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SOCIOECONOMIC INEQUALITY IN PREMATURE MORTALITY IN ITALY: A NATIONAL CENSUS-BASED RECORD LINKAGE STUDY

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SUMMARY

Background

Socioeconomic status (SES) is a well-recognized determinant of health. A high prevalence of risk factors for non-communicable diseases along with reduced access to early diagnosis and effective treatment have historically been thought to be the main mechanisms underlying the relationship between low SES and poor health. However, the phenomenon is more complex and involves also psychosocial factors, such as stress, depression, financial difficulties, lack of social support, and low job control, all risk factors for poor health.

Nowadays, inequalities in health represents a major challenge for health policies, having a high social, ethical and economic impact even in high-income countries. This is particularly true during economic recessions, when unemployment and financial problems is expected to affect more people with medium or low SES. However, results on the impact of macroeconomic changes on socioeconomic inequalities in health are controversial and substantial differences exist among European countries with higher inequality in North and East Europe compared to southern European countries.

In Europe, the evidence on inequalities in mortality comes mainly from national, longitudinal, census-linked or unlinked studies, whereas in Italy most of the data are based only on urban areas.

The lack of national study precludes a comprehensive analysis of socioeconomic inequalities in mortality in Italy which can measure the impact of SES on cause-specific mortality and evaluate within-country geographic differences and the interaction with other variables.

Aim

The study aimed to quantify socioeconomic inequality in premature mortality in absolute and relative terms in Italy considering also geographic differences and the role of other variables, such as marital status, size of the municipality, and social and material vulnerability of the municipality of residence.

Methods

The study was based on the record linkage of national administrative databases, including the 2011 census and the mortality registries. Each death occurred in Italy from census date (9 October 2011) onwards was linked to the census using the tax identification number as linkage key. This allowed to conduct a cohort study based on all Italian residents.

In this report, the mortality registries for the period 2011-2015 were linked to the 2011 census and the individuals alive on 1 January 2012 were included in the cohort.

Education and occupation were used to determine the SES of the individual. Four levels of education were considered: no education or primary school, middle school, high school and university. Occupation-based social class was obtained by using the Erikson-Goldthorpe scheme with the following classes: non-skilled manual, skilled manual workers, farmers, self-employees, routine non-manual and upper non-manual workers.

Relative inequality was measured by computing the age-adjusted mortality rate ratio (MRR) and the relative index of inequality (RII), whereas absolute inequality was measured by calculating the slope index of inequality (SII). The MRR and the RII was estimated by fitting multiplicative Poisson regression models, whereas the SII was estimated by fitting additive Poisson models. RII and SII were obtained by regressing the mortality rate of SES groups on a specific measure of their relative position in the social hierarchy: the socioeconomic rank, i.e. the proportion of the population that has a higher position, scaled to take values between 0 (highest rank) and 1 (lowest rank). The level of education was used to obtain the socioeconomic rank.

RII and SII express the magnitude of socioeconomic inequality in relative and absolute terms, respectively, by providing a unique estimate of the inequality that can be used for comparisons within the same population or between different populations. The resulting figures can be interpreted as the ratio (for RII) or difference (for SII) of mortality rates between those at the bottom and those at the top of the social hierarchy.

RII and SII were used to rank the causes of death by relative and absolute inequality.

Results

A total of 35,708,445 subjects aged between 30 and 74 years were included in the study. In four years of follow-up, 573,335 deaths were registered over 137,847,954 person-years at risk. Being low educated and having a less prestigious job had a negative effect on overall premature mortality and mortality from most of the causes of death considered in this study.

Compared to men with the highest level of education (university graduates), the MRR from all causes was 1.30 (95% CI: 1.10-1.53) for men with high school diploma, 1.64 (95% CI: 1.40-1.92) for those with middle school diploma and 1.93 (95% CI: 1.65-2.27) among those with no education or primary school certificate. Compared to women with the highest level of education (university graduates), the MRR from all causes was 1.14 (95% CI: 1.01-1.29) for women with high school diploma, 1.31 (95% CI: 1.16-1.48) for those with middle school diploma and 1.44 (95% CI: 1.28-1.63) among those with no education or primary school certificate.

Compared to men in the upper non-manual class, the MRR from all causes was 1.24 (95% CI: 1.18-1.30) among routine non-manual workers, 1.31 (95% CI: 1.24-1.38) among self-employees, 1.48 (95% CI: 1.35-1.63) among farmers, 1.37 (95% CI: 1.30- 1.45) among skilled manual workers and 1.63 (95% CI: 1.55-1.71) among non-skilled manual workers.

In women, all the other classes showed only a slight increase in mortality as compared to upper non-manual workers, with the only exception of farmers who had comparable mortality rates. The MRR was 1.07 (95% CI: 1.02-1.13) among routine non-manual workers, 1.14 (95% CI: 1.06-1.23) among self-employees, 1.03 (95% CI: 0.89-1.19) among farmers, 1.08 (95% CI: 0.98-1.20) among skilled manual workers and 1.09 (95% CI: 1.03-1.16) among non-skilled manual workers.

Socioeconomic inequality for all-cause mortality was higher in men than in women, both in relative (RII for men: 2.07, 95% CI: 1.81-2.37, RII for women: 1.51, 95% CI: 1.35-1.68) and absolute terms (SII for men: 373 deaths per 100.000 person-years, 95% CI: 327-419, SII for women: 113 deaths per 100.000 person-years, 95% CI: 88-138).

In relative terms, the causes of death with the highest inequality were: laryngeal cancer (RII: 5.69, 95% CI: 4.54-7.15), chronic liver diseases (RII: 5.03, 95% CI: 3.72-6.80), chronic lower respiratory diseases (RII: 4.83, 95% CI: 3.59-6.50) and HIV/AIDS (RII: 4.77, 95% CI: 3.11-7.31) among men, and diabetes (RII: 5.75, 95% CI: 4.48-7.37), HIV/AIDS (RII: 4.33, 95% CI: 2.55-7.38) and chronic liver diseases (RII: 3.47, 95% CI: 2.71-4.44) among women.

The causes of death with the highest absolute socioeconomic inequality were: circulatory system diseases (SII: 85 deaths per 100,000 person-years, 95% CI: 76-94) and lung cancer (SII: 58 deaths, 95% CI: 52-64) among men, and circulatory system diseases (SII: 43 deaths, 95% CI: 37-49) and diabetes (SII: 12 deaths, 95% CI: 10; 14) among women.

Socioeconomic inequality in all-cause mortality was higher among singles (RII in men: 3.24, 95% CI: 2.68-3.92, RII in women: 2.71, 95% CI: 2.11-3.49), separated or divorced (RII in men: 2.58, 95% CI: 2.30-2.58, RII in women: 1.67, 95% CI: 1.26-1.50) than married individuals (RII in men: 1.80, 95% CI: 1.63-1.98, RII in women 1.42, 95% CI: 1.32-1.53).

People living in large municipalities (≥50,000 residents) showed a higher level of socioeconomic inequality (RII in men: 2.42, 95% CI: 2.09-2.79, RII in women: 1.68, 95% CI: 1.68, 95% CI 1.52-1.86) than those living in small municipalities (<2000 residents) (RII in men: 1.88, 95% CI: 1.66-2.14, RII in women: 1.40, 95% CI: 1.12-1.62).

Women living in municipalities with high social and material vulnerability showed higher socioeconomic inequality in overall mortality (RIIs: 1.70, 95% CI: 1.51-1.91 and 1.34, 95% CI: 1.19-1.49 for those living in the last and first fifths of the distribution of the vulnerability index of the municipality of residence, respectively), whereas the estimates among men overlapped.

Socioeconomic inequality in mortality from circulatory system diseases and diabetes was greater in women from southern Italy, while there are no substantial geographic differences in men. The RIIs for all circulatory system diseases were: 2.73 (95% CI: 2.39-3.12) in women living in the South, 1.86 (95% CI: 1.55-2.22) in those living in the Center and 2.01 (95% CI: 2.01, 1.72-2.36) in those living in the North. The RIIs for diabetes were: 6.21 (95% CI: 4.80-8.08) in women living

in the South, 4.32 (95% CI: 3.33-5.61) in those living in the Center and 3.71 (95% CI: 2.78, 1.72-4.95) in those living in the North of the country.

