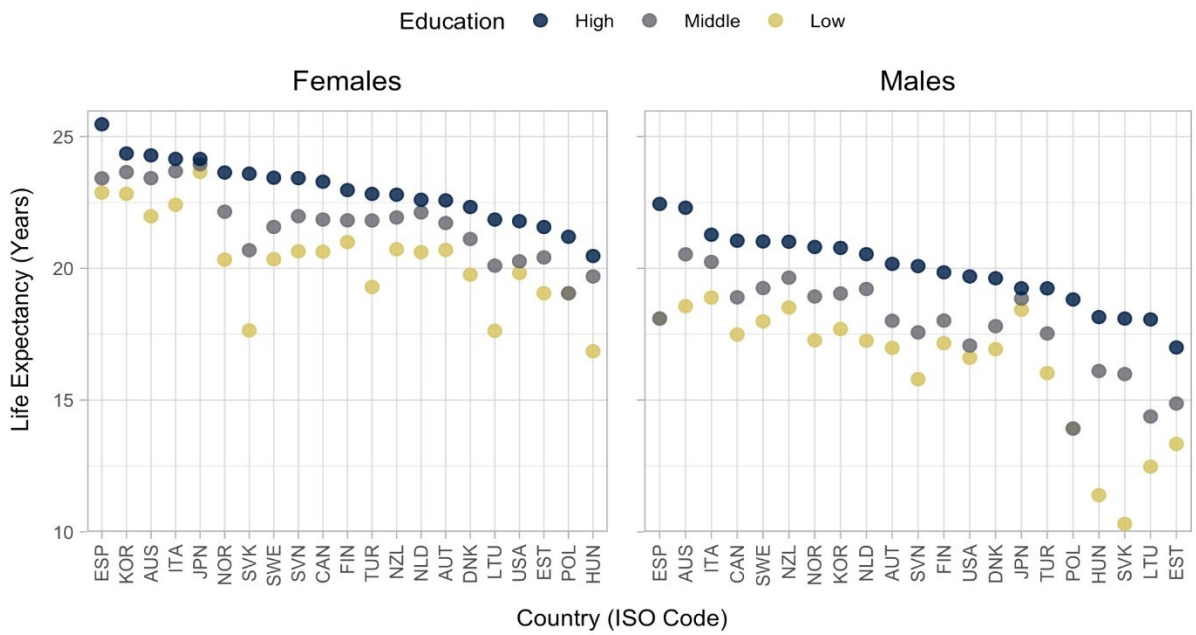


Note: Countries are reported in International Organization for Standardization (ISO) three-letter codes. Education is classified according to the 2011 International Standard Classification of Education (ISCED-2011) into low (lower secondary education and below, ISCED 0-2), medium (upper-secondary, ISCED 3-4), and high education (higher than upper-secondary, ISCED 5-8).

30. Relative gaps tell much the same story as absolute gaps. The average relative gap in male and female life expectancy at age 25 is 1.096 and 1.178, respectively. In Poland, Lithuania, Korea, Hungary, and the Slovak Republic, men in the high education group have life expectancies over 25% longer than men in the low education group. In Australia, Austria, Spain, Italy, Japan Netherlands and New Zealand, women in the high education group have life expectancies less than 7.5% longer than women in the low education group.

31. Trends in life expectancy (gaps) at age 25 are mirrored by trends observed at age 65 (see Figure 4.3 and Figure 4.4). Women in low, middle, and high education groups have life expectancies of 20.4, 21.7, and 23.0 years at age 65, respectively. Men in low, middle, and high education groups have life expectancies of 16.2, 17.8, and 20.0 years at age 65, respectively. Countries with life expectancy greater than OECD average for men and women in all education groups are the same as at age 25, with the addition of Korea. Countries with life expectancy below OECD average for men and women in all education groups are similar to life expectancy at age 25, although including Türkiye and excluding the United States. See Table A.3 and Table A.4 (Annex A) for full tables of results for life expectancies and gaps, including secondary sources.

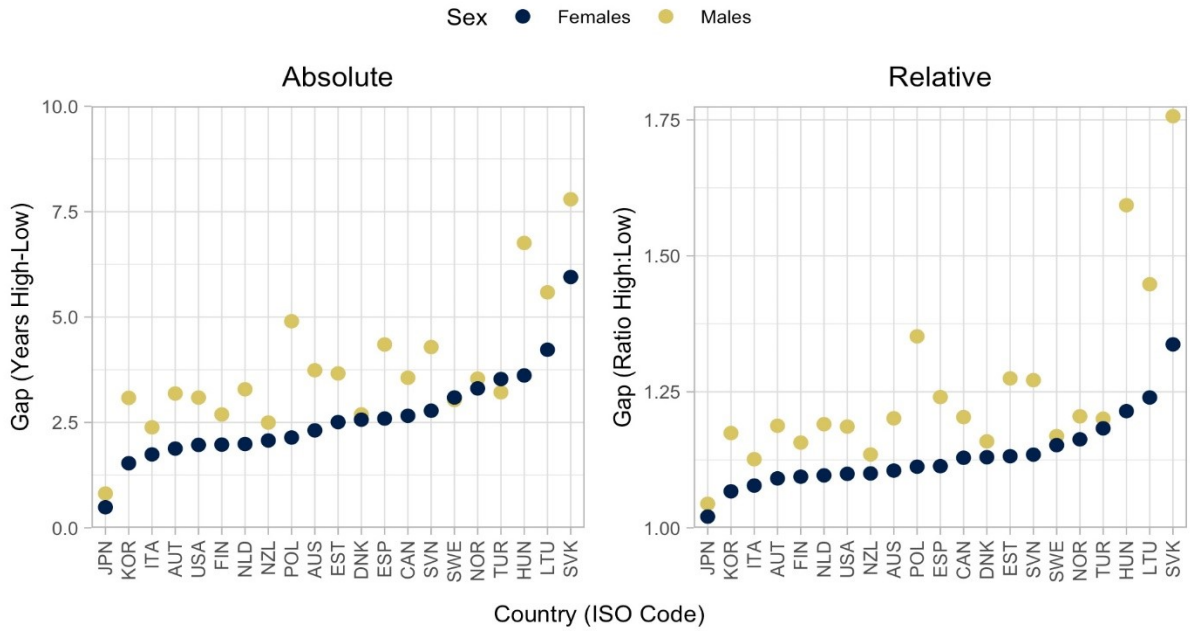
Figure 4.3. Life expectancy at age 65 by country, sex, and education around 201



Note: Countries are reported in International Organization for Standardization (ISO) three-letter codes. Education is classified according to the 2011 International Standard Classification of Education (ISCED-2011) into low (lower secondary education and below, ISCED 0-2), medium (upper-secondary, ISCED 3-4), and high education (higher than upper-secondary, ISCED 5-8).

32. Absolute gaps in life expectancy at age 65 for men and women are 4.1 and 3.1 years, respectively, a decrease of 4.5 years (55%) for men and 2.6 years (50%) for women relative to those observed at age 25. Relative gaps in life expectancy at age 65 for women and men are 1.113 and 1.251, respectively, an increase of 0.039 for women and 0.073 for men from relative life expectancy gaps at age 25. Country-source ranks for absolute and relative gaps are mostly similar at age 25 and 65. The largest outlier is the change in gap ranks for Korea, where the relative gap is third highest for men and women at age 25, but is second lowest for women and eighth lowest for men at age 65.

Figure 4.4. Absolute and relative life expectancy gaps between high and low educated people at age 65 by country and sex around 2016



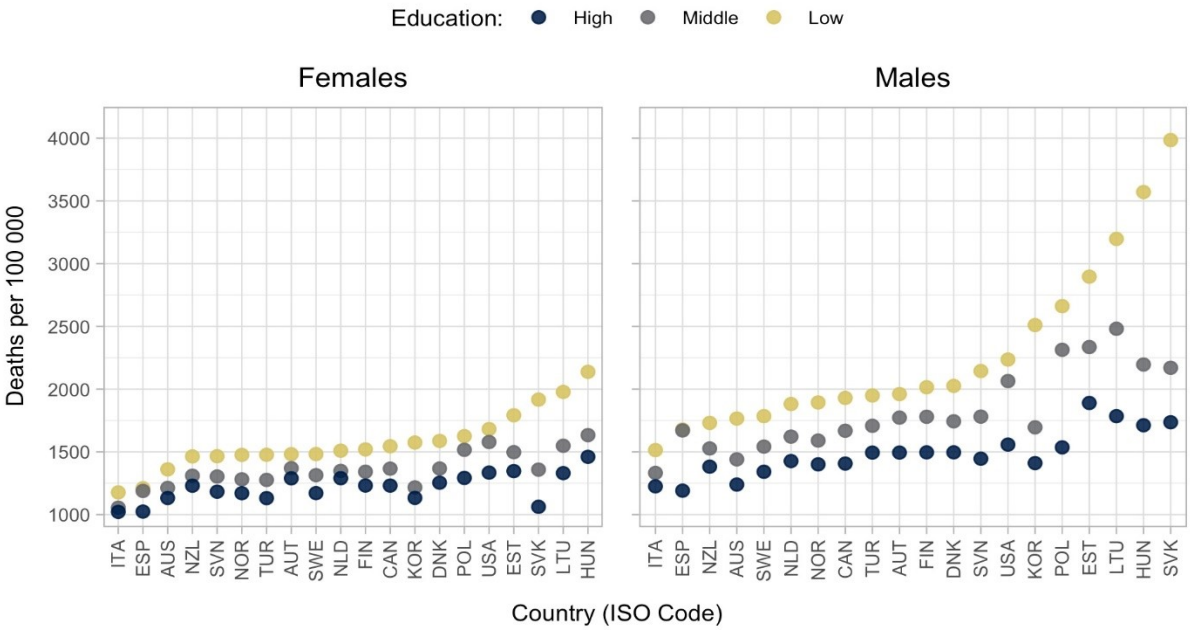
Note: Countries are reported in International Organization for Standardization (ISO) three-letter codes.

4.2. Age-standardised mortality rates

33. Figure 4.5 shows the age-standardised mortality rates (standardised mortality rates) by education level for women and men, in deaths per 100 000 person-years (full results available in Table A5, Annex A). Women in low, middle, and high education groups have standardised mortality rates of approximately 1 550, 1 350, and 1 200 deaths per 100 000, respectively, while men in low, middle, and high education groups have standardised mortality rates of approximately 2 250, 1 800, and 1 500 deaths per 100 000. We observe higher standardised mortality rates than the sample average for primary sources across all education groups for both women and men in Hungary, Lithuania, Poland, and the United States. Conversely, Australia, Denmark, Italy, Sweden, and Türkiye have standardised mortality rates below the sample average for all education groups for women and men.

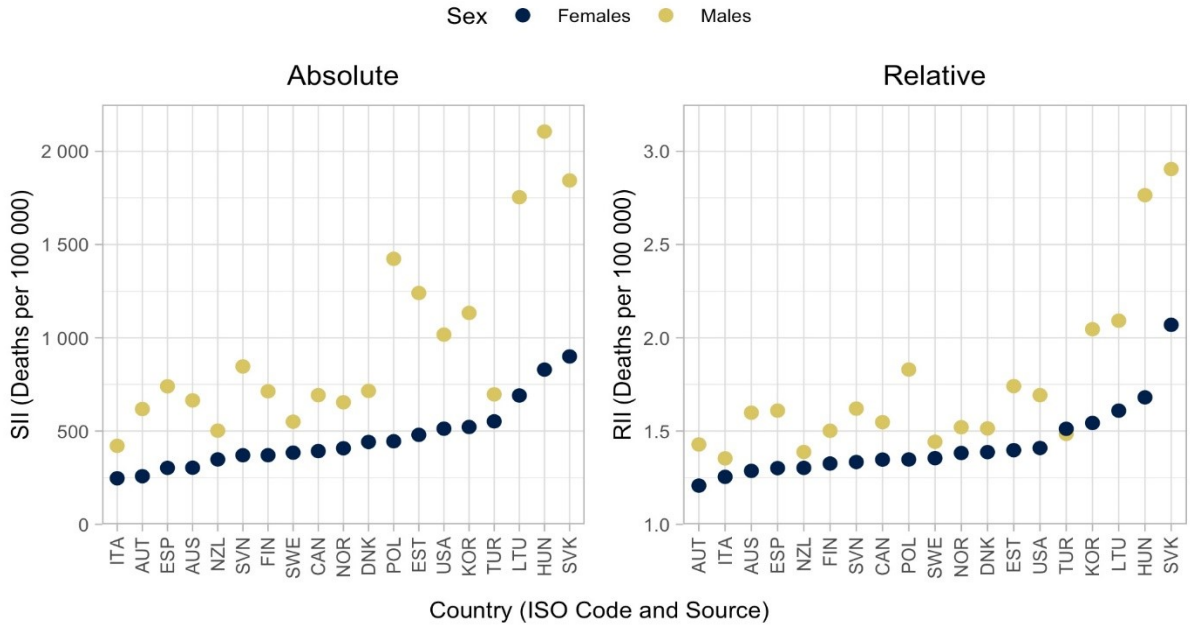
34. Figure 4.6 shows the SII and RII results for standardised mortality rates; the sample average SII for women and men is approximately 450 and 950 deaths per 100 000, respectively (full results, including rate differences and ratios, are available in Table A.6, Annex A). The sample average RII for women and men is approximately 1.40 for women and 1.69 for men. The SII and RII estimates indicate 26% and 12% greater inequality than those obtained using the RD and RR, respectively. Australia, Austria, Italy, and Spain consistently rank lowest in across absolute and relative measures of inequality, whereas Estonia, Hungary, Lithuania, and the Slovak Republic consistently rank among the highest inequality countries.

Figure 4.5. Age-standardised mortality rates by country, sex, and education around 2016



Note: Countries are reported in International Organization for Standardization (ISO) three-letter codes. Education is classified according to the 2011 International Standard Classification of Education (ISCED-2011) into low (lower secondary education and below, ISCED 0-2), medium (upper-secondary, ISCED 3-4), and high education (higher than upper-secondary, ISCED 5-8). Mortality rates are standardised using the OECD 2010 standard population.

Figure 4.6. Slope and relative indices of inequality in age-standardised mortality rates by country and sex around 2016

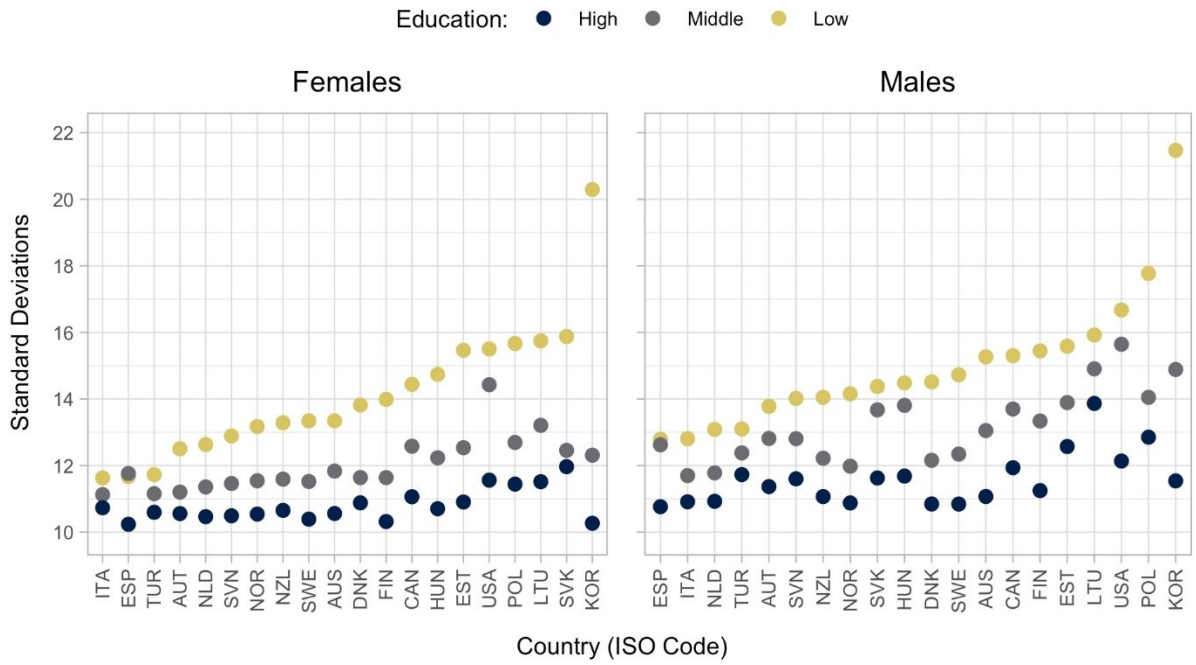


Note: SII, slope index of inequality; RII, relative index of inequality. Countries are reported in International Organization for Standardization (ISO) three-letter codes. Mortality rates are standardised using the OECD 2010 standard population.

4.3. Age-at-death

35. Figure 4.7 shows the standard deviations (SDs) of lifespan distributions in age-at-death by country, sex, and education (full results available in Table A.7, Annex A). The sample average SD for women in low, middle, and high education groups is 14.0, 12.1, and 10.8 years, respectively, with a mean age-at-death of 82.0, 85.4, and 87.5 years, respectively. For men, the lifespan SD for low, middle, and high education groups is 14.9, 13.3, and 11.6 years, respectively, with a with a mean age-at-death of 75.0, 79.7, and 83.8 years, respectively.

Figure 4.7. Standard deviations in age-at-death by country, sex, and education around 2016

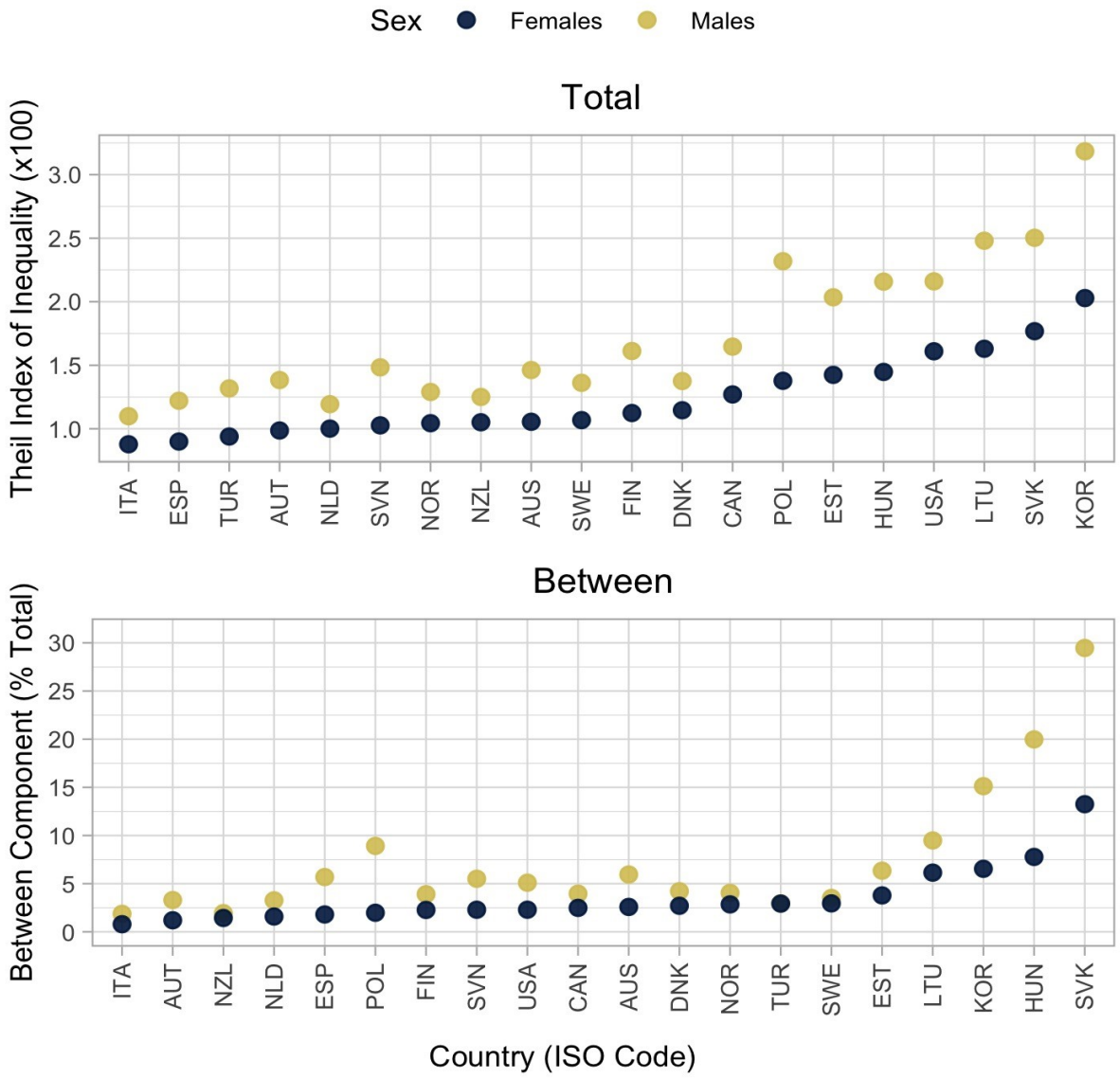


Note: Countries are reported in International Organization for Standardization (ISO) three-letter codes. Mortality rates are standardised using the OECD 2010 standard population.

36. In Canada, Lithuania, and the United States, the lifespan SD is greater than the sample average across all education groups for both men and women. Women and men in the United States with middle educational attainment have the highest lifespan SD of any country in the sample, at 14.4 and 15.6 years, respectively. The lifespan SD for Koreans with low educational attainment is especially large; 20 years for women and 22 years for men, which is 4.4 and 3.7 years greater than the second-highest SD for women (Slovak Republic) and men (Poland), respectively.

37. Figure 4.8 shows the total Theil index and the between- and within-group components (complete results available in Table A.8, Annex A). The sample average Theil Index is 1.23 for women and 1.73 for men, while the within-components are 1.18 and 1.57 for women and men, respectively. Consequently, the between-group component accounts for 3.8 and 7.5% of the total Theil Index for women and men, respectively. This low share is consistent with the large gaps in life expectancy between education groups as the dispersion of ages at death within groups is still very large.

Figure 4.8. Theil index of inequality in age-at-death by country and sex around 2016



Note: Countries are reported in International Organization for Standardization (ISO) three-letter codes.

38. There is considerable variation in country ranks between the total Theil Index and the between-group relative component for country-sex groups. The United States has the fourth highest total Theil Index and the ninth lowest between-group component. Nevertheless, some country-specific trends emerge; Italy records the lowest total Theil Index and between-group component among all countries in the sample. The Slovak Republic has the highest between-group components, accounting for 13% and 30% of the Theil Index for women and men, respectively.

4.4. Cause of death

39. Cause-specific age-standardised mortality rates have been estimated after applying the data treatments described in Section 2.2. We assume the same corrections for cause-specific mortality and decompose their contributions to rate differences.

Circulatory system diseases, neoplasm, external, and other deaths

40. Table 4.1 and Table 4.2 show cause-specific standardised mortality rates by sex, education, and two age-groups (25-64 and 65-89). Among younger women, neoplasms have the highest standardised mortality rate for all education groups. Among older women, neoplasms have the highest standardised mortality rate in middle and high education groups, but not for low education groups, where standardised mortality rates due to circulatory system diseases are highest. For younger men, "Other" causes of death have the highest standardised mortality rate among low and middle education groups, whereas neoplasms have the highest standardised mortality rate for high education groups. For older men, circulatory deaths have the highest standardised mortality rate on average across the three education groups. External deaths have the lowest standardised mortality rate for women and men in both age groups. Among high all-cause standardised mortality rate countries, such as Hungary, Lithuania, Slovak Republic, and Poland, deaths from circulatory disease and other causes tend to be substantially greater than other countries.

41. Table 4.3 and Table 4.4 show the SII and RII of age-standardised mortality rates by country, age, and cause of death for women and men, respectively (complete results including rate differences and ratios are available in Table A.9, Annex A). SIIs tend to be greater among older adults and RIIs tend to be greater among younger adults. Among men and women in both age groups, RIIs tend to be consistently lowest in neoplasm deaths and consistently highest in circulatory deaths, with more variability in deaths by external and other causes. Among younger adults, SIIs and RIIs are highest or "Other" causes of death for both women and men and fall sharply among older adults. Among older adults, circulatory deaths exhibit the greatest SIIs and RIIs and have the highest standardised mortality rate among men for each education group. For women, the highest standardised mortality rate is in neoplasm deaths, which also has the lowest RI.

Table 4.1. Age standardised mortality rates by country, age, education, and cause of death for women

Country	25-64												65-89											
	Circulatory			External			Neoplasms			Other			Circulatory			External			Neoplasms			Other		
	L	M	H	L	M	H	L	M	H	L	M	H	L	M	H	L	M	H	L	M	H	L	M	H
AUS	35	16	8	32	22	11	91	72	58	77	31	16	408	320	238	51	46	41	635	554	499	663	477	382
CAN	49	26	14	36	25	12	132	101	76	112	51	25	560	413	331	61	55	48	891	777	620	755	573	383
DNK	44	21	11	31	10	8	132	96	76	131	51	31	523	373	297	47	39	39	945	818	706	1079	816	625
ESP	23	18	8	11	12	5	80	95	54	41	28	11	394	318	222	39	35	26	464	530	393	552	461	325
HUN	159	56	23	40	17	11	220	126	85	178	54	25	1906	1086	870	87	58	54	1001	783	790	795	500	421
ITA	23	14	10	8	7	6	85	75	67	36	18	13	506	364	324	39	36	33	587	576	551	480	360	323
KOR	54	14	7	156	35	15	115	54	45	184	26	12	390	283	232	84	58	52	421	406	390	616	485	418
LTU	148	58	25	82	37	20	116	89	66	237	105	54	1732	1024	699	128	95	90	619	472	411	955	724	528
NZL	42	20	11	21	14	10	119	85	71	71	31	16	666	507	428	52	42	46	732	642	572	760	598	464
POL	79	47	21	31	16	10	124	116	86	140	62	24	1365	1181	748	57	55	43	865	1069	837	675	657	446
SVK	177	43	19	38	15	10	191	99	74	204	57	25	1861	1040	633	98	65	49	944	693	561	821	476	309
SWE	49	21	10	41	21	11	98	77	58	78	35	16	634	502	315	62	51	42	797	695	552	784	620	414
TUR	60	29	20	10	8	6	66	66	56	56	30	19	1332	683	541	50	36	38	397	458	425	952	630	529
USA	87	70	29	77	62	23	102	95	64	162	116	46	763	667	468	65	69	59	590	633	525	1128	975	695
Average	**74**	**32**	**15**	**44**	**22**	**11**	**119**	**89**	**67**	**122**	**50**	**24**	**932**	**626**	**453**	**66**	**53**	**47**	**706**	**650**	**559**	**787**	**597**	**447**

Note: L, low education; M, middle education; H, high education. Countries are reported in International Organization for Standardization (ISO) three-letter codes. Education is classified according to the 2011 International Standard Classification of Education (ISCED-2011) into low (lower secondary education and below, ISCED 0-2), medium (upper-secondary, ISCED 3-4), and high education (higher than upper-secondary, ISCED 5-8). Circulatory system diseases (Chapter IX): I00-I99. Neoplasms (Chapter II): C00-D48. External causes (Chapter XX): V01-Y98. Other diseases: All other causes.

Table 4.2. Age standardised mortality rates by country, age, sex, education, and cause of death for men

Country	25-64												65-89											
	Circulatory			External			Neoplasms			Other			Circulatory			External			Neoplasms			Other		
	L	M	H	L	M	H	L	M	H	L	M	H	L	M	H	L	M	H	L	M	H	L	M	H
AUS	85	46	25	114	57	25	134	85	51	123	51	23	758	563	396	101	83	64	1117	925	666	1021	679	504
CAN	107	75	38	114	69	33	144	105	70	143	77	42	954	739	551	131	107	77	1338	1161	786	1120	855	597
DNK	91	51	29	75	38	19	146	99	64	234	110	54	921	795	583	88	74	66	1322	1236	950	1461	1203	885
ESP	67	66	24	40	39	12	132	143	54	88	69	21	778	781	410	94	87	41	1237	1333	711	1078	985	520
HUN	499	192	75	179	70	28	424	195	91	391	133	50	3836	1903	1369	290	148	114	2284	1338	1059	1674	811	596
ITA	62	42	29	34	23	16	115	81	62	72	36	23	842	675	589	81	65	62	1162	983	808	750	580	484
KOR	155	49	26	369	109	40	205	93	60	463	90	34	660	554	414	277	177	118	1202	989	785	1281	1000	746
LTU	339	209	112	258	160	76	186	146	75	498	282	132	3084	2251	1377	366	257	186	1520	1279	814	1965	1709	1002
NZL	98	55	36	63	37	24	119	84	63	83	41	25	991	789	607	82	70	80	1073	945	768	931	745	555
POL	251	166	67	207	98	35	190	164	82	395	195	65	2451	2324	1155	194	167	77	1776	2023	1140	1377	1284	652
SVK	535	160	75	234	80	44	386	160	79	560	147	59	4383	1895	1360	358	160	119	2708	1428	1033	2116	859	605
SWE	89	57	28	113	56	25	90	67	50	98	51	29	1085	849	585	130	107	77	1036	905	730	938	767	569
TUR	136	103	73	47	30	20	142	105	81	97	62	42	1777	1339	1015	103	75	65	1043	1007	822	1431	1088	828
USA	173	147	60	205	164	52	133	110	55	229	163	58	1265	1185	739	157	161	112	1004	998	666	1522	1336	840
Average	**192**	**101**	**50**	**147**	**74**	**32**	**182**	**117**	**67**	**248**	**108**	**47**	**1699**	**1189**	**796**	**175**	**124**	**90**	**1416**	**1182**	**838**	**1333**	**993**	**670**

Note: L, low education; M, middle education; H, high education. Countries are reported in International Organization for Standardization (ISO) three-letter codes. Education is classified according to the 2011 International Standard Classification of Education (ISCED-2011) into low (lower secondary education and below, ISCED 0-2), medium (upper-secondary, ISCED 3-4), and high education (higher than upper-secondary, ISCED 5-8). Circulatory system diseases (Chapter IX): I00-I99. Neoplasms (Chapter II): C00-D48. External causes (Chapter XX): V01-Y98. Other diseases: All other causes

Table 4.3. Slope and relative indices of inequality of age-standardised mortality rates by country, age, and cause of death for women

Country	Females (25-64)								Females (65-89)							
	Circulatory		External		Neoplasms		Other		Circulatory		External		Neoplasms		Other	
	SII	RII	SII	RII	SII	RII	SII	RII	SII	RII	SII	RII	SII	RII	SII	RII
AUS	34	9.633	28	3.754	44	1.868	75	12.22	239	1.996	14	1.335	201	1.414	431	2.235
CAN	40	6.96	31	4.837	69	2.14	92	11.286	325	2.19	19	1.423	394	1.674	538	2.6
DNK	41	9.043	26	16.002	72	2.219	118	13.106	339	2.318	14	1.426	343	1.503	662	2.147
ESP	25	4.677	9	2.495	44	1.737	49	6.552	257	2.177	19	1.734	23	1.051	331	2.018
HUN	152	17.838	33	8.273	157	3.857	166	25.431	1624	3.448	55	2.301	373	1.559	585	2.736
ITA	19	3.475	3	1.467	26	1.402	36	4.897	306	2.059	8	1.231	39	1.07	261	1.886
KOR	44	106.279	132	226.692	64	3.766	151	1803.52	245	2.122	54	2.193	40	1.102	301	1.749
LTU	113	16.8	58	8.54	57	2.047	171	9.437	1377	3.497	52	1.722	278	1.781	556	2.096
NZL	45	9.139	15	2.973	69	2.248	78	11.439	397	2.063	12	1.305	256	1.473	474	2.122
POL	66	4.783	21	4.917	55	1.628	119	9.309	624	1.638	11	1.215	-214	0.812	174	1.294
SVK	122	49.653	22	7.463	99	3.497	144	31.717	1646	3.719	66	2.463	509	1.965	688	3.386
SWE	38	11.456	31	6.561	48	1.999	64	11.428	440	2.383	27	1.701	337	1.623	510	2.257
TUR	71	6.152	8	2.534	11	1.18	62	5.223	1422	4.59	27	1.862	-92	0.804	735	2.645
USA	86	4.579	81	5.095	61	2.052	158	5.614	414	1.931	14	1.222	145	1.262	596	1.915
Average	**239**	**1.996**	**14**	**1.335**	**201**	**1.414**	**431**	**2.235**	**690**	**2.581**	**28**	**1.652**	**188**	**1.364**	**489**	**2.22**

Note: SII, slope index of inequality; RII, relative index of inequality. Countries are reported in International Organization for Standardization (ISO) three-letter codes. Mortality rates are standardised using the OECD 2010 standard population. Circulatory system diseases (ICD-10 Chapter IX): I00-I99. Neoplasms (ICD-10 Chapter II): C00-D48. External causes (ICD-10 Chapter XX): V01-Y98. Other diseases: All other causes.

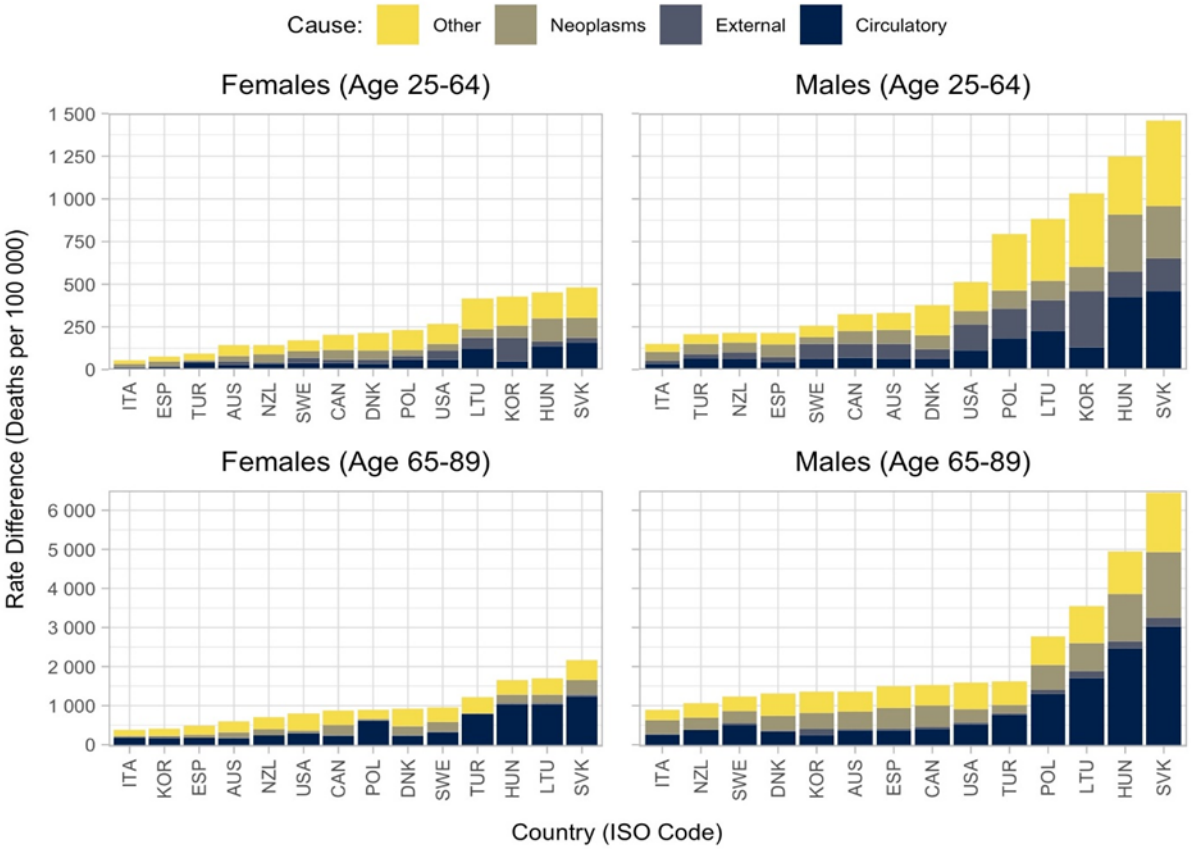
Table 4.4. Slope and relative indices of inequality of age-standardised mortality rates by country, age, and cause of death for men

Country	Males (25-64)								Males (65-89)							
	Circulatory		External		Neoplasms		Other		Circulatory		External		Neoplasms		Other	
	SII	RII	SII	RII	SII	RII	SII	RII	SII	RII	SII	RII	SII	RII	SII	RII
AUS	74	5.131	110	7.042	105	3.585	121	10.819	483	2.212	47	1.722	571	1.794	729	2.635
CAN	92	4.381	103	6.083	95	2.766	116	6.179	567	2.207	78	2.14	820	2.099	741	2.458
DNK	81	5.113	72	6.988	109	3.094	232	8.312	456	1.76	31	1.508	492	1.487	784	1.894
ESP	66	3.261	42	3.694	118	2.727	106	5.454	489	2.044	74	2.597	647	1.769	801	2.426
HUN	470	11.432	167	10.9	375	7.096	373	15.286	3323	4.913	237	4.41	1647	3.21	1455	5.106
ITA	47	2.651	26	2.649	77	2.342	75	5.102	391	1.696	33	1.586	481	1.584	403	1.87
KOR	104	36.833	278	162.855	124	5.333	315	2017.65	346	1.827	244	3.365	609	1.8	785	2.093
LTU	270	3.999	220	4.334	148	2.863	431	5.171	2204	2.571	234	2.43	905	1.99	1230	2.007
NZL	88	4.66	55	4.216	80	2.549	81	6.332	567	1.986	8	1.118	434	1.57	549	2.027
POL	219	3.678	188	6.998	143	2.306	367	6.535	1273	1.671	125	1.996	409	1.215	729	1.701
SVK	365	19.454	152	13.005	269	8.366	392	28.581	3065	6.068	242	5.46	1741	3.833	1526	7.147
SWE	75	4.163	101	7.261	48	2.119	78	5.501	665	2.113	70	1.884	403	1.544	490	1.852
TUR	97	2.413	44	3.569	96	2.317	88	3.461	1250	2.365	66	2.172	289	1.344	987	2.316
USA	172	3.802	227	4.934	112	3.197	234	5.357	846	2.193	82	1.731	585	1.889	1018	2.32
Average	**159**	**7.926**	**127**	**17.466**	**135**	**3.619**	**215**	**152.124**	**1138**	**2.545**	**112**	**2.437**	**717**	**1.938**	**873**	**2.704**

Note: SII, slope index of inequality; RII, relative index of inequality. Countries are reported in International Organization for Standardization (ISO) three-letter codes. Mortality rates are standardised using the OECD 2010 standard population. Circulatory system diseases (ICD-10 Chapter IX): I00-I99. Neoplasms (ICD-10 Chapter II): C00-D48. External causes (ICD-10 Chapter XX): V01-Y98. Other diseases: All other causes.

42. Figure 4.9 shows contributions to the total Rate Differences in standardised mortality rate between low and high education groups by cause of death. The relative contribution of circulatory disease to total Rate Differences in standardised mortality rates is higher among 65- to 89-year-olds than among 25- to 64-year-olds for men and women across all countries. Conversely, the proportion of external disease contribution to Rate Differences in standardised mortality rates is greater among 25- to 64-year-olds than among 65- to 89-year-olds, and greater for men than for women. Among women and men aged 25-64, deaths from causes other than circulatory disease, neoplasm, or external causes, account for over 47 and 35% of the risk difference in age-standardised mortality rates, respectively. Among women and men aged 65-89, deaths from circulatory diseases account for 49% and 41% of the risk differences in age-standardised mortality rates, respectively. Relative contributions are presented in Figure A.1 (Annex A).

Figure 4.9. Decomposition of contribution to rate differences in age-standardised mortality rates by country, sex, age-group, and cause of death around 2016



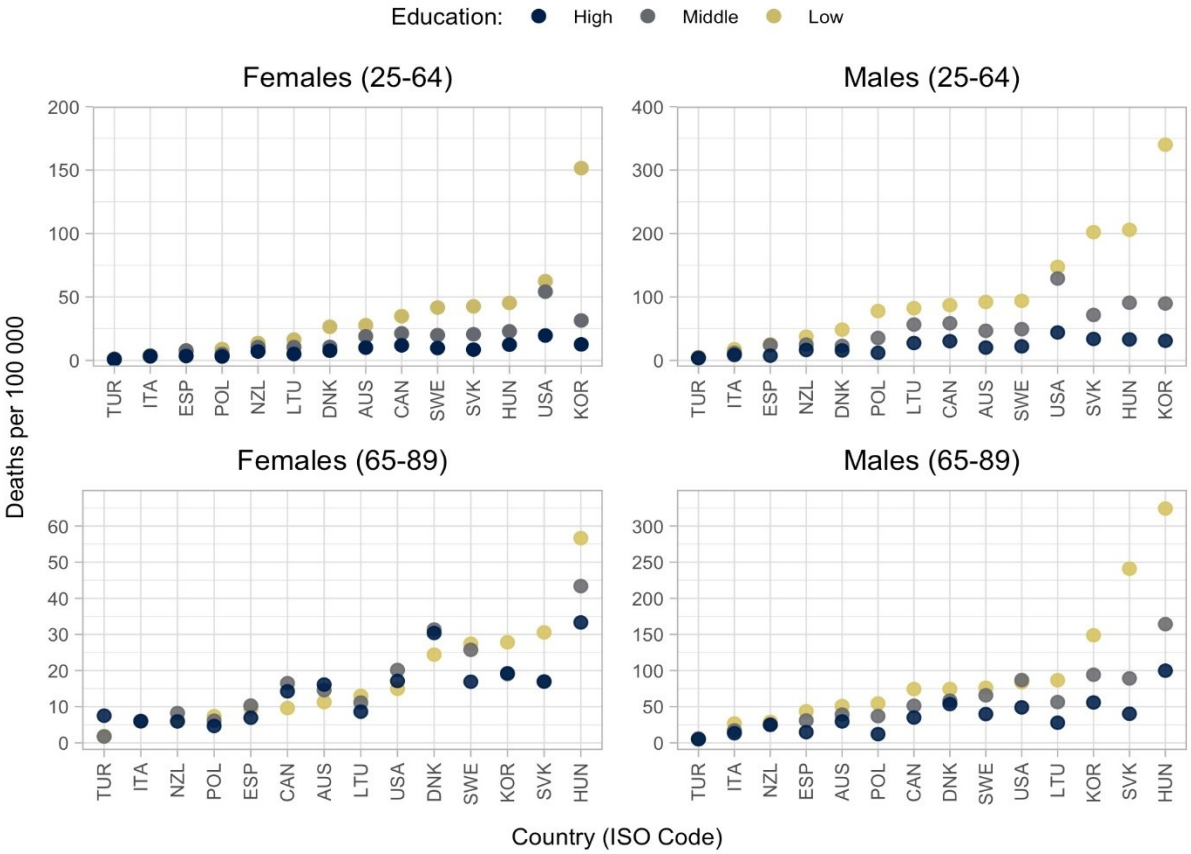
Note: Countries are reported in International Organization for Standardization (ISO) three-letter codes. Mortality rates are standardised using the OECD 2010 standard population. Circulatory system diseases (Chapter IX): I00-I99. Neoplasms (Chapter II): C00-D48. External causes (Chapter XX): V01-Y98. Other diseases: All other causes.

43. The relative contribution of deaths from circulatory disease tends to be higher for women than men. Hungary, Lithuania, Poland, Slovak Republic and Türkiye have especially high relative contributions of circulatory diseases to the total RD in standardised mortality rate. The relative contribution of deaths from external causes is consistently larger for women than men across all ages. The contribution to the total RD due to deaths from external causes is particularly high in Sweden, Korea and the United States, which may be explained by deaths of despair.

Deaths of despair

44. Figure 4.10 shows the standardised mortality rates due to deaths of despair by education, sex, and age-group (25-64 and 65-89). Complete results are available in Table A.10 (Annex A). Standardised mortality rates due to deaths of despairs are greater for men than women, generally by a factor of two among 25- to 64-year-olds and by a factor of five among 65- to 84-year-olds. The average standardised mortality rates due to this cause for women (men) aged 25-64 are 35, 17, and 8 (104, 51, and 22) deaths per 100 000 for low, medium, and high education groups, respectively. For the age group 65-89, the average standardised mortality rates due to deaths of despairs are 18, 17, and 15 (94, 59, and 36) deaths per 100 000 for women (men) in low, medium, and high education groups, respectively. While there is a clear pattern for women and men aged 25-64 and men aged 65-89, where higher education groups have lower standardised mortality rates, the pattern is not clear for women aged 65-89, where crossing are exhibited in multiple countries, including Australia, Denmark, Canada, and the United States. Deaths of despair standardised mortality rates are highest among low education groups aged 25-65 in Hungary, Slovak Republic, Korea, and the United States. For women and men aged 25-64, the United States experiences the highest deaths of despair standardised mortality rate for both high and middle education groups.