Conclusions

The successful linkage of national databases allowed, for the first time, to provide a comprehensive picture of socioeconomic inequality in mortality in Italy.

Socioeconomic inequality in premature mortality is still a major public health problem in Italy. It is more pronounced among some groups of the population, such as singles, separated and divorced individuals, those living in large municipalities, and women living in southern Italy or in municipalities with high social and material vulnerability.

Lung cancer (in men), circulatory system diseases (in both sexes) and diabetes (in women) are the major contributors to the absolute socioeconomic inequality in Italy.

The findings of this study will have important implications for planning policies to reduce the existing disparities in mortality in Italy.

1. INTRODUCTION

Inequality in health is a major challenge for health policy having a high social, ethical and economic impact even in high-income countries. Inequality among socioeconomic groups has been observed for many health outcomes, including incidence, survival, mortality and self-reported health [1]. Thus, better health outcomes in a country strictly depend on the distribution of the socioeconomic status (SES) indicators among the population [2].

SES is defined by a series of socioeconomic variables, used singularly or as composite indices, such as educational attainment, occupational-based social class and income. Education- and occupation-based social class are the major markers of social standing used in studies investigating socioeconomic disparities in health [3]. Although education and occupation are correlated, they cannot be used interchangeably as they measure different phenomena and act through different mechanisms [4]. While education reflects the ability of the individual to turn information into practical measures and behaviours, occupation better indicates prestige, job control and imbalance of effort and reward. All these mechanisms are involved in the generation of socioeconomic disparities in health, and are expected to have different roles in the specific health outcome considered [5,6].

Data from large population-based studies showed poorer health and higher mortality in low SES groups [7]. Higher mortality rates among subjects with low education, low occupational classes and low income have been consistently observed in the majority of high-income countries across Europe and North America [7,8].

A meta-analysis of 48 independent prospective cohort studies [9], including 1.7 million individuals, showed that low SES is an independent risk factor for mortality and has a comparable health impact to that of the seven risk factors identified in the World Health Organization (WHO) Global Action Plan for the Prevention and Control of Non-Communicable Diseases (including high alcohol intake, physical inactivity, current smoking, hypertension, salt intake, diabetes, and obesity). The

study estimated a hazard ratio of 1.26 (95% CI: 1.21–1.32) for low socioeconomic status after mutually adjusting for the above-mentioned risk factors.

Such differences in mortality have been reported mainly for cardiovascular diseases, diabetes, chronic obstructive pulmonary diseases and for some cancer sites, including lung and stomach cancers [1,10]. Although some of the differences are due to uneven distribution of access to prevention programs and effective treatment and survival across social classes [11–13], differences in incidence of the underlying diseases seem to play a major role [14,15].

A study based on data from 22 European countries [7], found substantially poorer self-assessed health and higher mortality rates in lower educated subjects and in those in the lowest occupational class. The magnitude of this difference was not equal in all European countries, with eastern and northern European countries showing higher inequality than southern European countries [7].

Similar socioeconomic disparities were also found in other European populations in the early 2000s. An extensive comparative study [16], based on longitudinal data of 14 European male cohorts, showed inequalities in mortality by occupational class, with a social gradient in favour of upper non-manual workers. This inequality was found for mortality from any cause as well as from some broad group of causes, such as all cancers, cardiovascular diseases and external causes. However, data from southern European countries were not representative of the whole country since they were collected only in selected urban and generally wealthier areas.

In addition, a recent study [17] found that between the 1990s and 2000s, absolute inequality in premature mortality (below age 75) decreased in many countries due to the considerable reduction in mortality from cardiovascular diseases (in both sexes) and cancer (only in men) among individuals with low SES. In contrast, relative inequality increased in the North, West and East Europe, but not in the South. This was mainly due to the smaller proportional reduction in mortality among individuals with low SES. Although, from the 1990s to 2000s level of education in the population rose, the population attributable fractions remain stable, or in some European countries even increased indicating that health inequality is an increasing public health problem.

Most of these epidemiological data derived from national, longitudinal, census-linked or unlinked mortality studies, while data from Italy were based on a longitudinal census-linked mortality study from the city of Turin, with follow-up data from 1991 to 2001.

For Italy, reliable national data on socioeconomic inequality in mortality became available only in the 2000s, when a study including a national representative sample of the Italian population (N= 81,763) was published [18]. This sample was selected from a non-institutionalized population (140,011 individuals) who had been interviewed during the Health Interview Survey (HIS), carried out between the second semester of 1999 and the first semester of 2000 by the National Institute of Statistics (ISTAT). During a follow-up of 8 years (1999 to 2007) a total of 8,875 deaths were observed. The authors found a higher overall mortality and mortality from circulatory diseases and all neoplasms in the lowest category of education (none or primary school) compared to the highest category (university). However, the study could not evaluate inequality for other causes of deaths and failed to detect any significant differences in mortality from respiratory diseases and external causes due to the low number of deaths due to those causes.

The 2008 financial crisis has caused long-term damages to the economics of many European countries, including Italy, with deleterious socioeconomic consequences, increasing unemployment and poverty rates and decreasing household's (health and nutrition) expenditure [19]. Thus, concerns have been raised that the financial crisis could have increased disparities in health outcomes among socioeconomic groups in Europe [20]. In five Western European countries most severely hit by the crisis (Ireland, Spain, Portugal, Greece, and Cyprus) trends in self-reported health outcomes have been less favourable after 2008 as compared to the 2002-2008 period [21]. However, mortality has sharply declined from 1980 to 2014 in most European countries, both in highly and in less educated individuals, and this trend was not arrested by the financial crisis [21]. In Italy, a survey based on a representative sample of the resident population reported a worsening of mental health status in 2013 as compared to 2005 [22]. These findings suggest that the financial crisis could have long-term effects on health status that may be more deleterious among vulnerable groups of the

population who have limited intellectual and material resources to face financial difficulties and in countries that has not fully recovered from the financial crisis.

However, results on the impact of macroeconomic changes on socioeconomic inequality have been mixed [23]. In fact, previous studies carried out during economic recessions suggest that the effects of the financial crisis on health inequality vary between countries, likely as a consequence of the different fiscal and social policies each country has adopted to deal with the crisis. Therefore, quantifying and monitoring social inequality in health are becoming top priorities, and ad hoc projects should be planned to find out potential areas of intervention.

In Italy, the lack of large national-based study precludes a comprehensive analysis of socioeconomic inequality in mortality.

2. AIM

The study was aimed to evaluate absolute and relative socioeconomic inequality in overall and cause-specific premature mortality in Italy.

The specific aims of the project were:

1. To quantify socioeconomic differences in premature mortality in Italy using education as proxy of SES;
2. To quantify socioeconomic differences in premature mortality in Italy using occupation as proxy of SES;
3. To estimate the independent role of education and occupation as determinants of premature mortality;
4. To detect the causes of death with the highest socioeconomic inequality both in absolute and relative terms;
5. To evaluate differences in socioeconomic inequality across strata of marital status;
6. To evaluate geographic differences in socioeconomic inequality within the country;
7. To evaluate differences in socioeconomic inequality according to the size of the municipality of residence;
8. To evaluate differences in socioeconomic inequality according to the social and material vulnerability of the municipality of residence.

3. METHODS

3.1 Study design

The aims of the study were achieved through a longitudinal record linkage study based on the Italian census and mortality registries, both available at the ISTAT.