Figure 4.10. Deaths of despair age-standardised mortality rates by country, sex, age-group, and education around 2016

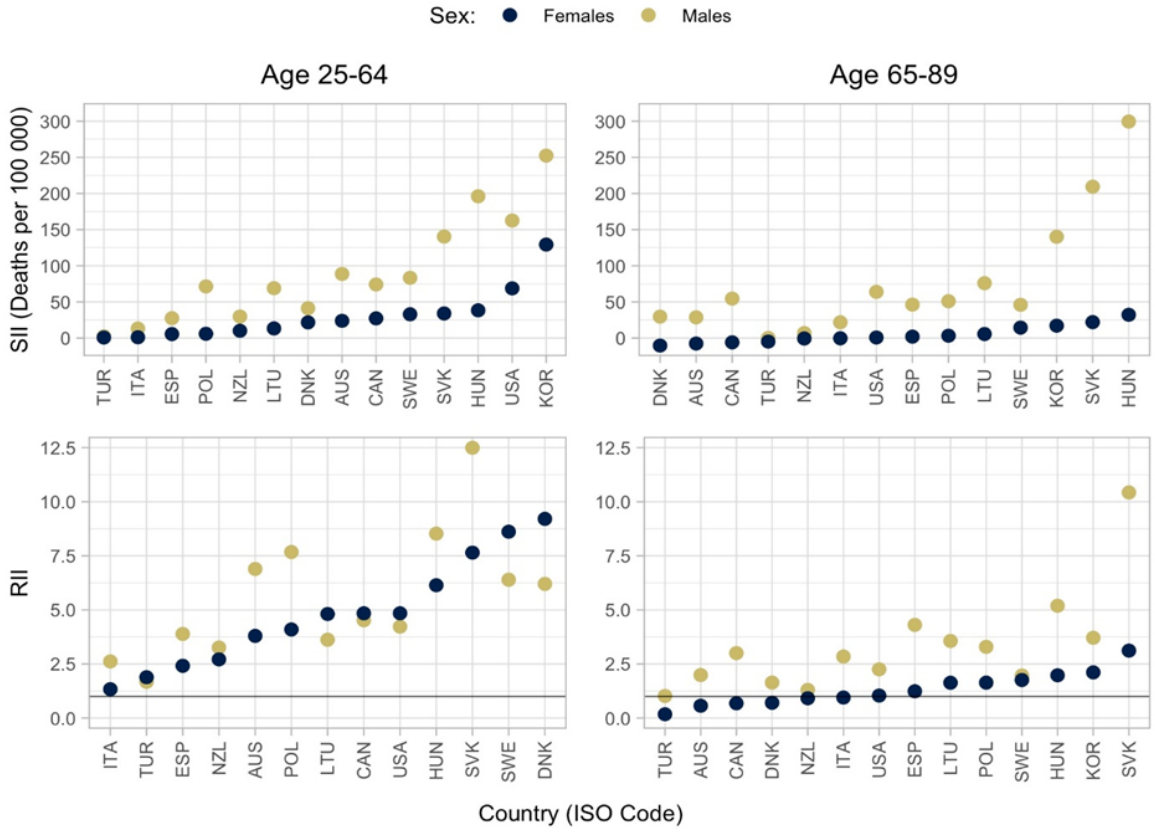


Note: Countries are reported in International Organization for Standardization (ISO) three-letter codes. Education is classified according to the 2011 International Standard Classification of Education (ISCED-2011) into low (lower secondary education and below, ISCED 0-2), medium (upper-secondary, ISCED 3-4), and high education (higher than upper-secondary, ISCED 5-8). Mortality rates are standardised using the OECD 2010 standard population. Deaths of Despair: Suicide (X60-X84, Y87.0), Alcohol-Related Deaths (E24.4, F10, G31.2, G62.1, G72.1, I42.6, K29.2, K70, K85.2, K86.0, O35.4, P04.3, Q86.0, R78.0, X45, Y15), and Drug-Related Deaths (F11-16, X40-44, Y10-14).

45. Looking more in details at age profiles of mortality rates due to deaths of despair by education (see Annex B), Korea stands out as the only country where mortality rates decline between age 35 and 59 for low-educated males. Some selection bias may explain this pattern as the share of low-educated people is very low for these cohorts (see Table A.1 and Table A.2 in Annex A). Nevertheless, (Jung-Choi et al., 2014[31]) reports similar results using an older wave of the same data source. They document a gap in life expectancy between high and low educated males equal to 16.2 years (versus 15.3 years in this study) and report a peak in the suicide rate at age 35-39 as well as a peak in deaths from liver disease at age 45-49. These two causes of death are by far the main contributors to the life expectancy gap between high and low educated males before age 60.

46. Figure 4.11 shows the SII and RII estimates for deaths of despair age-standardised mortality rates, excluding Korea, from the RII plot in the 25-64 age group (complete results including rate differences and ratios are available in Table A.11, Annex A).[5] Averaging across countries, SIIs and RIIs tend to decrease with age. For women (men), average standardised mortality rate SIIs decrease from 29 (89) to 5 (77) deaths per 100 000 from age 25-64 to 65-89. For women (men), average standardised mortality rate RIIs decrease from 4.817 (5.559) to 1.258 (3.293) deaths per 100 000 from age 25-64 to 65-89, when excluding Korea. Table A.11 includes RDs and RRs for all countries.

Figure 4.11. Slope and relative indices of inequality in deaths of despair age-standardised mortality rates by country, sex, and age group around 2016

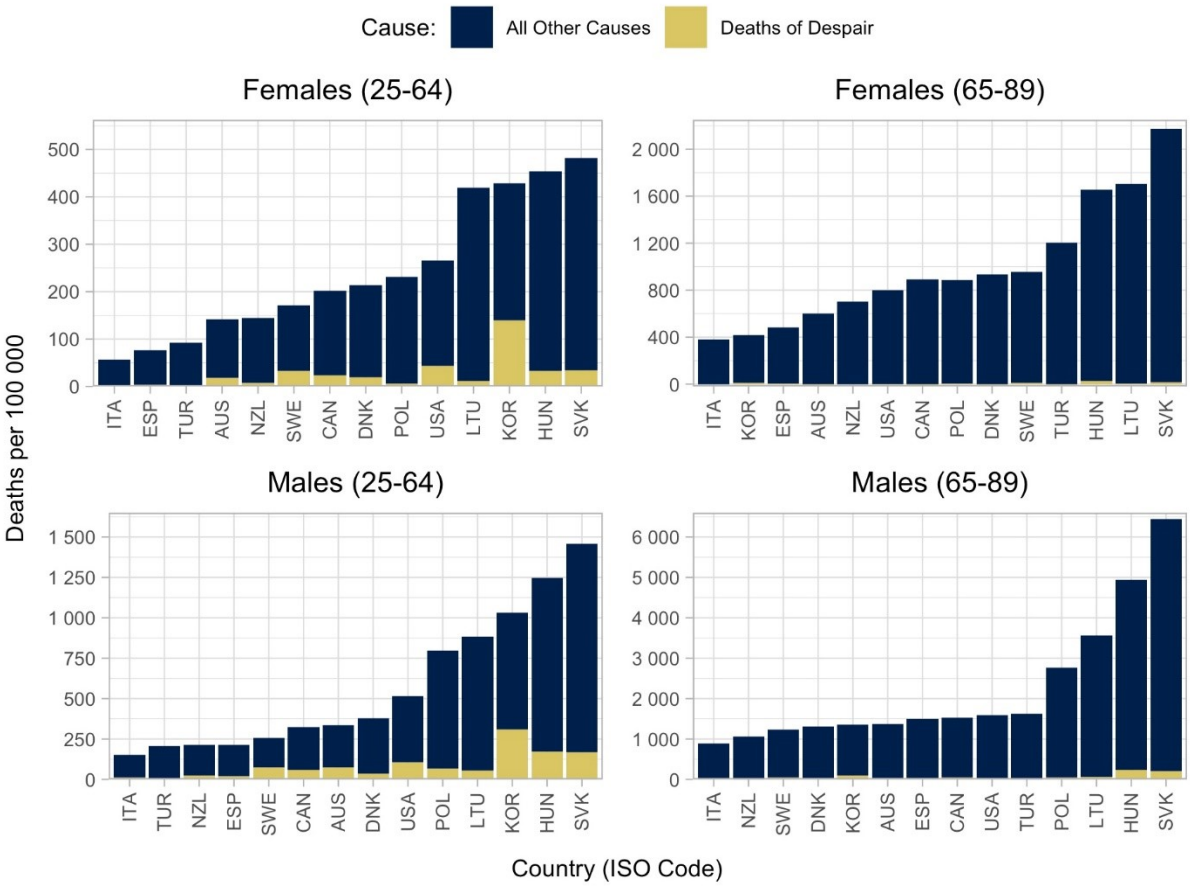


[5] Korea is an outlier, with an RII of 357.616 and 351.08 for women and men aged 25-64, respectively, dropping sharply for the 65-89 age group. These extreme results are likely caused by the low proportions of low educated people groups, leading to volatile estimates based on predicted high and low education groups from the RII (see Section 5.3).

Note: SII, slope index of inequality; RII, relative index of inequality. Countries are reported in International Organization for Standardization (ISO) three-letter codes. Mortality rates are standardised using the OECD 2010 standard population. Deaths of Despair: Suicide (X60-X84, Y87.0), Alcohol-Related Deaths (E24.4, F10, G31.2, G62.1, G72.1, I42.6, K29.2, K70, K85.2, K86.0, O35.4, P04.3, Q86.0, R78.0, X45, Y15), and Drug-Related Deaths (F11-16, X40-44, Y10-14).

47. Figure 4.12 shows the contribution of deaths of despair to the rate difference in standardised mortality rates compared to deaths from all other causes for men and women aged 25-64 and 65-89. Deaths of despair account for over 15% of the rate difference in age-standardised mortality rates among women and men aged 25-64 in the United States, Korea, and Sweden, as well as for men aged 25-64 in Australia and Canada. Deaths of despair contribute less than 5% (10%) of the total rate difference in standardised mortality rate for women (men) in New Zealand, Spain, Lithuania, Poland, Italy, and Türkiye. For women and men aged 65-89 the contribution of deaths of despair to the total standardised mortality rate difference are less than 2% for men in all countries except Canada, the United States, the Slovak Republic, Sweden, Hungary, and Korea, and are negative for women in Australia, Denmark, Canada, Türkiye, and the United States. Relative contributions are visualised in Figure A.2 (Annex A).

Figure 4.12. Decomposition of the contribution of deaths of despair to rate differences in age-standardised mortality rates by country, sex, and age-group (deaths per 100 000) around 2016

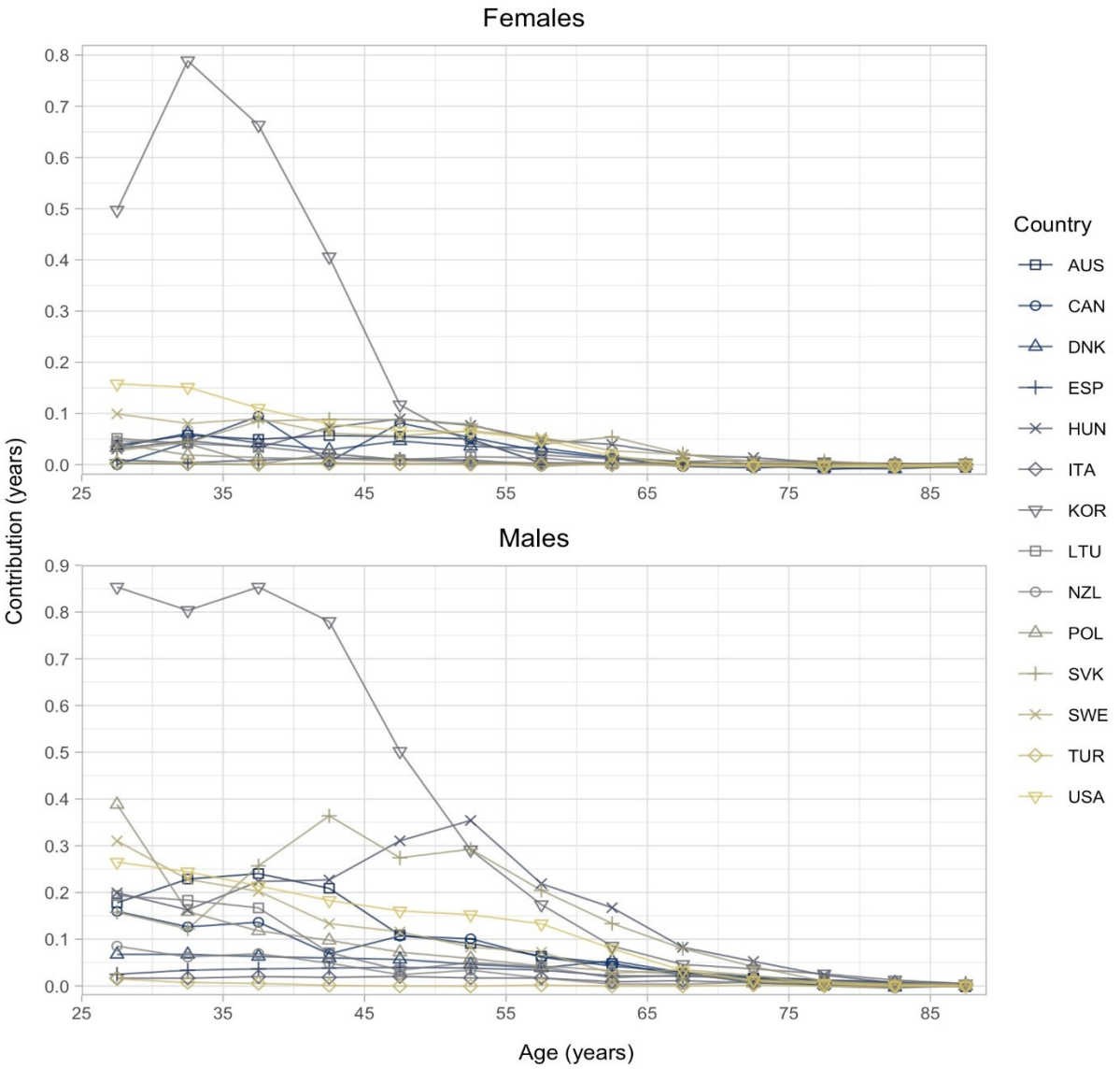


Note: Countries are reported in International Organization for Standardization (ISO) three-letter codes. Mortality rates are standardised using the OECD 2010 standard population. Deaths of Despair: Suicide (X60-X84, Y87.0), Alcohol-Related Deaths (E24.4, F10, G31.2, G62.1, G72.1, I42.6, K29.2, K70, K85.2, K86.0, O35.4, P04.3, Q86.0, R78.0, X45, Y15), and Drug-Related Deaths (F11-16, X40-44, Y10-14)

48. Figure 4.13 shows the decomposition of age- and cause-specific contributions of deaths of despair to the life expectancy gap between the high and low education groups, in years. The

decomposition uses 5-year age groups and provides a more detailed picture of the age distribution of the contribution of deaths of despair to educational inequalities in longevity. Deaths of despair contributions to the life expectancy gap tend to be highest for people aged less than 30, decreasing with age and converging beyond age 65 for women and 75 for men. However, patterns by age are not always declining ; for example, deaths of despair contributions rise with age for Korea and Australia, peaking around age 35-39 before decreasing in all older age groups.

Figure 4.13. Decomposition of deaths of despair contribution to the life expectancy gap (in years) by country, sex, and age (high vs low education) around 2016

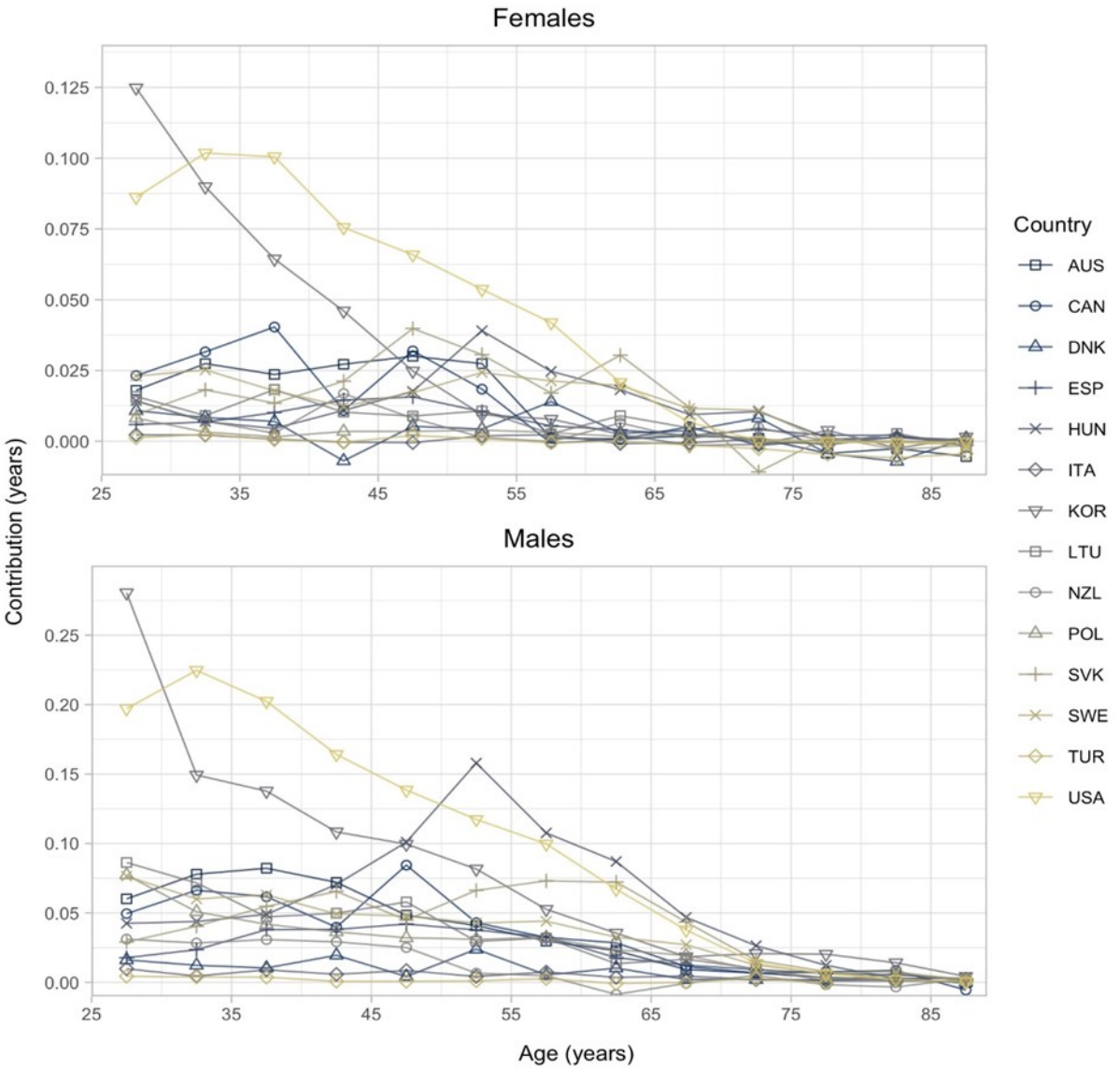


Note: Countries are reported in International Organization for Standardization (ISO) three-letter codes. Education is classified according to the 2011 International Standard Classification of Education (ISCED-2011) into low (lower secondary education and below, ISCED 0-2), medium (upper-secondary, ISCED 3-4), and high education (higher than upper-secondary, ISCED 5-8). Deaths of Despair: Suicide (X60-X84, Y87.0), Alcohol-Related Deaths (E24.4, F10, G31.2, G62.1, G72.1, I42.6, K29.2, K70, K85.2, K86.0, O35.4, P04.3, Q86.0, R78.0, X45, Y15), and Drug-Related Deaths (F11-16, X40-44, Y10-14).

49. For 25- to 35-year-old women, deaths of despair also contribute large shares to the life expectancy gap in Korea, Sweden, and the United States. For men from age 35 and above, deaths of despair contributions increase with age in the Slovak Republic and Poland, peaking around age 45-54, while contributions become highest among all countries for all age groups above 50. While deaths of despair have been documented in Korea, the scale may be a statistical artefact caused by small sample sizes (See Section 5.2). Figure A.3 (Annex A) excludes Korea to facilitate comparisons between other countries.

50. Figure 4.14 decomposes the contribution of deaths of despair to the life expectancy gap between high and middle education groups. Between ages 25-29 and 35-39, the contribution of deaths of despair is highest in Korea and the United States; between 0.125 and 0.045 (0.3 and 0.1) years per 5-year age group in women (men). Contributions appear to drop more sharply in Korea, whereas they remain high in the United States until higher ages. In Hungary, deaths of despair contributions rise with age from 25, peaking in the 50-54 age group at approximately 0.04 and 0.15 years, for women and men, respectively. In other countries, the contribution varies between -0.01 and 0.04 years between the 25-29 and 60-64 age groups, before converging to less than 0.0125. Small negative contributions to the gap in Danish and Slovakian women at ages 40-44 and 70-74, respectively, as well as men in New Zealand aged 60-64, indicate greater deaths of despair in the high education group than the middle education group.

Figure 4.14. Decomposition of deaths of despair contribution to the life expectancy gap (in years) by country, sex, and age (middle vs high education) around 2016



Note: Countries are reported in International Organization for Standardization (ISO) three-letter codes. Education is classified according to the 2011 International Standard Classification of Education (ISCED-2011) into low (lower secondary education and below, ISCED 0-2), medium (upper-secondary, ISCED 3-4), and high education (higher than upper-secondary, ISCED 5-8). Deaths of Despair: Suicide (X60-X84, Y87.0), Alcohol-Related Deaths (E24.4, F10, G31.2, G62.1, G72.1, I42.6, K29.2, K70, K85.2, K86.0, O35.4, P04.3, Q86.0, R78.0, X45, Y15), and Drug-Related Deaths (F11-16, X40-44, Y10-14).

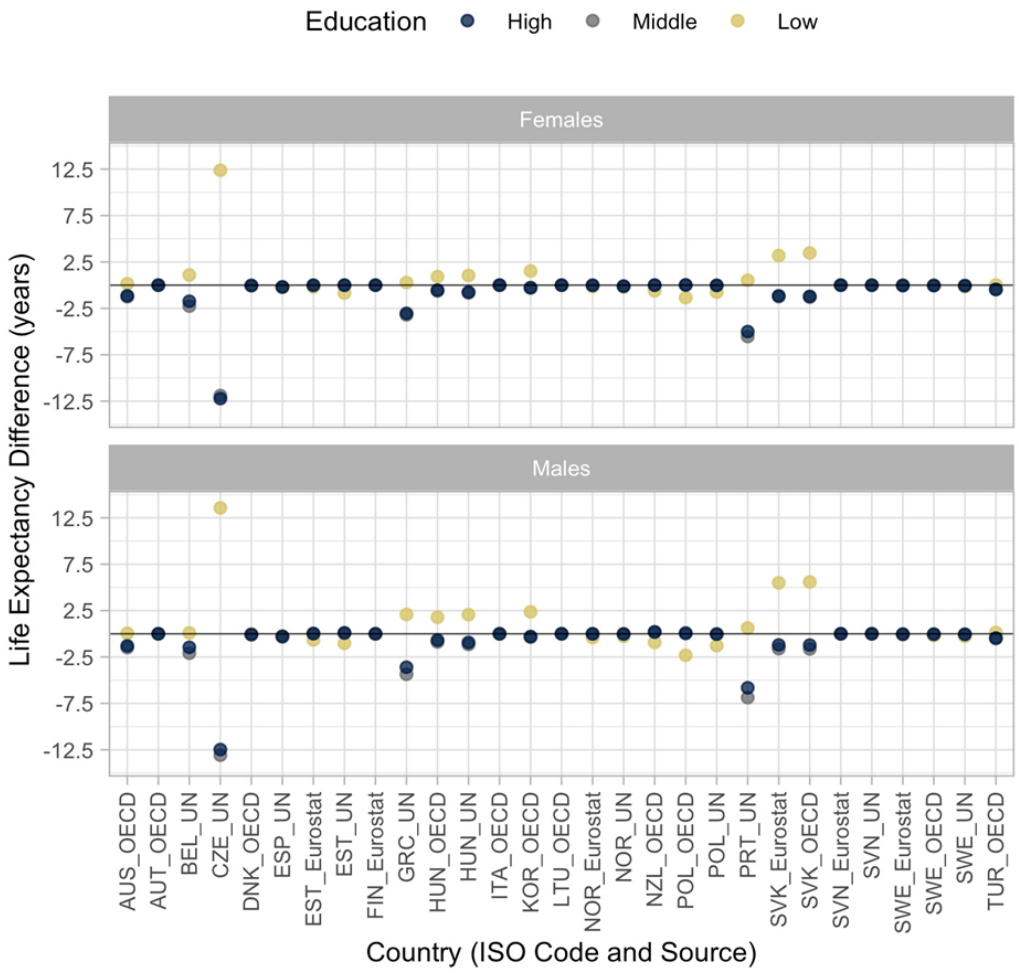
51. Table A.12 (Annex A) sums the contributions of deaths of despair to life expectancy gap at 25 for the age groups 25-44, 45-64 and 65+, and reports the proportion of this gap to the total life expectancy gap (high-low and high-medium), across all ages. Deaths of despair among women and men aged 25-64 account for 7 and 11% of the total gap in life expectancy between high and low education groups on average, respectively. At ages 25-44, the relative contribution of deaths of despair to the total life expectancy gap between high and low education groups is highest in Korea (27 and 21%, for women and men, respectively) and the United States (10% for women and men).

4.5. Robustness checks

Missing education data imputation

52. Figure 4.15 compares life expectancy estimates at age 25 when either imputing missing education data according to the existing education group proportions or imputing all missing data to low education groups. Positive values indicate a higher life expectancy estimate obtained when imputing all missing education proportionally. For most countries, the difference in imputation method results in minimal changes in life expectancy. However, for the Czech Republic (UN data), Greece (UN Data), Portugal (UN Data), and the Slovak Republic (Eurostat and OECD data), the differences in imputation results in larger differences in life expectancy at age 25. This concerns mainly secondary sources, whose estimates should taken with caution.

Figure 4.15. Comparison of missing education imputation assumptions



Note: OECD, Organisation for Economic Co-operation and Development; UN, United Nations. Countries are reported in International Organization for Standardization (ISO) three-letter codes. Positive results indicate higher life expectancy estimates obtained when imputing missing education data to each education group proportionally, compared to imputing all missing education data to the low education group and vice versa.

53. Countries where differences between imputation methods exceed 5 years of life expectancy at age 25 include the Czech Republic, Portugal, and the Slovak Republic. Of these large outliers, all are from the UN rolling population source, except the Slovak Republic, where large differences are observed in both the OECD and Eurostat data. Besides the large outliers, Hungary, Korea, New Zealand, and Poland (OECD) also exhibit substantial differences in life expectancy estimates depending on the imputation method.

54. At age 65, the life expectancy estimate differences between imputation methods are generally smaller than at 25, as expected. However, the Czech Republic and Portugal still feature large discrepancies greater than 5 years, while differences for Greece and the Slovak Republic exceed 3 years.

Benchmark comparisons

55. To check the robustness of results, the weighted average of life expectancy across low, middle, and high education groups is calculated and compared with life expectancy estimates from the OECD Database, averaged across the same years as used for each country-source (See Table 4.5). [6]

Table 4.5. Comparison of analysis and benchmark life expectancy estimates at age 40 by country, source, and sex

Country	Source	Females			Males		
		Analysis	Benchmark	Difference	Analysis	Benchmark	Difference
AUS	OECD	45.8	45.4	0.4	42.2	41.8	0.4
AUT	OECD	44.3	44.6	-0.3	40.3	40.5	-0.2
BEL	UN	44.2	44.7	-0.5	40.1	40.1	0
CAN	OECD	44.7	44.9	-0.2	41.2	41.3	-0.1
CZE	UN	42.6	42.5	0.1	37.1	37.1	0
DNK	OECD	43.4	43.5	-0.1	39.7	39.8	-0.1
ESP	OECD	46.5	46.8	-0.3	41.4	41.5	-0.1
ESP	UN	47.7	46.8	0.8	41.5	41.5	0
EST	Eurostat	43	43.1	-0.2	35.1	34.9	0.2
EST	UN	42.9	43.4	-0.5	34.9	35.4	-0.4
FIN	Eurostat	44.7	45	-0.3	39.7	39.8	-0.2
GRC	UN	44.9	44.8	0.1	39.9	40.1	-0.3
HUN	OECD	40.2	40.4	-0.2	34	34	0
HUN	UN	40.2	40.4	-0.2	33.8	33.9	-0.1
ITA	OECD	46	46	0.1	41.9	41.6	0.3
KOR	OECD	46.5	46.3	0.2	40.6	40.5	0.1
LTU	OECD	41.9	41.6	0.3	33.7	32.8	0.9
NLD	OECD	45	44	1	41.8	41.1	0.7
NOR	Eurostat	44.8	44.8	0	41.4	41.6	-0.2
NOR	UN	45.4	44.8	0.6	42.2	41.6	0.6
NZL	OECD	44.4	44.4	0	41.8	41.5	0.4
POL	OECD	42.9	42.7	0.3	35.2	35.6	-0.3
POL	UN	42.3	42.6	-0.3	35.4	35.5	-0.1

[6] Due to the data collection methodologies for Japan and Netherlands, educational distribution data are not directly available. To remedy this, the most appropriate data are substituted. For Netherlands, educations from 2011-20 are used for the population aged 25-64 from the OECD Database. The OECD database only contains shares of the population achieving tertiary or higher education level for Japan, so the UN database is used instead: education distribution from 2010 are used for the population aged 25-99. For USA, data on life expectancy at age 40 from 2019 data were not available, so 2018 data are substituted.

Country	Source	Females			Males		
		Analysis	Benchmark	Difference	Analysis	Benchmark	Difference
PRT	UN	44.9	45.1	-0.2	39.4	39.2	0.2
SVK	OECD	41.5	41.6	-0.1	35.3	35.3	0
SVK	Eurostat	41.3	41.4	-0.2	35.1	35	0.1
SVN	Eurostat	44.3	44.5	-0.2	39	39	0
SVN	UN	45.2	44.8	0.4	39.3	39.3	0.1
SWE	OECD	44.8	44.9	-0.1	41.7	41.8	0
SWE	Eurostat	44.7	44.8	0	41.7	41.6	0
SWE	UN	44.7	44.9	-0.1	41.8	41.8	0
TUR	OECD	42.5	42.4	0.1	37.9	37.6	0.4
USA	OECD	42.8	42.7	0.1	38.8	38.7	0.1
Average		**44**	**44**	**0**	**38.9**	**38.9**	**0.1**
	OECD			0.1			0.2
	Eurostat			-0.1			0
	UN			0			0

Note: OECD, Organisation for Economic Co-operation and Development; UN, United Nations. Countries are reported in International Organization for Standardization (ISO) three-letter codes.

56. The average difference between this paper's and benchmark life expectancy estimates for women and men is 0.065 and 0.101 years, respectively, at age 40. For life expectancy at age 65, the average difference between our estimates and OECD benchmark is 0.037 years for women and 0.043 years for men. These results indicate slightly higher life expectancy estimates from our analysis than the benchmarks, which may be explained by the methodology of this paper, which considers differential mortality rates by sex and education until age 120. From the primary sources, outliers are Netherlands (1.0 and 0.7 years overestimates for women and men at age 25, respectively) and Lithuania (0.9 years overestimate for men at age 25).

57. Table 4.6 compares life expectancy estimates at 25 by country, sex, and education using a Eurostat benchmark (Eurostat, 2021b[32]). Across all sources, difference in life expectancy estimates from our analysis and Eurostat benchmark at age 25 are -0.8, 0.8, and 2.0 years for low, middle, and high education groups, respectively for women (see Table 5.1). For men, differences between the analysis and benchmark life expectancy estimates at age 25 are -0,6, 0.8, and 1.3 years, respectively. Eurostat life expectancy by education calculation practices differ from those employed in this paper, which may explain part of the differences between estimates obtained, even when using Eurostat data. In any case, these differences are in line with expectations, as Eurostat estimates do not take into differential mortality across education groups after age 75. As a result, OECD estimates of life expectancy were expected to be lower for low-education groups and higher for high-education groups relative to Eurostat figures.

Table 4.6. Comparison of analysis and benchmark life expectancy estimates at age 25 by country, source, sex, and education

Country	Source	Females						Males					
		Low		Middle		High		Low		Middle		High	
		A	B	A	B	A	B	A	B	A	B	A	B
DNK	OECD	55.5	55.1	58.8	57.8	60.6	59	50.9	50.2	54.4	53.8	57.6	56.1
EST	Eurostat	53	53.5	57.3	57.4	59.6	59.3	43.3	43.4	48.4	48.6	52.9	52.4
EST	UN	50.2	53.5	58.3	57.4	60	59.3	43.9	43.4	48.4	48.6	51.5	52.4
FIN	Eurostat	56.8	57.2	59.6	59.7	61.5	61	50.8	51.1	53.8	53.9	57.6	56.9
GRC	UN	59.8	59	61.6	60	62.3	58.8	51.9	53.1	56.1	53.9	59.7	57.2
HUN	OECD	50.4	52.2	56.6	56.1	58.6	55	40.3	43	50.1	47.5	55.3	53.5
HUN	UN	50.9	52.2	56.5	56.1	57.9	55	40.6	43	50.7	47.5	54.5	53.5
ITA	OECD	60.3	59.7	62	61.7	62.7	60.3	55.4	54.6	57.9	57.5	59.5	57.7
NOR	Eurostat	57	57.4	60.1	59.7	62.2	60.8	52.3	52.8	56.2	56.2	58.9	57.9
NOR	UN	57.3	57.4	60.6	59.7	62.9	60.8	53	52.8	57.1	56.2	59.5	57.9
POL	OECD	54.2	55.7	56.1	56.9	59.3	58.3	43.4	44.8	47.9	48.3	55.8	55
POL	UN	54.2	55.7	57	56.9	61.3	58.3	44	44.8	49	48.3	56.6	55
PRT	UN	59.3	59.4	64.6	59.3	66.1	60.8	52.5	53.1	59.2	53.5	62.3	56.8
SVK	OECD	50.7	51.2	57.9	56.6	61.7	58.3	38.2	39	50.4	50	55.1	54.1
SVK	Eurostat	51	51.2	57.3	56.6	60.9	58.3	38.6	39	50.1	50	54.8	54.1
SVN	Eurostat	57.4	57.9	59.8	59.6	61.9	60.8	49.8	50.3	53.7	53.8	57.8	56.5
SVN	UN	56.7	57.9	59	59.6	61.1	60.8	49.8	50.3	53.4	53.8	57.2	56.5
SWE	OECD	56.8	57.9	59.5	59.4	62.1	60.8	53.1	53.8	56.3	56.2	59.3	58.2
SWE	Eurostat	57.6	57.9	59.4	59.4	61.8	60.8	53.4	53.8	56.3	56.2	59	58.2
SWE	UN	53.7	57.9	61.8	59.4	62.4	60.8	51.5	53.8	57	56.2	59.3	58.2
TUR	OECD	56.9	57	60	58.5	61.4	59.1	51.5	51.3	54.1	53	56.6	54.7
Average		**55.2**	**56**	**59.2**	**58.5**	**61.4**	**59.3**	**48**	**48.6**	**53.4**	**52.5**	**57.2**	**55.9**
Average Difference (All)		**-0.8**		**0.8**		**2**		**-0.6**		**0.8**		**1.3**	
	OECD	-0.5		0.5		2		-0.5		0.6		1.2	
	Eurostat	-0.3		0.2		1.2		-0.3		0		0.7	
	UN	-1.8		0.8		2		-1.1		1.1		1	

Note: A, analysis estimate; B, Eurostat benchmark estimate. OECD, Organisation for Economic Co-operation and Development; UN, United Nations. Countries are reported in International Organization for Standardization (ISO) three-letter codes. Benchmark source: (Eurostat, 2021b[32]).

5. Discussion

5.1. Primary findings

58. On average, women and men in high education group have 5.2 and 8.2 years (9.6 and 17.8%) longer life expectancies at 25 than their low education peers. The SII (RII) estimates on age-standardised mortality rates indicate that women and men in the lowest education group experience 460 (40%) and 966 (67%) more deaths per 100 000 person-years, respectively. The SII and RII results are 10-30% greater than the RD and RR inequality estimates. Across both longevity measures Austria, Italy, and Spain record lower absolute and relative inequality estimates, while Estonia, Hungary, Lithuania, and the Slovak Republic display higher absolute and relative inequality estimates.

59. The standard deviation of age-at-death is on average 3.3 and 3.4 years greater in the low education groups than high education groups for women and men, respectively. Although between-group inequalities in age-at-death are significant, within-group inequalities in age-at-death account for most of total inequalities; 96.2% for women and 92.5% for men. Between-group relative components are lowest in Italy (0.8 and 1.9% for women and men, respectively) and highest in Slovakia (13.3 and 29.5% for women and men, respectively). Again, large inequalities between education groups account for a low proportion of the total dispersion in ages of death as the within-group inequality is even larger.

60. Among women and men aged 25-64, deaths from causes other than circulatory disease, neoplasm, or external causes, account for over 47 and 35% of the risk difference in age-standardised mortality rates, respectively. Among women and men aged 65-89, deaths from circulatory diseases account for 49 and 41% of the risk differences in age-standardised mortality rates, respectively. Among high all-cause age-standardised mortality rates countries, such as Hungary, Lithuania, Slovak Republic, and Poland, deaths from circulatory disease are the key driver of high mortality rates.

61. Deaths of despair age-standardised mortality rates are highest in Hungary, Korea, Slovak Republic, and the United States and lowest in Italy, Spain, New Zealand, Poland, and Türkiye. For women (men), average age-standardised mortality rate SIIs decrease from 29 (89) to 5 (77) deaths per 100 000 from age 25-64 to 65-89. Deaths of despair account for over 15% of the difference in age-standardised mortality rates among women and men aged 25-64 in the United States, Korea, and Sweden, as well as for men aged 25-64 in Australia and Canada. For women and men aged 25-64, deaths of despair account for 7 and 11% of the total gap in life expectancy at 25 between high and low education groups on average, respectively.

62. Robustness checks show that imputing missing education data to the low education group (rather than proportionally distributing them according to country-age-sex proportions of low, middle, and high education) has small impacts on primary country-sources, except for the Slovak Republic.[7] Comparisons of female and male average life expectancy estimates at age 40 with OECD benchmarks reveal that our estimates are within 0.1 years for women and men. Education-specific life expectancy estimates from the analysis vary considerably from Eurostat benchmarks, which is likely explained by

[7] Secondary country sources with large differences by missing education imputation method include: Czech Republic (UN data), Greece (UN data), Portugal (UN data), and Slovakia (Eurostat data).

differing extrapolation methods and by the censoring of differential mortality at ages above 75 in Eurostat data sources.

Comparisons with estimates from other studies

63. Table 5.1 shows the differences between inequality measurements from the 2011 analysis provided by (Murtin et al., 2017[1]) compared to the 2016 update presented in this paper, restricting comparisons to identical country-sources using Eurostat and OECD data. On average, absolute gaps in life expectancy by educational level have increased by 0.4 year for women and 0.5 year for men when one outlier, namely the Slovak Republic, is excluded from the sample – bearing in mind that 2012 figures for SVK were probably largely underestimated. This increase is primarily driven by Australia, Canada,[8] Hungary, Portugal, and the United States. Some countries have experienced reductions in the life expectancy gap, including Denmark, Estonia, Poland, and Slovenia. These trends are reflected in the relative life expectancy gap. SII results suggest an increase in standardised mortality rates of 48 and 3 deaths per 100 000 for women and men, respectively. Large increases in SII are observed in the United States, while large decreases are observed in Denmark, Hungary, Norway and Poland for men.

64. Results suggest the Theil Index measure – total – has slightly increased since 2011. However the share of the between-component has decreased by an average of 3.2%, suggesting that education has a weaker association with total variation in age-at-death around 2016, compared to 2011. The greatest decreases were experienced in Estonia, Hungary, Poland, and Sweden.

Table 5.1. Comparison of key educational inequality in longevity results with results from the previous analysis (2011 data)

Country	Source	Year Average (2011 / 2016 Analysis)			Δ Absolute LE Gap		Δ Relative LE Gap		Δ ASMR SII		Δ Theil Index Age-at-Death^ (Women and Men)	
					Females	Males	Females	Males	Females	Males	Total (x100)	Between %
AUS	OECD	2011	/	2016	0.6	1.1	0.009	0.02	34.7	54	-0.028	-1
AUT	OECD	2012	/	2017	0.1	-0.5	0.002	-0.011	-9.3	8.2	-0.04	-3.8
CAN	OECD*	2010	/	2014.5	2.5	3	0.046	0.063	88.6	165.8	0.366	-0.1
DNK	OECD	2011	/	2015	0	-0.2	-0.003	-0.007	6.7	-23.5	-0.091	-2.4
FIN	Eurostat	2010	/	2015.5	-0.1	-0.8	-0.002	-0.021	-19.4	-82.1	-0.186	-4.7
HUN	OECD	2011.5	/	2017.5	2.5	1.1	0.051	0.023	192.7	-350.5	0.161	-4.6
ITA	OECD	2012	/	2014.5	0.5	0.3	0.007	0.004			-0.067	-3.1
NOR	Eurostat	2011	/	2015.5	0.4	-0.2	0.005	-0.007	-36.5	-77	-0.062	-3
NZL	OECD	2006	/	2015.5	-0.5	0.3	-0.01	0.003	54.3	107.3	-0.354	-2.8
POL	OECD	2011.5	/	2016.5	-1	-0.3	-0.021	-0.013	-168.1	-234.1	0.084	-9.5
SVK	Eurostat	2012	/	2015.5								
SVN	Eurostat	2011.5	/	2015.5	-0.1	-0.3	-0.002	-0.009	0.2	-60.9	-0.026	-1.7
SWE	OECD	2012.5	/	2016.5	0.2	0.3	0.004	0.005	8.8	15.7	-0.026	-1.7
TUR	OECD	2013	/	2014.5	0.6	1	0.009	0.018	78.2	84.3	0.07	-4.5
USA	OECD	2011.5	/	2018.5	1.3	1.1	0.025	0.025	397.4	436	0.229	-1
Average					0.5	0.4	0.009	0.007	48	3	0.002	-3.2

[8] The 2011 analysis did not use and adjustment factor to align CanCHEC data with the general Canadian population, which may explain a large proportion of differences in results between analyses.

Note: OECD, Organisation for Economic Co-operation and Development; LE, life expectancy; SII, slope index of inequality; standardised mortality rate, age-standardised mortality rate. *Canadian data were not corrected for underreporting of deaths in the previous analysis. Countries are reported in International Organization for Standardization (ISO) three-letter codes.

65. This paper uses education as the proxy variable for socioeconomic status (SES), where other studies have used income (Chetty et al., 2016[33]) or occupation (Banks et al., 2006[34]; Blanpain, 2016[35]) to stratify life expectancy. The causal effects of improved educational outcomes on long-term health are well-documented (Lleras-Muney, 2005[36]; Hummer and Hernandez, 2013[37]; Murtin, 2013[38]; Galama, Lleras-Muney and van Kippersluis, 2018[39]), largely via health-related behaviours (Cutler and Lleras-Muney, 2010[40]; Brunello et al., 2016[41]); (Brunello et al., 2016[41]). Using education as a proxy may minimise reverse causality – health influencing SES – since education level is determined early in life while mortality outcomes happen later in life in most instances (Galobardes B, 2007[42]). Yet, (Case and Deaton, 2017[43]) argue that poor health during childhood can yield both low educational attainment and premature mortality.