All deaths occurred in Italy between the census date (9 October 2011) onwards were linked to the 15th Italian census (15° Censimento della popoplazione e delle abitazioni del 2011), which registered all residents on 9 October 2011. Given the high probability of not being linked for the deaths occurred close to the census date, 1 January 2012 was considered the starting date of the study. Therefore, the population at risk (alive on 1 January 2012) was reconstructed subtracting the deaths occurred between 9 October 2011 and 31 December 2011. In order to take into account censoring due to emigration in the data analysis, the list of residents in all Italian municipalities were also linked to the census to track people who moved abroad, whose vital status was unknown. From this list, we extracted the individuals who had been deleted from the list for emigration to obtain the emigration date. These individuals were linked with the census and censored at the date of emigration. The tax identification number was used as linkage key. The tax identification number is a composite alphanumeric code made up of 16 characters, and it is derived from the name, the date and place of birth of the individual. To minimize false match rate, the tax identification number reported on the death certificate was checked for consistency with personal details of the deceased citizen before matching and, in case of inconsistency, a new tax identification number was recalculated from the personal details and used for the matching. The percentage of deaths successfully linked with the 2011 census was 95%. It was similar across sexes, age categories and areas of residence.

3.2 Data source

Three administrative databases were considered in this project:

1. The 2011 census;
2. Mortality archives from 2011 to 2015;
3. List of residents from 2011 to 2015.

The list of the variables retrieved from the three databases is provided in **Table 1**.

The 2011 census database contains all Italian residents alive on 9 October 2011 with demographic and SES variables.

The mortality archive includes all deaths occurred in Italy during a calendar year with demographic variables, date of death and the underlying cause of death, coded as 4-digit code of the International Classification of Diseases (ICD), 10th Revision.

The 2011 mortality archive and the 2011 list of residence have been used only to reconstruct the population at risk on 1 January 2012.

The list of residents contains all residents in the municipality and in case of transfer to a different municipality or a foreign country the transfer date and the place.

3.3 Indicators of socioeconomic status

Education: Four levels of education were considered: no education or primary school, middle school, high school and university.

Occupation-based social class: Occupational variables were retrieved from the census and was available for a subset of the Italian residents. Italian residents were administered two different questionnaires, a short and a long form. The short form contained only a subset of the census variables, while the long one contained all the census variables, including the occupational variables. The long form was administered to all households living in small/medium municipalities (less than 20,000 inhabitants) and to one third of the households living in larger municipalities. The household assigned to the long form were selected randomly from the list of residents in the municipality, with each household having the same chance to be selected [24].

Occupation class was classified according to the Erikson-Goldthorpe (EGP) scheme. We used two questions of the long form of the census questionnaire to convert occupation categories into the EGP scheme. These questions asked the

subject to indicate his/her occupation and the type of job he/she had in the week that preceded the census date. The first question reflects the major groups of the International Standard Classification of Occupation (ISCO-08) [25] and had the following options: 1) non-skilled manual work; 2) personnel working in manufacturing, machinery, assembly lines or drivers; 3) skilled manual work; 4) agriculture and farming; 5) sales and service work; 6) clerical work; 7) medium-qualified technical, administrative, sport or artistic activities; 8) highly-qualified activities including management, intellectual, scientific and artistic activities; 9) management of private or public companies and 10) armed forces. The options for the second question were: 1) employee; 2) term-contract worker; 3) casual worker; 4) entrepreneur; 4) professional; 5) self-employee, 6) member of a cooperative and 7) family worker. The combination of these two questions were used to assign each subject to one of the EGP categories. The full scheme used to assign the EGP category is reported in **Table 2**.

We used the seven-class version of the EGP scheme, which includes the following categories: upper non-manual workers (professionals, administrators, managers and higher grade technicians), routine non-manual workers (clerical workers, sales personnel, other rank-and-file service workers), self-employees, farmers (farmers and small holders and other self-employed workers in primary production), skilled manual workers, non-skilled manual workers and agricultural labourers (workers in primary production). To obtain a reliable estimate for people working in the primary production, we regrouped farmers and agricultural labourers in the same social class due to a low number of events. It was not possible to assign a social class to people working in armed forces since no information on their job position was collected during the census. Thus, this group were excluded from the analysis by occupation.

In the EGP scheme, employment relations in the labor market are held to be of key importance to the allocation of individuals into social class categories [26]. Individuals within a social class are considered to share similar ‘market situation’ (e.g. levels of income, economic security, chances for economic advancement) and ‘work situation’ (e.g. authority and control). Accordingly, those individuals within a social class are thought to hold similar life chances and often lifestyles.

3.3 Other study variables

Age: Five-year age categories were used in all the analysis.

Employment status: This variable was used to select the active population for the analysis of occupation-based social class. People unemployed at the census date and those looking for the first employment, retired, student, housewife or other conditions were excluded.

Geographic area of residence: The 8092 Italian municipalities existing at the census date were grouped in three major country area: north, center, and south and major islands.

Marital status: Marital status was grouped in four categories: single, married, divorced or separated and widowed.

Population size: The Italian municipalities were classified according to the size of the population as follows: municipalities under 2000, between 2000 and 19,999, between 20,000 and 49,999 and over 50,000 residents,

Index of social and material vulnerability: This index was developed by the ISTAT with the aim to provide a summary measure of the level of social and material vulnerability of the Italian municipalities [27]. It was obtained by a combination of seven elementary indices that describe the main social and material dimensions of vulnerability. The main dimensions that were covered by the index were: the level of education, family structure, housing conditions, labour market participation, and financial resources.

The seven elementary indices that were used to develop the index of social and material vulnerability were:

1. Percentage of the population aged 25 to 64 years illiterate or literate without education;
2. Percentage of families with six or more members;
3. Percentage of young (parent's age below 35 years) or older (parent's age between 35 and 64 years) one-parent family out of all families;

4. Percentage of families including only elderly people (65 years and over) with at least one member aged 80 years and over.
5. Percentage of the population living in overcrowding houses, i.e. percentage of people living in houses under 40 square meters with more than 4 occupants, or in houses between 40 and 59 square meres with more than 5 occupants, or in houses between 60 and 79 square meters with more than 6 occupants out of all the population living in occupied houses;
6. Percentage of young people (aged between 15 and 29 years) out of labour market and education;
7. Percentage of families with potential financial difficulties, i.e. percentage of families in which none of the sons is active or retired out of all families.

The Italian municipalities were then classified according to the quintiles of the distribution of the vulnerability index.

3.4 Measured outcomes

Mortality from all causes and from some selected causes were the outcomes of this study. Causes of death were selected among those included in the European short list of causes of death (65-items). The European shortlist of causes of death is a tool giving a categorization of the most relevant causes of death for the European Union. It covers 65 causes of death selected on the basis of relevance with respect to the European Union mortality patterns and to national and sub-national health programs.

Among these causes we selected 34 groups of causes including: HIV/AIDS (ICD-10 codes: B20-B24), other infectious and parasitic diseases (rest of A00-B99), all neoplasms (C00-D48), cancer of buccal cavity, pharynx (C00-C14), cancer of oesophagus (C15), cancer of stomach (C16), cancer of colon-rectum (C18-C21), cancer of liver (C22), cancer of larynx (C32), cancer of trachea, bronchus and lung (C33-C34), melanoma of the skin (C43), cancer of prostate (C61), cancer of bladder (C67), cancer of kidney and other urinary organs except bladder (C64-C66, C68), Hodgkin's disease (C81), leukemia (C91-C95), other neoplasms (rest of C00-D48), diabetes mellitus (E10-E14), dementia and Alzheimer's diseases

(F01, F03, G30), all circulatory system diseases (I00-I99), ischaemic heart disease (I20-I25), cerebrovascular disease (I60-I69), other circulatory system diseases (rest of I00-I99), pneumonia/influenza (J10-J18), chronic obstructive pulmonary diseases (COPD) (J40-J44, J47), other respiratory system diseases (rest of J00-J99), chronic liver diseases (K70, K74), symptoms and ill-defined conditions (R00-R99), all external causes (V01-Y98), road traffic accidents (V01-V89, Y85), suicide (X60-X84, Y87.0), other external causes (rest of V01-Y98), all other causes of death (not listed above).

The analysis by strata of geographic area, marital status, employment status, size and vulnerability index of the municipality of residence was limited to all-cause mortality, mortality from all neoplasms (C00-D-48), major cancers, i.e. stomach (C16), colorectal (C20-C21), liver (C22), lung (C33-C34), breast (C50) and prostate (C61) cancer, diabetes, all circulatory system disease (I00-I99) and suicide.

In this study, we considered only the underlying causes of death, i.e. the disease or injury that initiated the train of morbid events leading directly to death or the circumstances of the accident or violence that produced the injury. The underlying cause of death is the one adopted as the cause for tabulation of mortality statistics.

3.5 Data analysis

This report is based on four years of follow-up of the census cohort covering the period 2012-2015.

Highest educational attainment and occupation-based social class were used to attribute the SES to each individual, since they are among the main SES variables used in studies evaluating socioeconomic inequality [3].

When education was used as proxy of SES the analysis was restricted to people aged 30-74 years as younger subjects may have not completed their educational course and the limited number of highly educated people at older ages would make the analysis of limited usefulness.

When occupation was used as proxy of SES, only the working population aged between 30 and 64 years on 1 January 2012 and with available data on occupation (73% of the working Italian population, i.e. the workers who filled in the long form of the census questionnaire) was considered in the analysis. Unemployed people and people older than 65 years were excluded since most of them had retired at that age.

Absolute socioeconomic inequality was evaluated by computing the age-standardized mortality rate (ASMR), whereas relative inequality was measured by estimating the mortality rate ratio (MRR) in strata of a given SES variable.

The age-standardized mortality rate (ASMR), for each strata of the SES variable, was calculated as follows:

$$\sum_{i=1}^{I} \frac{D_i}{PY_i} * W_i * 10{,}000$$

where *D* denotes the number of deaths occurred in the period 2012-2015 in each age group *(i)*, *PY* the person-years at risk and *W* the weights obtained from the 2013 European standard population [28].

The MRR was estimated by fitting a multiplicative Poisson model, in which the random variable "number of deaths" *(D)* is assumed to follow a Poisson distribution $D \sim Pois\ (\mu)$ with probability density function equal to:

$$P(D=d) = \frac{exp(-\mu) \cdot \mu^d}{d!}$$

and the expected variance that equals the mean:

$$E(D) = \mu \qquad Var(D) = \mu$$

In the standard Poisson model, the variance function is equal to μ, however, to verify if this assumption holds the over-dispersion parameter (Φ) was estimated from Pearson's χ_p^2 statistic, which is defined as:

$$\chi_p^2 = \sum_{i=1}^{I} \frac{(d_i - \mu_i)^2}{var(d_i)} = \sum_{i=1}^{I} \frac{(d_i - \mu_i)^2}{\Phi\ \mu_i}$$

Equating the Pearson's χ_p^2 statistic to its expectation and solving for Φ gives the estimate:

$$\Phi = \frac{\chi_p^2}{n-p}$$

If Φ >1 there is indication of potential over-dispersion, therefore a quasi-Poisson model [29] was run in order to inflate the standard errors of the model estimates. This strategy leads to the same coefficient estimates as the standard Poisson model, but inference is adjusted for over-dispersion. In this type of model, the variance is assumed to be proportional to the mean:

$$Var(D) = \Phi\ \mu$$

The link function for these kinds of models is η = log(μ) and results in a log-linear relationship between the mean expected death count and the linear predictor:

$$log\ (\mu_{i,k}) = \alpha + \beta_i AGEC_i + \gamma_k SES_k + log\ (PY_{i,k})$$

Where *i* denotes the ith 5-year age category, *k* the *kth* category of a given SES variable and *α, β* and *γ* are the estimated parameters for intercept, age group and category of a given SES variable, respectively. The model was fitted separately for men and women.

Person-years (PY) at risk for each 5-year age group and each category of a given SES variable were computed as:

$$PY_{j,i} = \sum_{j=1}^{J} \sum_{i=1}^{I} (d2_{j,i} - d1_{j,i})$$

where $d1_{j,i}$ and $d2_{j,i}$ represent, respectively, the starting date of the follow-up (1 January 2012) and the end of the follow-up (date of death or date of censoring –

31 December 2015 for people alive on that date or the date of emigration for people who moved abroad) for the *j*th subject in the *i*th age category.

Exponentiating the linear predictor gives a multiplicative model for the mean itself:

$$\mu_{i,k} = exp^{(\beta_0+\beta_i AGEC_i+\gamma_k SES_k)} \cdot PY_{i,k}$$

In this model, the exponentiated regression coefficient γ_k represents the multiplicative effect of the SES variable on the mean death rate, therefore it can be considered an estimate of the mortality rate ratio (MRR).

Beside the basic model, containing one SES variable at time, we fitted different models mutually adjusting for other SES variables, to evaluate the independent effect of education or occupation-based social class.

However, the MRR does not provide a unique synthetic measure of inequality to be used for comparisons among the same population or among different population. To this aim two regression based indicators have been developed: the slope index of inequality (SII) and the relative index of inequalities (RII) [30,31]. These indicators take into account the relative socioeconomic position of groups in the population. It does so by regressing the mortality rate of SES groups on a very specific measure of their relative position: the proportion of the population that has a higher position in the social hierarchy, i.e. the socioeconomic rank $X_{(k)}$, scaled to take values between 0 (lowest) and 1 (highest). The computation of the socioeconomic rank requires a SES variable that is ordinal and with a gradient linear relationship with mortality rate. Among the SES variables, we used the highest education attainment to compute the socioeconomic rank, since it has an ordinal scale and it yield a linear relationship with mortality rates. The computation of socioeconomic rank using occupation - based social class was not possible since the frame of the classification do not imply an ordinal scale.

The socioeconomic rank $X_{(k)}$ was calculated as follows:

1. For each of the k ordered level of education (i = 1, . . . , k), let c_i be the fraction of the population in class i or higher ($c_{k+1} = 0$).
2. For each class i the social rank is obtained by computing the median social rank for that class $x_i = (c_i + c_{i+1})/2$

The RII was obtained from a multiplicative Poisson model, as described above, using the socioeconomic rank $X_{(k)}$ as predictor instead of the original SES variable [32].

$$\mu_{i,k} = exp^{(\beta_0+\beta_i AGEC_i+\gamma X_{(k)})} \cdot PY_{i,k}$$

Then the RII is given by:

$$RII = exp(\gamma)$$

Given that the SII is an absolute measure and the relationship between mortality and age is of undisputable exponential nature, its value strictly depends on the age structure of the population. Therefore, to account for this, the age-standardized SII was obtained by fitting an additive Poisson model assuming that death counts *(D)* is Poisson distributed with mean satisfying a linear model [32]:

$$\mu_{i,k} = \beta_i AGEC_i PY_i + \gamma_i X_{(k)} AGEC_i PY_{i,k}$$

The estimate of the SII is given by:

$$SII = \sum_{i=1}^{I} W_i \gamma_i$$

Where W_i denotes the weights obtained by the 2013 European standard population.

As for the previous models, in case of the dispersion parameter (Φ) was greater than 1 we inflated the estimate of the standard errors using a quasi-Poisson model and the delta method [32].

RII and SII express the magnitude of socioeconomic inequality in relative and absolute terms, respectively, by providing a unique estimate of the inequality that can be used for comparisons within the same population or between different populations. The resulting figures can be interpreted as the ratio (for RII) or

difference (for SII) of mortality rates between those at the bottom and those at the top of the social hierarchy.

These indicators were computed to achieve the following aims:

1. To detect the causes of death with the highest socioeconomic inequality both in absolute and relative terms;
2. To evaluate differences in socioeconomic inequality across strata of marital status;
3. To evaluate geographic differences in socioeconomic inequality within the country;
4. To evaluate differences in socioeconomic inequality according to size and vulnerability index of the municipality of residence.

Moreover, RII and SII were also computed to obtain national estimates of socioeconomic inequalities to be used for international comparisons.

The analysis of variance (ANOVA) between nested models along with *F* test were used to verify the overall statistical significance of the interaction between SES variables and geographic area, marital status, size and quintiles of the vulnerability index of the municipality of residence. All tests were two-sided and a *P* values below .05 were considered statistically significant.