66. Previous international comparisons of educational inequalities in mortality among European countries noted large and increasing absolute and relative inequalities in Eastern European countries and low inequalities in Italy and Spain (Mackenbach et al., 2018[10]). Recent studies in Australia (Welsh and al., 2021a[44]; Welsh and al., 2021b[45]) and Japan (Kasajima, 2020[46]) report results similar to those in this paper. Differences between Australian estimates may be due to the maximum age used in the life table calculation of life expectancy. Other estimates confirm the lower life expectancy found in international studies with fewer comparators (van Hedel and al., 2015[47]), which disproportionately affects those with lower educational attainment (Olshansky and al., 2012[48]; Hummer and Hernandez, 2013[37]; Hendi, 2015[49]; Sasson, 2016[50]).

67. Deaths of despair (Case and Deaton, 2020[51]) are an increasing concern, especially in the United States (Murthy, 2017[52]; JAMA, 2018[53]), where they have been identified as drivers of lower life expectancy and increasing mortality rates (Stein et al., 2017[54]; Masters, Tilstra and Simon, 2018[55]; Woolf et al., 2018[56]; Simon and Masters, 2021[57]; Tilstra, Simon and Masters, 2021[58]). Deaths of despair occur more commonly in populations with low educational attainment (Case and Deaton, 2015[59]; Case and Deaton, 2017[43]). Internationally, socio-economic inequalities in deaths of despair have been documented and investigated in Scotland (Allik et al., 2020[60]) and Korea (Jung-Choi et al., 2014[31]). There have been few international comparisons examining socio-economic inequalities using high quality data ((Lorant et al., 2005[61]; Lorant and al., 2018[62]; Mackenbach et al., 2015[26]). Our paper therefore provides a novel contribution to a subject of great and increasing concern, especially since the onset of the COVID-19 pandemic, which was associated with a 10-60% increase in US deaths of despair in 2020 (Mulligan, 2021[63]).

5.2. Strengths and limitations

68. This paper provides novel contributions to the literature on education inequalities in longevity on multiple fronts. First, this study provides an up-to-date cross-country comparison, which is both rare and instrumental to effective policy design. Second, this study includes a number of non-European countries (Australia, Canada, Japan, New Zealand, Korea, and the United States), which allows for novel cross-country comparisons, contextualising relevant research across European and non-European regions. Third, this study incorporates high-quality national-level data, benefitting from linkages between death certificates and administrative records; this provides additional confidence in results and allows us to effectively benchmark estimates. Fourth, this study synthesises data from multiple international sources of longevity statistics; this allows for the calculation of life expectancy estimates across more countries contextualising evidence across countries and data sources. Fifth, data are systematically and transparently corrected to regularise implausible outlier data points,

including the differential treatment of education groups beyond age 75. Finally, this study provides new insights into deaths of despair and their contribution to educational inequalities in longevity in a cross-country study.

69. This paper is subject to limitations. Data quality varies between country-sources; unlinked and self-reported data may be subject to misreporting. Furthermore, subgrouping data by age, sex, education, and cause of death may lead to small sample sizes and volatile mortality rate estimates. We grouped ages into five-year groups and pooled data across available years to minimise this problem. Where observation counts are especially small due to subgrouping, some data were censored to protect anonymity of the deceased, which may influence results.[9] Rolling population exposure estimates data are also subject to biases. For example, they do not account for migration or changing education status, which may be especially impactful among younger age groups. These issues are compounded in Korean data for low education groups among young age groups, as an example.[10] Death registers are unlinked, education data are collected from self-reported census (with weights applied), only around 1% of women and men aged 25-44 in the sample are in the low education group, and a rolling population exposure estimate is used. Where data limitations are encountered, results should be interpreted with appropriate caution.

70. We have made simplifying assumptions in the absence of data to inform our data treatment, including (a) mortality rates generally rise log-linearly at all successive ages from age 30 and (b) education group mortality rates never cross over at ages beyond 85. We have endeavoured to treat and analyse data to maximise comparability between countries, however some differences remain. (1) Countries do not all have data available for the same years, hence the average year of the pooled data may differ. The biggest difference is between Japan (average 2014) and the United States (average mid-2018). Assuming within-country variations across years are smaller than between-country variations, country ranks will hold across different inequality measures. (2) Comparisons of linked and unlinked sources may differ if unlinked sources systematically misreport exposure or deaths for specific education groups. (3) Some inequality measures are more comparable across countries and years than others; gaps and rate differences as well as ratios do not take the underlying country-specific education distribution into account, which makes them less comparable than slope and relative indices of inequality.

71. Lastly, while we have made the case for educational inequalities as good indicators of unfair inequalities in longevity, findings are not causal. Based solely on this analysis, we cannot state whether the mechanism driving educational disparities in longevity is, for example: (1) people with higher educational attainment make better health-related decisions and thereby experience greater longevity, i.e. social causation; (2) people with better health are more likely to pursue education (and go on to experience greater longevity), i.e. health selection; or (3) whether parental investment or non-cognitive skill development in childhood drives both education and longevity outcomes, i.e. joint determination or confounding by a third factor (Cunha and Heckman, 2007[64]; Mackenbach, 2019[65]). Education interventions may therefore only be one of many drivers of the education-health relationship and should be one aspect of a multifaceted evidence-based policy-making approach.

[9] In the event of low observation counts some countries, such as Canada, randomly select a number within a plausible range, whereas others censor the data completely. When averaging across large samples of person-years, the former is more likely to provide accurate data and the latter is more likely to underreport observations.

[10] This leads to some puzzling mortality rates (see Annex B).

5.3. Policy implications

72. Educational inequalities in longevity are substantial and appear to be increasing over time when comparing results to the 2011 analysis. Some countries have consistently low inequalities and greater average longevity, such as Spain and Italy, while others suffer from high inequalities and lower average longevity, such as Hungary, Lithuania, Poland, and the Slovak Republic. Efforts to improve inequality and longevity outcomes would benefit from closer inspections of these outliers and analysis of the underlying determinants of their health and socio-economic characteristics.

73. Results from the Theil Index indicate that between-group educational inequalities in longevity account for relatively small proportions of the overall variation in age at death. While improvements in education have repeatedly been shown to improve length and quality of life, this contextualises education in the greater picture of overall longevity variance. Furthermore, assuming differences between the 2016 and 2011 analyses indicate an overall trend, between-group relative contributions to total variation in longevity seems to be decreasing as overall education levels rise over time, potentially due to diminishing marginal returns to education. This does not necessarily imply that education-based interventions are ineffective at improving longevity, however it indicates that policies should be multifaceted and incorporate interventions across the mechanisms influencing lifetime health.

74. Labour market policies such as income tax credits and increasing minimum wage have been found to be effective in reducing deaths by suicide (but does not cause significant reductions in alcohol-related deaths and drug overdoses) in the United States over the 1999-2017 period (Dow et al., 2020[66]). If these effects are generalisable, policies which improve the income of the poorest quantiles may be key to reducing deaths of despair. Improving educational attainment may be a plausible mechanism to increase the income of those at the lower end of the distribution (Card, 1999[67]). However, while socio-economic conditions play a significant role, health care policies may also have a large direct effect, for example by influencing accessibility of opioids (Ruhm, 2018[68]).

5.4. Future research

75. Routine updates are required to monitor international educational inequalities in longevity, tracking progress towards reducing 'unfair' inequalities and informing evidence-based policy-making and target-setting. Where possible, these data should transition towards a linked collection methodology, whereby the death certificate is directly linked to administrative data to ensure the reliability of the data. Where education data are missing, these should also be included in the dataset, and their treatment should be assessed on a case-by-case basis to minimise bias.

76. Future research could expand country-coverage and also consider assessing other socio-economic characteristics, such as ethnicity or race, and their association with longevity. Expanding research on stratifying variables and country inclusion is subject to subject to data availability and quality, which has been the reason for their exclusion in this analysis.

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Annex A. Complete and supplementary results

Table A.1. Distribution of educational attainment by country, source, and age for women

Country	Source	Total Person-Years	Age 25-44					Age 45-64					Age 65-84					Age 85+				
		(1,000,000s)	Person-Years	Low	Middle	High	Missing	Person-Years	Low	Middle	High	Missing	Person-Years	Low	Middle	High	Missing	Person-Years	Low	Middle	High	Missing
			(1000s)	(%)	(%)	(%)	(%)	(1000s)	(%)	(%)	(%)	(%)	(1000s)	(%)	(%)	(%)	(%)	(1000s)	(%)	(%)	(%)	(%)
AUS	OECD	8	3,413	11.8	49	29	10.2	2,913	22	47.1	20.7	10.2	1,538	30.8	41	13.7	14.4	179	35.6	31.9	8	24.5
AUT	OECD	3.1	1,185	16.6	50.6	32.8		1,251	14.1	57.9	28		629	22.1	55	22.9		70	31.6	46.8	21.6	
BEL	UN	3.8	1,493	20.5	37.6	29.5	12.4	1,481	39	28.5	24.7	7.8	723	57	16.8	16.5	9.7	74	60.8	14.9	12	12.3
CAN	OECD	42.8	13,828	10.7	38.9	50.4		18,970	14.8	41.3	43.9		9,120	25.8	38.6	35.5		928	40.5	33.9	25.6	
CZE	UN	19.1	7,991	8.3	68.7	16.1	6.9	6,844	7.6	72.5	16	3.9	3,824	12.4	72.5	15	0.1	395	17.5	63.7	18.8	0
DNK	OECD	9.7	3,580	19.1	43.3	34.6	3	3,767	23.4	47.5	27.1	2	2,197	31.3	43.7	22.9	2.1	192	44.1	30.2	16.5	9.2
ESP	OECD	50.8	19,686	42.4	22.3	35.4		19,601	48.7	21.8	29.5		10,082	70.5	12.4	17.1		1,446	83.8	6.9	9.3	
ESP	UN	51.6	21,616	41.5	24.7	33.8		19,001	52.5	20.9	26.6		9,773	74.7	9.6	15.7		1,245	85.5	5.1	9.4	
EST	Eurostat	1.8	768	20.7	49.7	27.7	1.9	649	7.8	57.1	34.1	1.1	316	14.2	50.2	35.2	0.4	27	22	42.4	35.4	0.3
EST	UN	1.7	729	21.4	54.3	22.2	2.1	635	7.7	58.8	31.5	1.9	310	16.8	50.9	31.4	0.9	29	35.9	36.3	27.8	0
FIN	Eurostat	11.5	4,198	18.2	49.8	32		4,400	21.8	46.3	31.9		2,619	45.7	28.2	26.2		237	68.4	13.6	18	
GRC	UN	23.7	9,401	25.4	49.5	25.1		8,339	39.1	36.6	24.3		5,263	67	18.2	14.8		714	78.3	11.4	10.2	
HUN	OECD	13.2	5,257	13.1	61.1	25.8		5,069	14.8	66.5	18.6		2,654	30.7	48.2	21.1		199	59.1	16.4	24.5	
HUN	UN	10.2	4,186	18.7	63.5	17.8		3,802	15.7	67.5	16.8		1,999	29.2	50.9	19.9		171	58.5	19.1	22.3	
ITA	OECD	81.9	26,488	37.1	45.4	17.5		32,912	51.2	36	12.8		20,111	72.9	18.8	8.2		2,434	82.2	11	6.8	
JPN	OECD																					
KOR	OECD	69.7	27,275	1.2	24.3	74.5		31,036	15.1	42.6	42.3		11,196	50.1	30	19.9		198	64.4	18.4	17.2	
LTU	OECD	4.6	1,799	20.6	48.4	31		1,891	6.4	67.2	26.4		864	28.3	50.3	21.4		85	57.6	24.7	17.6	
NLD	OECD																					
NOR	Eurostat	10.7	4,358	19	36.1	36.1	8.8	4,044	20.4	44.7	31.9	3	2,074	25	48.6	25.8	0.6	227	36.1	45	17.9	1
NOR	UN	10.7	4,085	23.1	41.7	28.4	6.8	4,067	20.6	47.2	29.4	2.8	2,209	24.4	49.4	25.6	0.7	306	36.6	44.9	17.6	0.9
NZL	OECD	20.8	8,019	21	35.2	29.9	13.8	8,214	29.1	33	25.8	12.1	4,114	36.8	27.8	18.1	17.4	403	36.4	25.8	13.8	24

Country	Source	Total Person-Years	Age 25-44					Age 45-64					Age 65-84					Age 85+				
		(1,000,000s)	Person-Years	Low	Middle	High	Missing	Person-Years	Low	Middle	High	Missing	Person-Years	Low	Middle	High	Missing	Person-Years	Low	Middle	High	Missing
			(1000s)	(%)	(%)	(%)	(%)	(1000s)	(%)	(%)	(%)	(%)	(1000s)	(%)	(%)	(%)	(%)	(1000s)	(%)	(%)	(%)	(%)
POL	OECD	75	31,450	7.9	60	24.2	7.9	30,592	13.6	69.7	12.4	4.3	12,024	34.3	49.5	14	2.1	896	58.3	26.1	13	2.6
POL	UN	66.1	29,366	11.2	62.1	22.2	4.6	24,706	12.3	71.4	13.6	2.6	11,052	28.8	54.8	14.6	1.8	1,002	49.1	32.5	16.2	2.1
PRT	UN	22.7	8,402	53.1	29	17.9		8,320	74	14.2	11.8		5,226	87.1	5.9	6.9		795	90.7	4.3	5.1	
SVK	OECD	7.7	3,505	6.6	67.5	25.9		2,848	7.2	75.1	17.7		1,212	11.9	70.9	17.2		87	20.3	63.4	16.2	
SVK	Eurostat	7.6	3,512	6.7	67.9	25.3	0.1	2,845	7.5	74.9	17.5	0.1	1,160	12.8	70.3	16.8	0.1	82	22.8	61.1	15.9	0.3
SVN	Eurostat	3.1	1,206	9.9	63.7	26.5		1,210	18.8	63.4	17.7		592	25.9	57.5	16.6		49	32.1	49.2	18.6	
SVN	UN	3	1,198	11.1	65	23.9		1,210	19.2	63.2	17.7		594	26	57.5	16.5		18	30.1	54.3	15.5	
SWE	OECD	14	5,351	11.5	50.8	34.2	3.5	4,988	16.1	58.2	24.6	1.1	3,287	32.8	46.1	19.8	1.2	361	48	36.2	13.9	2
SWE	Eurostat	13.9	5,300	17	46.1	33.5	3.3	4,968	20.8	54	24.1	1	3,255	35.7	41.7	21.4	1.2	357	49	32.8	16.2	2
SWE	UN	13.6	4,993	13.8	56.7	25.6	3.9	4,922	15.7	58.9	24.3	1.1	3,315	32	45.3	21.7	1	365	45.9	34.9	17.4	1.7
TUR	OECD	45.6	24,380	44.5	29.6	24.5	1.5	15,743	65.3	19.2	14.3	1.2	5,202	82	7.4	8.7	1.9	313	86.7	5.2	6.1	2
USA	OECD	215.8	87,344	11.1	48.1	40.8		81,833	12.6	49	38.4		42,130	13.4	46.3	40.2		4,452	21.8	45.6	32.7	
Average		**29.3**	**11,730**	**18.1**	**45.3**	**28.1**	**3**	**11,346**	**22.2**	**47.4**	**22.8**	**1.9**	**5,646**	**35**	**38.7**	**18.9**	**1.8**	**573**	**46.8**	**29.1**	**15.8**	**2.8**

Table A.2. Distribution of educational attainment by country, source, and age for men

Country	Source	Total Person-Years	Age 25-44					Age 45-64					Age 65-84					Age 85+				
		(1,000,000s)	Person-Years	Low	Middle	High	Missing	Person-Years	Low	Middle	High	Missing	Person-Years	Low	Middle	High	Missing	Person-Years	Low	Middle	High	Missing
			(1000s)	(%)	(%)	(%)	(%)	(1000s)	(%)	(%)	(%)	(%)	(1000s)	(%)	(%)	(%)	(%)	(1000s)	(%)	(%)	(%)	(%)
AUS	OECD	8.4	3,438	9.9	42.7	38.8	8.5	3,028	27.6	39.4	23.2	9.9	1,653	46.3	24.8	11.5	17.3	303	50.5	15.8	4.2	30
AUT	OECD	3.4	1,163	18	45	37		1,269	27.1	52	21		773	47.8	43	9.2		154	63.2	30.4	6.4	
BEL	UN	4	1,461	14.9	33.7	40.1	11.3	1,482	39.3	28.5	25.3	6.8	912	64.8	14.2	10.4	10.6	173	69.6	10.2	6.1	14
CAN	OECD	46.3	14,435	7.7	29.2	63.2		19,942	12.8	39.1	48.1		10,299	30.8	37.3	31.8		1,612	48.7	32.9	18.4	
CZE	UN	20.5	7,650	7.4	65.4	21.8	5.4	6,967	15.2	69.2	13	2.7	4,981	33.9	58.3	7.6	0.2	880	52.4	43.6	4	
DNK	OECD	10.1	3,519	14	35.8	47.6	2.6	3,750	22.9	41.3	34.4	1.4	2,464	43.3	35.2	19.7	1.8	394	57.3	19.3	9	14
ESP	OECD	54.4	19,414	30.9	21.1	48		19,890	47.9	21.6	30.5		12,262	81	9.6	9.4		2,857	90.8	5.1	4.1	
ESP	UN	54.3	20,682	31.5	24.2	44.3		19,119	54.3	20.2	25.5		12,094	85.1	7.2	7.7		2,453	92.4	3.7	3.9	
EST	Eurostat	2.1	724	10.3	39.5	49.3	0.8	733	6.7	45.1	47.7	0.5	569	27.5	40.3	31.6	0.7	98	54.7	26.3	17.9	1
EST	UN	2.1	707	12.8	45.7	40.6	1	726	4.9	46.1	48.1	1	560	20.6	45.8	32.9	0.7	99	44	34.7	20.9	0
FIN	Eurostat	12.2	3,975	11.4	39.4	49.2		4,436	15.7	41.5	42.7		3,185	48.2	29.9	21.9		573	74.8	15.5	9.7	
GRC	UN	25.4	9,116	18.4	48.8	32.8		8,772	43.6	35.7	20.7		6,368	78.8	14.7	6.6		1,146	87.5	9.4	3.2	
HUN	OECD	15.2	5,069	11.6	50.7	37.7		5,491	20.7	56.4	22.9		4,144	48.5	37.9	13.7		529	80.1	13.1	6.9	
HUN	UN	11.8	4,075	15.8	55.4	28.8		4,139	22.2	56.7	21.1		3,089	49.7	37.8	12.5		458	82.2	12.2	5.5	
ITA	OECD	91.1	26,719	29.3	44.7	26		34,418	50.2	36.2	13.6		24,606	81.6	13.5	4.9		5,335	89.5	8	2.5	
JPN	OECD																					
KOR	OECD	71.7	25,894	1.1	26.9	72		31,036	24.7	47.5	27.8		14,264	78.4	15.8	5.8		472	92.1	6.1	1.8	
LTU	OECD	5.8	1,794	13.8	41.5	44.8	0	2,208	4	56.3	39.7	0	1,572	32.5	48.9	18.5	0	266	68.1	21.4	10.5	
NLD	OECD	0	0					0					0					0				
NOR	Eurostat	10.8	4,129	15.5	27.2	50.9	6.4	3,879	21.6	41.1	35.7	1.7	2,297	31.9	48.5	18.9	0.7	459	49.3	40.7	9.2	1
NOR	UN	10.8	3,904	18.8	32.9	43	5.3	3,892	21.9	40.6	36	1.5	2,399	31	48.7	19.7	0.6	562	49.1	40.8	9.3	1
NZL	OECD	22.8	8,708	18.2	30	40.6	11.2	8,854	31.6	27	30	11.4	4,549	45.4	17.8	18.1	18.8	703	44.8	17.1	10.3	28
POL	OECD	84	30,704	5.2	49.2	36.8	8.8	32,534	14.7	65.5	16	3.9	18,224	48.3	40.8	9	1.9	2,586	75.7	16.5	3.5	4
POL	UN	73.6	28,552	7.4	53.1	35	4.5	26,222	12.9	66.6	18.4	2.2	16,178	41	46.8	10.7	1.5	2,603	69.3	21.5	5.1	4
PRT	UN	25.9	8,659	40.2	30.1	29.7		9,089	69.9	14.3	15.8		6,603	90.3	3.6	6.1		1,514	94.7	2.7	2.7	
SVK	OECD	8.3	3,335	5.7	55.1	39.2		2,969	11.8	69.5	18.8		1,795	31.8	58.2	10		224	57.4	37.9	4.7	
SVK	Eurostat	8.3	3,346	5.8	56.3	37.8	0.1	2,978	12.7	69.2	18.1	0.1	1,740	33.7	56.8	9.5	0.1	214	59.5	36	4.3	0

SVN	Eurostat	3.2	1,101	7.5	45.5	47		1,180	25.8	50.2	24		761	52	37.4	10.6		138	64.4	30.4	5.1	
SVN	UN	3.1	1,099	8	49	43		1,179	25.9	50.2	23.9		762	51.9	37.5	10.6		38	63.4	31.1	5.5	
SWE	OECD	14.3	5,108	8.6	40.6	48.4	2.4	4,890	11.8	50.6	36.8	0.8	3,580	29.9	43.3	25.4	1.4	676	56	30.1	11.5	2
SWE	Eurostat	14.2	5,066	12.8	37.6	47.3	2.3	4,872	19.5	44.3	35.5	0.7	3,552	42.5	31.4	24.7	1.4	670	62.2	24.3	11.1	2
SWE	UN	13.9	4,782	11.1	49.6	36	3.3	4,826	11.4	52.2	35.6	0.8	3,605	28.4	44.8	25.6	1.2	664	51.3	33.7	12.8	2
TUR	OECD	46.6	23,795	56.2	21.4	21.4	1.1	15,702	79.8	11.4	7.4	1.4	6,438	91.4	3.8	2.6	2.2	679	91.9	3	1.3	4
USA	OECD	230.6	86,342	8.6	40.8	50.6		85,953	10.6	46.8	42.6		50,109	14.1	53.1	32.9		8,156	23.6	56.5	19.9	
Average		30.6	86,342	9	41	51		85,953	11	47	43		50,109	14	53	33		8,156	24	56	20	

Table A.3. Life expectancy at 25 and 65 by country, sex, and education

Country	Source	Life expectancy at 25						Life expectancy at 65					
		Females			Males			Females			Males		
		Low	Middle	High	Low	Middle	High	Low	Middle	High	Low	Middle	High
AUS	OECD	58.6	61.3	62.9	52.9	57.3	60.6	22	23.4	24.3	18.6	20.5	22.3
AUT	OECD	57.8	59.7	60.9	52	54.3	57.9	20.7	21.7	22.6	17	18	20.2
BEL	UN	56.3	60.1	64.8	51.7	52.3	59.9	20.4	23.4	26.3	17	17	21.8
CAN	OECD	56.3	59.1	61.5	51.5	54.9	58.6	20.6	21.9	23.3	17.5	18.9	21
CZE	UN	51.7	56.5	57.7	45.2	51.5	52.6	16.4	18.9	20	14.5	15.9	16.2
DNK	OECD	55.5	58.8	60.6	50.9	54.4	57.6	19.8	21.1	22.3	16.9	17.8	19.6
ESP	OECD	60.7	61.2	64.2	54.3	54.4	60.9	22.9	23.4	25.5	18.1	18.1	22.4
ESP	UN	61.2	61.5	63.6	53.7	54.5	57.9	23.6	23.6	25.6	17.6	17.6	20.4
EST	Eurostat	53	57.3	59.6	43.3	48.4	52.9	19.1	20.4	21.6	13.3	14.9	17
EST	UN	50.2	58.3	60	43.9	48.4	51.5	16.6	21.4	22	14.3	14.7	15.9
FIN	Eurostat	56.8	59.6	61.5	50.8	53.8	57.6	21	21.8	23	17.2	18	19.8
GRC	UN	59.8	61.6	62.3	51.9	56.1	59.7	22.4	24	24	18.1	20.9	22.4
HUN	OECD	50.4	56.6	58.6	40.3	50.1	55.3	16.9	19.7	20.5	11.4	16.1	18.1
HUN	UN	50.9	56.5	57.9	40.6	50.7	54.5	16.9	19.5	19.9	10.8	16.8	17.8
ITA	OECD	60.3	62	62.7	55.4	57.9	59.5	22.4	23.7	24.2	18.9	20.2	21.3
JPN	OECD	61.4	62.1	62.4	54.5	55.7	56.6	23.7	23.9	24.1	18.4	18.9	19.2
KOR	OECD	54.4	61.5	63.1	43.3	54.5	58.6	22.8	23.7	24.4	17.7	19	20.8
LTU	OECD	50.9	56.4	59.6	41.4	46.6	53.5	17.6	20.1	21.9	12.5	14.4	18.1
NLD	OECD	57.4	60	61	53.1	56.5	58.6	20.6	22.1	22.6	17.3	19.2	20.5
NOR	Eurostat	57	60.1	62.2	52.3	56.2	58.9	20.3	22.1	23.6	17.3	18.9	20.8
NOR	UN	57.3	60.6	62.9	53	57.1	59.5	20.7	22.8	24.5	17.9	19.8	21.8
NZL	OECD	57.3	59.8	61.3	54.1	56.9	59	20.7	21.9	22.8	18.5	19.6	21
POL	OECD	54.2	56.1	59.3	43.4	47.9	55.8	19.1	19.1	21.2	13.9	13.9	18.8
POL	UN	54.2	57	61.3	44	49	56.6	19.5	20.1	23.1	14.9	15.2	19.7
PRT	UN	59.3	64.6	66.1	52.5	59.2	62.3	21.8	26.9	27.6	17.9	23.4	24.7
SVK	OECD	50.7	57.9	61.7	38.2	50.4	55.1	17.6	20.7	23.8	10.3	16	18.1
SVK	Eurostat	51	57.3	60.9	38.6	50.1	54.8	17.7	20	22.7	10.4	15.6	17.8
SVN	Eurostat	57.4	59.8	61.9	49.8	53.7	57.8	20.6	22	23.4	15.8	17.6	20.1
SVN	UN	56.7	59	61.1	49.8	53.4	57.2	19.8	21	22.6	15.5	17.2	19.4
SWE	OECD	56.8	59.5	62.1	53.1	56.3	59.3	20.3	21.6	23.4	18	19.2	21
SWE	Eurostat	57.6	59.4	61.8	53.4	56.3	59	20.7	21.5	23.2	18	19.1	20.7
SWE	UN	53.7	61.8	62.4	51.5	57	59.3	18.2	23.7	23.8	17.4	19.8	21.2
TUR	OECD	56.9	60	61.4	51.5	54.1	56.6	19.2	21.8	22.8	16	17.5	19.2
USA	OECD	54.3	55.8	59.6	48.4	50.3	56.8	19.8	20.3	21.8	16.6	17.1	19.7
Average		**55.8**	**59.4**	**61.5**	**49**	**53.5**	**57.4**	**20.1**	**21.9**	**23.2**	**16**	**17.9**	**20**

Table A.4. Absolute and relative gaps in life expectancy at 25 and 65 by country, sex, and education

Country	Source	Life Expectancy at 25				Life Expectancy at 65			
		Absolute Gap		Relative Gap		Absolute Gap		Relative Gap	
		Females	Males	Females	Males	Females	Males	Females	Males
AUS	OECD	4.2	7.7	1.072	1.146	2.3	3.7	1.105	1.201
AUT	OECD	3.2	5.9	1.055	1.114	1.9	3.2	1.091	1.188
BEL	UN	8.4	8.2	1.15	1.159	5.9	4.8	1.288	1.283
CAN	OECD	5.2	7.1	1.093	1.138	2.7	3.6	1.129	1.204
CZE	UN	6	6.4	1.117	1.138	3.6	1.7	1.221	1.116
DNK	OECD	5.1	6.7	1.092	1.131	2.6	2.7	1.13	1.159
ESP	OECD	3.6	6.6	1.059	1.122	2.6	4.3	1.113	1.24
ESP	UN	2.4	4.2	1.04	1.078	2	2.7	1.086	1.155
EST	Eurostat	6.6	9.5	1.124	1.22	2.5	3.7	1.132	1.275
EST	UN	9.8	7.6	1.196	1.173	5.4	1.6	1.326	1.116
FIN	Eurostat	4.7	6.8	1.083	1.134	2	2.7	1.094	1.157
GRC	UN	2.5	7.8	1.042	1.15	1.6	4.3	1.07	1.241
HUN	OECD	8.2	15	1.163	1.373	3.6	6.8	1.214	1.593
HUN	UN	7	13.9	1.138	1.344	3	7	1.177	1.651
ITA	OECD	2.5	4.1	1.041	1.074	1.7	2.4	1.078	1.126
JPN	OECD	1	2.2	1.016	1.039	0.5	0.8	1.021	1.044
KOR	OECD	8.7	15.3	1.16	1.355	1.5	3.1	1.067	1.174
LTU	OECD	8.7	12.1	1.172	1.293	4.2	5.6	1.24	1.448
NLD	OECD	3.6	5.5	1.063	1.104	2	3.3	1.096	1.191
NOR	Eurostat	5.2	6.6	1.091	1.126	3.3	3.5	1.163	1.205
NOR	UN	5.6	6.5	1.097	1.123	3.8	3.9	1.185	1.217
NZL	OECD	3.9	5	1.068	1.092	2.1	2.5	1.1	1.135
POL	OECD	5.2	12.3	1.095	1.284	2.1	4.9	1.112	1.352
POL	UN	7.1	12.6	1.131	1.288	3.6	4.8	1.186	1.323
PRT	UN	6.7	9.8	1.114	1.187	5.8	6.8	1.263	1.381
SVK	OECD	11.1	16.9	1.218	1.442	6	7.8	1.337	1.757
SVK	Eurostat	9.9	16.3	1.195	1.422	5	7.4	1.282	1.711
SVN	Eurostat	4.6	8	1.079	1.161	2.8	4.3	1.135	1.271
SVN	UN	4.4	7.4	1.078	1.149	2.8	3.9	1.142	1.252
SWE	OECD	5.2	6.2	1.092	1.116	3.1	3	1.152	1.169
SWE	Eurostat	4.3	5.6	1.074	1.105	2.5	2.7	1.12	1.15
SWE	UN	8.7	7.8	1.162	1.152	5.6	3.7	1.308	1.214
TUR	OECD	4.5	5.1	1.08	1.099	3.5	3.2	1.183	1.201
USA	OECD	5.3	8.4	1.097	1.174	2	3.1	1.099	1.186
Average		**5.7**	**8.4**	**1.104**	**1.182**	**3.1**	**3.9**	**1.16**	**1.267**

Table A.5. Age-standardised mortality rates by country, sex, and education

Country	Source	Females			Males		
		Low	Middle	High	Low	Middle	High
AUS	OECD	1361	1213	1133	1766	1440	1239
AUT	OECD	1481	1370	1289	1961	1773	1494
BEL	UN	1493	1207	980	2031	1988	1413
CAN	OECD	1545	1366	1231	1930	1668	1407
CZE	UN	1995	1580	1428	2552	2032	1932
DNK	OECD	1587	1367	1254	2026	1744	1496
ESP	OECD	1210	1189	1024	1678	1671	1191
ESP	UN	1092	1028	834	1761	1714	1343
EST	Eurostat	1792	1498	1347	2897	2336	1890
EST	UN	2036	1406	1294	2753	2352	2022
FIN	Eurostat	1520	1342	1232	2015	1780	1496
GRC	UN	1382	1274	1235	1857	1525	1298
HUN	OECD	2138	1634	1461	3571	2196	1712
HUN	UN	2106	1635	1533	3660	2132	1796
ITA	OECD	1177	1055	1022	1514	1332	1225
KOR	OECD	1574	1217	1133	2511	1696	1411
LTU	OECD	1978	1549	1331	3198	2481	1785
NLD	OECD	1509	1348	1290	1881	1622	1427
NOR	Eurostat	1476	1281	1171	1894	1590	1401
NOR	UN	1406	1207	1092	1774	1463	1306
NZL	OECD	1464	1310	1230	1731	1527	1382
POL	OECD	1625	1517	1292	2662	2314	1536
POL	UN	1675	1425	1118	2669	2170	1428
PRT	UN	1280	1015	948	1778	1264	1083
SVK	OECD	1917	1359	1062	3985	2170	1736
SVK	Eurostat	1963	1472	1145	3863	2184	1742
SVN	Eurostat	1465	1304	1183	2144	1781	1446
SVN	UN	1642	1476	1339	2308	1931	1616
SWE	OECD	1483	1314	1171	1785	1542	1342
SWE	Eurostat	1467	1348	1212	1796	1595	1399
SWE	UN	1784	1201	1167	1996	1543	1371
TUR	OECD	1477	1277	1131	1949	1708	1494
USA	OECD	1682	1579	1335	2236	2064	1558
Average		**1599**	**1344**	**1201**	**2307**	**1828**	**1497**

Table A.6. Rate difference, rate ratio, slope index of inequality, and relative index of inequality in age-standardised mortality rates by country and sex

Country	Source	Risk Difference		Risk Ratio		Slope Index		Relative Index	
		Females	Males	Females	Males	Females	Males	Females	Males
AUS	OECD	228	526	1.202	1.424	303	665	1.287	1.598
AUT	OECD	192	466	1.149	1.312	258	618	1.207	1.428
BEL	UN	512	618	1.523	1.437	788	846	1.899	1.55
CAN	OECD	313	523	1.254	1.372	393	692	1.347	1.548
CZE	UN	567	620	1.397	1.321	635	568	1.518	1.349
DNK	OECD	333	530	1.266	1.354	442	715	1.387	1.514
ESP	OECD	186	488	1.182	1.409	303	740	1.301	1.61
ESP	UN	258	418	1.31	1.312	411	635	1.509	1.473
EST	Eurostat	445	1007	1.33	1.533	480	1240	1.398	1.741
EST	UN	742	731	1.573	1.361	601	898	1.578	1.48
FIN	Eurostat	288	519	1.234	1.347	370	713	1.326	1.502
GRC	UN	147	559	1.119	1.431	219	800	1.185	1.664
HUN	OECD	677	1859	1.464	2.086	829	2106	1.681	2.765
HUN	UN	573	1864	1.374	2.038	730	2274	1.568	2.947
ITA	OECD	155	289	1.152	1.236	247	421	1.254	1.354
KOR	OECD	441	1100	1.389	1.78	522	1133	1.543	2.046
LTU	OECD	647	1413	1.486	1.792	691	1754	1.609	2.092
NLD	OECD	219	454	1.17	1.318				
NOR	Eurostat	305	493	1.261	1.352	408	654	1.382	1.52
NOR	UN	314	468	1.288	1.358	423	618	1.427	1.53
NZL	OECD	233	349	1.19	1.253	348	502	1.303	1.388
POL	OECD	333	1126	1.258	1.733	445	1423	1.348	1.83
POL	UN	557	1241	1.498	1.869	699	1514	1.66	1.989
PRT	UN	332	695	1.35	1.642	579	1171	1.691	2.249
SVK	OECD	854	2249	1.804	2.296	900	1844	2.07	2.905
SVK	Eurostat	818	2121	1.714	2.217	908	1796	1.942	2.742
SVN	Eurostat	283	699	1.239	1.483	370	846	1.334	1.62
SVN	UN	303	692	1.226	1.428	399	836	1.315	1.549
SWE	OECD	311	443	1.266	1.33	384	550	1.355	1.443
SWE	Eurostat	255	397	1.21	1.284	356	525	1.31	1.395
SWE	UN	616	625	1.528	1.456	556	735	1.636	1.635
TUR	OECD	345	455	1.305	1.305	552	697	1.512	1.485
USA	OECD	347	678	1.26	1.435	513	1017	1.409	1.692
Average		**398**	**810**	**1.332**	**1.524**	**502**	**986**	**1.478**	**1.77**

Table A.7. Mean and standard deviation of age-at-death by country, sex, and education

Country	Source	Females						Males					
		Low		Middle		High		Low		Middle		High	
		Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
AUS	OECD	84.7	13.3	87.3	11.8	88.9	10.6	78.8	15.3	83.3	13.1	86.6	11.1
AUT	OECD	83.7	12.5	85.7	11.2	86.9	10.6	78	13.8	80.3	12.8	83.9	11.4
BEL	UN	82.4	13.9	86.1	14.1	90.8	11.5	77.7	14.1	78.3	13.4	85.9	10.8
CAN	OECD	82.3	14.4	85.1	12.6	87.5	11.1	77.4	15.3	80.8	13.7	84.6	11.9
CZE	UN	77.8	13.3	82.5	11.3	83.7	11.8	72.4	14.9	77.5	12.8	78.6	12.3
DNK	OECD	81.6	13.8	84.8	11.6	86.7	10.9	76.9	14.5	80.5	12.2	83.6	10.8
ESP	OECD	86.7	11.7	87.2	11.8	90.3	10.2	80.3	12.8	80.5	12.6	87	10.8
ESP	UN	87.2	12.9	87.6	12.4	89.7	12.8	79.8	13	80.5	12	83.9	12
EST	Eurostat	79	15.5	83.4	12.5	85.7	10.9	69.4	15.6	74.5	13.9	79	12.6
EST	UN	76.2	15.1	84.3	12.9	86.1	11.2	70.1	16.1	74.5	13.6	77.6	12.4
FIN	Eurostat	82.8	14	85.6	11.6	87.5	10.3	76.6	15.4	79.8	13.3	83.6	11.2
GRC	UN	85.7	12.7	87.6	11.8	88.3	10.8	77.9	15.5	82.2	15	85.7	12.7
HUN	OECD	76.4	14.7	82.6	12.2	84.6	10.7	66.2	14.5	76.2	13.8	81.3	11.7
HUN	UN	77	14.2	82.4	12.2	83.8	11	66.7	13.2	76.6	14.3	80.4	12.6
ITA	OECD	86.3	11.6	88.1	11.1	88.8	10.7	81.4	12.8	83.9	11.7	85.6	10.9
KOR	OECD	80	20.3	87.4	12.3	89.1	10.3	68.3	21.5	80.2	14.9	84.6	11.5
LTU	OECD	76.8	15.7	82.4	13.2	85.6	11.5	67.2	15.9	72.7	14.9	79.5	13.9
NLD	OECD	83.4	12.6	86	11.4	87	10.5	79.1	13.1	82.5	11.8	84.6	10.9
NOR	Eurostat	83	13.2	86.1	11.5	88.2	10.5	78.3	14.2	82.2	12	84.9	10.9
NOR	UN	83.3	13.6	86.6	12.2	88.8	11.4	79.1	14.3	83.1	12.4	85.5	12
NZL	OECD	83.4	13.3	85.9	11.6	87.3	10.7	80	14.1	82.9	12.2	85.1	11.1
POL	OECD	79.9	15.7	82.1	12.7	85.3	11.4	68.8	17.8	73.8	14.1	81.8	12.9
POL	UN	80.2	14.9	83	12.6	87.3	11.8	69.9	16.8	75.1	14	82.5	13.2
PRT	UN	85.4	12.3	90.6	12.8	92.1	11.5	78.6	14.3	85.2	15	88.4	12.6
SVK	OECD	76.8	15.9	83.9	12.5	87.8	12	64.1	14.4	76.4	13.7	81.1	11.6
SVK	Eurostat	77.1	15.6	83.4	12.1	86.9	11.6	64.5	14.4	76.1	13.5	80.9	11.6
SVN	Eurostat	83.4	12.9	85.9	11.5	87.9	10.5	75.9	14	79.7	12.8	83.8	11.6
SVN	UN	82.7	12	84.9	10.7	87.1	9.8	75.8	13.5	79.4	12.2	83.2	10.8
SWE	OECD	82.8	13.3	85.5	11.5	88.1	10.4	78.9	14.7	82.3	12.3	85.3	10.8
SWE	Eurostat	83.5	12.9	85.5	11.4	87.8	10.2	79.3	14.3	82.2	12.2	85	10.6
SWE	UN	79.8	13.5	87.8	11.5	88.3	10.7	77.6	14.9	83	12.3	85.3	11.1
TUR	OECD	82.9	11.7	86	11.2	87.4	10.6	77.5	13.1	80.1	12.4	82.7	11.7
USA	OECD	80.2	15.5	81.8	14.4	85.6	11.6	74.2	16.7	76.3	15.6	82.8	12.1
Average		**81.6**	**13.9**	**85.3**	**12.1**	**87.5**	**11**	**74.7**	**14.8**	**79.5**	**13.2**	**83.5**	**11.7**

Table A.8. Theil index of inequality (total, within-component, between-component, and between-component proportion) in age-at-death by country and sex

Country	Source	Females				Males				All			
		Theil Index (x100)	Within	Between	Between (% Total)	Theil Index (x100)	Within	Between	Between (% Total)	Theil Index (x100)	Within	Between	Between (% Total)
AUS	OECD	1.055	1.028	0.027	2.6	1.462	1.375	0.087	6	1.281	1.229	0.052	4.1
AUT	OECD	0.987	0.975	0.012	1.2	1.384	1.338	0.046	3.3	1.22	1.195	0.025	2.1
BEL	UN	1.443	1.328	0.115	8	1.556	1.418	0.139	8.9	1.569	1.445	0.124	7.9
CAN	OECD	1.27	1.239	0.032	2.5	1.646	1.581	0.065	4	1.483	1.436	0.046	3.1
CZE	UN	1.886	1.373	0.513	27.2	2.473	1.798	0.675	27.3	2.221	1.632	0.589	26.5
DNK	OECD	1.146	1.115	0.031	2.7	1.376	1.318	0.058	4.2	1.288	1.245	0.043	3.3
ESP	OECD	0.9	0.883	0.016	1.8	1.221	1.151	0.069	5.7	1.107	1.069	0.037	3.4
ESP	UN	1.088	1.08	0.007	0.7	1.215	1.191	0.025	2	1.227	1.213	0.014	1.2
EST	Eurostat	1.424	1.371	0.054	3.8	2.035	1.906	0.129	6.3	1.854	1.769	0.085	4.6
EST	UN	1.492	1.366	0.125	8.4	2.001	1.926	0.075	3.7	1.869	1.771	0.098	5.2
FIN	Eurostat	1.124	1.099	0.026	2.3	1.612	1.549	0.063	3.9	1.411	1.37	0.041	2.9
GRC	UN	1.227	1.139	0.089	7.2	1.966	1.728	0.238	12.1	1.636	1.486	0.15	9.1
HUN	OECD	1.448	1.335	0.113	7.8	2.158	1.727	0.431	20	1.881	1.642	0.239	12.7
HUN	UN	1.384	1.296	0.088	6.3	2.084	1.7	0.384	18.4	1.809	1.606	0.203	11.2
ITA	OECD	0.878	0.871	0.007	0.8	1.099	1.078	0.021	1.9	1.014	1.002	0.013	1.2
KOR	OECD	2.029	1.896	0.133	6.5	3.184	2.702	0.482	15.1	2.697	2.426	0.271	10
LTU	OECD	1.63	1.53	0.1	6.1	2.48	2.245	0.235	9.5	2.182	2.027	0.155	7.1
NLD	OECD	1.001	0.986	0.016	1.6	1.194	1.155	0.039	3.3	1.116	1.09	0.026	2.3
NOR	Eurostat	1.044	1.014	0.03	2.8	1.29	1.238	0.052	4	1.192	1.152	0.04	3.4
NOR	UN	1.125	1.091	0.034	3	1.379	1.329	0.049	3.6	1.273	1.233	0.041	3.2
NZL	OECD	1.051	1.036	0.015	1.4	1.25	1.226	0.024	1.9	1.164	1.144	0.019	1.7
POL	OECD	1.378	1.35	0.027	2	2.319	2.112	0.207	8.9	1.939	1.847	0.092	4.7
POL	UN	1.366	1.311	0.055	4	2.197	1.988	0.208	9.5	1.874	1.758	0.115	6.2
PRT	UN	1.098	0.989	0.109	9.9	1.69	1.473	0.217	12.8	1.425	1.269	0.156	11
SVK	OECD	1.768	1.534	0.234	13.3	2.503	1.765	0.738	29.5	2.29	1.855	0.435	19
SVK	Eurostat	1.668	1.477	0.191	11.4	2.427	1.747	0.68	28	2.191	1.809	0.382	17.4