The analysis was performed using R (R version 3.5.0 (2018-04-23)). The function "glm" from the package "stats" was used to fit the multiplicative Poisson/quasi-Poisson model, while the "glm2" function from the package "glm2" was used for fitting the additive models [33].

4. RESULTS

4.1 Socioeconomic status of the Italian population

A total of 35,708,445 subjects aged between 30-74 were included in the study. The follow-up until 31 December 2015 resulted in 137,847,954 person-years at risk. **Table 3** shows the distribution of the population according to sex, level of education and occupation-based social class. A subset of the population was used in the analysis of occupation-based social class which included 13,741,773 working Italians aged between 30 and 64 years and a total of 54,116,521 person-years at risk.

Around 20% of the population aged 30-74 years did not have a middle school diploma and 14% were university graduates. Women were more likely to have a low level of education than men (22.6% had less than middle school education *vs.* 16.5% among men), while the percentage of university graduates was similar between sexes (14.8% among women vs. 13.1% among men).

The largest occupation-based social class was routine non-manual (32.8%) followed by non-skilled manual (22.7%) and upper non-manual workers (20%). Skilled manual workers and self-employees exceeded 11%, while farmers were only a minority (less than 2%). The distribution according to occupation-based social class showed remarkable differences between sexes, with a higher percentage of women employed in routine non-manual worker activity (45.3% vs. 23.7%), while only a minority of them were employed as skilled-manual workers or self-employees. The percentages of upper non-manual workers were not substantially different (20.7% among women and 19.4% among men).

4.2 Education and premature mortality

During the follow-up 573,335 deaths (357,046 among men and 216,289 among women) were registered in the age range 30-74 years.

The ASMR from all causes showed a gradient relationship between education and mortality both in men and women. The ASMRs for men with no education or primary school, middle school, high school and university graduated were: 717.1, 559.7, 460.6, and 356.3 deaths per 100,000 person-years, respectively. The

ASMRs for women with no education or primary school, middle school, high school and university graduated were: 354.8, 299.0, 266.1 and 237.2 deaths per 100,000 person-years, respectively. **Table 4** and **Table 5** give the ASMRs for specific causes in men and women, respectively.

Compared to men with the highest level of education (university graduates), the MRR from all causes was 1.30 (95% CI: 1.10-1.53) for men with high school diploma, 1.64 (95% CI: 1.40-1.92) for those with middle school diploma and 1.93 (95% CI: 1.65-2.27) among those with no education or primary school certificate. Compared to women with the highest level of education (university graduates), the MRR from all causes was 1.14 (95% CI: 1.01- 1.29) for women with high school diploma, 1.31 (95% CI: 1.16- 1.48) for those with middle school diploma and 1.44 (95% CI: 1.28- 1.63) among those with no education or primary school certificate.

Men with the lowest level of education had a higher risk of mortality from all the diseases considered in this study, with the only exception of skin cancer for which low education is associated with lower mortality (**Table 6**).

Women with the lowest level of education had a higher risk of mortality from most of the diseases considered in this study, with the exception of colorectal, skin, lung, and bladder cancers and Hodgkin's disease, leukemia and suicide for which there was no significant association. In contrast, women in the lowest level of education showed a reduced mortality from breast cancer (**Table 7**).

4.3 Occupation-based social class and premature mortality

During the follow-up 76,987 deaths (55,692 among men and 21,295 among women) were registered in the working population aged between 30 and 64 years at the beginning of the follow-up.

Among men, non-skilled manual workers had the highest ASMR from all causes (229.1 deaths per 100,000 person-years). The ASMRs was lower among farmers (210.9 deaths per 100,000 person-years), skilled manual workers (196.2 deaths per 100,000 person-years), routine non-manual workers (178.7 deaths per 10,000 person-years) and managers or professionals (142.6 deaths per 10,000 person-years).

Among women, the ASMR from all causes was similar among routine non-manual, skilled and non-skilled manual workers (around 100 deaths per 100,000 person-years), while it was lower among upper non-manual workers and farmers (95 deaths per 100,000 person-years) and slightly higher among self-employees (108 deaths per 100,000 person-years).

Table 8 and **Table 9** give the cause-specific AMRs by occupation-based social class in men and women, respectively.

In men, all the other classes showed increased all-cause mortality as compared to upper non-manual workers. The MRR was 1.24 (95% CI: 1.18- 1.30) among routine non-manual workers, 1.31 (95% CI: 1.24- 1.38) among self-employees, 1.48 (95% CI: 1.35- 1.63) among farmers, 1.37 (95% CI: 1.30- 1.45) among skilled manual workers and 1.63 (95% CI: 1.55- 1.71) among non-skilled manual workers.

In women, all the other classes showed only a slight increased mortality as compared to upper non-manual workers, with the only exception of farmers who had similar mortality level. The MRR was 1.07 (95% CI: 1.02- 1.13) among Routine non-manual workers, 1.14 (95% CI: 1.06- 1.23) among self-employees, 1.03 (95% CI: 0.89- 1.19) among farmers, 1.08 (95% CI: 0.98- 1.20) among skilled manual workers and 1.09 (95% CI: 1.03- 1.16) among non-skilled manual workers.

Table 10 shows the MRRs from specific causes of death across occupation-based social classes among men. As compared to upper non-manual workers the other categories had increased mortality from most of the causes considered in this study, with the exception of HIV (among farmers), colorectal (among farmer), prostate and kidney cancers, leukemia, dementia and suicide (among routine non-manual workers) for which mortality rates were not significantly different. In contrast, mortality from skin cancer was lower among all the other classes as compared with upper non-manual workers.

Table 11 shows the MRRs from specific causes of death across occupation-based social classes among women. Among women, the MRRs were around the unity or not significant for most of the causes and occupation-based classes. However, increased mortality was observed for HIV (among routine non-manual workers), oesophageal cancer (among self-employees and non-skilled manual

workers), stomach cancer (among routine non-manual workers, self-employees and non-skilled manual workers), laryngeal cancer (among self-employees), lung cancer (among routine non-manual workers, self-employees and skilled non-manual workers), cervical cancer (among skilled and non-skilled manual workers), uterine cancer (among non-skilled manual workers), ischaemic heart disease (among self-employee and non-skilled manual workers), cerebrovascular diseases (among farmers and non-skilled manual workers), COPD (among non-skilled manual workers), chronic liver diseases (among non-skilled manual workers), road traffic accidents (among non-skilled manual workers) and suicide (among farmers). Compared to upper non-manual workers, mortality from breast cancer was lower in routine non-manual workers, farmers, skilled and non-skilled manual workers.

4.4 Independent effect of education and occupation-based social class on premature mortality

Although, both education and occupation were demonstrated to be significant determinants of overall and cause-specific mortality, we tested, in the working population aged between 30 and 64 years, the independent effect of both SES variables in mutually adjusted models.

When occupation-based social class was added to the model used to obtain the MRRs, the MRRs for all-cause mortality across educational levels reduced. The MRR for all causes changed from 1.29 to 1.19 among men with high school diploma, from 1.64 to 1.44 among men with middle school diploma and from 1.75 to 1.51 among men with no education or primary school certificate. In women, the inclusion of occupation-based social class into the model did not change materially the MRRs. The unadjusted and occupation-adjusted MRRs were: 1.07 and 1.05 among women with high school diploma, 1.14 and 1.11 among women with middle school diploma, 1.08 and 1.04 among women with no education or primary school certificate.

Table 12 and Table 13 show the estimates of the MRRs by level of education unadjusted and adjusted for occupation-based social class. In men, the MRRs for people with no education, primary school or middle school diploma remained

considerably higher for most of the causes. In women, most of the associations were not statistically significant with only a few exceptions, such as increased mortality from HIV/AIDS and liver cancer among women with no education, primary or middle school diploma, ischaemic diseases among women with no education, primary, middle and high school diploma, cerebrovascular and chronic liver diseases among women with middle school diploma. The MRR remained below one for breast cancer in women with middle school diploma or no education or primary school certificate and for leukemia among women with no education or primary school certificate.