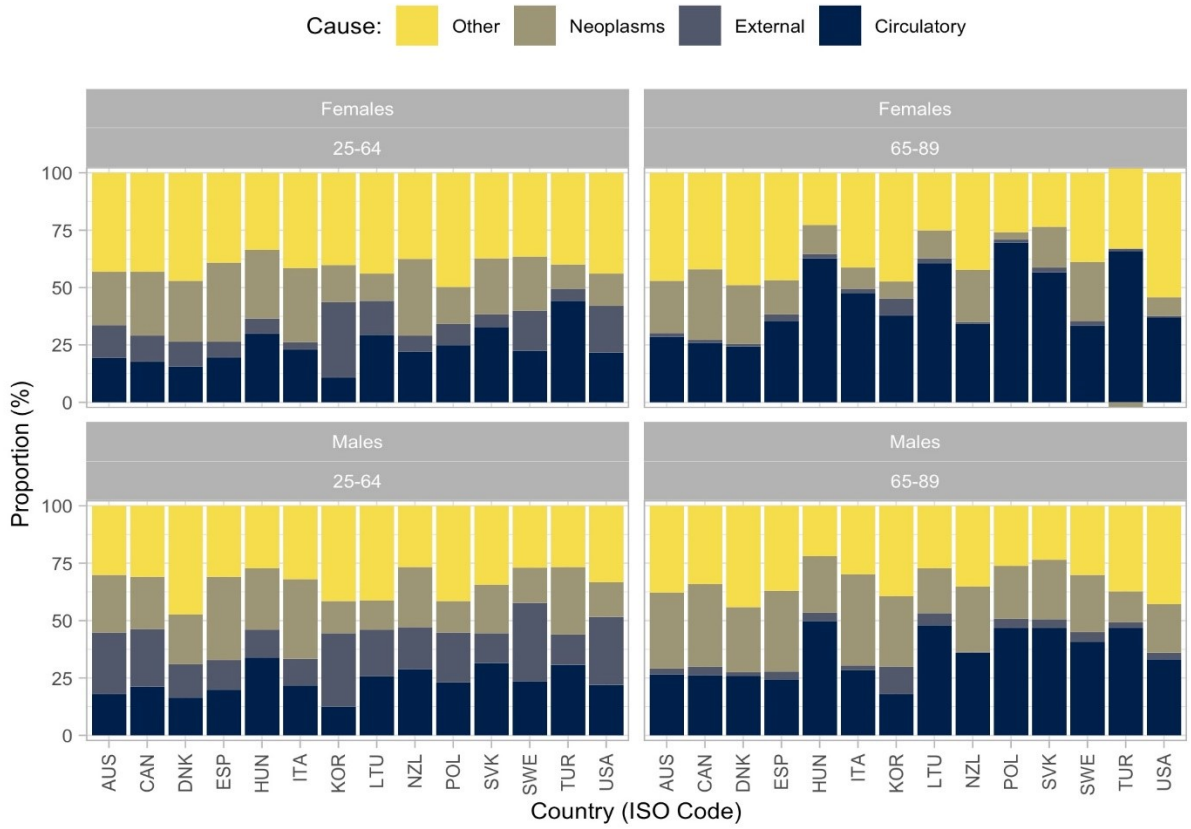
SVN	Eurostat	1.027	1.004	0.024	2.3	1.484	1.402	0.082	5.5	1.312	1.264	0.047	3.6
SVN	UN	1.308	1.294	0.014	1.1	1.525	1.474	0.051	3.3	1.442	1.413	0.029	2
SWE	OECD	1.068	1.037	0.032	3	1.362	1.314	0.048	3.5	1.231	1.192	0.039	3.2
SWE	Eurostat	1.012	0.99	0.021	2.1	1.3	1.26	0.04	3.1	1.173	1.144	0.03	2.5
SWE	UN	1.173	1.069	0.105	8.9	1.43	1.354	0.076	5.3	1.319	1.23	0.089	6.7
TUR	OECD	0.939	0.912	0.028	2.9	1.318	1.279	0.039	3	1.174	1.142	0.033	2.8
USA	OECD	1.61	1.573	0.037	2.3	2.16	2.05	0.11	5.1	1.922	1.854	0.068	3.5
Average		**1.274**	**1.2**	**0.074**	**5.1**	**1.751**	**1.573**	**0.178**	**8.6**	**1.569**	**1.453**	**0.116**	**6.3**

Table A.9. Rate difference, rate ratio, slope index of inequality, and relative index of inequality in age-standardised mortality rates by country, age, sex, and cause of death

Country	Females (25-64)																Females (65-89)															
	Circulatory				External				Neoplasms				Other				Circulatory				External				Neoplasms				Other			
	SII	RD	RII	RR	SII	RD	RII	RR	SII	RD	RII	RR	SII	RD	RII	RR	SII	RD	RII	RR	SII	RD	RII	RR	SII	RD	RII	RR	SII	RD	RII	RR
AUS	34	27	9.633	4.376	28	20	3.754	2.800	44	33	1.868	1.574	75	61	12.220	4.940	239	170	1.996	1.715	14	10	1.335	1.243	201	135	1.414	1.271	431	280	2.235	1.733
CAN	40	36	6.960	3.604	31	23	4.837	2.890	69	56	2.140	1.743	92	87	11.286	4.503	325	229	2.190	1.691	19	13	1.423	1.276	394	270	1.674	1.436	538	373	2.600	1.973
DNK	41	33	9.043	4.071	26	23	16.002	4.004	72	56	2.219	1.748	118	100	13.106	4.228	339	227	2.318	1.763	14	9	1.426	1.227	343	239	1.503	1.339	662	454	2.147	1.727
ESP	25	15	4.677	2.936	9	5	2.495	2.032	44	26	1.737	1.482	49	30	6.552	3.629	257	172	2.177	1.774	19	14	1.734	1.537	23	71	1.051	1.181	331	227	2.018	1.699
HUN	152	136	17.838	6.891	33	30	8.273	3.794	157	136	3.857	2.601	166	152	25.431	7.014	1624	1036	3.448	2.191	55	34	2.301	1.623	373	211	1.559	1.267	585	374	2.736	1.889
ITA	19	13	3.475	2.335	3	2	1.467	1.298	26	18	1.402	1.269	36	23	4.897	2.797	306	182	2.059	1.562	8	6	1.231	1.194	39	36	1.070	1.066	261	157	1.886	1.485
KOR	44	47	106.279	7.369	132	141	226.692	10.089	64	70	3.766	2.546	151	172	#######	15.928	245	158	2.122	1.681	54	31	2.193	1.599	40	31	1.102	1.080	301	198	1.749	1.473
LTU	113	123	16.800	6.002	58	63	8.540	4.206	57	50	2.047	1.749	171	184	9.437	4.435	1377	1033	3.497	2.479	52	38	1.722	1.427	278	208	1.781	1.507	556	427	2.096	1.808
NZL	45	32	9.139	3.893	15	10	2.973	2.010	69	48	2.248	1.681	78	54	11.439	4.322	397	239	2.063	1.559	12	6	1.305	1.122	256	160	1.473	1.279	474	296	2.122	1.639
POL	66	58	4.783	3.718	21	21	4.917	3.161	55	37	1.628	1.432	119	115	9.309	5.730	624	617	1.638	1.825	11	14	1.215	1.322	-214	28	0.812	1.033	174	229	1.294	1.513
SVK	122	158	49.653	9.459	22	27	7.463	3.617	99	117	3.497	2.577	144	180	31.717	8.229	1646	1228	3.719	2.940	66	49	2.463	2.011	509	383	1.965	1.683	688	512	3.386	2.659
SWE	38	38	11.456	4.724	31	30	6.561	3.636	48	40	1.999	1.691	64	63	11.428	5.017	440	319	2.383	2.015	27	20	1.701	1.467	337	245	1.623	1.444	510	370	2.257	1.894
TUR	71	41	6.152	3.088	8	5	2.534	1.877	11	10	1.180	1.172	62	37	5.223	2.946	1422	791	4.590	2.462	27	12	1.862	1.316	-92	-28	0.804	0.934	735	424	2.645	1.802
USA	86	58	4.579	2.996	81	54	5.095	3.319	61	38	2.052	1.589	158	117	5.614	3.545	414	295	1.931	1.630	14	6	1.222	1.101	145	65	1.262	1.123	596	433	1.915	1.623
Average	**239**	**170**	**1.996**	**1.715**	**14**	**10**	**1.335**	**1.243**	**201**	**135**	**1.414**	**1.271**	**431**	**280**	**2.235**	**1.733**	**690**	**478**	**2.581**	**1.949**	**28**	**19**	**1.652**	**1.390**	**188**	**147**	**1.364**	**1.260**	**489**	**340**	**2.220**	**1.780**

Country	Males (25-64)																Males (65-89)													
	Circulatory				External				Neoplasms				Other				Circulatory				External				Neoplasms				Other			
	SII	RD	RII	RR	SII	RD	RII	RR	SII	RD	RII	RR	SII	RD	RII	RR	SII	RD	RII	RR	SII	RD	RII	RR	SII	RD	RII	RR	SII	RD	RII	RR
AUS	74	60	5.131	3.398	110	89	7.042	4.544	105	84	3.585	2.656	121	101	10.819	5.477	483	362	2.212	1.915	47	36	1.722	1.562	571	451	1.794	1.677	729	517	2.635	2.026
CAN	92	69	4.381	2.828	103	82	6.083	3.508	95	74	2.766	2.054	116	101	6.179	3.378	567	403	2.207	1.732	78	54	2.140	1.709	820	552	2.099	1.703	741	523	2.458	1.876
DNK	81	62	5.113	3.162	72	56	6.988	3.877	109	82	3.094	2.280	232	180	8.312	4.361	456	338	1.760	1.580	31	22	1.508	1.334	492	372	1.487	1.391	784	576	1.894	1.651
ESP	66	43	3.261	2.809	42	28	3.694	3.344	118	78	2.727	2.436	106	67	5.454	4.114	489	367	2.044	1.895	74	52	2.597	2.277	647	526	1.769	1.741	801	557	2.426	2.071
HUN	470	424	11.432	6.654	167	151	10.900	6.379	375	333	7.096	4.656	373	341	15.286	7.769	3323	2467	4.913	2.802	237	175	4.410	2.533	1647	1224	3.210	2.156	1455	1078	5.106	2.808
ITA	47	33	2.651	2.123	26	18	2.649	2.099	77	53	2.342	1.845	75	49	5.102	3.128	391	253	1.696	1.429	33	19	1.586	1.311	481	354	1.584	1.438	403	265	1.870	1.548
KOR	104	130	36.833	6.010	278	330	162.855	9.333	124	145	5.333	3.398	315	428	#######	13.574	346	246	1.827	1.593	244	159	3.365	2.352	609	418	1.800	1.532	785	535	2.093	1.717
LTU	270	227	3.999	3.023	220	181	4.334	3.376	148	111	2.863	2.482	431	366	5.171	3.772	2204	1708	2.571	2.241	234	180	2.430	1.972	905	706	1.990	1.867	1230	963	2.007	1.960
NZL	88	62	4.660	2.713	55	39	4.216	2.632	80	56	2.549	1.893	81	57	6.332	3.271	567	385	1.986	1.634	8	2	1.118	1.026	434	305	1.570	1.398	549	376	2.027	1.677
POL	219	184	3.678	3.745	188	173	6.998	5.958	143	108	2.306	2.325	367	331	6.535	6.119	1273	1296	1.671	2.122	125	116	1.996	2.500	409	635	1.215	1.557	729	725	1.701	2.112
SVK	365	460	19.454	7.134	152	191	13.005	5.369	269	307	8.366	4.889	392	501	28.581	9.435	3065	3023	6.068	3.223	242	239	5.460	3.011	1741	1675	3.833	2.621	1526	1511	7.147	3.496
SWE	75	61	4.163	3.192	101	88	7.261	4.518	48	40	2.119	1.790	78	69	5.501	3.414	665	500	2.113	1.855	70	54	1.884	1.697	403	306	1.544	1.419	490	369	1.852	1.649
TUR	97	64	2.413	1.874	44	28	3.569	2.412	96	61	2.317	1.756	88	55	3.461	2.302	1250	762	2.365	1.751	66	37	2.172	1.575	289	221	1.344	1.269	987	603	2.316	1.728
USA	172	113	3.802	2.891	227	153	4.934	3.915	112	77	3.197	2.401	234	171	5.357	3.956	846	526	2.193	1.713	82	45	1.731	1.400	585	337	1.889	1.506	1018	682	2.320	1.812
Average	**159**	**142**	**7.926**	**3.683**	**127**	**115**	**17.466**	**4.376**	**135**	**115**	**3.619**	**2.633**	**215**	**201**	**152.124**	**5.291**	**1138**	**903**	**2.545**	**1.963**	**112**	**85**	**2.437**	**1.876**	**717**	**577**	**1.938**	**1.662**	**873**	**663**	**2.704**	**2.009**

Figure A.1. Relative cause of death contribution to rate differences in age-standardised mortality rates by country, sex, and age-group



Note: Countries are reported in International Organization for Standardization (ISO) three-letter codes.

Table A.10. Deaths of despair age-standardised mortality rates by country, sex, age-group, and education

Country	Females						Males					
	25-64			65-89			25-64			65-89		
	Low	Middle	High	Low	Middle	High	Low	Middle	High	Low	Middle	High
AUS	28	19	10	11	15	16	92	47	20	51	39	30
CAN	35	21	12	10	16	14	87	59	30	74	51	35
DNK	26	11	8	24	31	30	48	23	16	74	58	54
ESP	7	8	3	9	10	7	25	24	7	44	31	15
HUN	45	23	12	57	43	33	206	91	33	324	164	100
ITA	4	4	3	6	6	6	18	12	9	27	17	13
KOR	152	31	13	28	19	19	340	90	31	149	94	56
LTU	16	11	5	13	11	9	82	57	27	87	56	28
NZL	14	11	7	6	8	6	37	25	16	29	25	25
POL	9	5	3	7	6	5	78	35	12	54	37	12
SVK	43	21	9	31	17	17	202	72	34	241	89	40
SWE	42	20	10	27	26	17	94	49	22	76	66	40
TUR	1	1	1	2	2	8	5	5	4	5	6	5
USA	62	54	20	15	20	17	147	129	44	84	87	49
Average	**35**	**17**	**8**	**18**	**17**	**15**	**104**	**51**	**22**	**94**	**59**	**36**

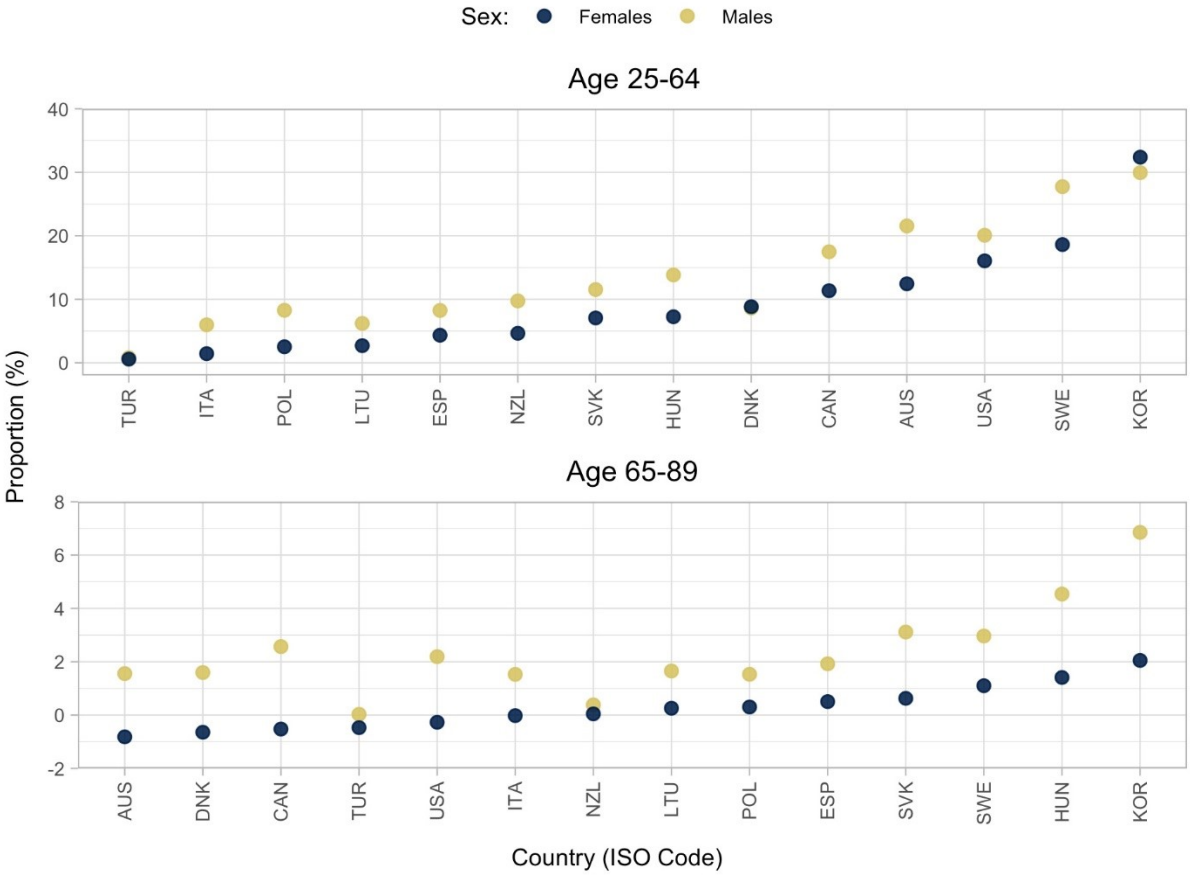
Note: Countries are reported in International Organization for Standardization (ISO) three-letter codes. Education is classified according to the 2011 International Standard Classification of Education (ISCED-2011) into low (lower secondary education and below, ISCED 0-2), medium (upper-secondary, ISCED 3-4), and high education (higher than upper-secondary, ISCED 5-8). Mortality rates are standardised using the OECD 2010 standard population. Deaths of Despair: Suicide (X60-X84, Y87.0), Alcohol-Related Deaths (E24.4, F10, G31.2, G62.1, G72.1, I42.6, K29.2, K70, K85.2, K86.0, O35.4, P04.3, Q86.0, R78.0, X45, Y15), and Drug-Related Deaths (F11-16, X40-44, Y10-14).

Table A.11. Rate difference, rate ratio, slope index of inequality, and relative index of inequality in age-standardised mortality rates for deaths of despair by country, age, and sex

Country	Females								Males							
	25-64				65-89				25-64				65-89			
	SII	RD	RII	RR	SII	RD	RII	RR	SII	RD	RII	RR	SII	RD	RII	RR
AUS	24	18	3.797	2.754	-8	-5	0.569	0.698	89	72	6.891	4.555	29	21	1.988	1.718
CAN	27	23	4.843	2.933	-6	-5	0.683	0.675	74	57	4.52	2.879	55	39	3.002	2.125
DNK	22	19	9.208	3.467	-10	-6	0.706	0.803	41	33	6.201	3.088	30	21	1.64	1.39
ESP	6	3	2.415	1.953	2	2	1.238	1.352	27	18	3.887	3.38	46	29	4.306	2.955
HUN	38	33	6.141	3.653	32	23	1.977	1.701	196	173	8.526	6.225	300	224	5.191	3.249
ITA	1	1	1.335	1.25	0	0	0.949	0.987	13	9	2.618	2.066	22	14	2.844	2.031
KOR	129	139	357.616	12.015	17	9	2.112	1.445	252	309	351.081	10.998	140	93	3.711	2.665
LTU	13	11	4.811	3.23	6	4	1.632	1.508	69	55	3.621	3	76	59	3.563	3.114
NZL	10	7	2.713	1.956	-1	0	0.916	1.054	30	21	3.26	2.268	7	4	1.302	1.163
POL	6	6	4.095	2.879	3	3	1.637	1.578	71	66	7.675	6.496	51	42	3.292	4.523
SVK	34	34	7.647	4.991	22	14	3.118	1.805	140	168	12.494	5.974	209	201	10.429	5.989
SWE	33	32	8.614	4.258	14	11	1.758	1.622	83	72	6.395	4.239	46	36	1.966	1.916
TUR	1	1	1.888	1.665	-5	-6	0.177	0.248	2	2	1.675	1.465	0	0	1.023	1.099
USA	69	43	4.843	3.18	1	-2	1.039	0.874	163	103	4.226	3.345	64	35	2.254	1.711
Average	**29**	**26**	**29.998**	**3.584**	**5**	**3**	**1.322**	**1.168**	**89**	**83**	**30.219**	**4.284**	**77**	**59**	**3.322**	**2.546**

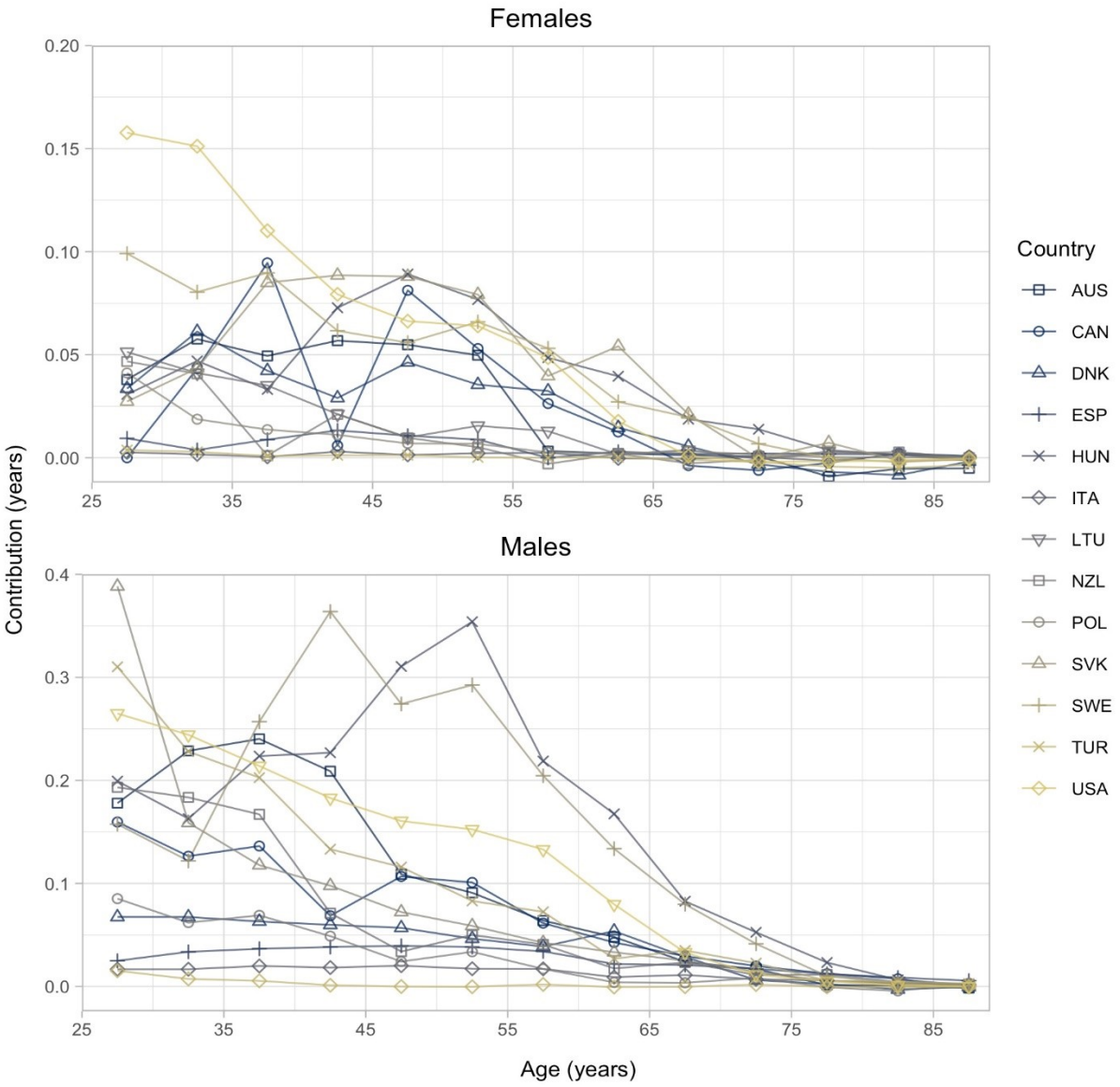
Note: SII, slope index of inequality; RII, relative index of inequality; RD, rate difference; RR, rate ratio.
Mortality rates are standardised using the OECD 2010 standard population. Deaths of Despair: Suicide (X60-X84, Y87.0), Alcohol-Related Deaths (E24.4, F10, G31.2, G62.1, G72.1, I42.6, K29.2, K70, K85.2, K86.0, O35.4, P04.3, Q86.0, R78.0, X45, Y15), and Drug-Related Deaths (F11-16, X40-44, Y10-14)

Figure A.2. Deaths of despair relative contribution to rate differences in age-standardised mortality rates by country, sex, and age-group



Note: Countries are reported in International Organization for Standardization (ISO) three-letter codes

Figure A.3. Decomposition of deaths of despair contribution to the life expectancy gap (in years) by country, sex, and age, excluding Korea



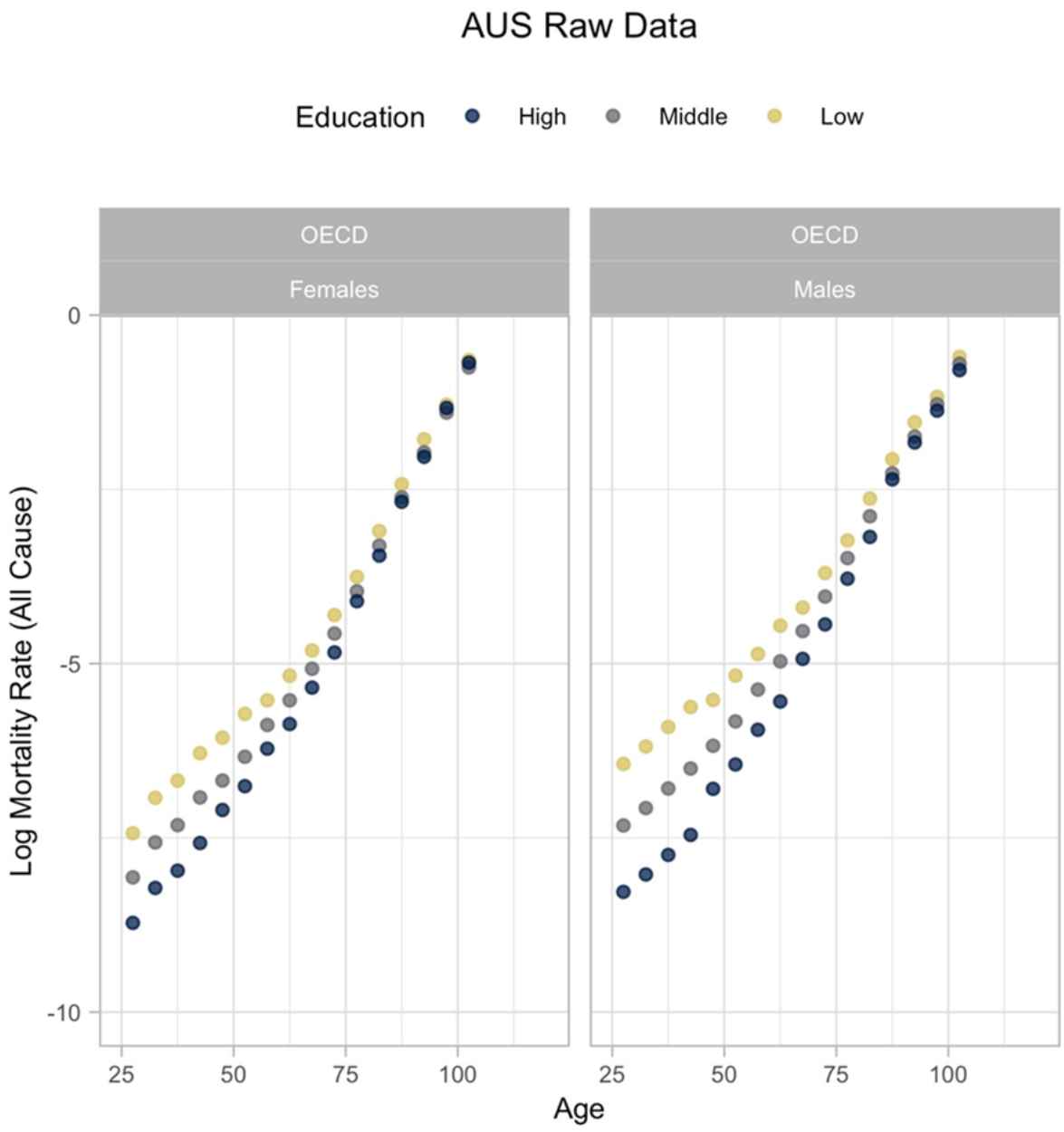
Note: Countries are reported in International Organization for Standardization (ISO) three-letter codes.

Table A.12. Decomposition of deaths of despair contribution to the total life expectancy gap (in years and percent) by country, sex, and age group

Country	High vs Low Education						High vs Middle Education					
	Females			Males			Females			Males		
	25-44	45-64	65+	25-44	45-64	65+	25-44	45-64	65+	25-44	45-64	65+
AUS	0.2	0.11	-0.02	0.86	0.31	0.04	0.1	0.06	-0.01	0.29	0.14	0.02
% LE Gap (all ages)	4.7	2.6	-0.5	11.1	4	0.5	6.1	3.8	-0.7	9	4.4	0.6
CAN	0.14	0.17	-0.01	0.49	0.31	0.07	0.11	0.05	0.01	0.22	0.19	0.03
% LE Gap (all ages)	2.8	3.3	-0.2	6.9	4.4	1	4.4	2.1	0.2	5.8	5	0.8
DNK	0.17	0.13	-0.02	0.26	0.2	0.03	0.02	0.03	0	0.06	0.04	0.01
% LE Gap (all ages)	3.2	2.5	-0.3	3.9	2.9	0.5	1.1	1.4	0	1.8	1.4	0.3
ESP	0.04	0.02	0.01	0.13	0.13	0.07	0.04	0.04	0.01	0.12	0.13	0.04
% LE Gap (all ages)	1	0.6	0.2	2	2	1	1.2	1.2	0.3	1.8	2	0.6
HUN	0.18	0.25	0.04	0.81	1.05	0.17	0.04	0.1	0.02	0.21	0.45	0.09
% LE Gap (all ages)	2.2	3.1	0.4	5.4	7	1.1	1.8	4.9	0.9	4	8.7	1.8
ITA	0.01	0.01	0	0.07	0.06	0.03	0	0	0	0.03	0.02	0.01
% LE Gap (all ages)	0.3	0.2	0	1.8	1.6	0.7	0.7	0.4	0.1	1.8	1.4	0.6
KOR	2.36	0.19	0.02	3.29	1.05	0.13	0.33	0.04	0	0.68	0.27	0.08
% LE Gap (all ages)	27.1	2.2	0.3	21.4	6.9	0.8	20.6	2.8	0	16.4	6.5	1.9
LTU	0.15	0.04	0.01	0.62	0.14	0.05	0.05	0.03	0.01	0.25	0.13	0.04
% LE Gap (all ages)	1.7	0.5	0.1	5.1	1.2	0.4	1.7	1	0.2	3.7	1.9	0.5
NZL	0.11	0.01	0	0.27	0.08	0.01	0.04	0.02	0.01	0.12	0.03	0
% LE Gap (all ages)	2.8	0.4	0	5.3	1.6	0.2	2.9	1.1	0.4	5.5	1.3	0.1
POL	0.08	0.02	0.01	0.76	0.21	0.05	0.02	0.01	0	0.21	0.12	0.03
% LE Gap (all ages)	1.6	0.4	0.1	6.2	1.7	0.4	0.5	0.4	0.1	2.6	1.5	0.4
SVK	0.24	0.26	0.03	0.9	0.91	0.13	0.06	0.12	0	0.19	0.26	0.07
% LE Gap (all ages)	2.2	2.4	0.2	5.3	5.4	0.8	1.6	3.1	0	4	5.4	1.4
SWE	0.33	0.2	0.02	0.87	0.3	0.07	0.08	0.08	0.02	0.25	0.17	0.06
% LE Gap (all ages)	6.3	3.9	0.4	14.2	4.8	1.2	3	3.2	0.8	8.5	5.7	1.9
TUR	0.01	0	-0.02	0.03	0	0	0	0	-0.03	0.01	0	0
% LE Gap (all ages)	0.2	0	-0.5	0.6	0	0	0.3	0.2	-2.1	0.5	0.1	0.1
USA	0.5	0.2	0	0.91	0.53	0.05	0.36	0.18	0.01	0.79	0.42	0.06
% LE Gap (all ages)	9.5	3.7	-0.1	10.8	6.3	0.6	9.6	4.8	0.2	12.2	6.6	0.9
Average (Years)	**0.36**	**0.87**	**0.01**	**3.68**	**1.8**	**0.35**	**1.74**	**0.97**	**0.01**	**2.55**	**1.77**	**0.43**
Average (% Total)	**5.36**	**2.1**	**0.05**	**7.87**	**4**	**0.7**	**4.62**	**2.49**	**0.19**	**6.38**	**4.17**	**0.91**

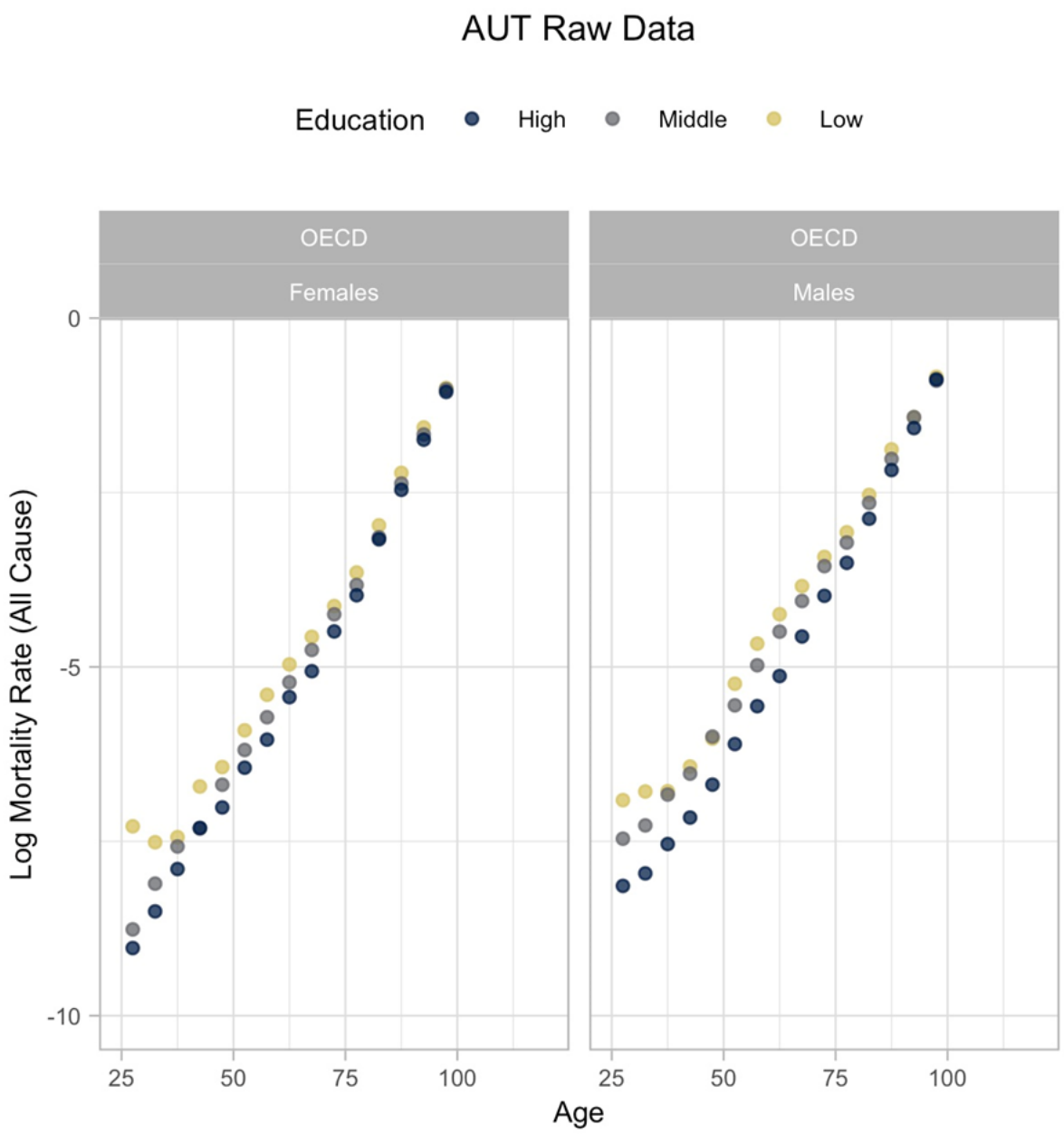
Annex B. Observed mortality rates by country, source, age, sex, and education

Figure B.1. Observed mortality rates for Australia



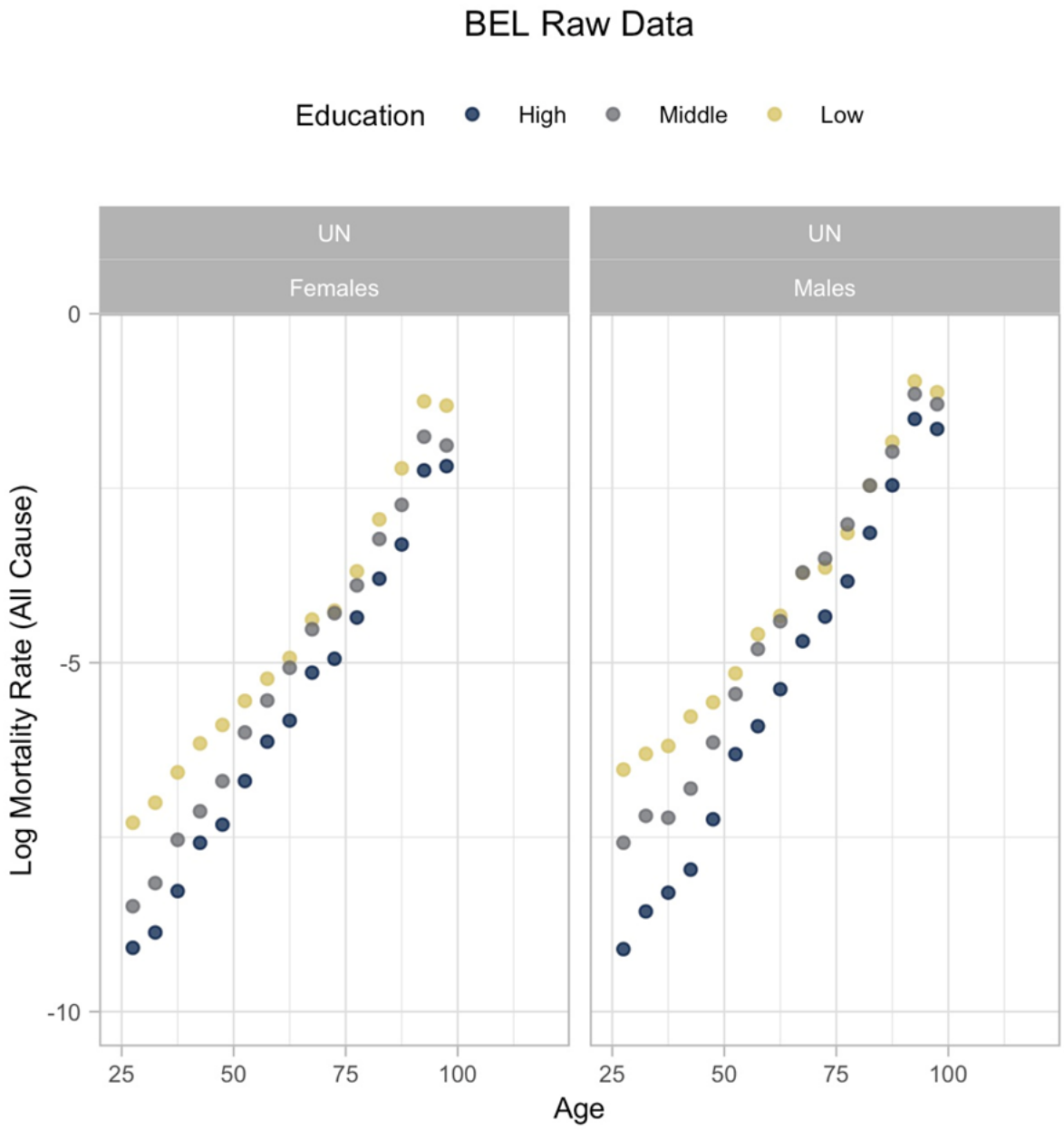
OECD, Organisation for Economic Co-operation and Development; UN, United Nations.
Countries are reported in International Organization for Standardization (ISO) three-letter codes.
Missing education data are assigned proportially to the education distribution of the observed data.

Figure B.2. Observed mortality rates for Austria



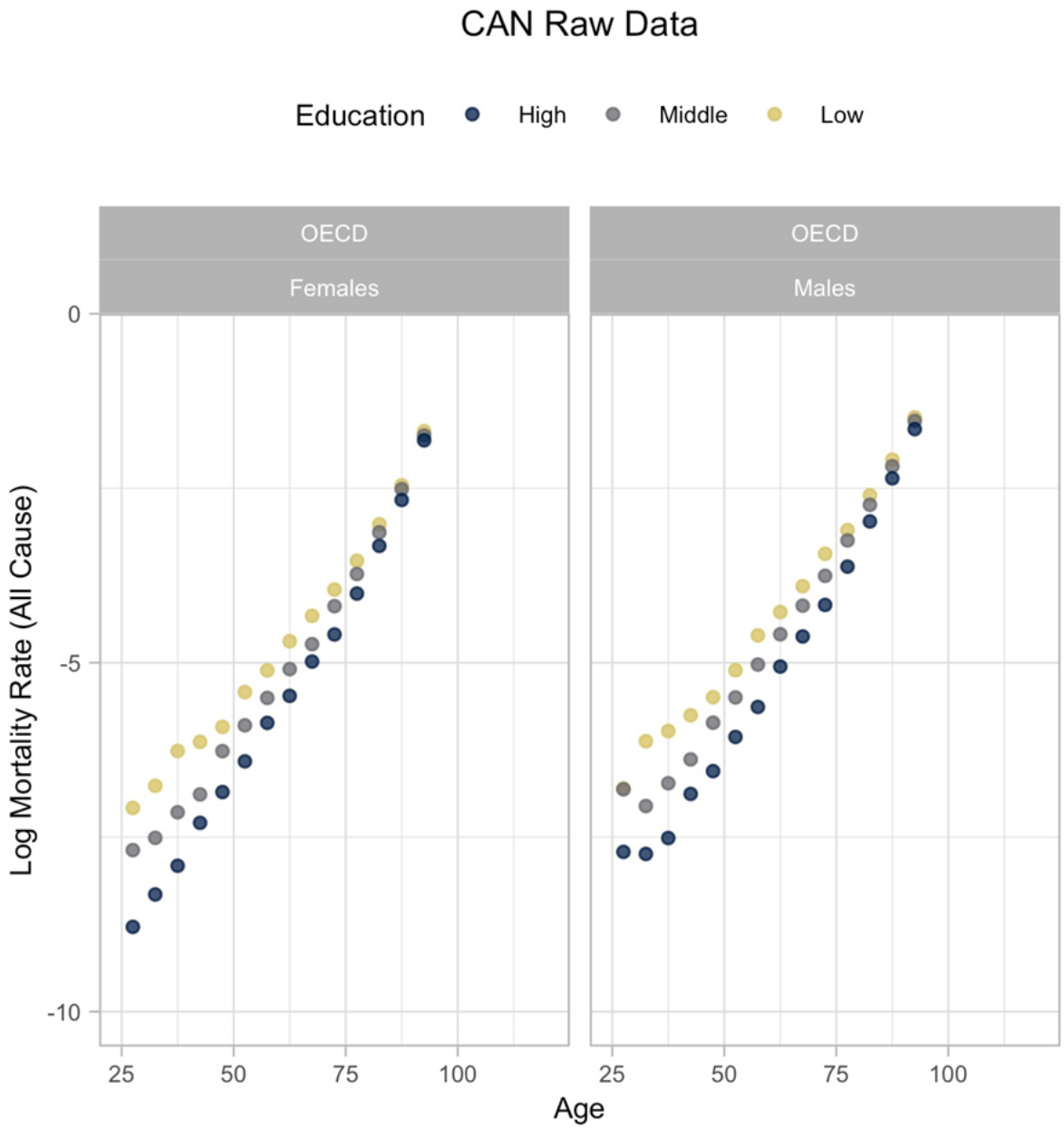
OECD, Organisation for Economic Co-operation and Development; UN, United Nations.
Countries are reported in International Organization for Standardization (ISO) three-letter codes.
Missing education data are assigned proportially to the education distribution of the observed data.