Similarly, when level of education was added to the model used to obtain the MRRs, the MRRs for all-cause mortality across occupation-based social class reduced. In men, the MRR for all causes changed from 1.24 to 1.12 among routine non-manual workers, from 1.31 to 1.09 among self-employees, from 1.48 to 1.21 among farmers and from 1.37 to 1.12 among skilled manual workers, from 1.63 to 1.31 among non-skilled manual workers. In women, the inclusion of education into the model did not affect the MRR estimates. The unadjusted and education-adjusted MRRs were: 1.07 and 1.05 among routine non-manual workers, 1.14 and 1.11 among self-employees, 1.03 and 1.00 among farmers, 1.08 and 1.04 among skilled, 1.09 and 1.05 among non-skilled manual workers.

Table 14 and Table 15 show the estimates of the MRRs by occupation-based social class unadjusted and adjusted for level of education, using the upper non-manual workers as reference. In men, the MRRs remained higher for most of the causes, including oral cancer among non-skilled manual workers, oesophageal cancer among farmers, skilled and non-skilled manual workers, stomach cancer among skilled and non-skilled manual workers, liver cancer among non-skilled manual workers, laryngeal cancer among non-skilled manual workers, lung cancer among routine non-manual workers, self-employees, skilled and non-skilled manual workers, bladder cancer among skilled and non-skilled manual workers, diabetes among routine non-manual and non-skilled manual workers, ischaemic heart diseases among farmers and non-skilled manual workers, cerebrovascular diseases among non-skilled manual workers, pneumonia among farmers, COPD among non-skilled manual workers, chronic liver diseases among all the classes, road traffic accidents and suicide among self-employees, farmers

and non-skilled manual workers. In women, the MRR remained significantly higher only for stomach cancer among self-employees and non-skilled manual workers, cervical cancer among skilled and non-skilled manual workers, chronic liver diseases and suicide among farmers. The MRR for breast cancer remained below the unity among farmers, skilled and non-skilled manual workers.

4.5 The causes of death with the highest socioeconomic inequality in premature mortality

Table 16 gives the RII by causes of death, derived by regressing the socioeconomic rank based on education attainment on overall and cause-specific mortality rates. Relative socioeconomic inequality was larger in men for all-cause mortality (RII: 2.07, 95% CI: 1.81-2.37 in men and 1.51, 95% CI: 1.35-1.68 in women, *P* = .001). Significant higher inequality in men was also found for oral, oesophageal, colorectal, laryngeal, liver and bladder cancers, COPD, road traffic accidents and suicide, while inequality was significantly higher in women for diabetes. In men, the causes with high relative inequality (RII>2) were: HIV/AIDS, other infectious diseases, oral, esophageal, stomach, liver, laryngeal and lung cancers, diabetes, cerebrovascular diseases, pneumonia, COPD chronic liver diseases and road traffic accidents. In women, the causes with high relative inequality (RII>2) were: HIV/AIDS, other infectious diseases, stomach, liver, laryngeal and cervical cancers, diabetes, ischaemic and cerebrovascular diseases, pneumonia and chronic liver diseases.

Figure 1 shows the causes of death ranked by relative inequality in men. And women separately. The five causes of death with the highest relative socioeconomic inequality were: laryngeal cancer (RII: 5.69), chronic liver disease (RII: 5.05), COPD (RII: 4.83), HIV (RII: 4.77) and oral cancer (RII: 3.52) in men and diabetes (RII: 5.75), HIV (4.33), chronic liver diseases (RII: 3.47), COPD (RII: 2.81) and ischaemic heart diseases (RII: 2.52) in women.

Table 17 gives the SII by causes of death, derived by regressing the socioeconomic rank based on education attainment on overall and cause-specific mortality rates. As expected, socioeconomic inequality in absolute terms was considerably higher in men than in women (SII: 373 vs. 113 deaths per 100,000 person-years) due to the higher mortality in men. All neoplasms contributed to

38% of overall socioeconomic inequality in men and only 7% in women. In contrast, the contribution of all circulatory system diseases was higher among women than among men (38 vs. 23%). The causes of death with the highest absolute socioeconomic inequality were: lung cancer (15.5% of total inequality), ischemic heart diseases (9.4%), other circulatory diseases (4.8%), liver cancer (4.5%), chronic liver diseases (4.5%) and diabetes among men, and other circulatory system diseases (16.8%), ischemic heart diseases, diabetes (12.4%), cerebrovascular diseases (8.0%), chronic liver diseases (4.4%) and stomach cancer (4.4%) among women (**Figure 2**).

4.6 Marital status and socioeconomic inequality in premature mortality

Figure 3 and **Figure 4** show the RII estimated according to marital status for some selected causes of death among men and women, respectively.

In men, socioeconomic inequality was significantly different across strata of marital status for all-cause mortality (*P*< .0001), all neoplasms (*P*< .0001), colorectal (*P*= .001), liver (*P*= .041), lung (*P*= .031) cancers, diabetes (*P*= .046) and all circulatory system diseases (*P*< .0001), whereas socioeconomic inequality for stomach (*P*= .947), prostate cancers (*P*= .130) and suicide (*P*= .404) were not significantly different across strata of marital status. Socioeconomic inequality was greater among singles and separated or divorced than married individuals for all-cause mortality (RIIs: 3.24, 2.58 and 1.80 among singles, separated/divorced and married men, respectively), all neoplasms (RII were: 2.23, 2.36 and 1.65 among singles, separated/divorced and married men, respectively), colorectal (RIIs were: 1.80, 1.61 and 1.26 among singles, separated/divorced and married men, respectively), liver (RII were: 3.65, 4.19 and 2.42 among singles, separated/divorced and married men, respectively) and lung cancers (RIIs: 2.74, 3.30 and 2.27 among singles, separated/divorced and married men, respectively), diabetes (RIIs: 3.87, 3.80 and 2.88 among singles, separated/divorced and married men, respectively) and all circulatory system diseases (RIIs: 2.89, 2.33 and 1.73 among singles, separated/divorced and married men, respectively)

In women, socioeconomic inequality was significantly different across strata of marital status for mortality from all causes (*P*< .0001), all neoplasms (*P*= .0003)

and lung cancer (*P*= .0005), whereas socioeconomic inequality in mortality from stomach (*P*= .518), colorectal (*P*= .207), liver (*P*= .537), breast cancers (*P*= .075), diabetes (*P*= .538) and suicide (*P*= .579) were not significantly different across strata of marital status. Socioeconomic inequality was significantly higher in singles as compared to married individuals for mortality from all causes (RIIs: 2.71 among singles and 1.42 among married women) and circulatory system diseases (RIIs: 4.21 among singles and 2.36 among married women). RII values for mortality from all neoplasms indicated moderate socioeconomic inequality among singles (RII: 1.35) and separated or divorced women (RII: 1.26), whereas there was no evidence of inequality in married (RII: 1.07) and widowed women (RII: 0.98). Similar results were observed for mortality from lung cancer with RII values of 1.33 and 1.19 among singles and separated or divorced women.

4.7 Geographic differences in socioeconomic inequality in premature mortality

Figure 5 and **Figure 6** show the RII estimated across geographic area of the country for some selected causes of death among men and women, respectively. In men, socioeconomic inequality in mortality from colorectal cancer was significantly different across geographic area of the country (*P* = .033) with lower RII values among men living in southern Italy as compared to those living in northern and central Italy (RIIs: 1.21, 1.45 and 1.40 in southern, central and northern Italy respectively). In contrast, there were no significant geographic differences in inequality for all-cause mortality (*P*= .839) and mortality from stomach (*P*= .103), liver (*P*= 0.198), lung (*P*= .793) and prostate cancers (*P*= .247), all circulatory system diseases (*P* = .417), diabetes (*P*= .708) and suicide (*P*= .896).

In women, socioeconomic inequality was significantly different across geographic area of the country for all-cause mortality (*P* = .047), stomach cancer (*P* = .010), diabetes (*P* = .008) and all circulatory system diseases (*P* = .0001).