Figure B.3. Observed mortality rates for Belgium



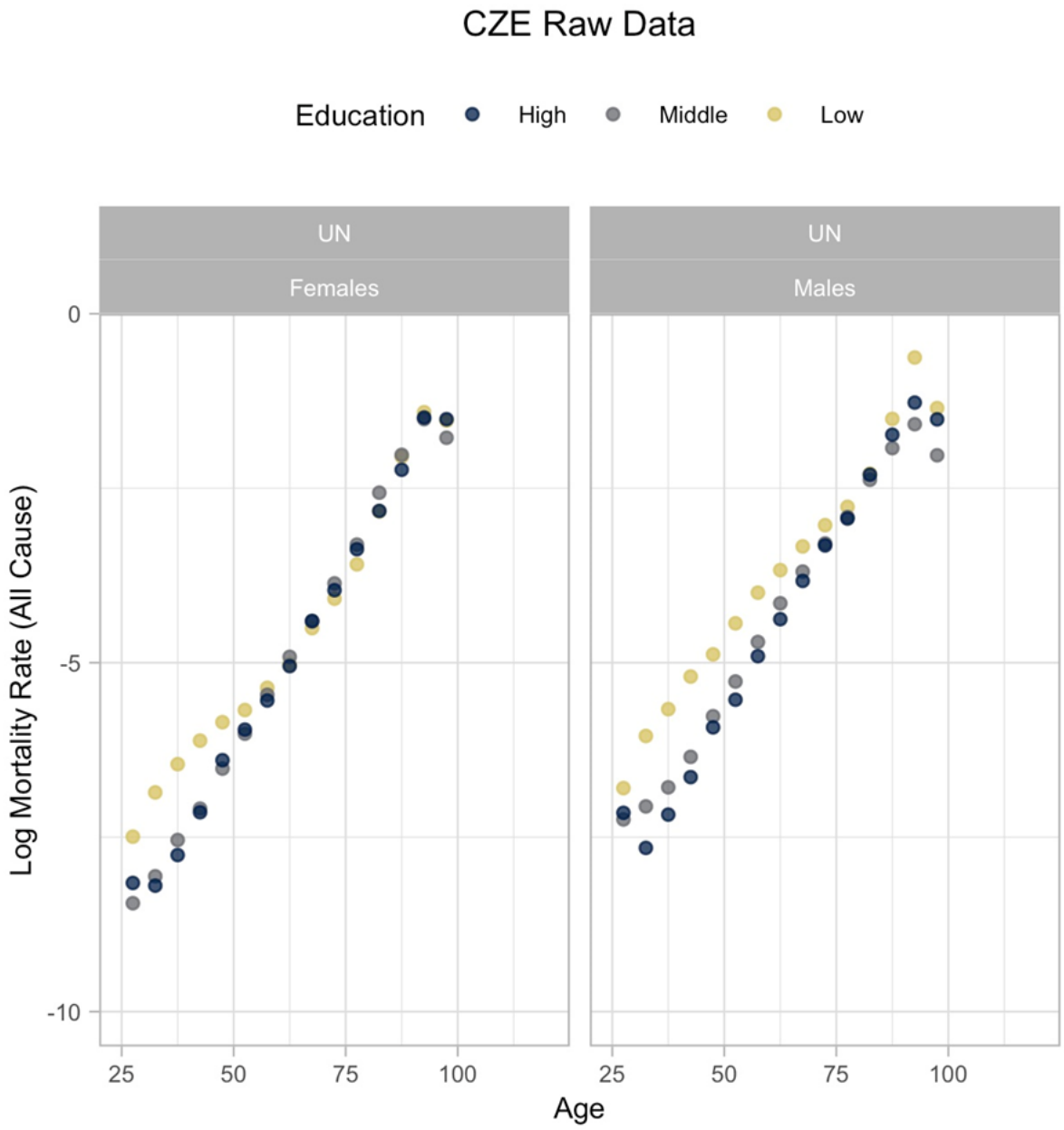
OECD, Organisation for Economic Co-operation and Development; UN, United Nations.
Countries are reported in International Organization for Standardization (ISO) three-letter codes.
Missing education data are assigned proportially to the education distribution of the observed data.

Figure B.4.Observed mortality rates for Canada



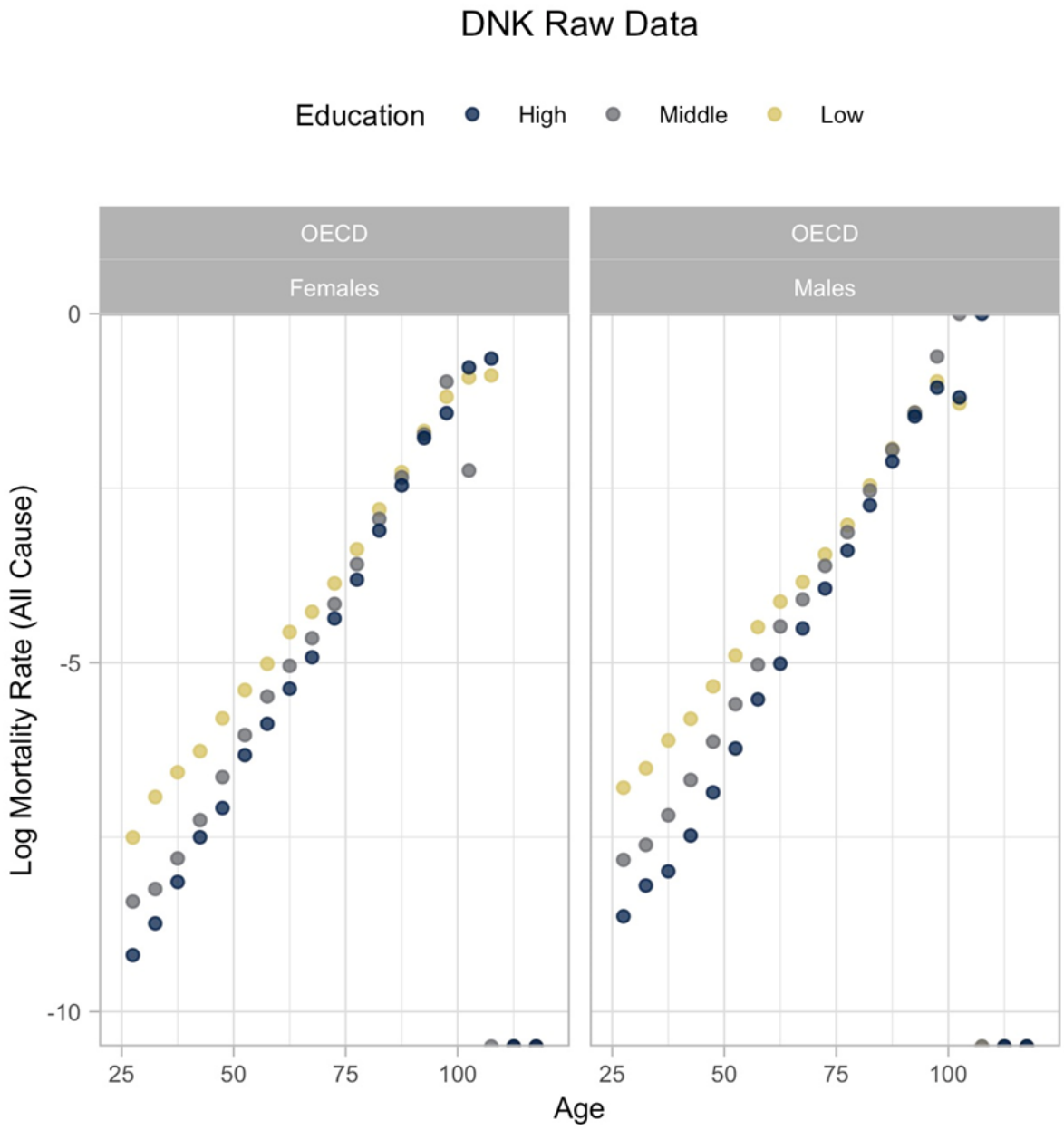
OECD, Organisation for Economic Co-operation and Development; UN, United Nations.
Countries are reported in International Organization for Standardization (ISO) three-letter codes.
Missing education data are assigned proportially to the education distribution of the observed data.

Figure B.5. Observed mortality rates for the Czech Republic



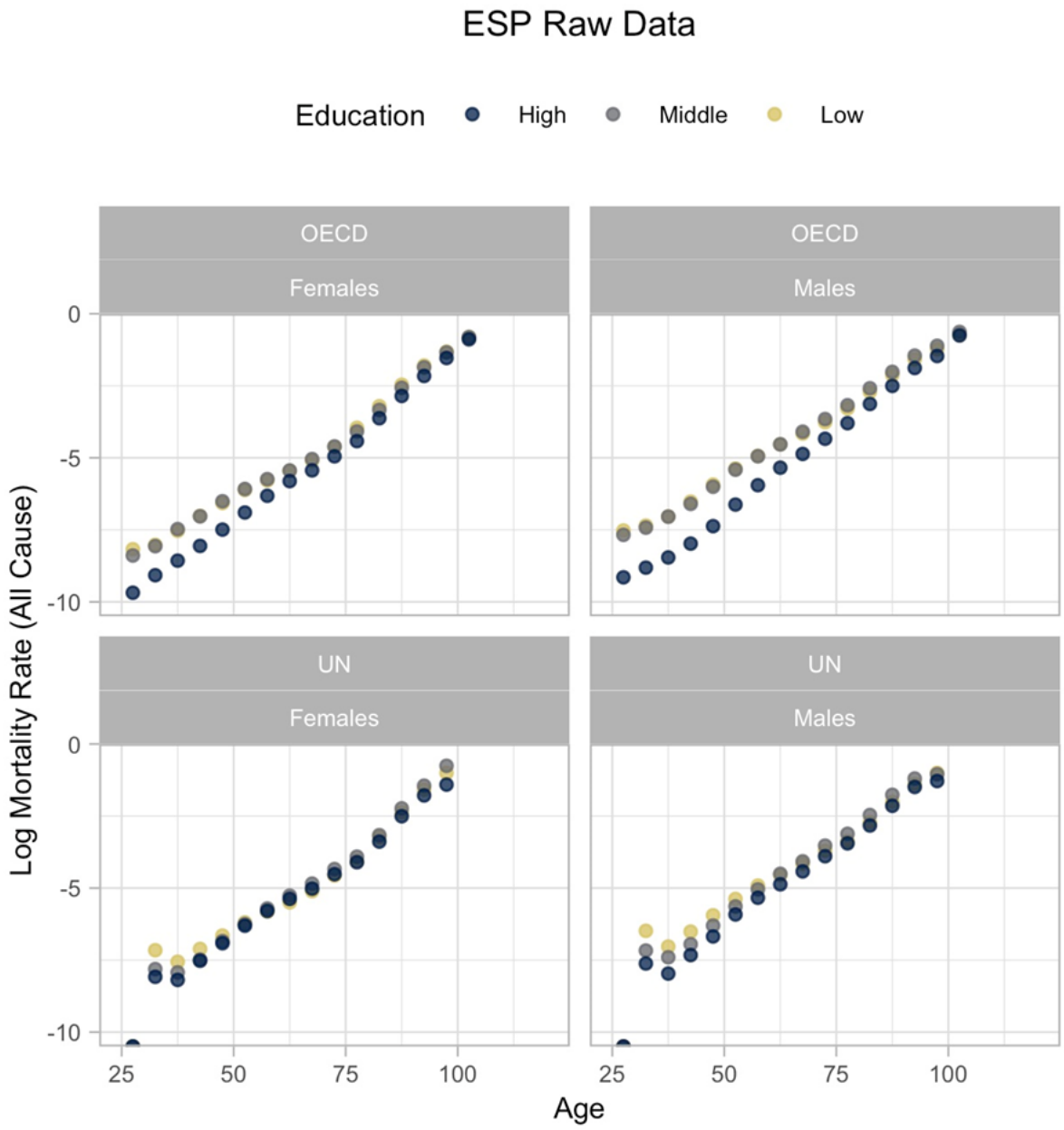
OECD, Organisation for Economic Co-operation and Development; UN, United Nations.
Countries are reported in International Organization for Standardization (ISO) three-letter codes.
Missing education data are assigned proportially to the education distribution of the observed data.

Figure B.6. Observed mortality rates for Denmark



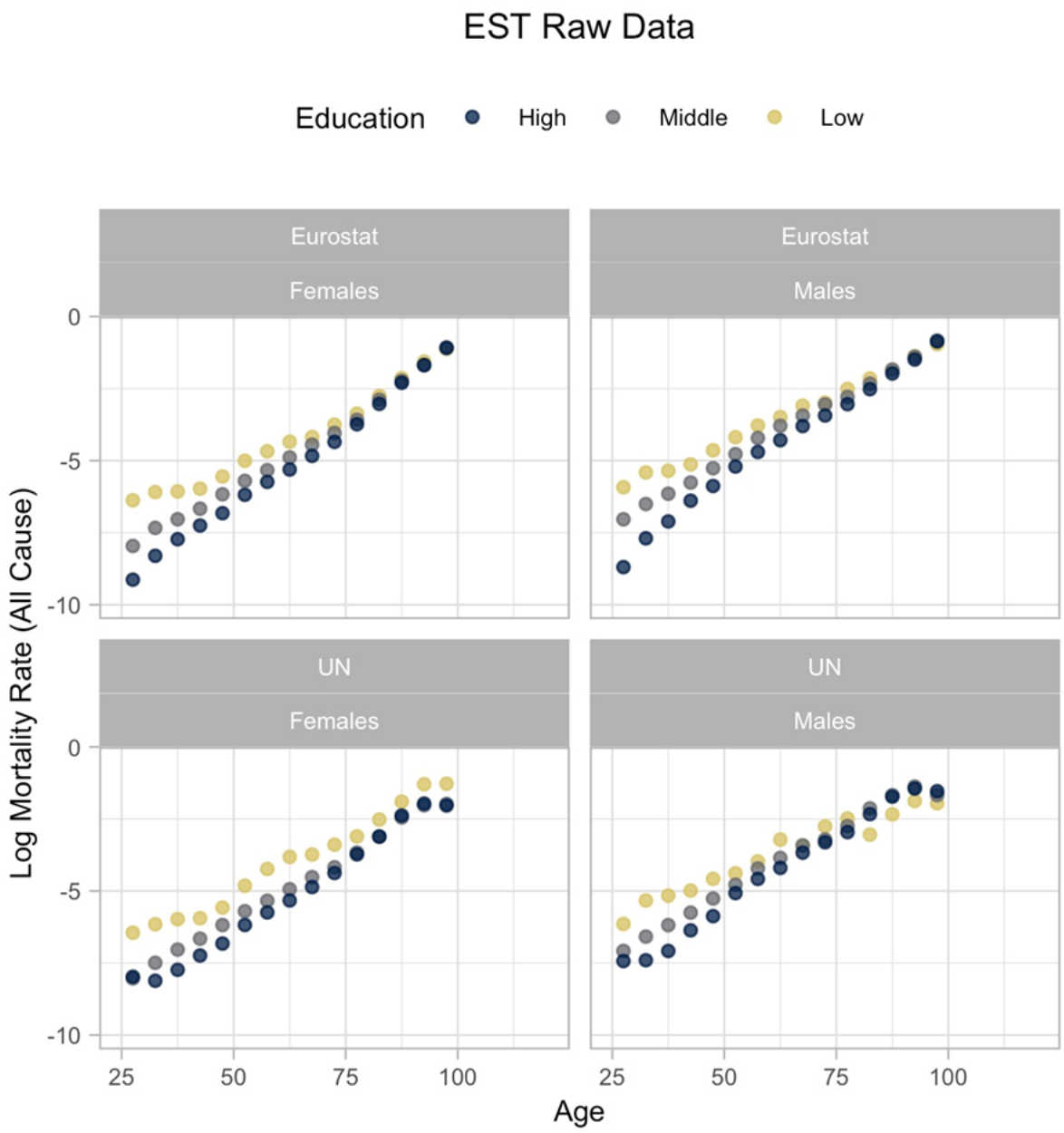
OECD, Organisation for Economic Co-operation and Development; UN, United Nations.
Countries are reported in International Organization for Standardization (ISO) three-letter codes.
Missing education data are assigned proportially to the education distribution of the observed data.

Figure B.7. Observed mortality rates for Spain



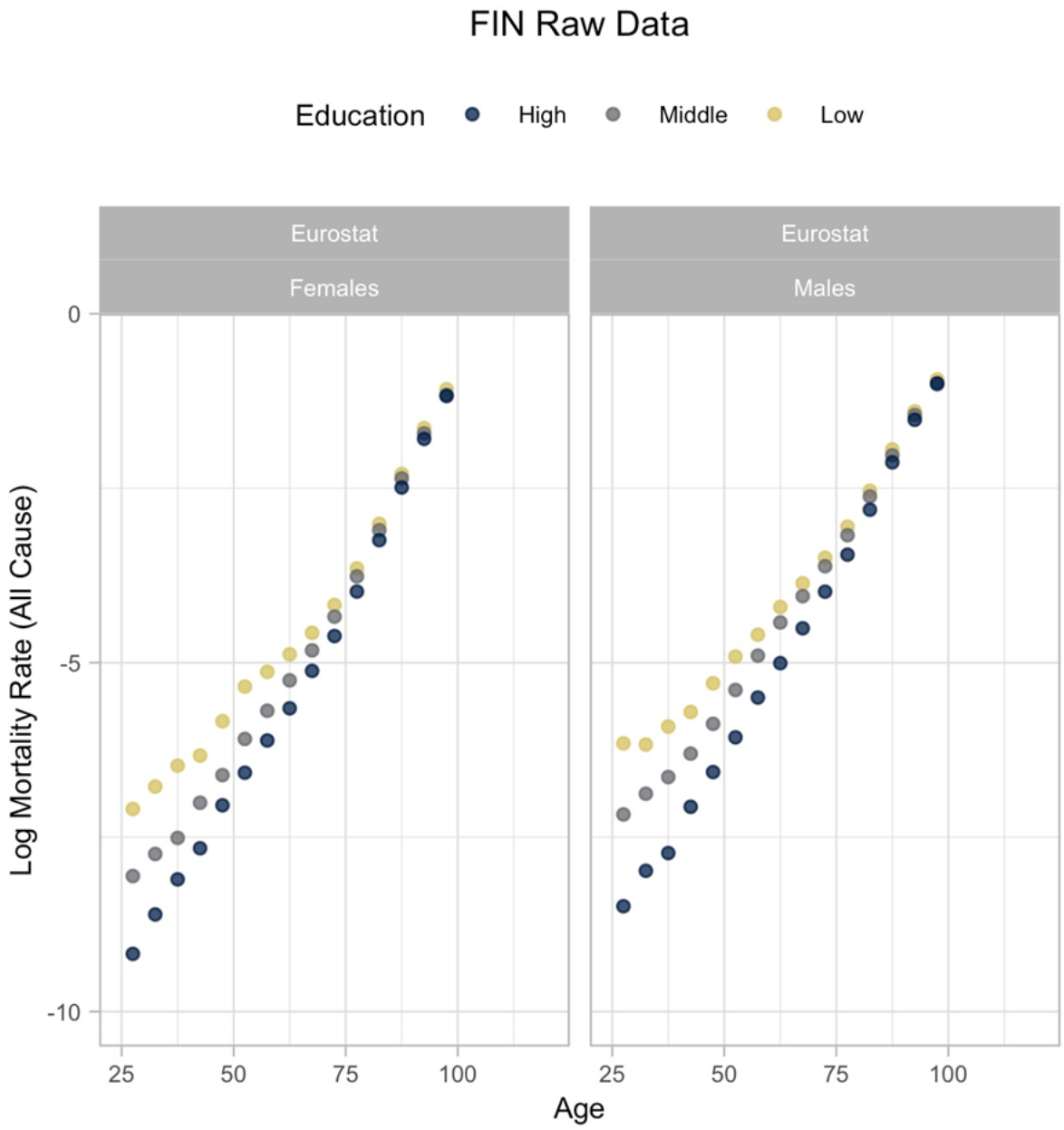
OECD, Organisation for Economic Co-operation and Development; UN, United Nations.
Countries are reported in International Organization for Standardization (ISO) three-letter codes.
Missing education data are assigned proportially to the education distribution of the observed data.

Figure B.8. Observed mortality rates for Estonia



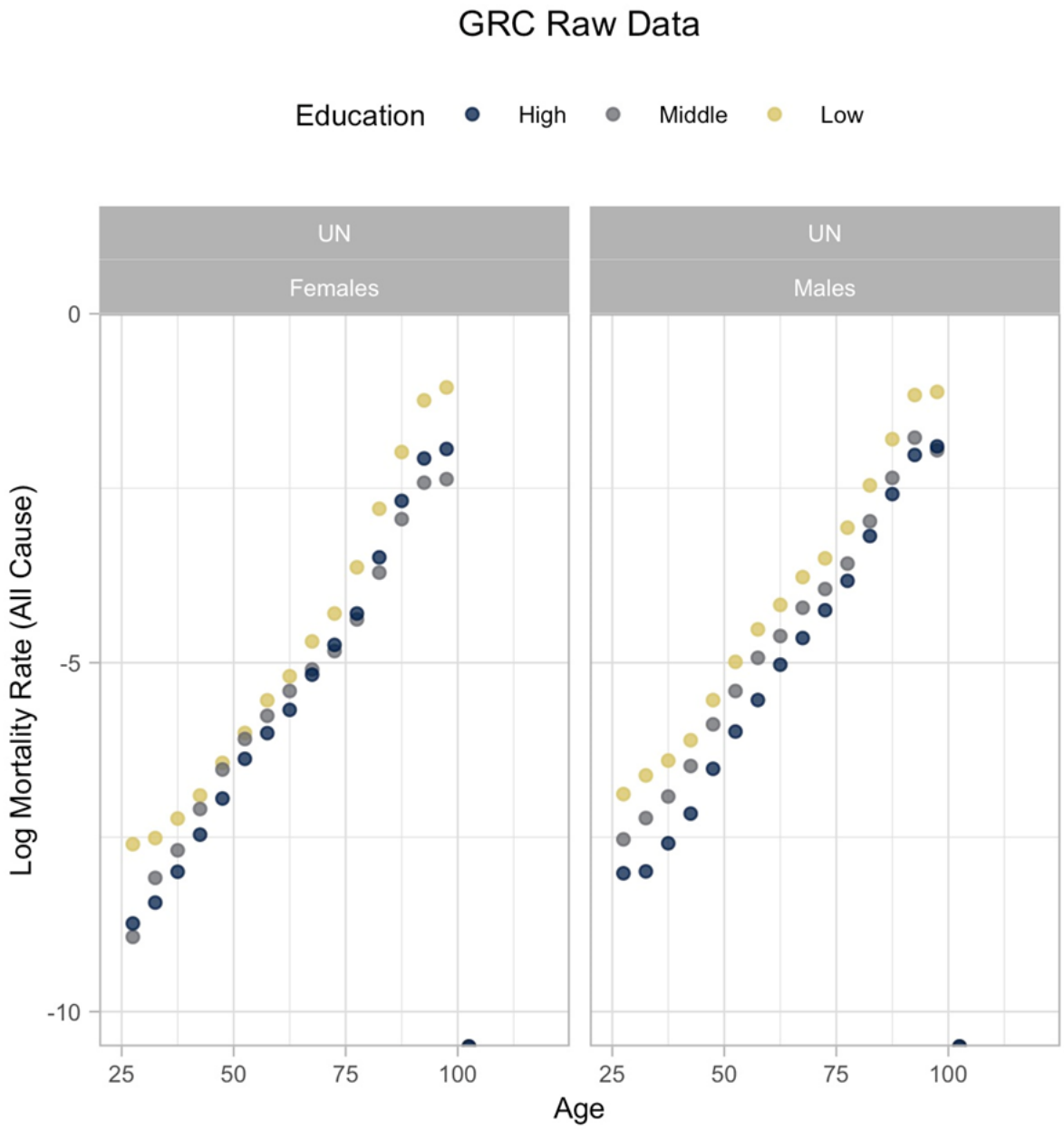
OECD, Organisation for Economic Co-operation and Development; UN, United Nations.
Countries are reported in International Organization for Standardization (ISO) three-letter codes.
Missing education data are assigned proportially to the education distribution of the observed data.

Figure B.9. Observed mortality rates for Finland



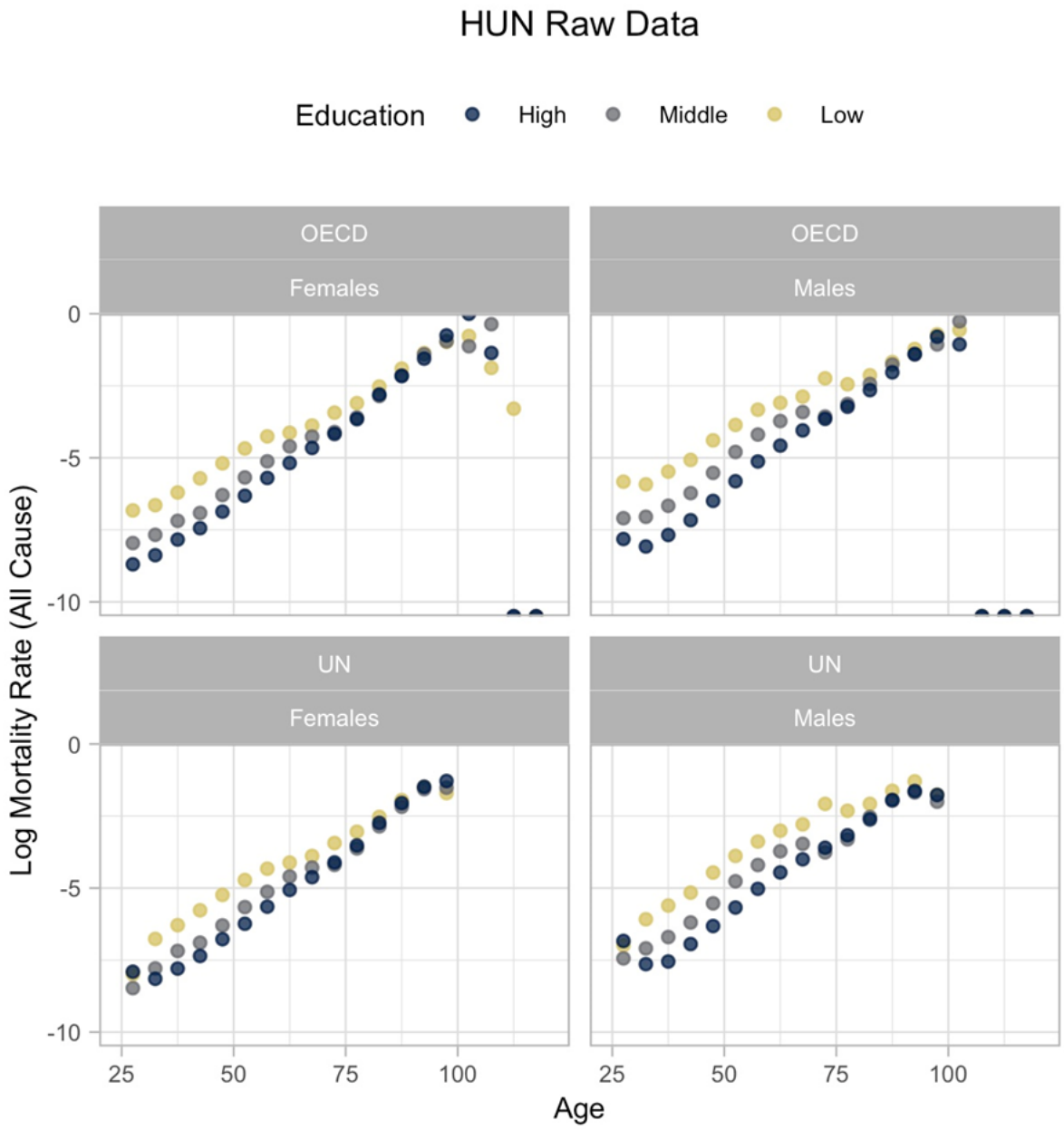
OECD, Organisation for Economic Co-operation and Development; UN, United Nations.
Countries are reported in International Organization for Standardization (ISO) three-letter codes.
Missing education data are assigned proportially to the education distribution of the observed data.

Figure B.10. Observed mortality rates for Greece



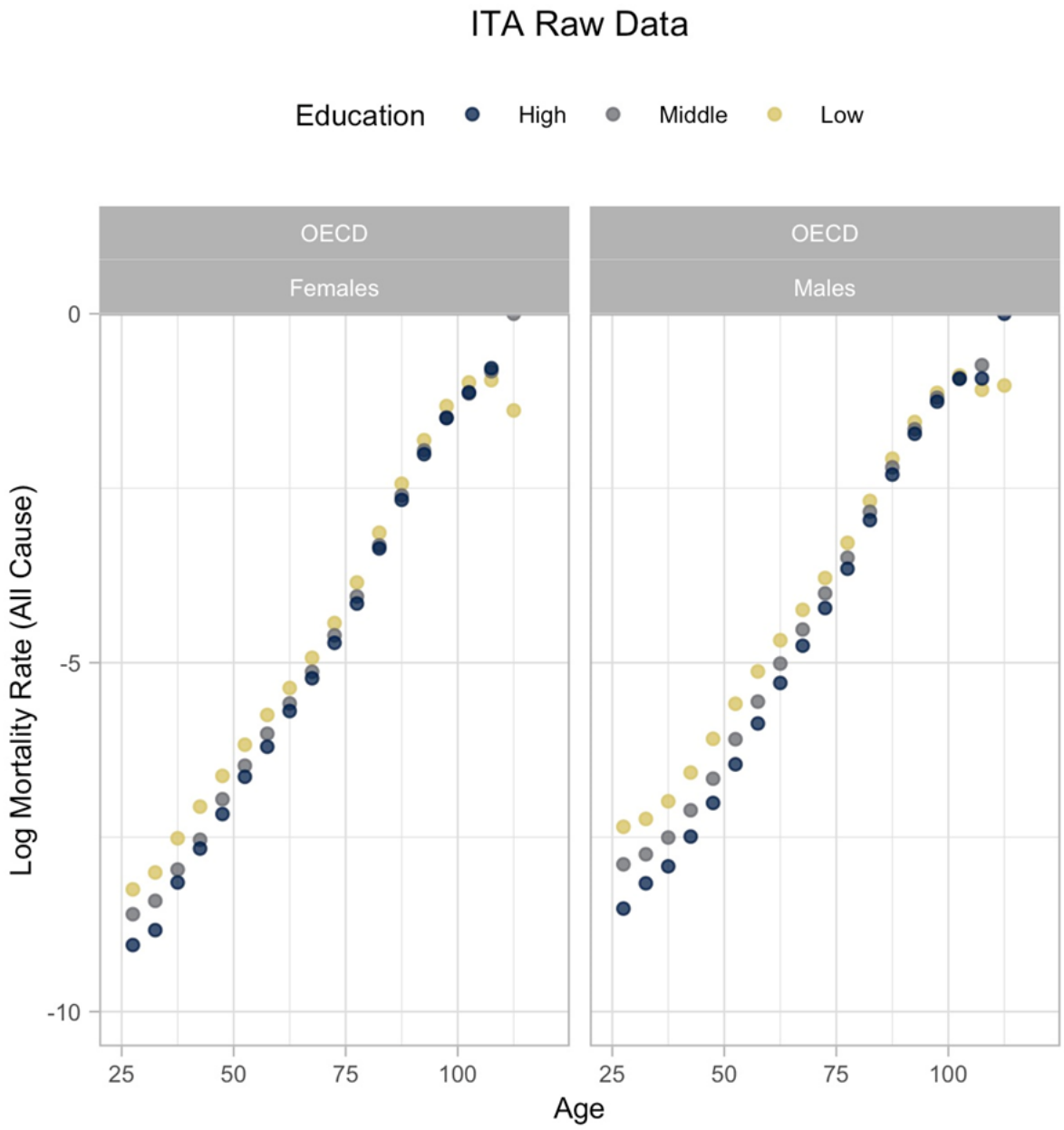
OECD, Organisation for Economic Co-operation and Development; UN, United Nations.
Countries are reported in International Organization for Standardization (ISO) three-letter codes.
Missing education data are assigned proportially to the education distribution of the observed data.

Figure B.11. Observed mortality rates for Hungary



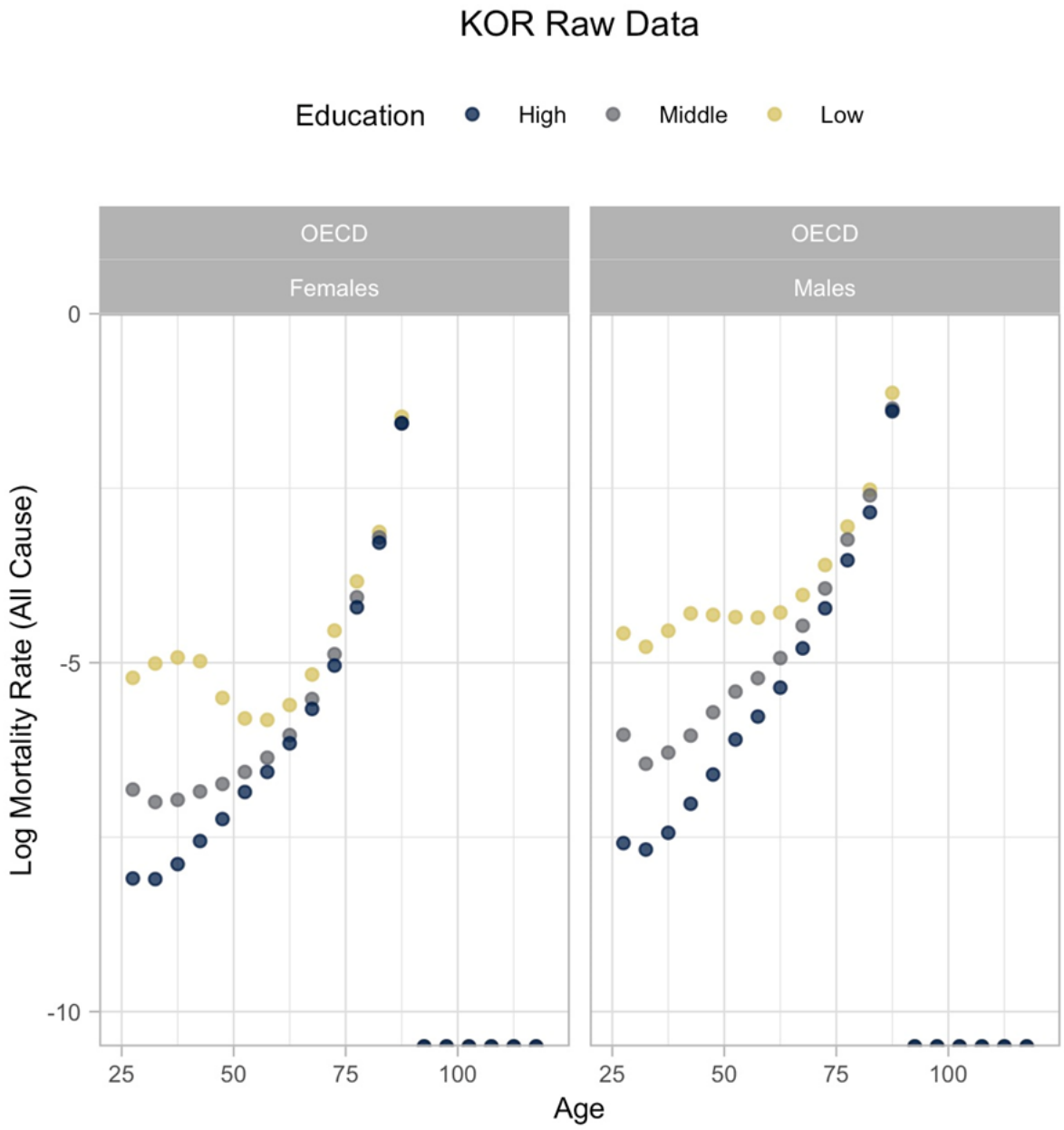
OECD, Organisation for Economic Co-operation and Development; UN, United Nations.
Countries are reported in International Organization for Standardization (ISO) three-letter codes.
Missing education data are assigned proportially to the education distribution of the observed data.

Figure B.12. Observed mortality rates for Italy



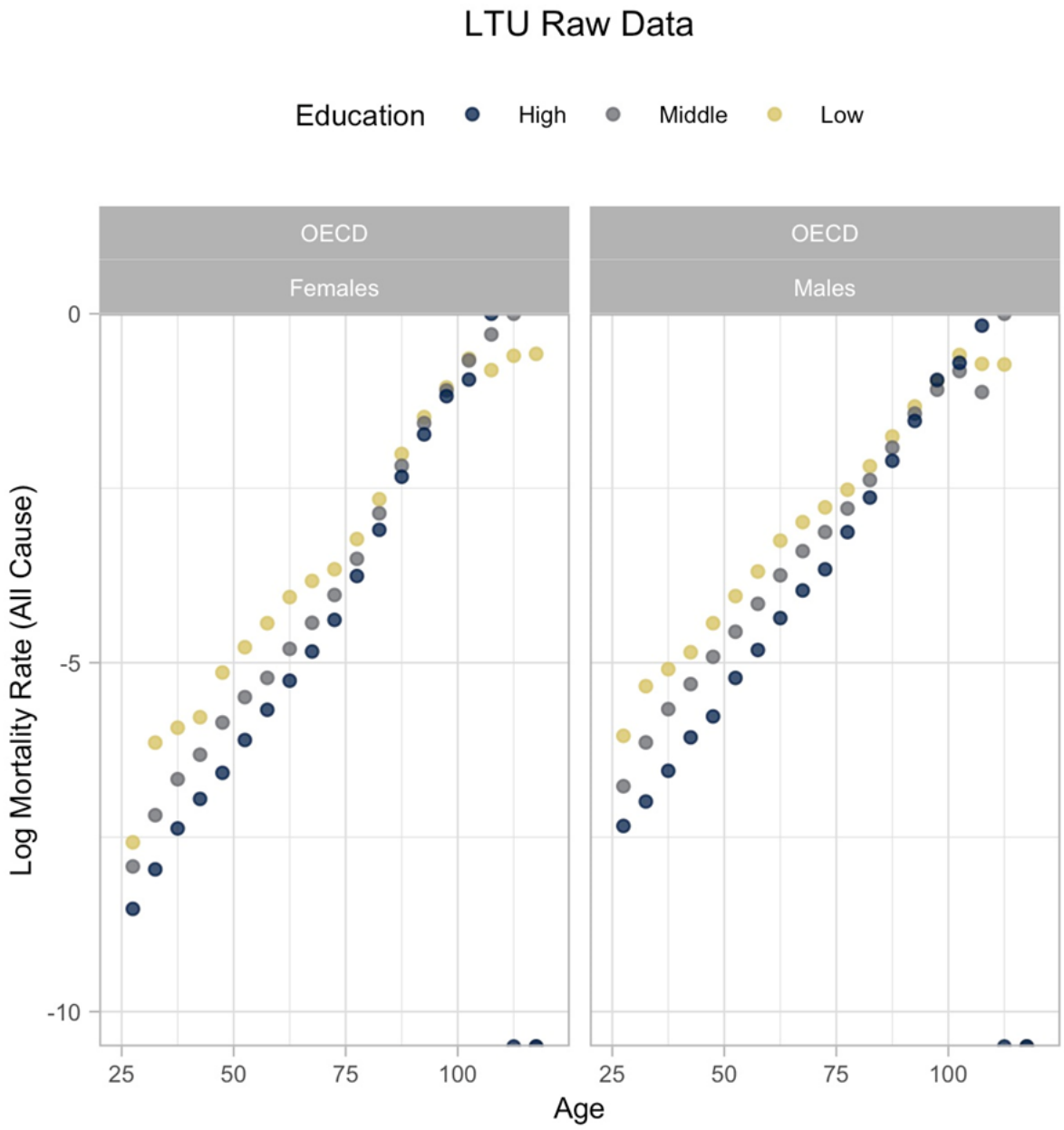
OECD, Organisation for Economic Co-operation and Development; UN, United Nations.
Countries are reported in International Organization for Standardization (ISO) three-letter codes.
Missing education data are assigned proportially to the education distribution of the observed data.

Figure B.13. Observed mortality rates for South Korea



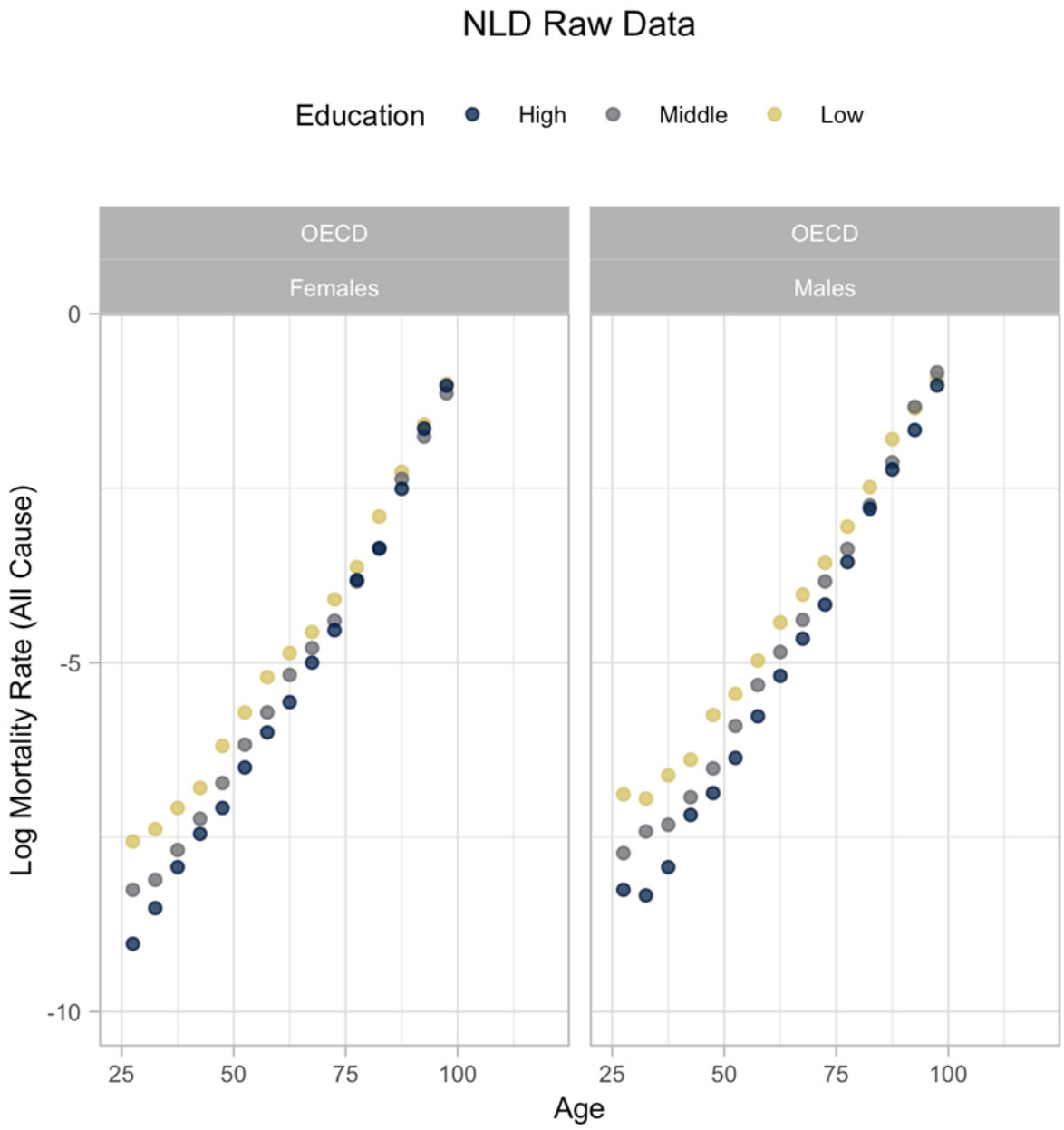
OECD, Organisation for Economic Co-operation and Development; UN, United Nations.
Countries are reported in International Organization for Standardization (ISO) three-letter codes.
Missing education data are assigned proportially to the education distribution of the observed data.