Women living in southern Italy showed higher socioeconomic inequality for all-cause mortality (RIIs: 1.65, 1.37, 1.42 in southern, central and northern Italy, respectively), mortality from all circulatory system diseases (RIIs: 2.73, 1.86, 2.01 in southern, central and northern Italy, respectively), and diabetes (RIIs: 6.21,

4.32, 3.71 in southern, central and northern Italy, respectively) as compared to northern and central Italy. In contrast, socioeconomic inequality in mortality from stomach cancer was lower in southern as compared to the other area of the country (RIIs were: 1.62, 2.43, 2.56 in southern, central and northern Italy respectively). Inequality for all neoplasms (*P*= .629), colorectal (*P*= .779), liver (*P*= .265), lung (*P*= .245), breast cancers (*P*= .908) and suicide (*P*= .882) were not significant different across geographic area of the country.

4.8 Size of the municipality of residence and socioeconomic inequality in premature mortality

Figure 7 and **Figure 8** show the RII estimated according to the size of the municipalities for some selected causes of death among men and women, respectively.

In men, there were significant differences in socioeconomic inequality according to the size of the municipalities for all-cause mortality (*P*= .008) and mortality from all neoplasms (*P*=.001), stomach (P= .011), liver (P= .046), lung (P= .0002) cancers, diabetes (*P*= .002), all circulatory system diseases (P= .003). In contrast, there were no significant differences for colorectal (P= .121) and prostate (*P*= .998) cancers and suicide (*P*= .721). Socioeconomic inequality was higher in large municipality with 50,000 or more inhabitants. The RIIs for all-cause mortality were 1.88, 1.90, 2.03 and 2.42 in municipality with less than 2,000, 2000-19,999, 20,000-49,999 and 50,000 or more inhabitants, respectively. Similar results were observed for mortality from all neoplasms (RIIs: 1.56, 1.62, 1.76 and 2.03 in municipality with less than 2,000, 2000-19,999, 20,000-49,999 and 50,000 or more inhabitants, respectively), liver (RIIs: 2.09, 2.29, 2.52 and 3.44), lung (RIIs: 1.89, 2.10, 2.50 and 2.98) cancers, diabetes (RIIs: 2.58, 2.64, 3.26 and 4.13) and all circulatory system diseases (RIIs: 1.77, 1.83, 1.82 and 2.31). For mortality from stomach cancer, the smallest and the largest municipalities showed higher socioeconomic inequality (RIIs: 2.75, 2.01, 2.30 and 2.75)

In women, there were no significant differences according to the size of municipalities for all-cause mortality (*P*= .074) and for stomach (*P*= .089), colorectal (*P*= .267), liver (*P*= .688), lung (*P*= .412), breast (*P*= .243) cancers, all

circulatory system diseases (*P*= .0686) and suicide (P= .608), whereas socioeconomic inequality in mortality from diabetes was higher in municipalities with 50,000 or more inhabitants (RIIs were: 4.46, 4.73, 4.92 and 8.08 in municipalities with less than 2000, 2000-19,999, 20,000-49,999 and 50,000 or more inhabitants, respectively, *P*= .011).

4.9 Social and material vulnerability of the municipality of residence and socioeconomic inequality in premature mortality

Figure 9 and **Figure 10** show the RII estimated according to the quintiles of the distribution of the vulnerability index of the municipality of residence for some selected causes of death among men and women, respectively.

In men, there were no significant differences in socioeconomic mortality across fifths of the vulnerability index distribution for all-cause mortality (*P*= .986), stomach (*P*= .327), liver (*P*= .529), lung (*P*= .583), prostate (*P*= .835) cancers, diabetes (*P*= .164), all circulatory system diseases (*P*= .872) and suicide (*P*= .680). For mortality from colorectal cancer, socioeconomic inequality was higher in the 3rd and the 4th fifths of the distribution as compared to the other fifths (RII were: 1.26, 1.28, 1.45, 1.49 and 1.19 for the 1st,2nd ,3rd, 4th and 5th fifths of the vulnerability index distribution, respectively).

In women, there were significant differences in in socioeconomic mortality across fifth of the vulnerability index distribution for all-cause mortality (P= .0401) and mortality from diabetes (P= .049), all circulatory diseases (P= .0004) and suicide (P= .029), whereas there were no significant differences for mortality from all neoplasms (P= .0783), stomach (P= .267), colorectal (P=.164), liver (P= .541), lung (P= .473) and breast (P= .905) cancers. Socioeconomic inequality in mortality from all causes and circulatory system diseases was higher among women living in municipalities with high values of the vulnerability index. The RIIs for all-cause mortality were: 1.34, 1.40, 1.43, 1.47 and 1.70 for the 1st,2nd ,3rd, 4th and 5th fifths of the vulnerability index distribution, respectively. The RIIs for mortality from all circulatory system diseases were: 1.90, 1.92, 2.02, 2.29 and 2.90 for the 1st, 2nd, 3rd, 4th and 5th fifths of the vulnerability index distribution, respectively. Corresponding figures for diabetes were: 3.37, 4.33, 4.04, 5.36 and 6.58. There was no evidence of inequality in mortality from suicide in all

municipalities with the only exception for those in the 3rd fifth of the vulnerability index distribution with an opposite relationship, i.e. higher mortality among women with high SES.

4.10 Socioeconomic inequality in mortality: international comparisons.

In the study by Mackenback et al.[7], aiming to evaluate socioeconomic inequality in 22 European countries, the RII was greater than 1 in all countries, indicating that, throughout Europe, mortality is higher among less-educated people. The magnitude of these inequalities varied substantially among countries. For example, in Sweden, the RII for men was less than 2, indicating that mortality among those with the least education is less than twice that among those with the most education; on the other hand, in Hungary, the Czech Republic, and Poland, the RII for men was 4 or higher, indicating that mortality differs by a factor of more than 4 between the lower and upper ends of the education scale. The smallest inequalities for both men and women were found in the Basque country of Spain, whereas the largest inequalities were found in the Czech Republic and Lithuania. Education-related inequalities in mortality was smaller than the average for Europe in all southern European populations included in that study and larger than average in most countries in the eastern and Baltic regions.
For Italy, the RII was lower than 2 in men and lower than 1.5 in women. These estimates were derived from an urban, longitudinal, census-linked mortality study in the city of Turin having 4,873,109 person-years of follow-up and 50,621 deaths, collected between 1991 and 2001. The estimates of the present study of 2.07 in men and 1.51 in women, obtained a decade later, are slightly higher compared to those reported in that study.

5. DISCUSSION

5.1 Main findings

This study documented a high degree of socioeconomic inequality in premature mortality in Italy over a recent period between 2012 and 2015. Education and occupation, two proxies of SES, were proved to be major determinants of overall and cause-specific premature mortality in Italy. Being less educated and having a less prestigious job had a negative effect on premature mortality from a wide range of causes of death.

The magnitude of the socioeconomic inequality varies according to sex and cause of death. Men showed higher socioeconomic inequality for all-cause mortality and for most of the causes considered in this study. In relative terms, the causes of death with the highest inequality were: laryngeal cancer, chronic liver diseases, COPD, HIV/AIDS among men, and diabetes, HIV/AIDS and chronic liver diseases among women. However, the contribution of some of these causes (i.e. laryngeal cancer and HIV/AIDS) to the overall socioeconomic inequality was only marginal. In fact, in absolute terms, lung cancer and circulatory system diseases in men, and circulatory system diseases and diabetes in women made the highest contribution to overall socioeconomic inequality.

There were no substantial geographic differences in socioeconomic inequality in mortality from all causes and from specific causes in men, whereas socioeconomic inequality from circulatory system diseases and diabetes was considerably higher in women living in southern Italy compared to those living in the north and central part of the country.

Socioeconomic inequality was more pronounced among singles, separated and divorced compared to married individuals, among those living in large municipalities, and among women living in municipalities with high social and material vulnerability.