Figure B.14. Observed mortality rates for Lithuania



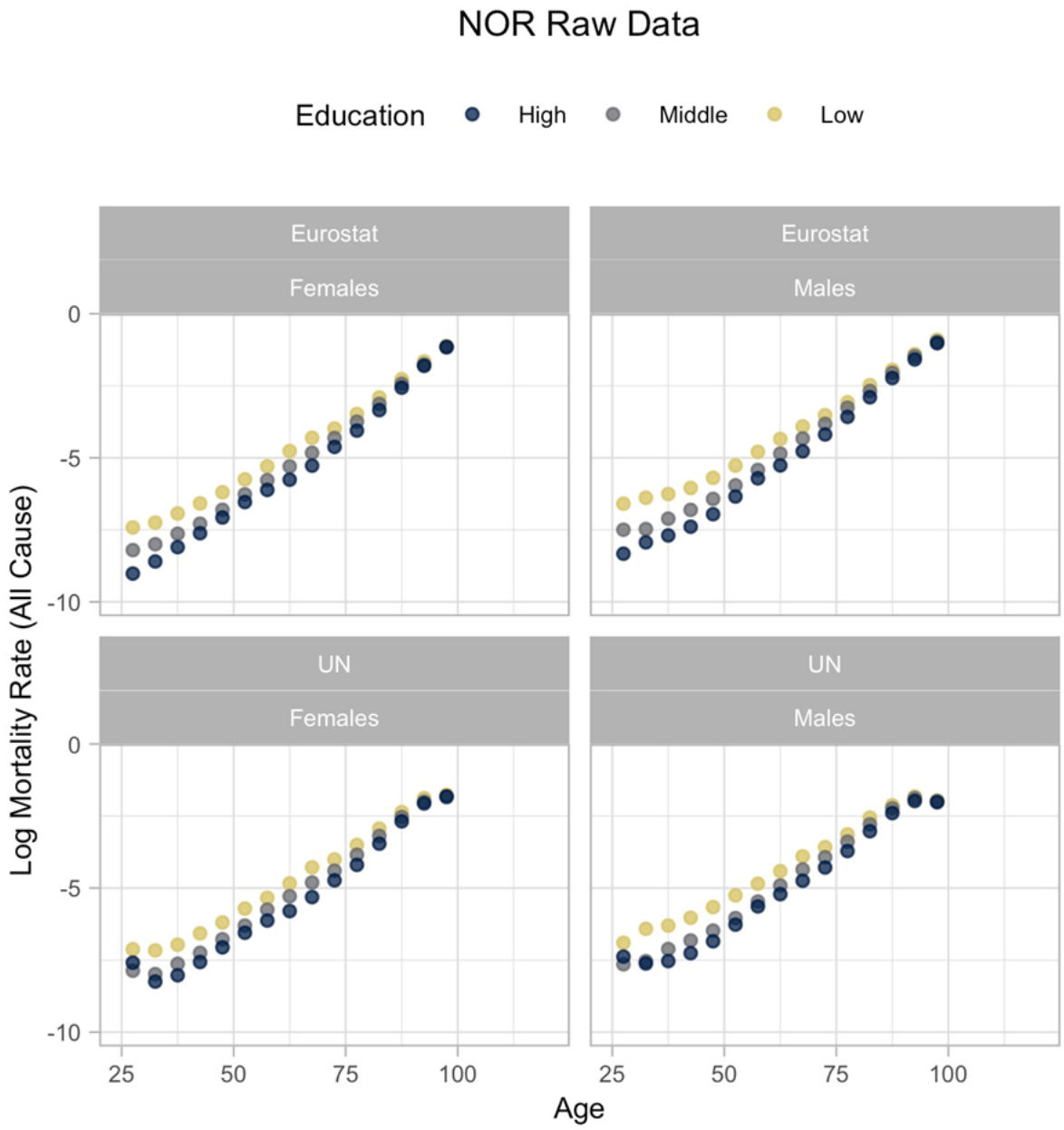
OECD, Organisation for Economic Co-operation and Development; UN, United Nations.
Countries are reported in International Organization for Standardization (ISO) three-letter codes.
Missing education data are assigned proportially to the education distribution of the observed data.

Figure B.15. Observed mortality rates for the Netherlands



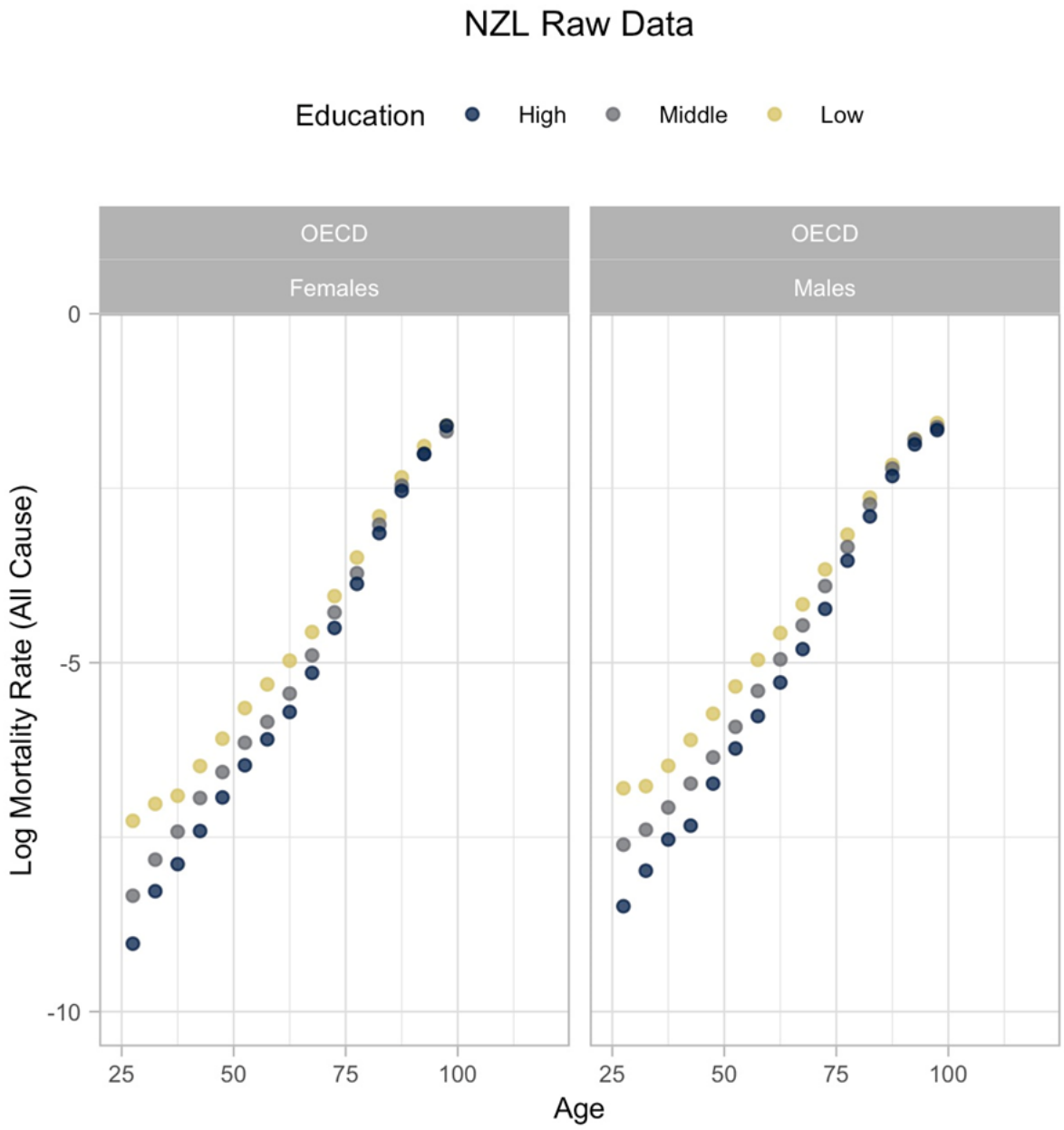
OECD, Organisation for Economic Co-operation and Development; UN, United Nations.
Countries are reported in International Organization for Standardization (ISO) three-letter codes.
Missing education data are assigned proportially to the education distribution of the observed data.

Figure B.16. Observed mortality rates for Norway



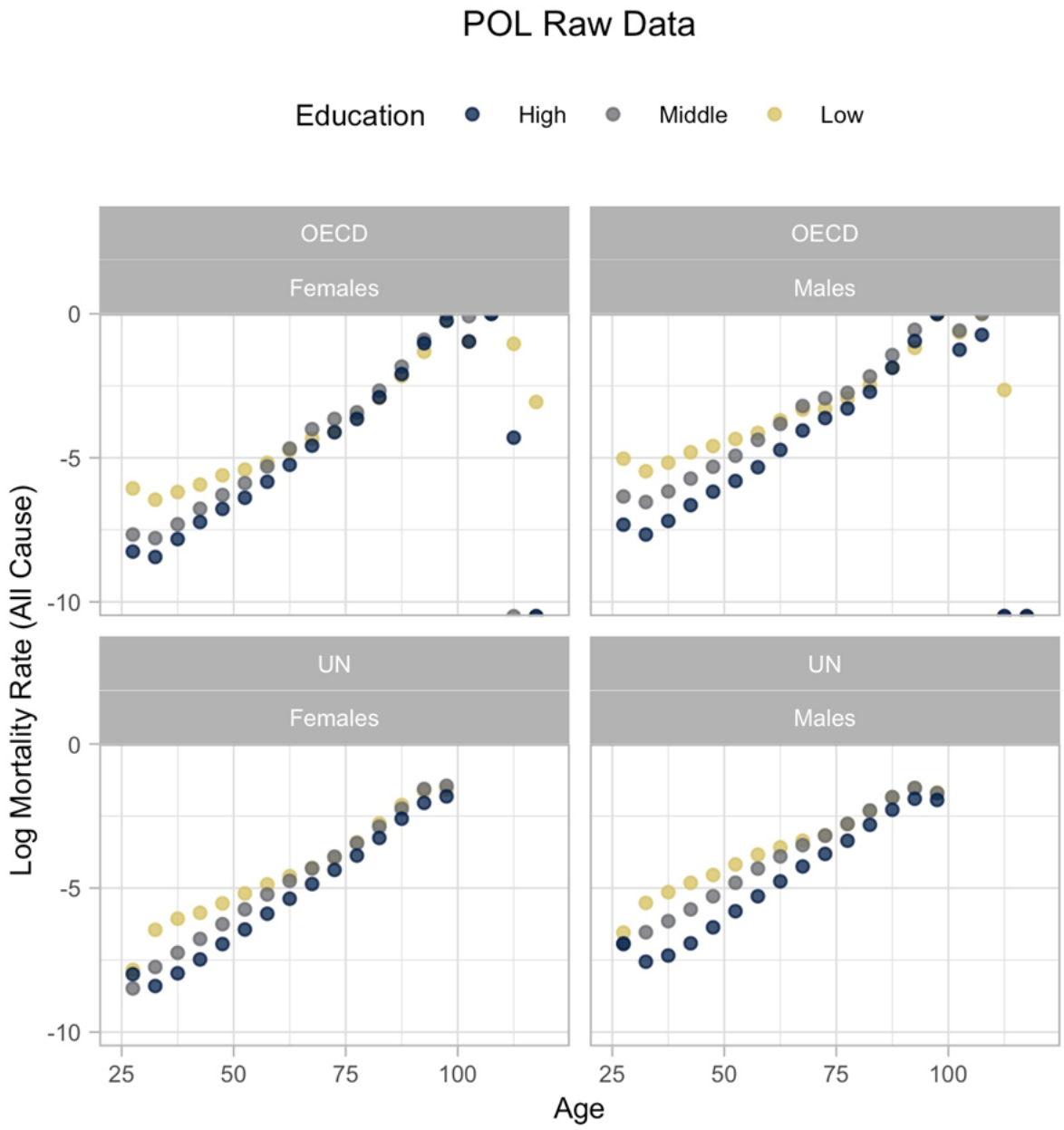
OECD, Organisation for Economic Co-operation and Development; UN, United Nations.
Countries are reported in International Organization for Standardization (ISO) three-letter codes.
Missing education data are assigned proportially to the education distribution of the observed data.

Figure B.17. Observed mortality rates for New Zealand



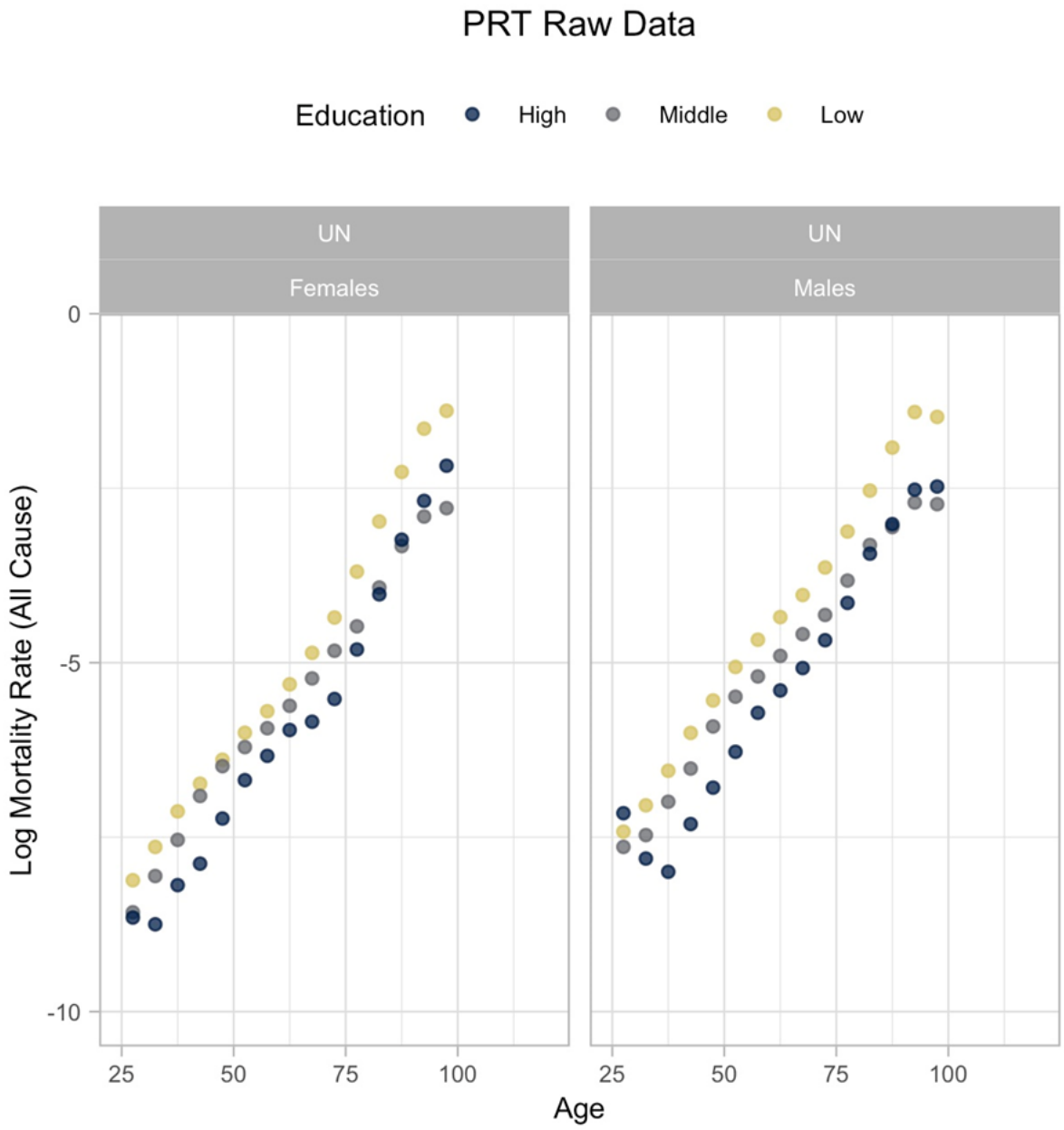
OECD, Organisation for Economic Co-operation and Development; UN, United Nations.
Countries are reported in International Organization for Standardization (ISO) three-letter codes.
Missing education data are assigned proportially to the education distribution of the observed data.

Figure B.18. Observed mortality rates for Poland



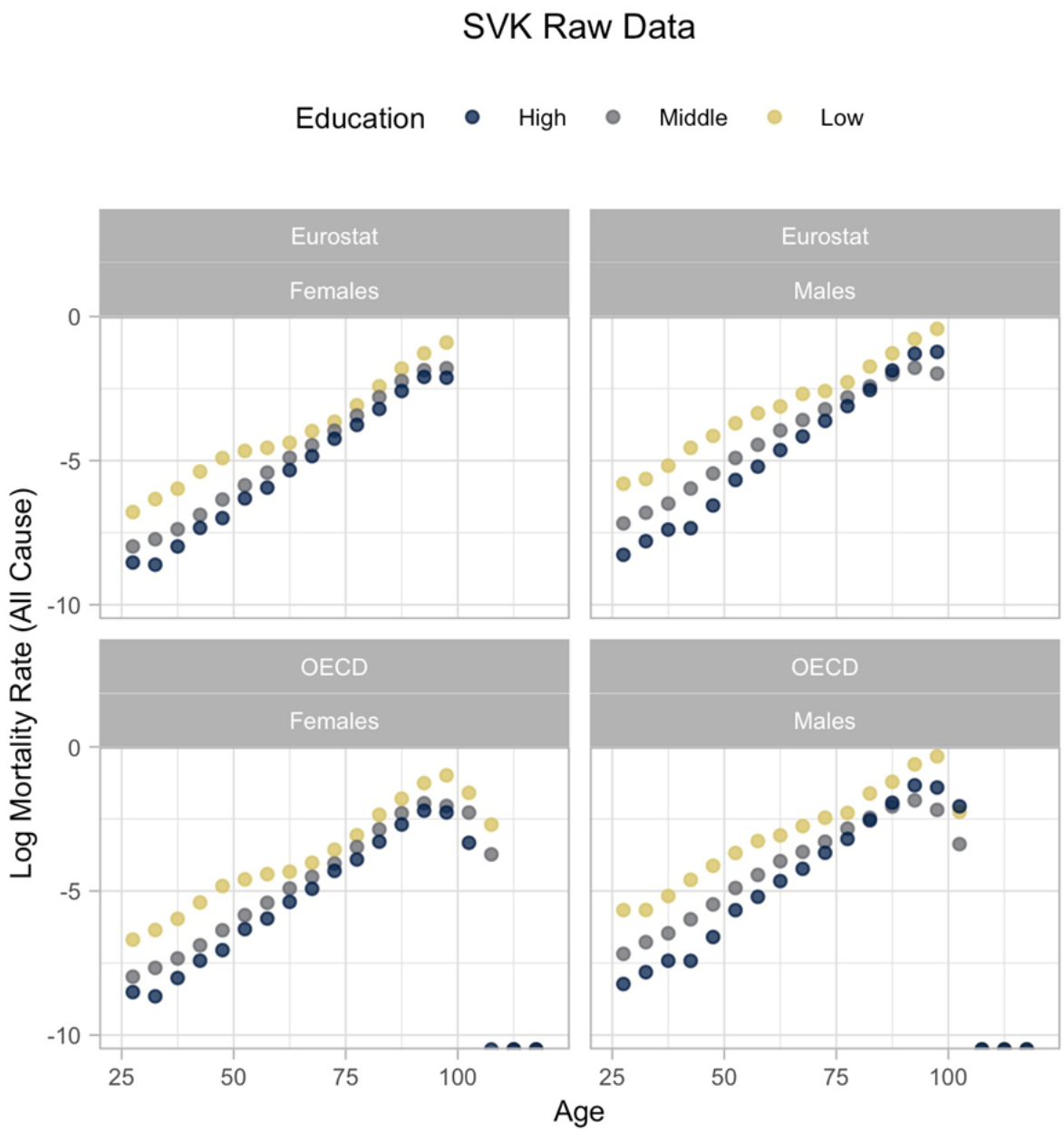
OECD, Organisation for Economic Co-operation and Development; UN, United Nations.
Countries are reported in International Organization for Standardization (ISO) three-letter codes.
Missing education data are assigned proportially to the education distribution of the observed data.

Figure B.19. Observed mortality rates for Portugal



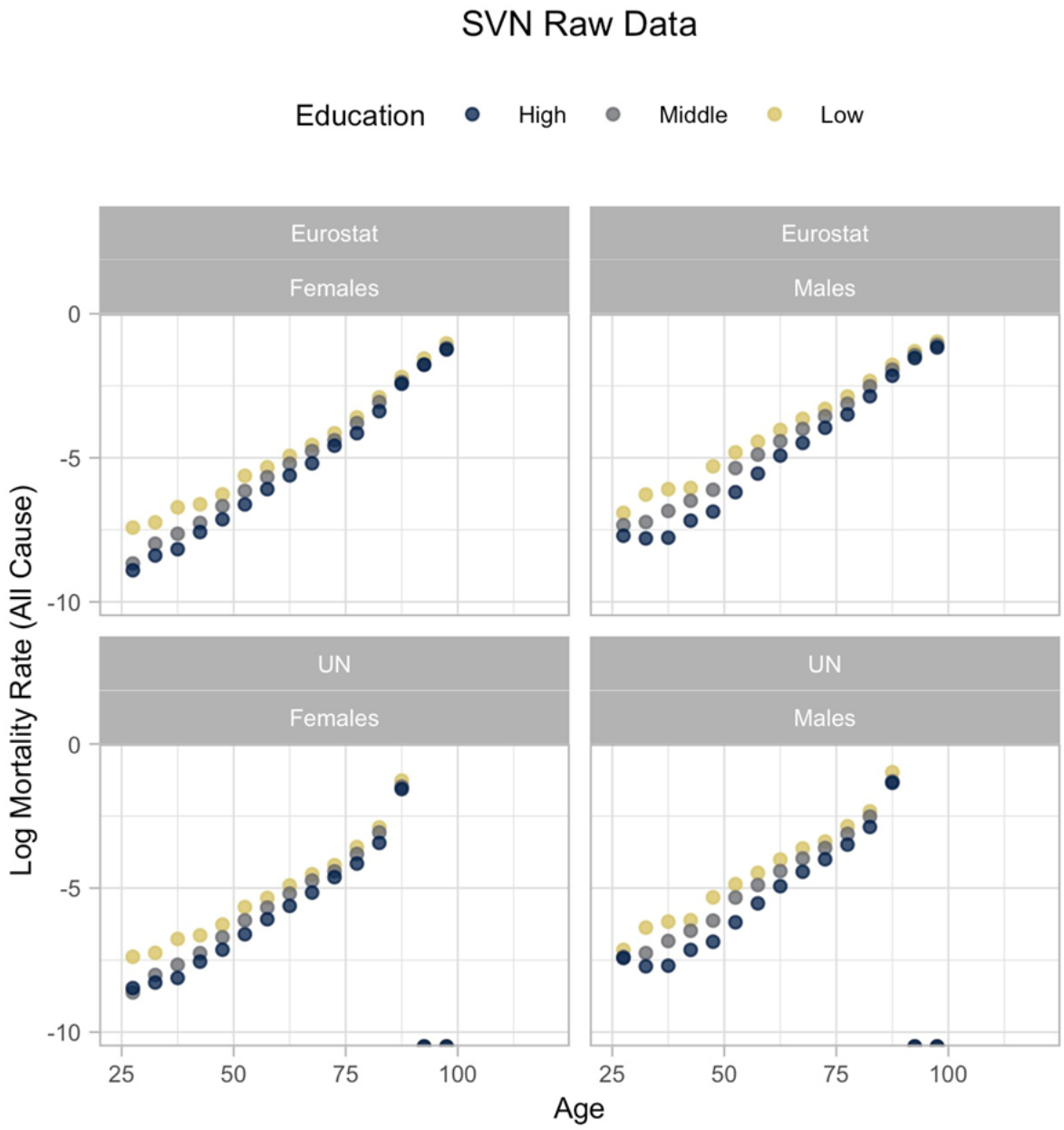
OECD, Organisation for Economic Co-operation and Development; UN, United Nations.
Countries are reported in International Organization for Standardization (ISO) three-letter codes.
Missing education data are assigned proportially to the education distribution of the observed data.

Figure B.20. Observed mortality rates for the Slovak Republic



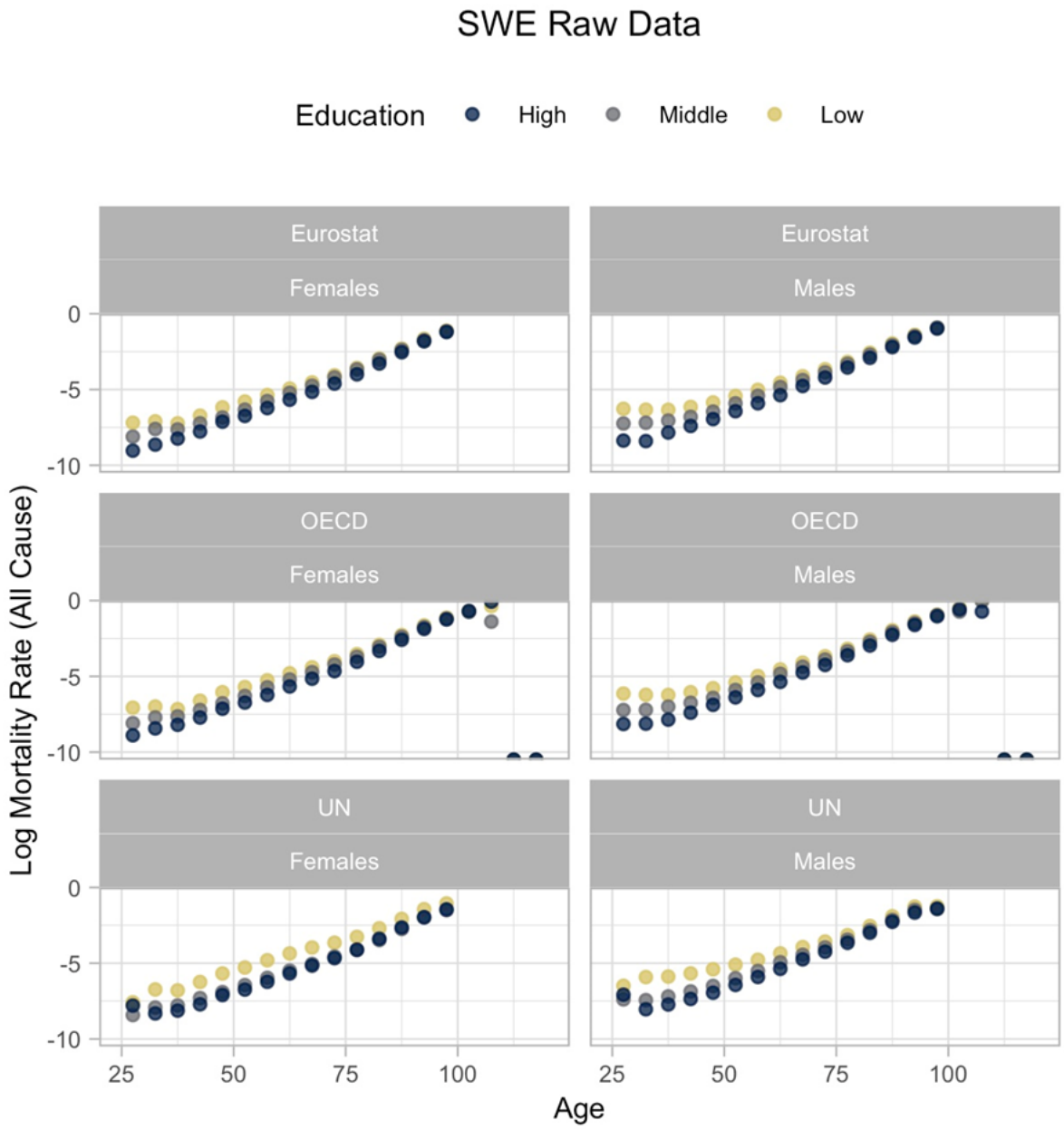
OECD, Organisation for Economic Co-operation and Development; UN, United Nations.
Countries are reported in International Organization for Standardization (ISO) three-letter codes.
Missing education data are assigned proportially to the education distribution of the observed data.

Figure B.21. Observed mortality rates for Slovenia



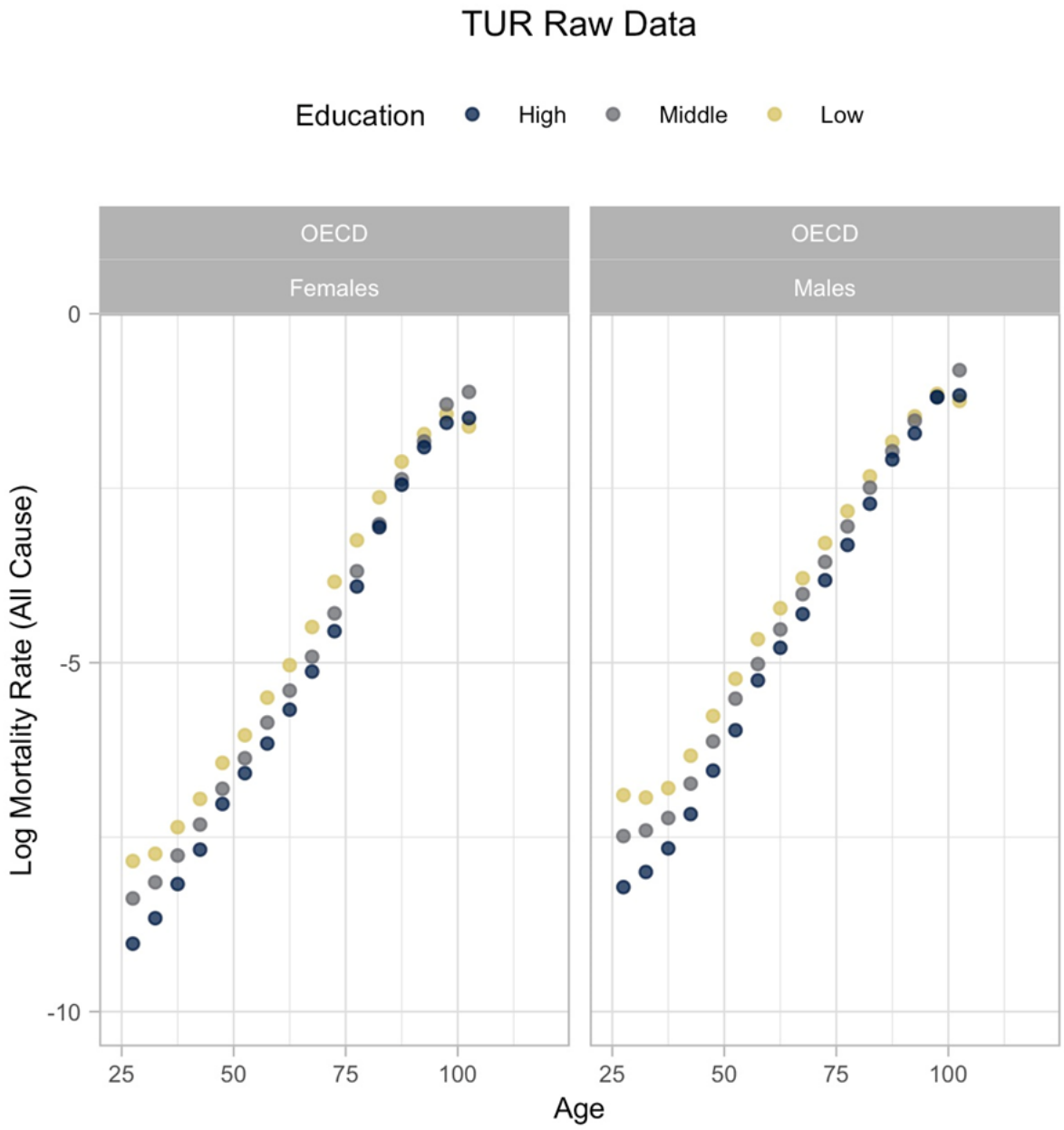
OECD, Organisation for Economic Co-operation and Development; UN, United Nations.
Countries are reported in International Organization for Standardization (ISO) three-letter codes.
Missing education data are assigned proportially to the education distribution of the observed data.

Figure B.22. Observed mortality rates for Sweden



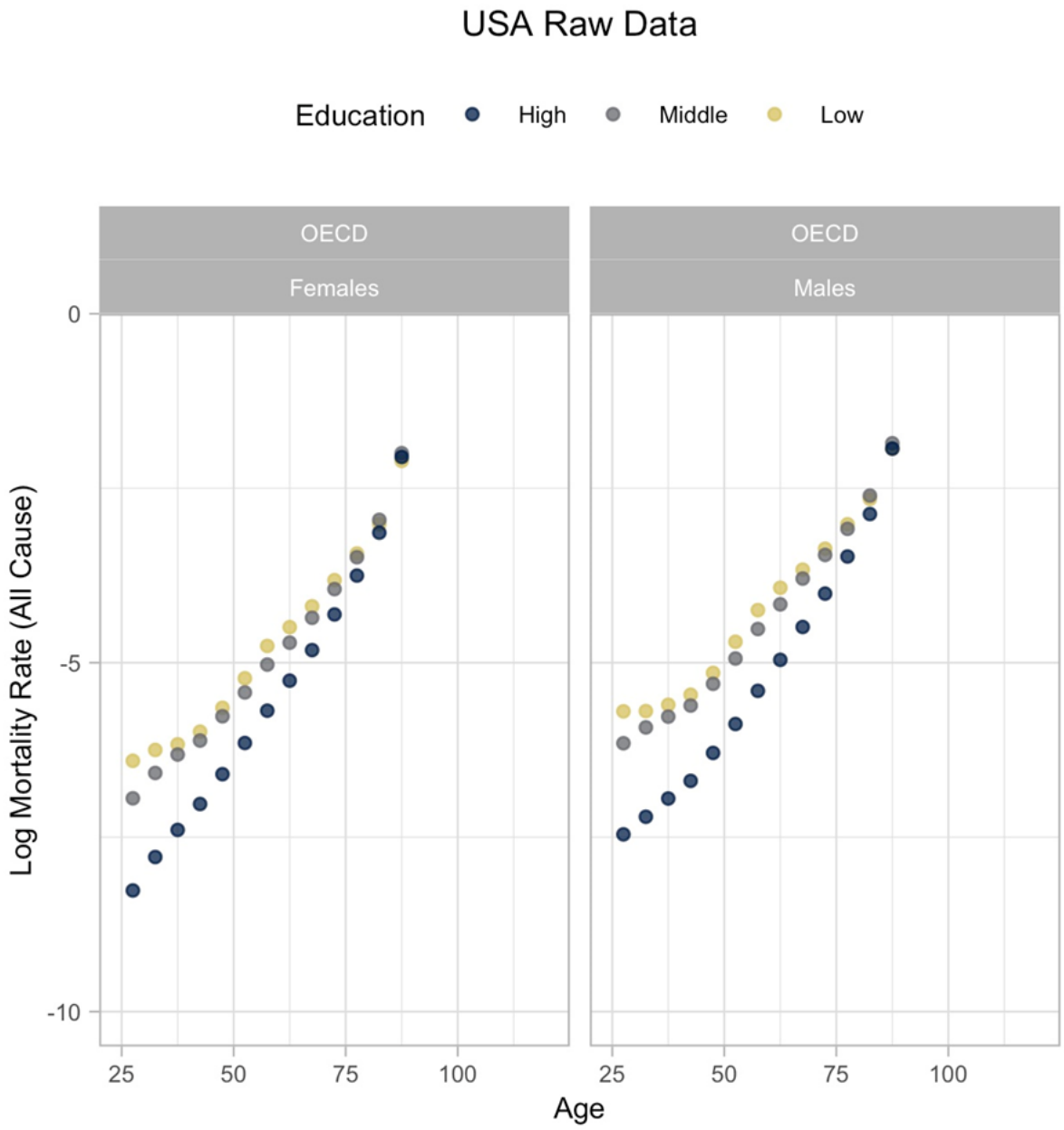
OECD, Organisation for Economic Co-operation and Development; UN, United Nations.
Countries are reported in International Organization for Standardization (ISO) three-letter codes.
Missing education data are assigned proportially to the education distribution of the observed data.

Figure B.23. Observed mortality rates for Türkiye



OECD, Organisation for Economic Co-operation and Development; UN, United Nations.
Countries are reported in International Organization for Standardization (ISO) three-letter codes.
Missing education data are assigned proportially to the education distribution of the observed data.

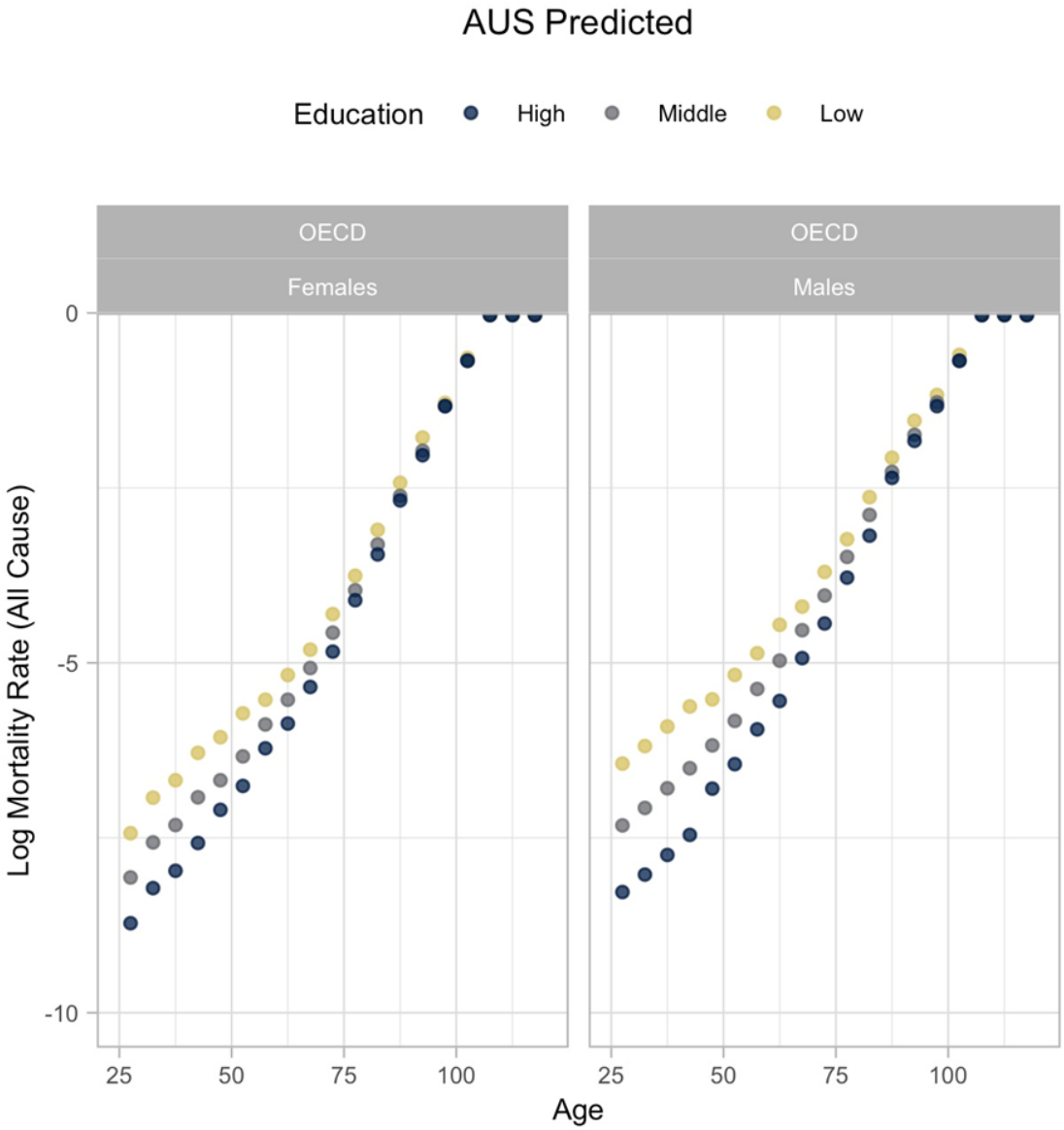
Figure B.24. Observed mortality rates for the United States



OECD, Organisation for Economic Co-operation and Development; UN, United Nations.
Countries are reported in International Organization for Standardization (ISO) three-letter codes.
Missing education data are assigned proportially to the education distribution of the observed data.

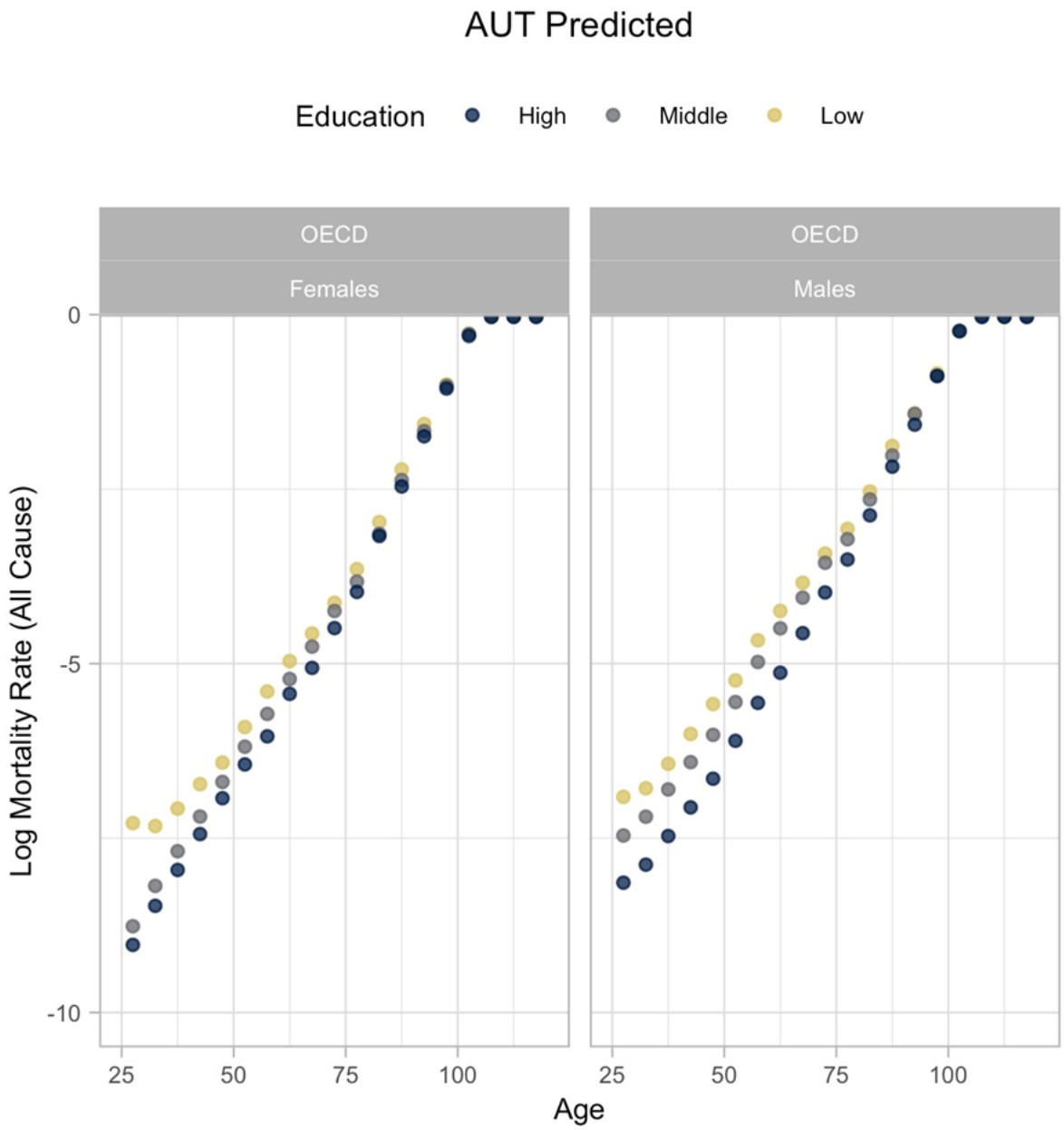
Annex C. Predicted mortality rates by country, source, age, sex, and education

Figure C.1. Predicted mortality rates for Australia



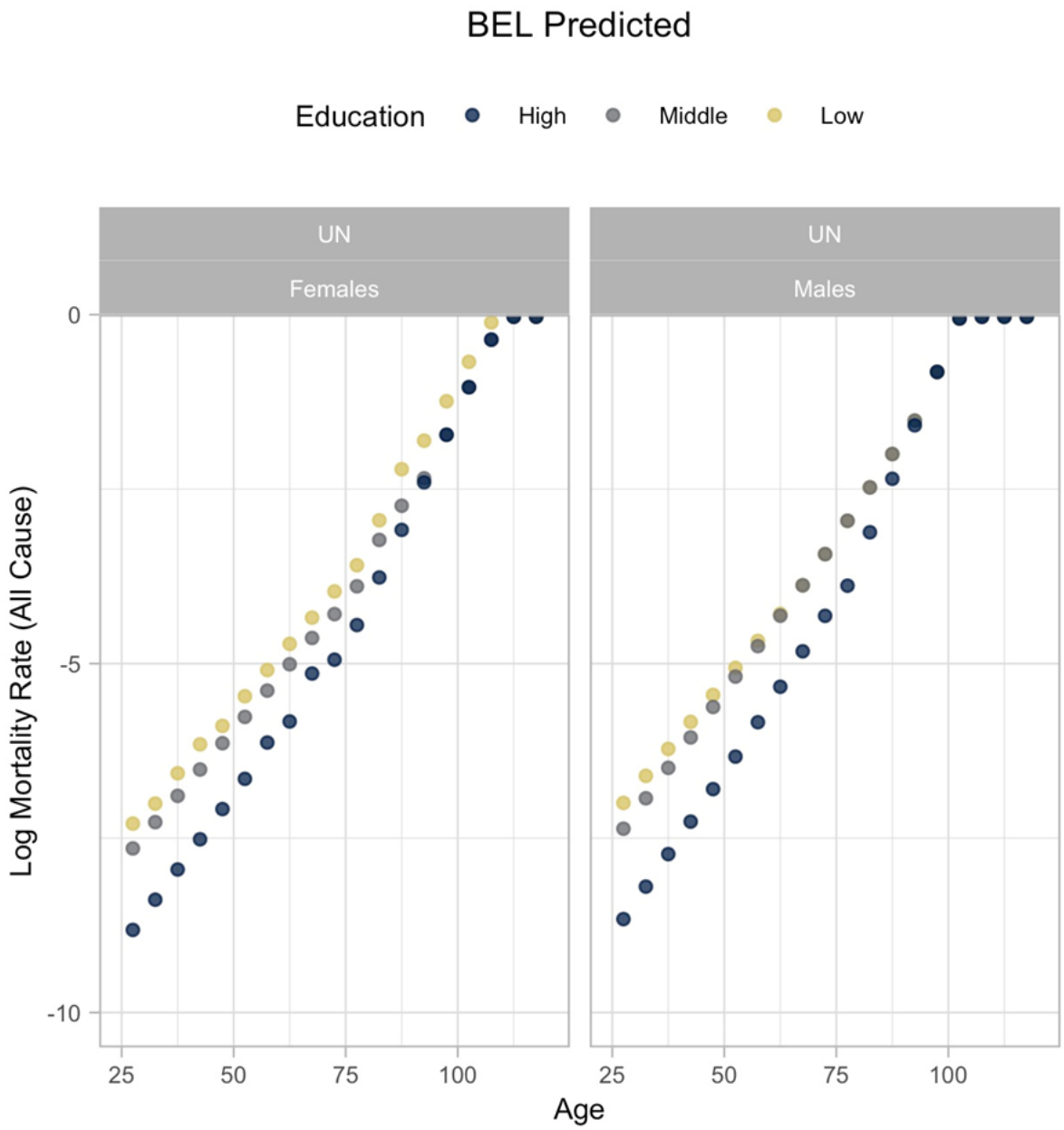
OECD, Organisation for Economic Co-operation and Development; UN, United Nations.
Countries are reported in International Organization for Standardization (ISO) three-letter codes.
Missing education data are assigned proportially to the education distribution of the observed data.

Figure C.2. Predicted mortality rates for Austria



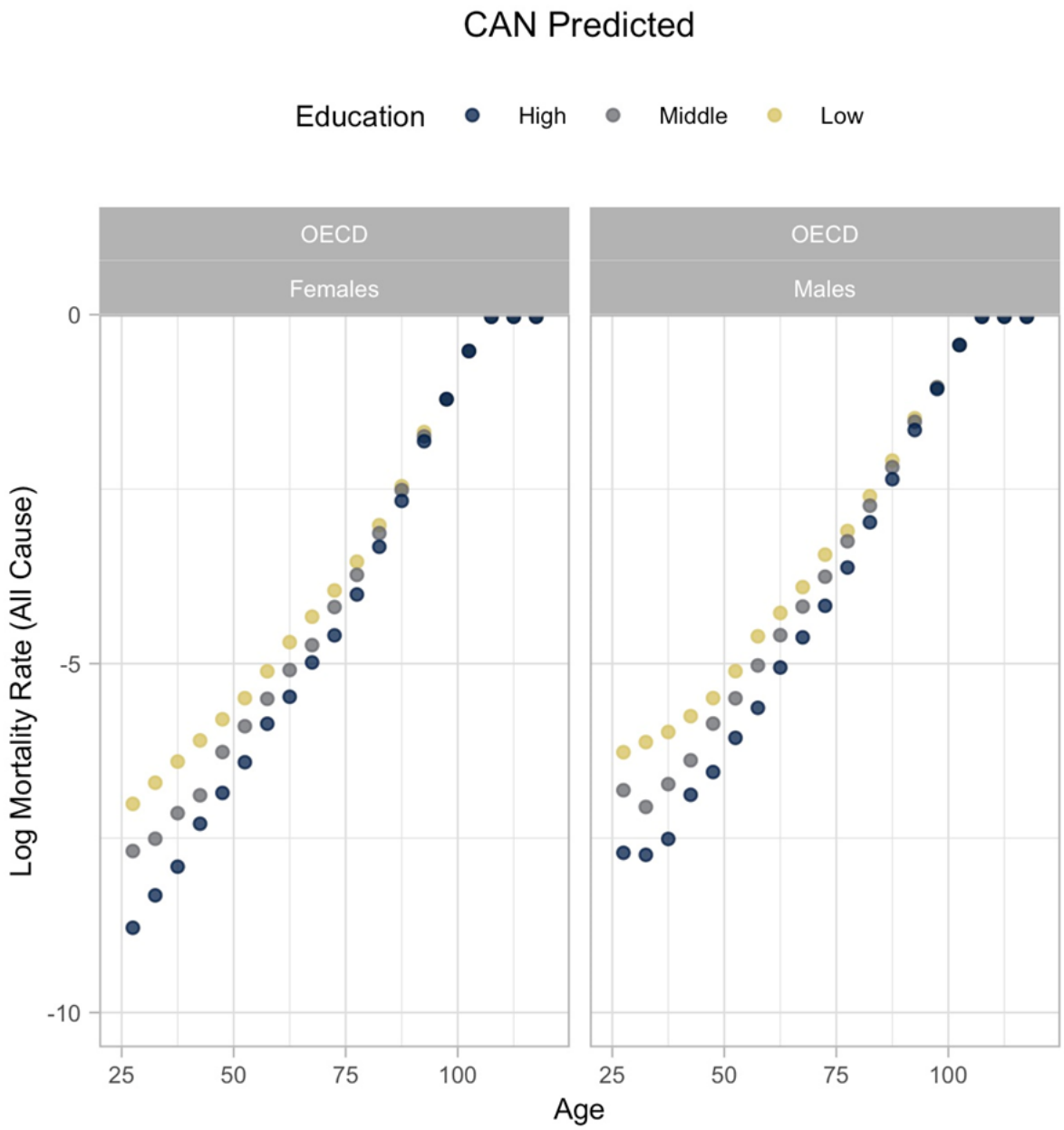
OECD, Organisation for Economic Co-operation and Development; UN, United Nations.
Countries are reported in International Organization for Standardization (ISO) three-letter codes.
Missing education data are assigned proportially to the education distribution of the observed data.

Figure C.3. Predicted mortality rates for Belgium



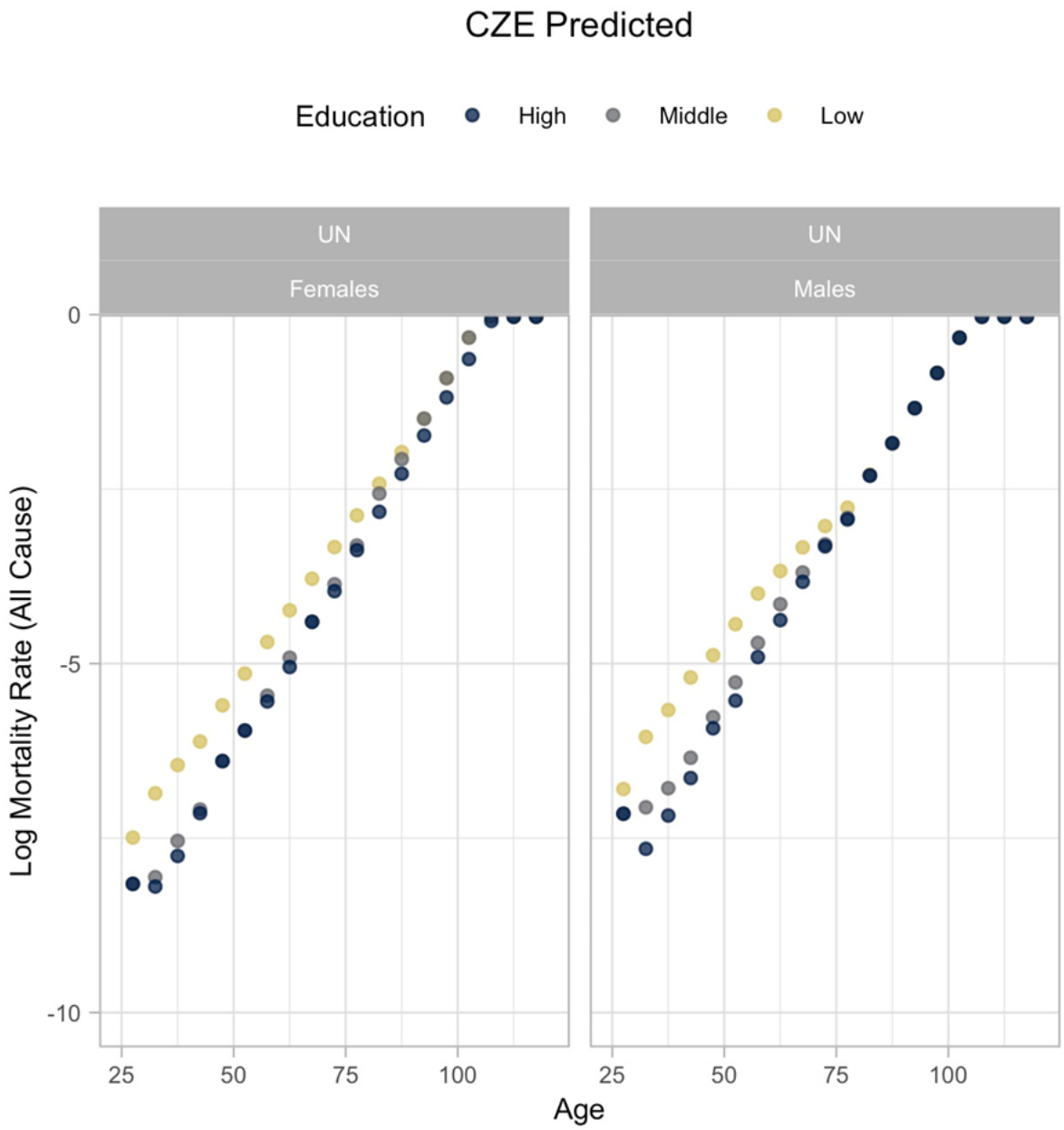
OECD, Organisation for Economic Co-operation and Development; UN, United Nations.
Countries are reported in International Organization for Standardization (ISO) three-letter codes.
Missing education data are assigned proportially to the education distribution of the observed data.

Figure C.4. Predicted mortality rates for Canada



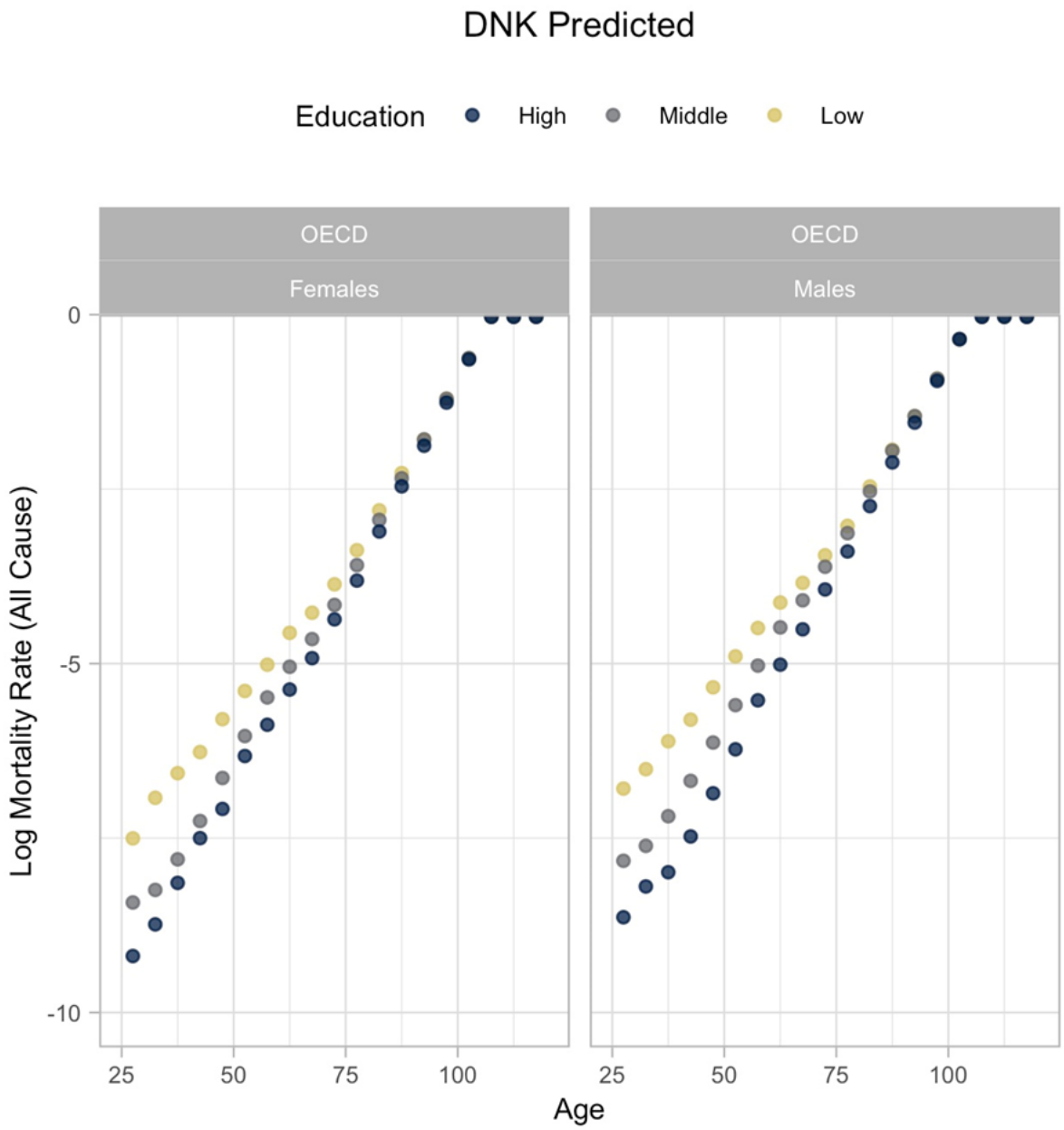
OECD, Organisation for Economic Co-operation and Development; UN, United Nations.
Countries are reported in International Organization for Standardization (ISO) three-letter codes.
Missing education data are assigned proportially to the education distribution of the observed data.

Figure C.5. Predicted mortality rates for the Czech Republic



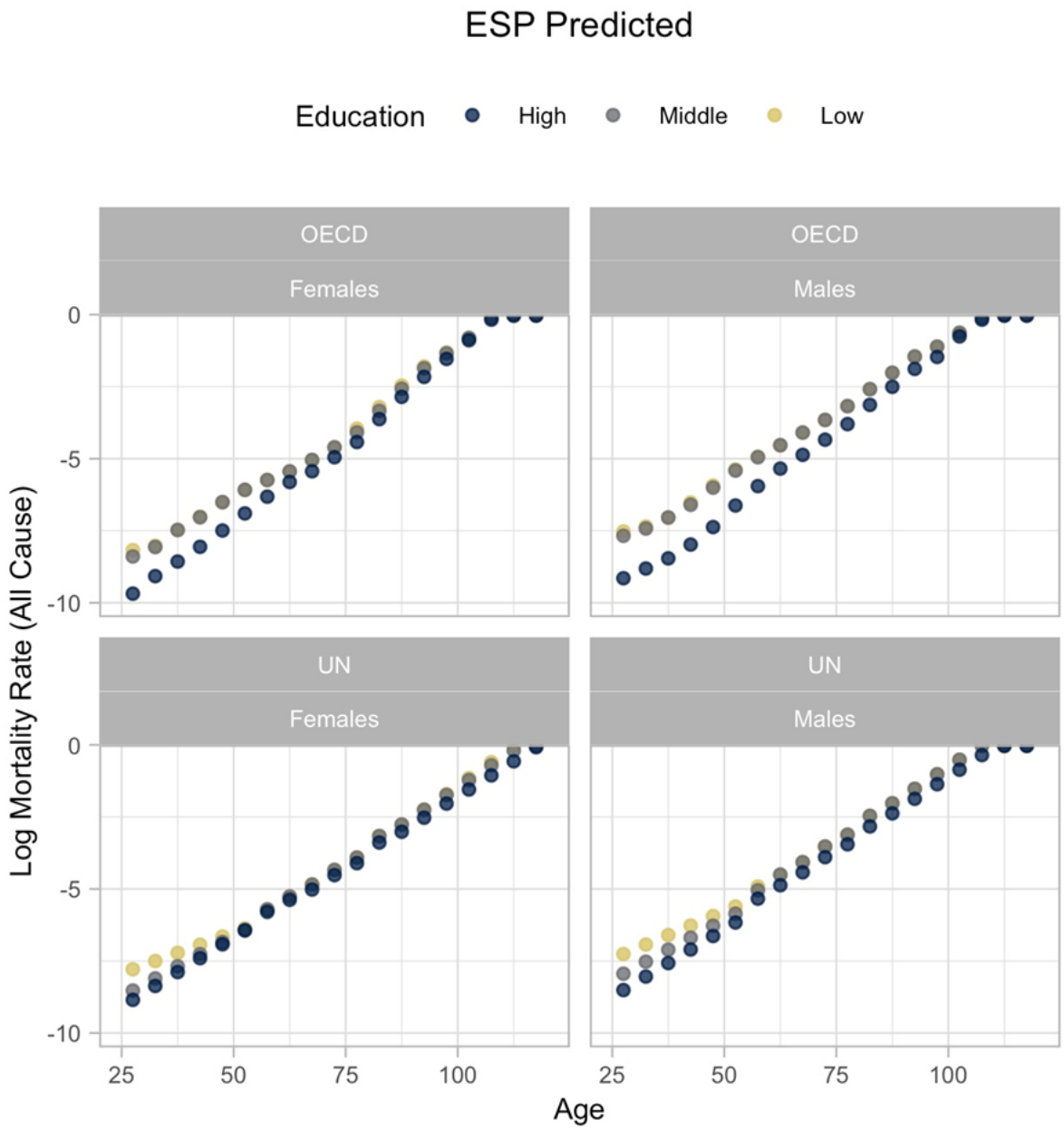
OECD, Organisation for Economic Co-operation and Development; UN, United Nations.
Countries are reported in International Organization for Standardization (ISO) three-letter codes.
Missing education data are assigned proportially to the education distribution of the observed data.

Figure C.6. Predicted mortality rates for Denmark



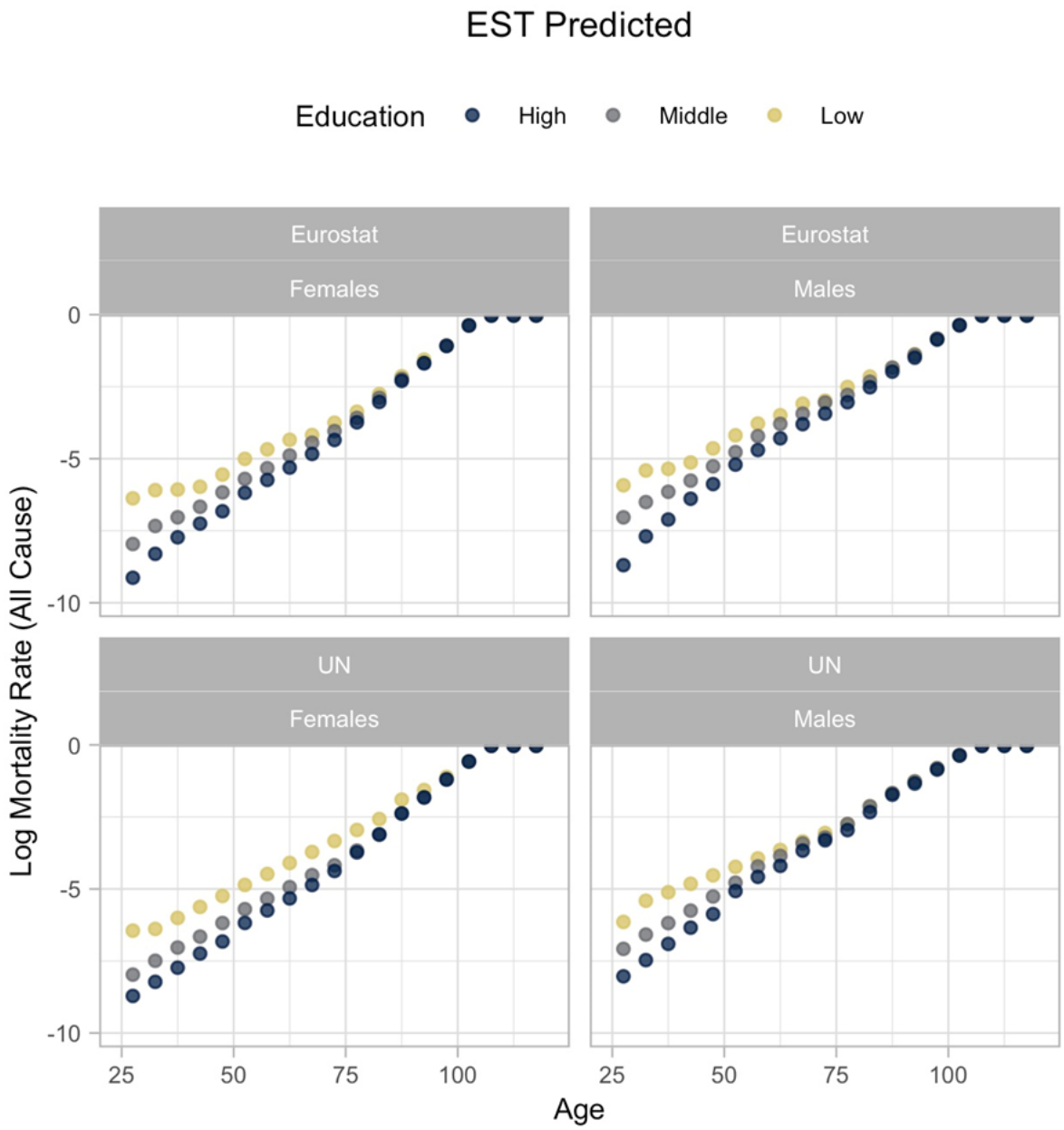
OECD, Organisation for Economic Co-operation and Development; UN, United Nations.
Countries are reported in International Organization for Standardization (ISO) three-letter codes.
Missing education data are assigned proportially to the education distribution of the observed data.

Figure C.7. Predicted mortality rates for Spain



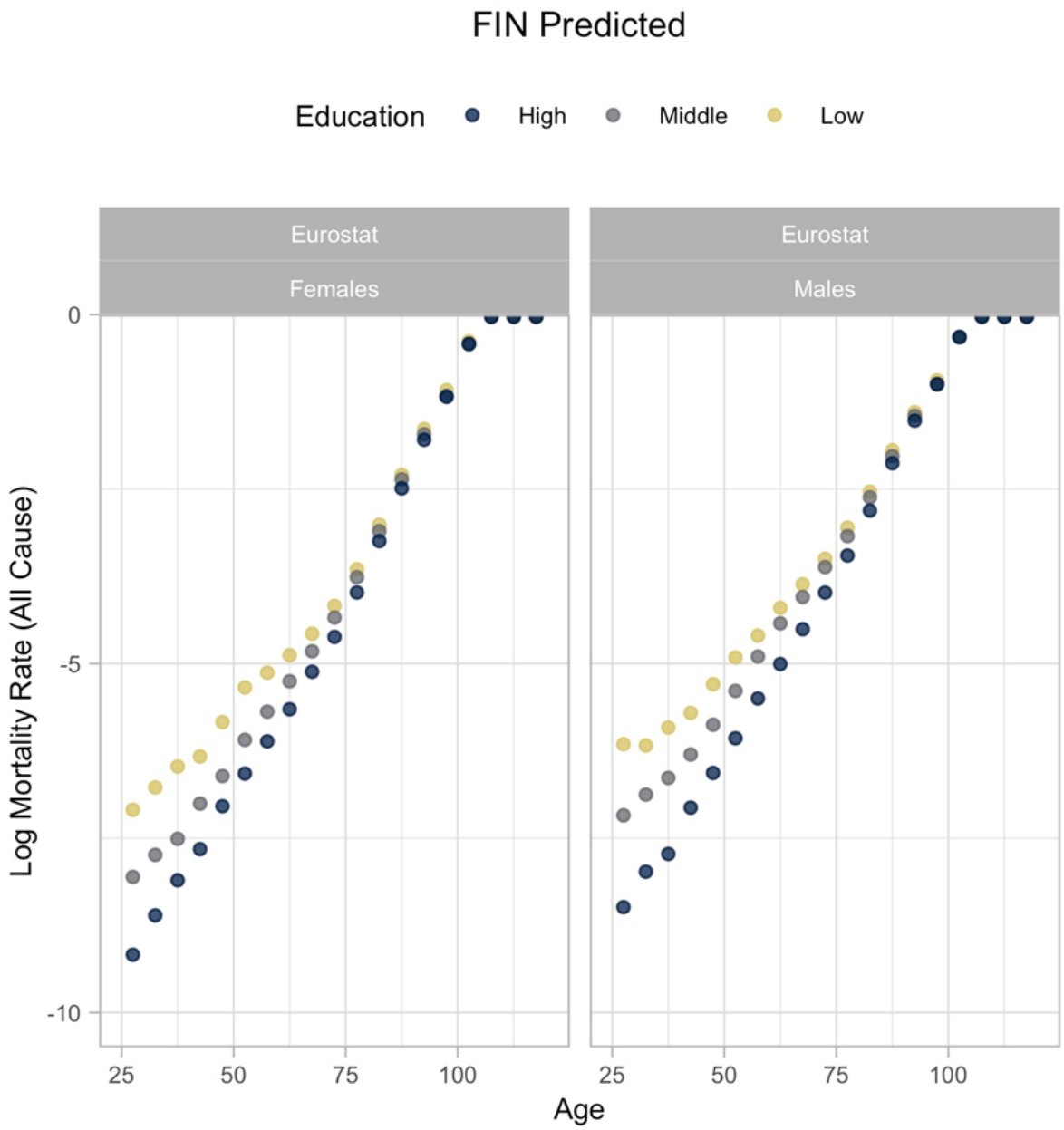
OECD, Organisation for Economic Co-operation and Development; UN, United Nations.
Countries are reported in International Organization for Standardization (ISO) three-letter codes.
Missing education data are assigned proportially to the education distribution of the observed data.

Figure C.8. Predicted mortality rates for Estonia



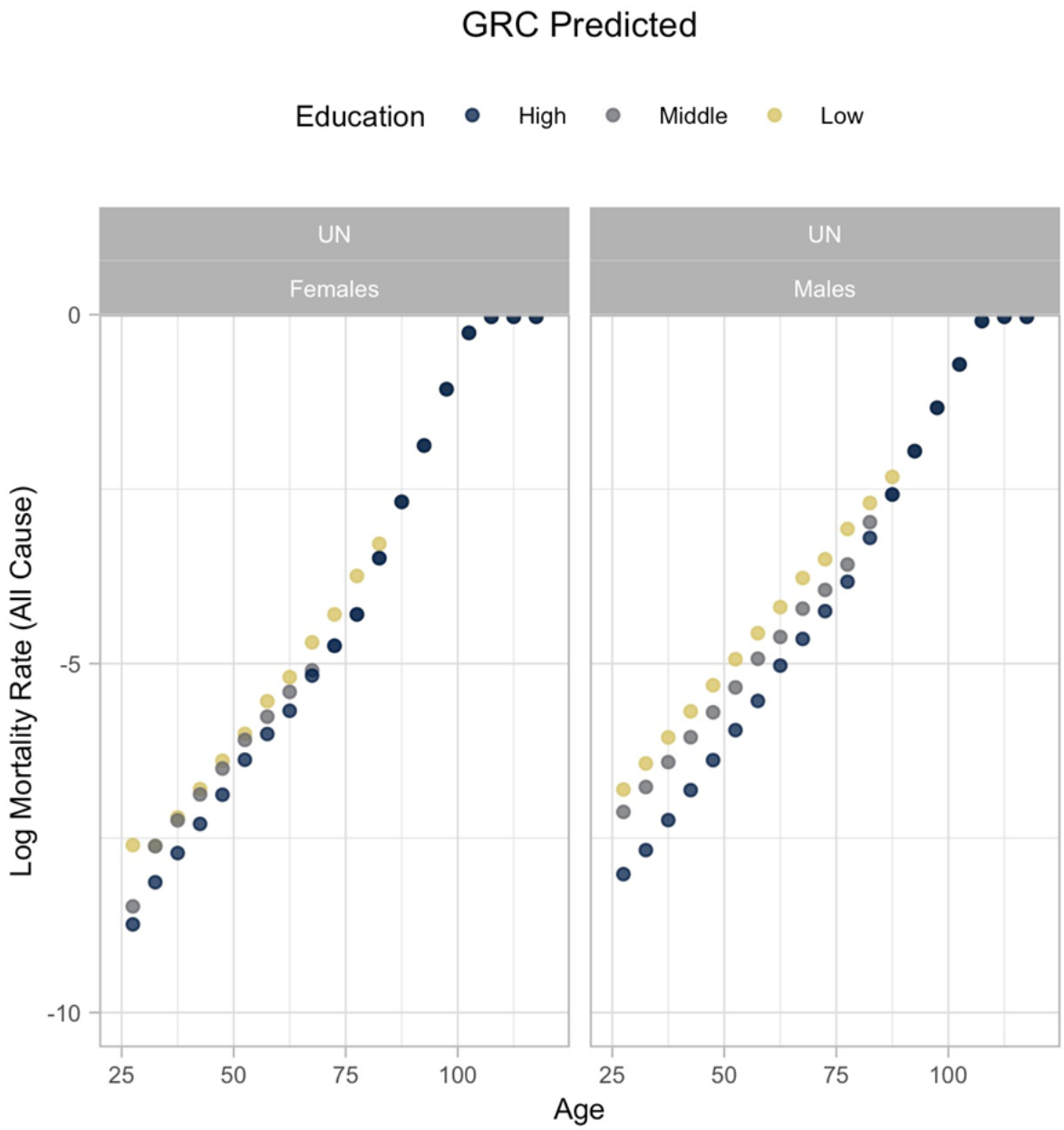
OECD, Organisation for Economic Co-operation and Development; UN, United Nations.
Countries are reported in International Organization for Standardization (ISO) three-letter codes.
Missing education data are assigned proportially to the education distribution of the observed data.

Figure C.9. Predicted mortality rates for Finland



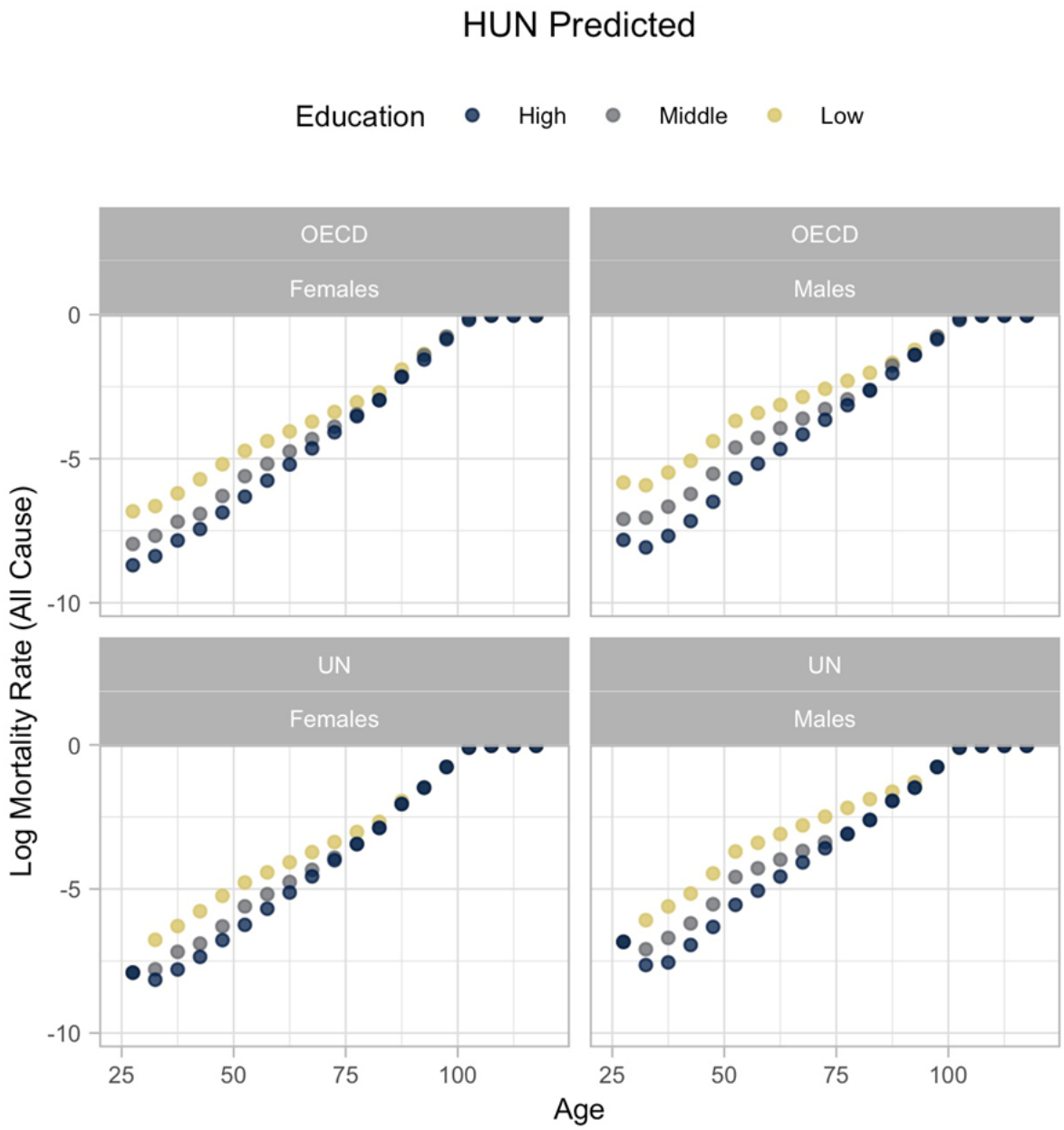
OECD, Organisation for Economic Co-operation and Development; UN, United Nations.
Countries are reported in International Organization for Standardization (ISO) three-letter codes.
Missing education data are assigned proportially to the education distribution of the observed data.

Figure C.10. Predicted mortality rates for Greece



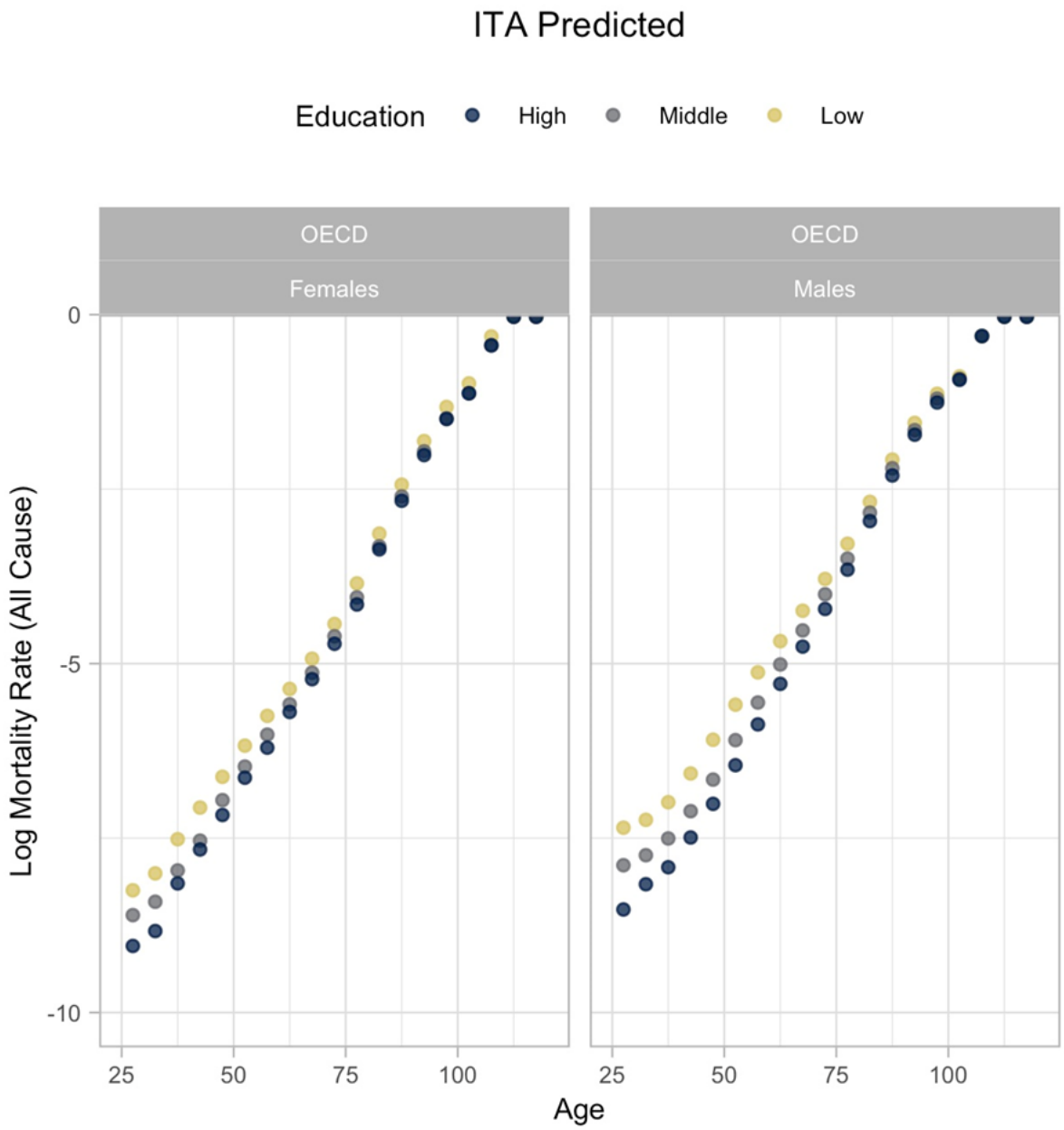
OECD, Organisation for Economic Co-operation and Development; UN, United Nations.
Countries are reported in International Organization for Standardization (ISO) three-letter codes.
Missing education data are assigned proportially to the education distribution of the observed data.

Figure C.11. Predicted mortality rates for Hungary



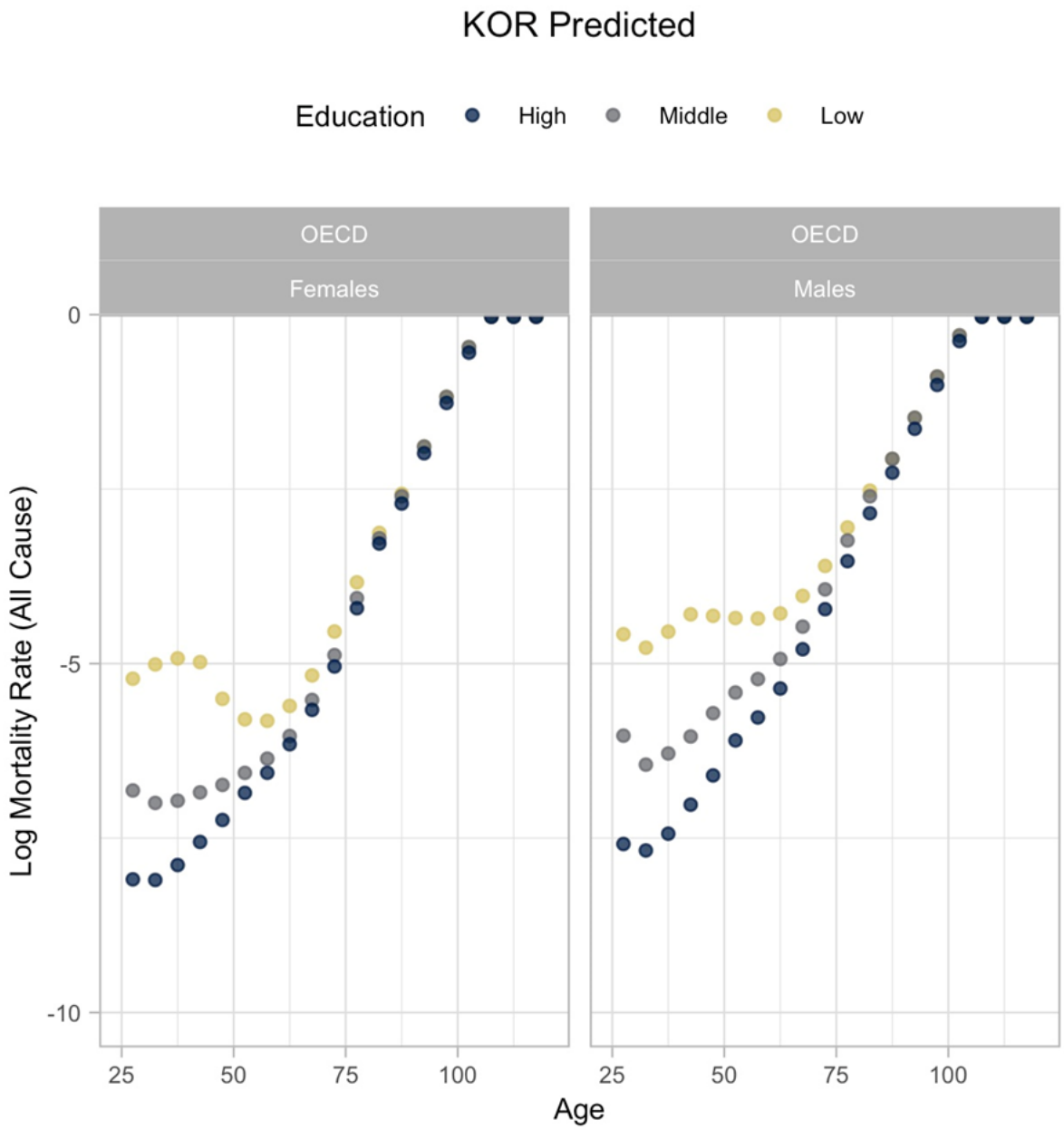
OECD, Organisation for Economic Co-operation and Development; UN, United Nations.
Countries are reported in International Organization for Standardization (ISO) three-letter codes.
Missing education data are assigned proportially to the education distribution of the observed data.

Figure C.12. Predicted mortality rates for Italy



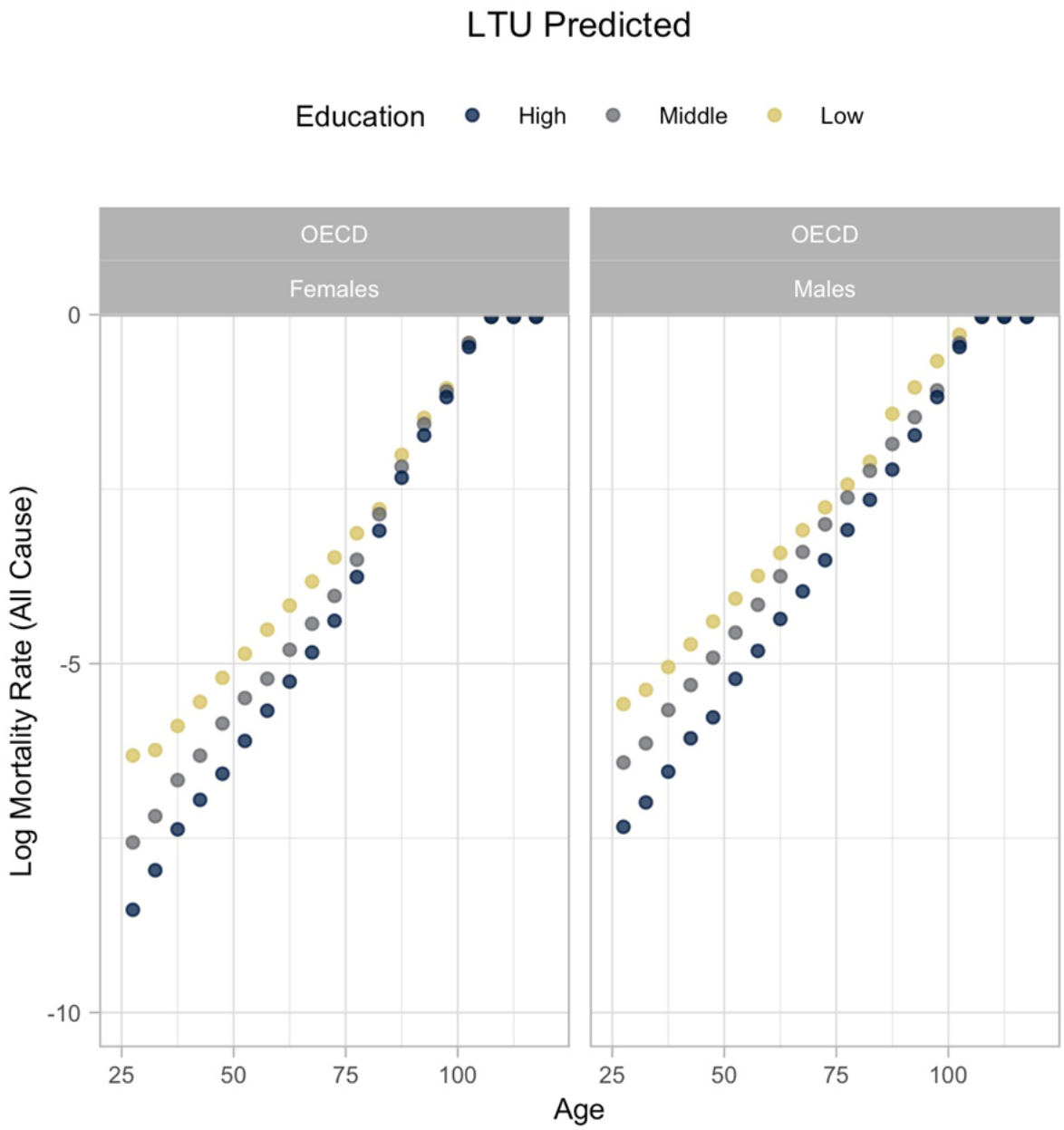
OECD, Organisation for Economic Co-operation and Development; UN, United Nations.
Countries are reported in International Organization for Standardization (ISO) three-letter codes.
Missing education data are assigned proportially to the education distribution of the observed data.

Figure C.13. Predicted mortality rates for South Korea



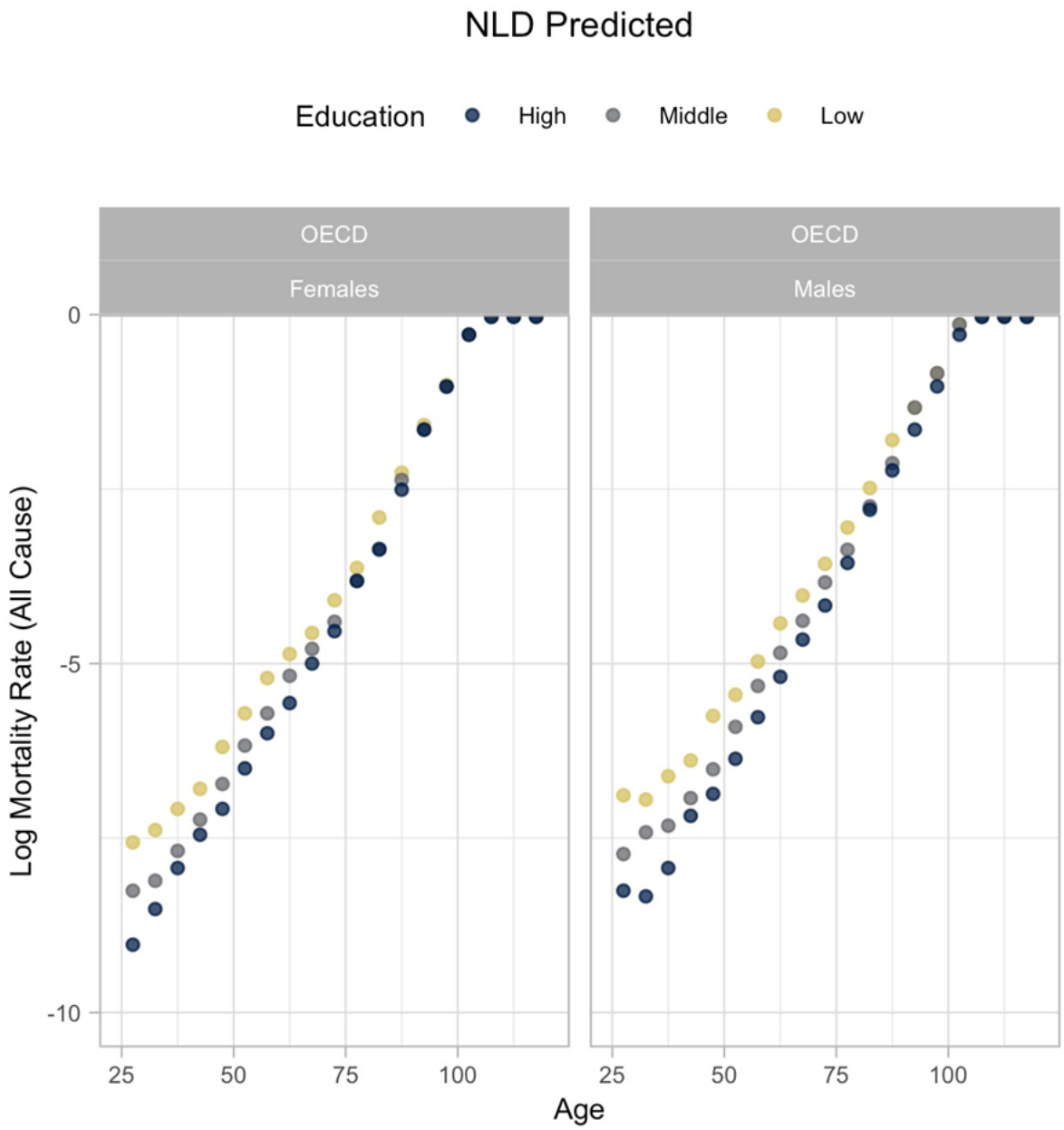
OECD, Organisation for Economic Co-operation and Development; UN, United Nations.
Countries are reported in International Organization for Standardization (ISO) three-letter codes.
Missing education data are assigned proportially to the education distribution of the observed data.

Figure C.14. Predicted mortality rates for Lithuania



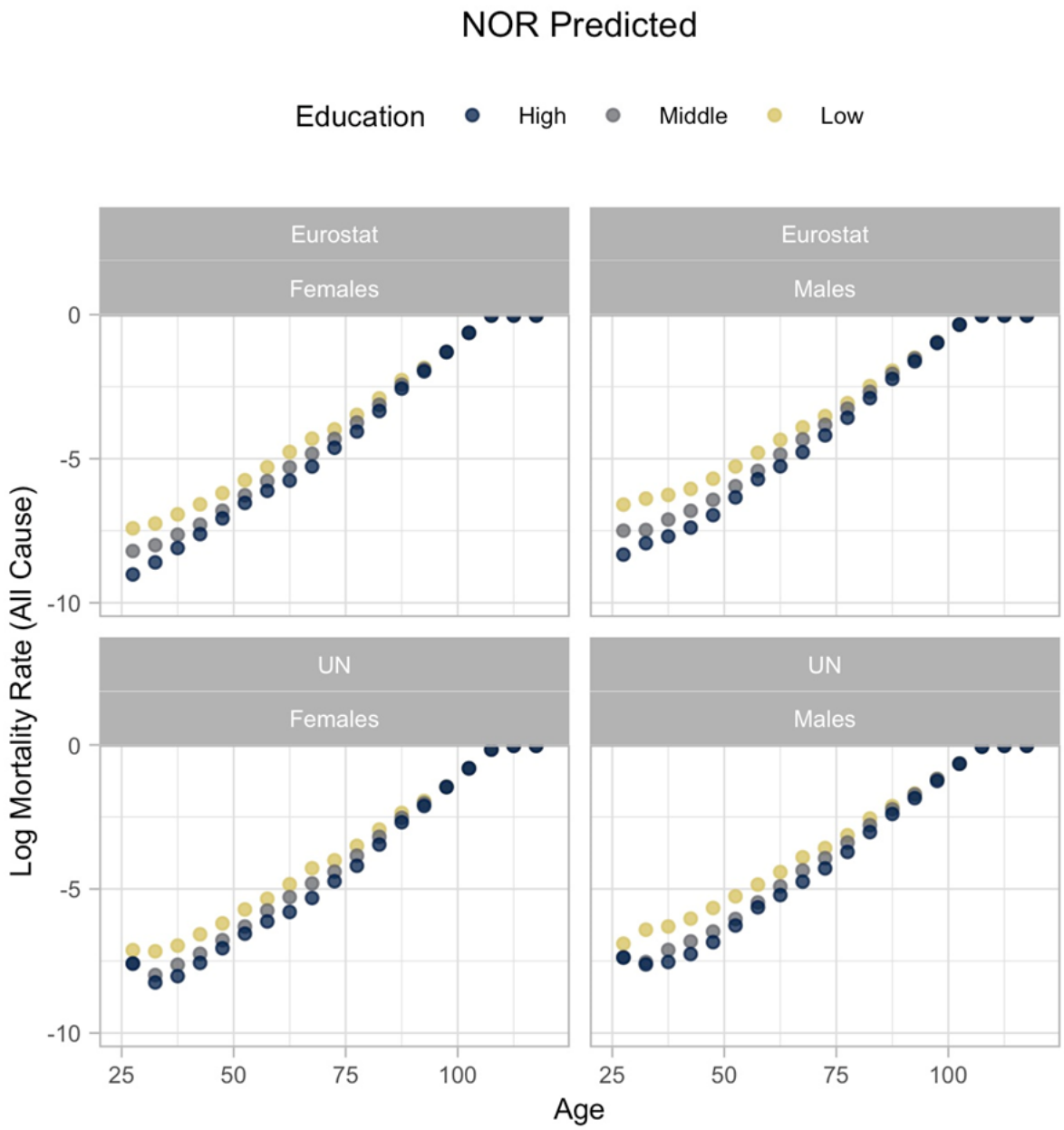
OECD, Organisation for Economic Co-operation and Development; UN, United Nations.
Countries are reported in International Organization for Standardization (ISO) three-letter codes.
Missing education data are assigned proportially to the education distribution of the observed data.

Figure C.15. Predicted mortality rates for the Netherlands



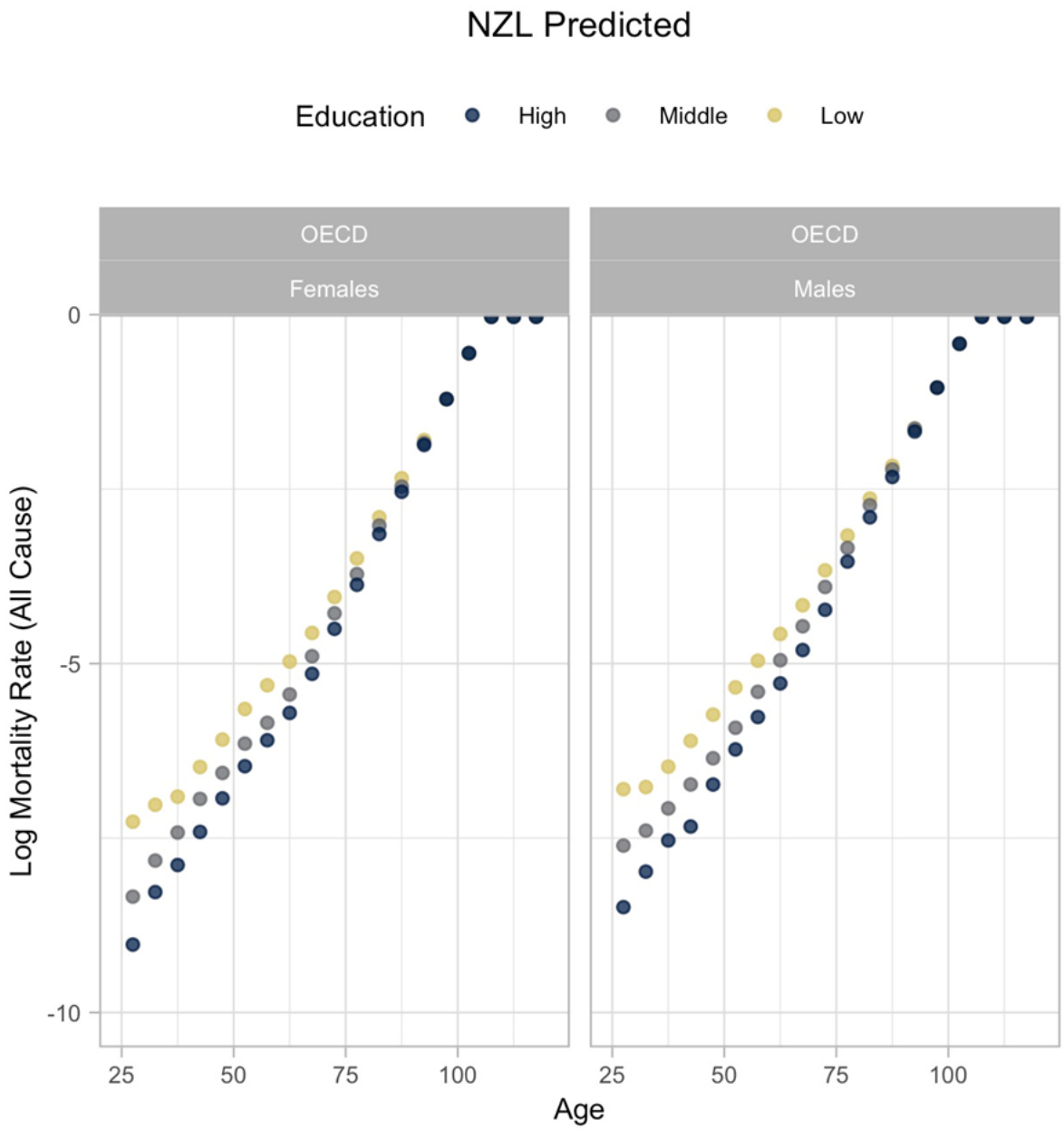
OECD, Organisation for Economic Co-operation and Development; UN, United Nations.
Countries are reported in International Organization for Standardization (ISO) three-letter codes.
Missing education data are assigned proportially to the education distribution of the observed data.

Figure C.16. Predicted mortality rates for Norway



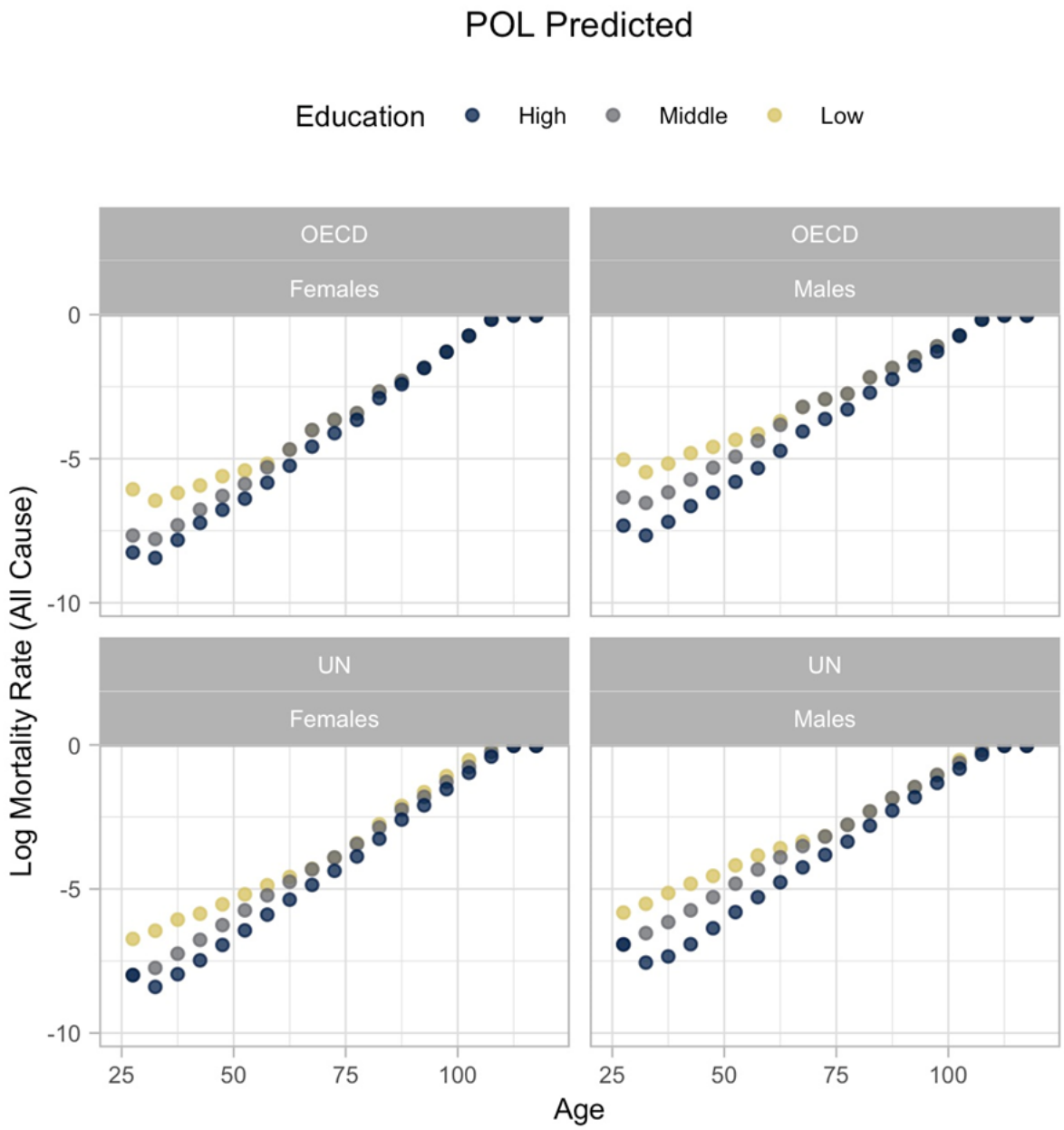
OECD, Organisation for Economic Co-operation and Development; UN, United Nations.
Countries are reported in International Organization for Standardization (ISO) three-letter codes.
Missing education data are assigned proportially to the education distribution of the observed data.

Figure C.17. Predicted mortality rates for New Zealand



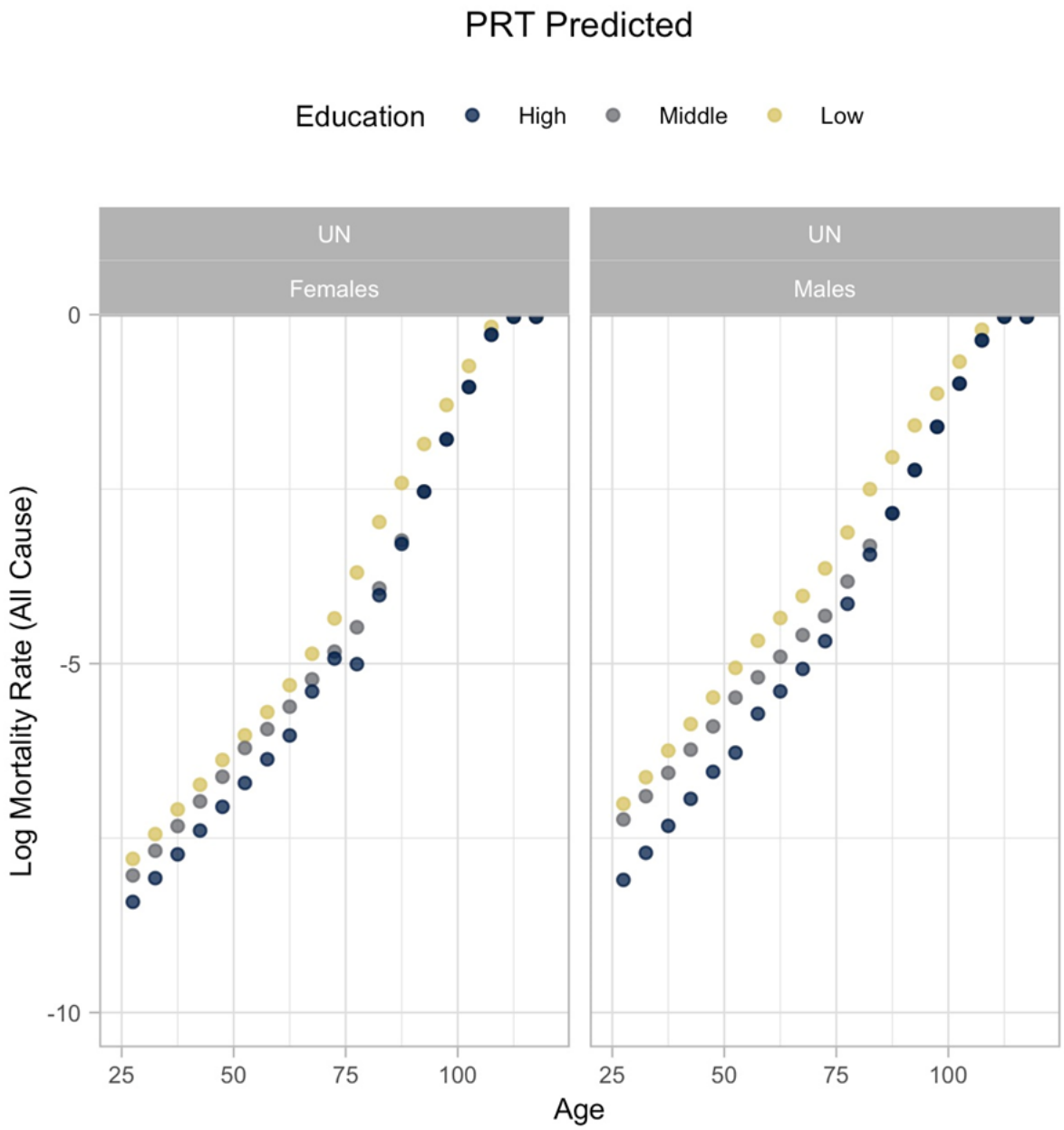
OECD, Organisation for Economic Co-operation and Development; UN, United Nations.
Countries are reported in International Organization for Standardization (ISO) three-letter codes.
Missing education data are assigned proportially to the education distribution of the observed data.

Figure C.18. Predicted mortality rates for Poland



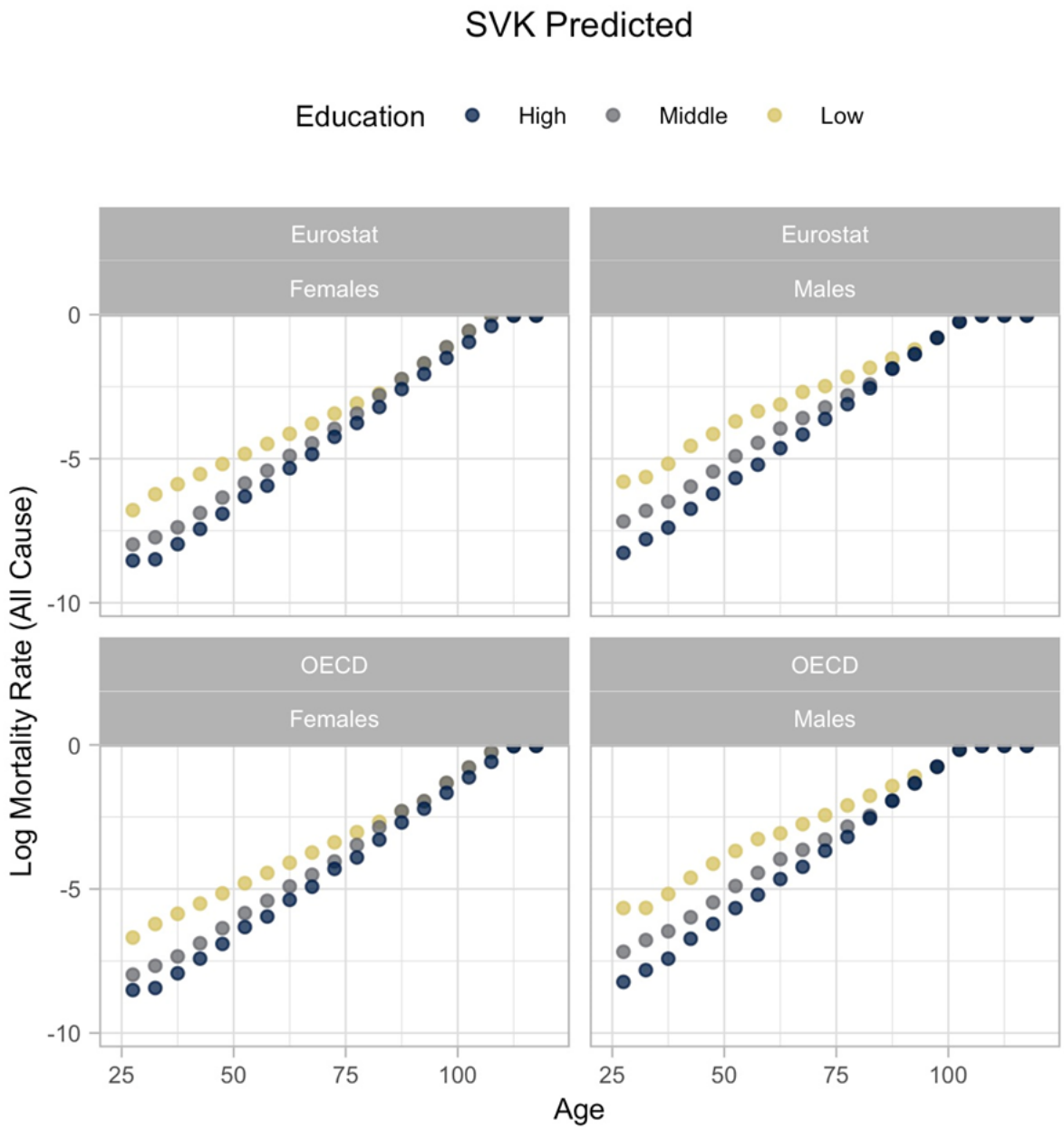
OECD, Organisation for Economic Co-operation and Development; UN, United Nations.
Countries are reported in International Organization for Standardization (ISO) three-letter codes.
Missing education data are assigned proportially to the education distribution of the observed data.

Figure C.19. Predicted mortality rates for Portugal



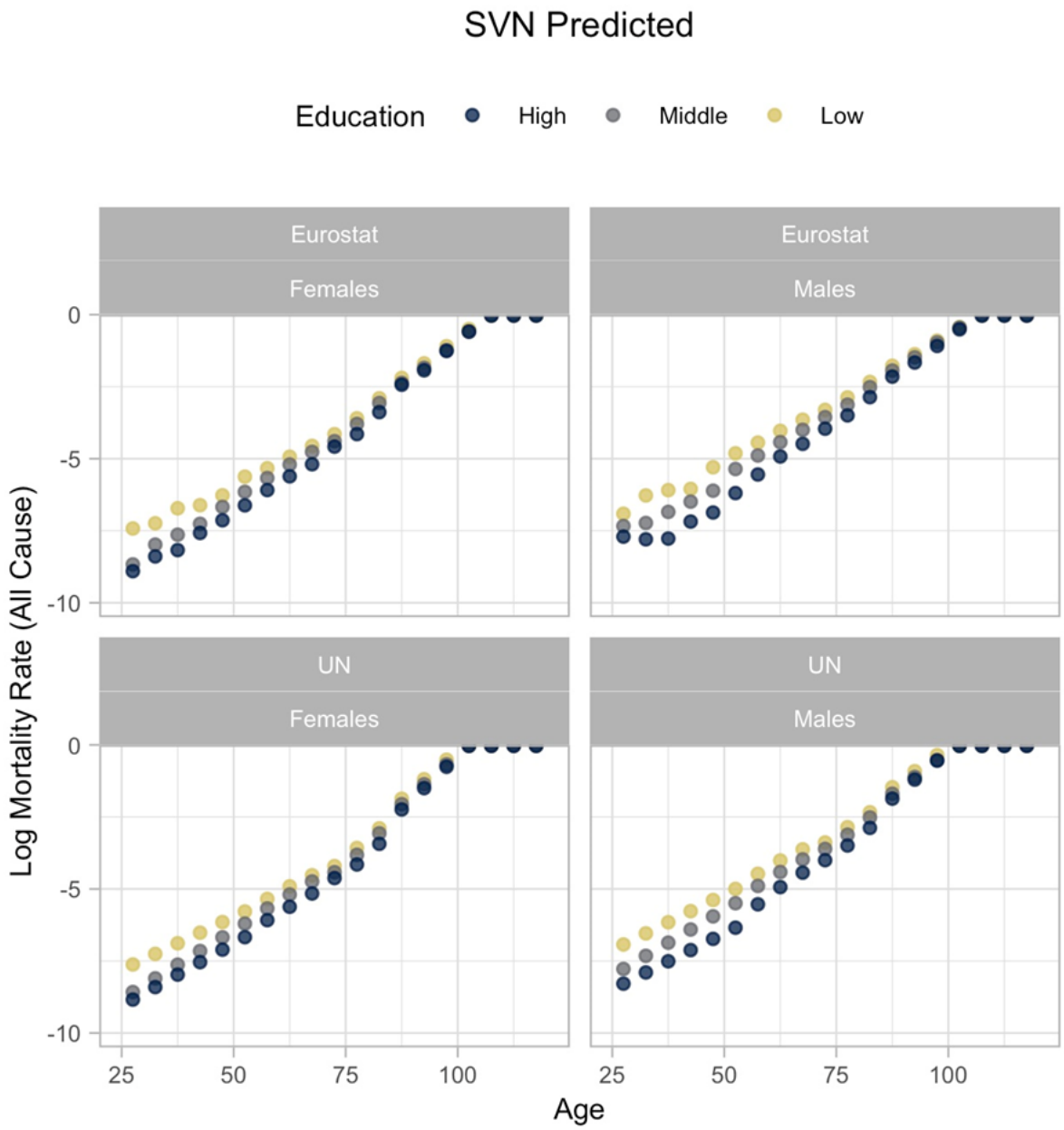
OECD, Organisation for Economic Co-operation and Development; UN, United Nations.
Countries are reported in International Organization for Standardization (ISO) three-letter codes.
Missing education data are assigned proportially to the education distribution of the observed data.

Figure C.20. Predicted mortality rates for the Slovak Republic



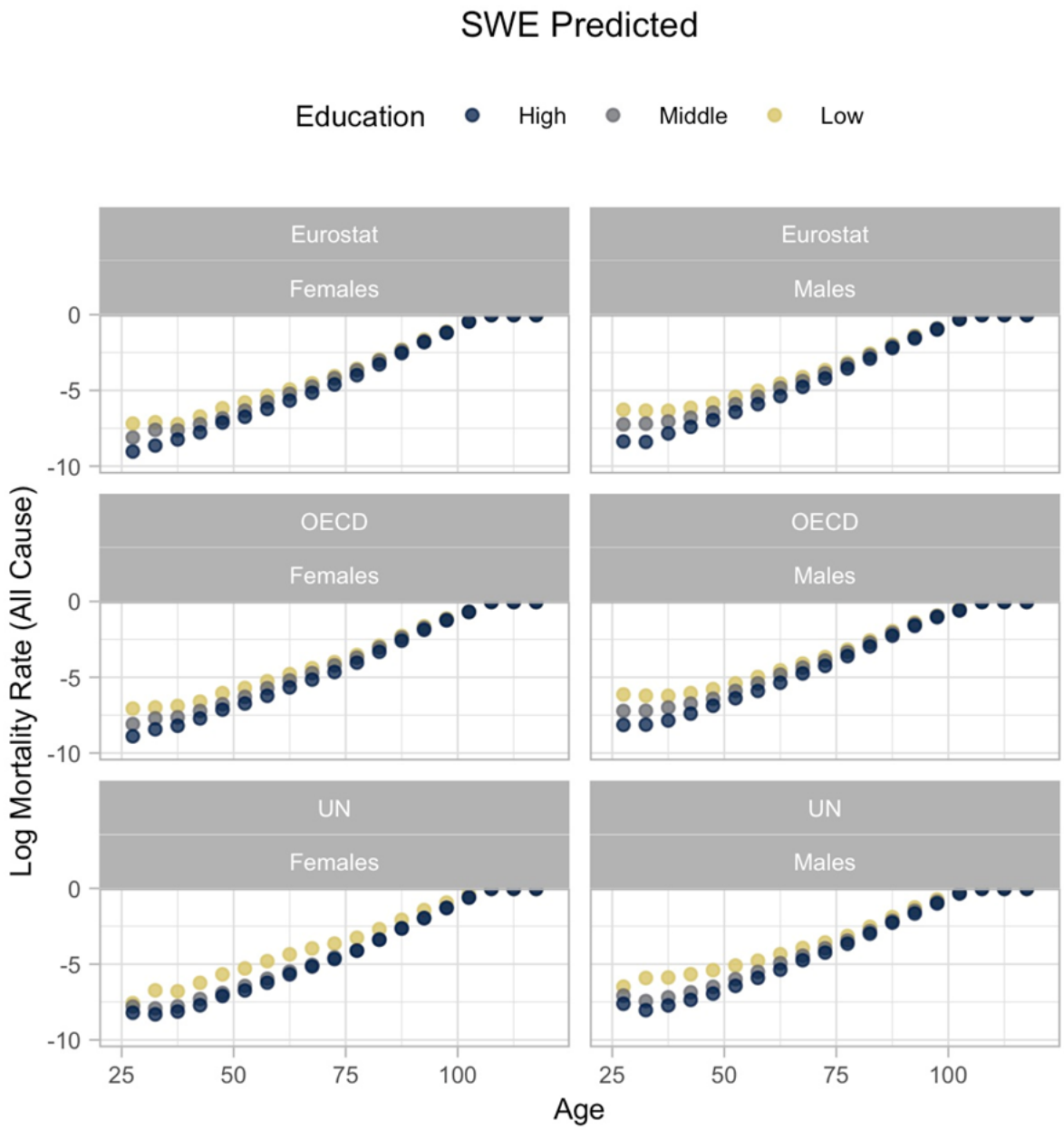
OECD, Organisation for Economic Co-operation and Development; UN, United Nations.
Countries are reported in International Organization for Standardization (ISO) three-letter codes.
Missing education data are assigned proportially to the education distribution of the observed data.

Figure C.21. Predicted mortality rates for Slovenia



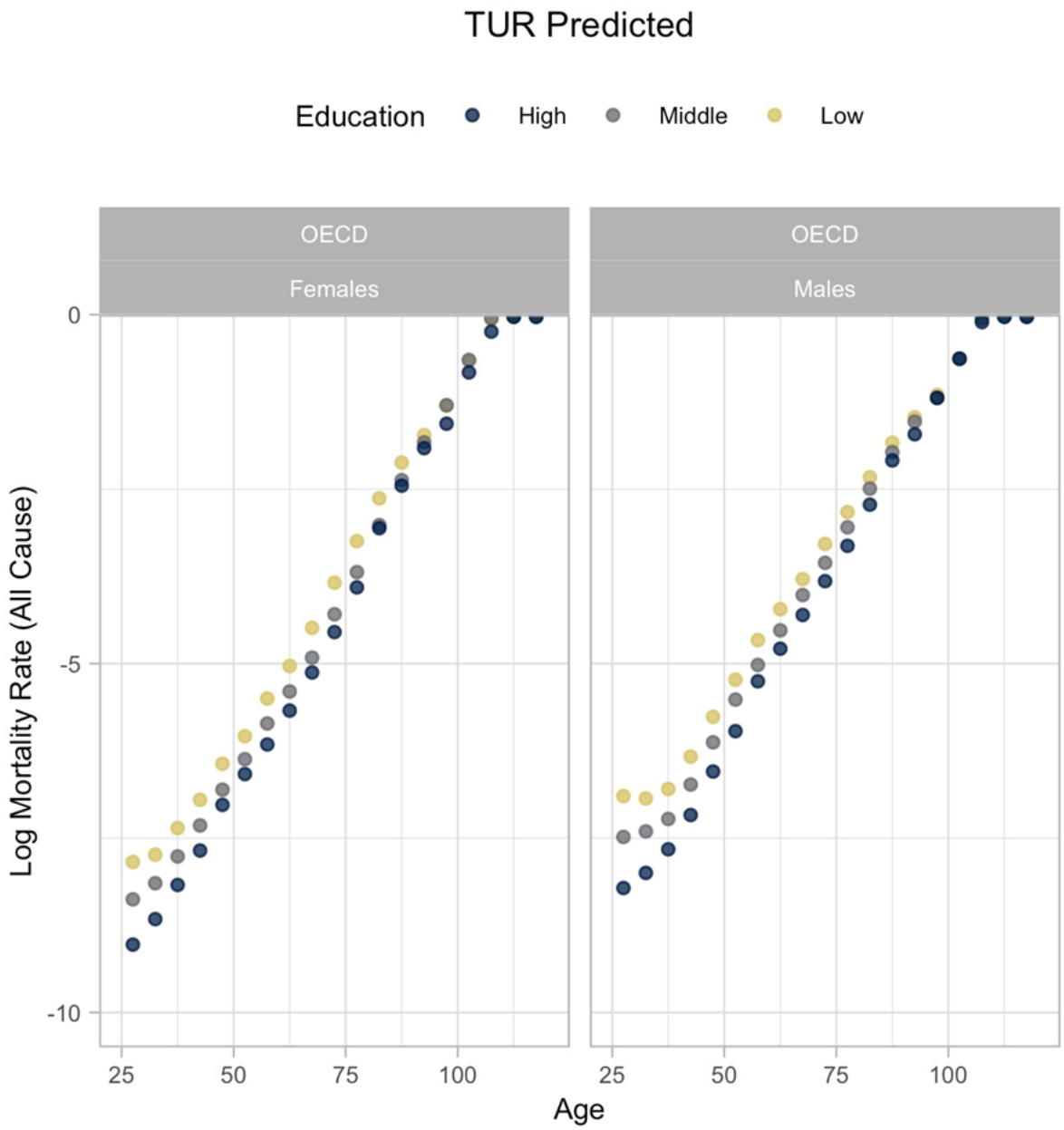
OECD, Organisation for Economic Co-operation and Development; UN, United Nations.
Countries are reported in International Organization for Standardization (ISO) three-letter codes.
Missing education data are assigned proportially to the education distribution of the observed data.

Figure C.22. Predicted mortality rates for Sweden



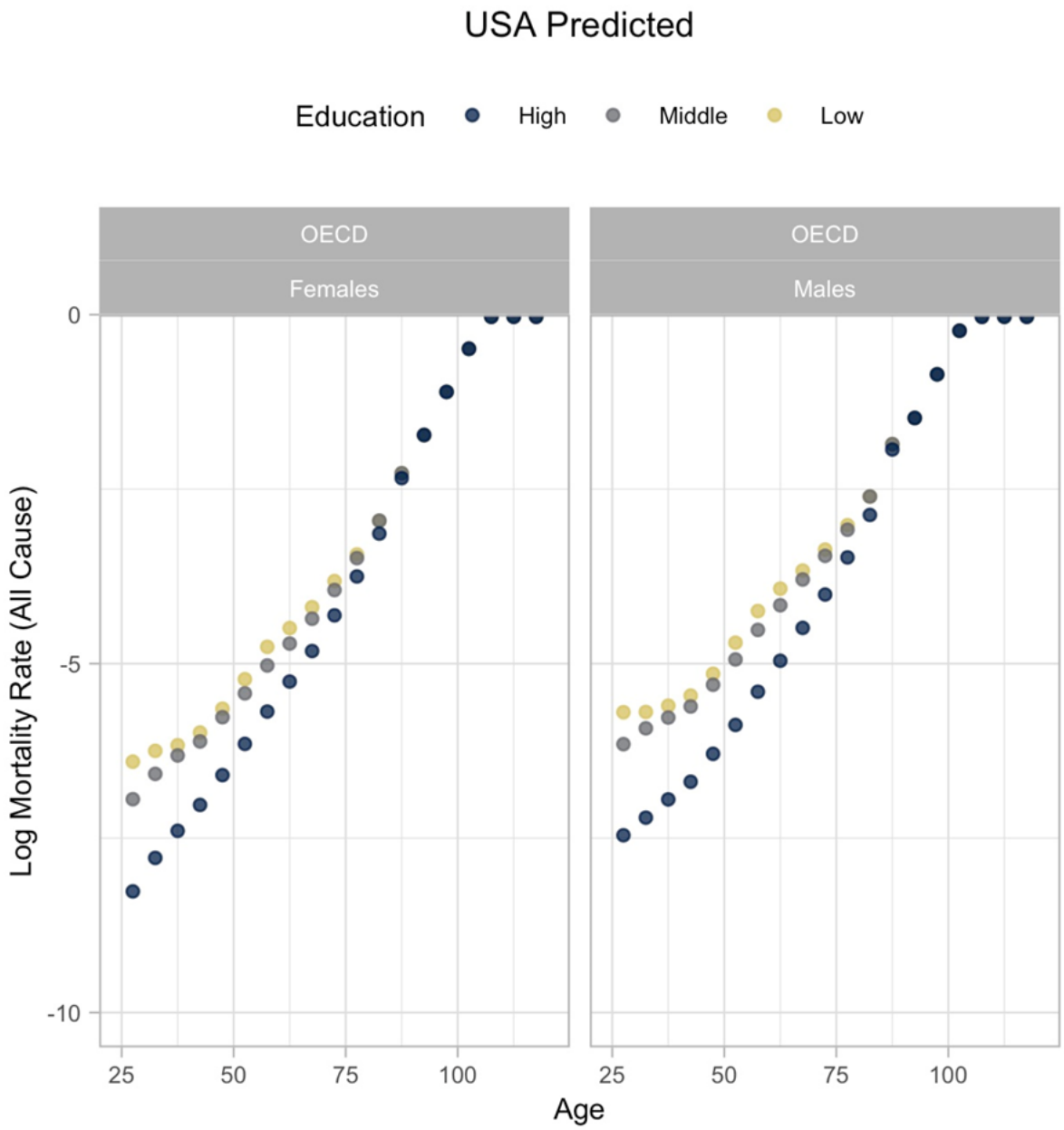
OECD, Organisation for Economic Co-operation and Development; UN, United Nations.
Countries are reported in International Organization for Standardization (ISO) three-letter codes.
Missing education data are assigned proportially to the education distribution of the observed data.

Figure C.23. Predicted mortality rates for Türkiye



OECD, Organisation for Economic Co-operation and Development; UN, United Nations.
Countries are reported in International Organization for Standardization (ISO) three-letter codes.
Missing education data are assigned proportially to the education distribution of the observed data.

Figure C.24. Predicted mortality rates for the United States



OECD, Organisation for Economic Co-operation and Development; UN, United Nations.
Countries are reported in International Organization for Standardization (ISO) three-letter codes.
Missing education data are assigned proportially to the education distribution of the observed data.