In addition, this study shows that education and occupation are not interchangeable as markers of SES but they are independent determinants of

premature mortality. However, education is a better proxy then occupation-based social class in evaluating socioeconomic inequality in mortality among Italian women.

5.2 Study findings in the context of the existing knowledge

In agreement with most European populations, both absolute and relative socioeconomic inequality for overall mortality in Italy is greater in men than in women [7]. Similarly, the sex difference in the contribution of cancer and circulatory system diseases to total socioeconomic inequality, reported in this study, was previously found in studies from Spain and France [34,35].

The lower contribution of cancer among women depends on the specific pattern of association between socioeconomic position and breast and lung cancers in women (the most common cancer sites in women). Breast cancer mortality, in fact, tends to be positively associated with education, with higher mortality among highly educated women [36]. This has been ascribed to the reproductive behaviours of highly educated women who were more likely to have the first childbirth at older ages [37]. However, a study [38] based on data from national mortality registers and censuses of 18 European populations in the 2000s suggests that this pattern of association is changing. In most populations, high education was associated with lower mortality rates among women 30-49 years old, while an inverse pattern was found in older women (50-74 years) showing positive association. That study included also data from an Italian census-based longitudinal study from the city of Turin that showed the same pattern of association. Our study found similar results, i.e. a positive association in the whole population aged 30-74 years, but a negative association in younger women. The most reliable explanation for this pattern of association is a better survival in the highly educated women, who are lately diagnosed at early stage [39].

With regard to lung cancer, a study [40] including 16 European populations observed a regional pattern in Europe with northern countries showing a similar association between men and women, i.e. higher mortality rates among people in lower social classes, while in the rest of Europe socioeconomic inequality was

much smaller or even inverse. In agreement with the results of the present study, for most European countries the contribution of lung cancer to total socioeconomic inequality was greater than 10% in men, whereas in women was less important with the only exception of Sweden, Norway and Denmark reporting a contribution between 5 and 15%. However, data from the urban areas of Turin, Madrid and Barcelona showed an inverse gradient with higher mortality among highly educated women. The results of the present study, obtained a decade later, are in agreement with this last finding and can be partially attributed to the higher prevalence of smoking in highly educated as compared to the less educated women [41]. Although, this inverse association is expected to mirror that of men in the next future as a consequence of the reduction of smokers among the highly educated young women [42].

In addition, lung and colon cancers are more frequent in countries with high level of human development [43], as defined by life expectancy, education and gross national income. In high-income countries there is a decreasing mortality trend from these cancers limited to highly educated individuals [44]. In fact, individuals with high SES had a consistent advantage in term of treatment and survival compared to those in the low SES category [45,46]. The decreasing mortality rate from these cancer sites, observed in the highest level of education, might have contributed to eliminate the association previously found between high education and mortality from lung and colon cancers in women.

Difference in smoking prevalence among levels of education may also explain the strong association between low SES and upper aero-digestive, bladder cancers and chronic lower respiratory diseases in men. Though, this last association can be affected by a confounding effect of occupational exposure to toxic chemicals [47], that has not been evaluated in the present study.

A lower risk of melanoma was found among people with low SES. This is consistent with the hypothesis that a more regular sun exposure among individuals with low social class could protect against this cancer [48].

In the present study, ischaemic heart disease was among the major contributor to the overall socioeconomic inequality in both sexes, however, relative inequality was higher in women than in men. This is in line with the results of a study [49]

of 49 middle-aged (35-64 years old) cohorts from 15 European countries, which included also 4 cohorts from northern, one from central and one from southern Italy. In that study, 28-day case-fatality was the main determinant of socioeconomic inequality in mortality from coronary heart diseases (CHD) in men, while in women CHD incidence accounted for most of the disparity in CHD mortality. The relative inequality in CHD incidence was higher in women than in men in all countries, with women who lived in an area of northern Italy showing the highest socioeconomic inequality in relative terms. This disadvantage persists after adjusting for major baseline risk factors, such as HDL cholesterol, non-HDL cholesterol, systolic blood pressure, smoking and diabetes. However, differences in secondary prevention with worse control of risk factors in women affected by CHD may also play a role. Data from the EUROASPIRE IV cross-sectional survey (2012-2013) [50], including hospitalized patients for a first or recurrent coronary event from 24 European countries, showed a lower proportion of less educated women reaching the target for blood pressure, LDL-cholesterol, HbA1c, weight and physical activity as compared to men with the same level of education, whereas medication compliance was not different. In addition, psychosocial factors, such as depressive symptoms, financial stress and living alone have been associated with ischaemic cardiovascular events and death in stable CHD patients [51]. Gender-differences in these factors should be further investigated, since they are expected to play a more relevant role in women.

Although the mortality rate from diabetes in men almost doubled that in women, it ranked third among the major contributors in women, accounting around 10% of the social economic inequality, while in men its contribution was remarkably lower (5%). This difference was previously reported in the Spanish cohort where the RII and the contribution of diabetes to the overall socioeconomic inequality in women were twice those of men [34]. The diagnosis of diabetes has more deleterious effect in women than in men, in fact, the risk for fatal CHD in patients with diabetes compared with no diabetes is about 50% greater in women than in men. This difference is mostly attributable to a more unfavourable cardiovascular risk profile in women than in men along with differences in treatment of cardiovascular risk factors with women being less likely to be treated with antihypertensive drugs, statin and aspirin [52,53]. In fact, the lower mortality for

diabetes observed in people with low SES can be explained by both a reduced risk of developing type 2 diabetes [54] and reduced vascular complication rate, the main causes of death in diabetes patients.

Chronic liver diseases were among the major contributors accounting for almost 5% of the total socioeconomic inequality both in men and in women. The inequality for these diseases is likely due to the uneven distribution of the risk factors among the social strata, with viral hepatitis and alcohol abuse being more common in the lowest social stratum [55].

According to previous studies [34,56], AIDS is among the causes with the highest relative socioeconomic inequality both in men and in women. However, its contribution to the absolute inequality was only marginal over recent years in Italy.

The higher socioeconomic inequality for all the external causes in men was expected and reported also in previous cohorts [34,57].

With regard to dementia and Alzheimer's diseases, our findings are of particular interest, since the relationship between socioeconomic status and these diseases is still controversial [58,59]. For dementia and Alzheimer's disease the relative socioeconomic inequality was similar between sexes. Although these causes accounted only for a marginal share of the socioeconomic inequality, our data suggest that studies investigating these populations should take into account the socioeconomic status since it is a relevant risk factor for mortality. Further studies are needed to detect the major determinants of these disparities.

Less-educated men had a higher risk of dying from road traffic accidents, whereas less-educated women had a lower risk. A riskier behavior and a higher prevalence of high-risk occupations, such as driver, in less-educated men, and more time spent driving in highly educated women are among the possible explanations of this pattern of association.

The specific contribution of modifiable behaviors (cigarette smoking, alcohol consumption, unhealthy diet and sedentary) to SES differences in mortality had received considerable attention. However, the contribution of behavior factors is difficult to quantify because its distribution across SES classes is different among the population studied and is expected to change over the time as a consequence of replacement of unhealthy behaviors towards more healthy and social

acceptable behaviors [60]. Several studies suggested that modifiable behaviors explain from 15 to 75% of SES difference in mortality [14]. However, when behavior factors are treated as time-varying variables, the estimate becomes more consistent. A study based on data from the British Whitehall II cohort [61], found that 4 behaviors (smoking, alcohol consumption, diet and physical activity) explained 70% of the difference in occupational mortality and a recent analysis of the Health and Retirement Study (HRS) [62] using a composite SES index found that 3 behaviors (smoking, alcohol consumption and physical activity) explained 68% of SES difference in mortality. When major behavioral risk factor are taking into account the excessive risk of overall, cardiovascular and cancer mortality among subjects with low SES diminishes but does not disappear [63–65].

Psychosocial factors were not evaluated in the previous mentioned studies, however, they are thought to be the unmeasured risk factors accounting for the unexplained difference in inequalities among SES levels. Stress, depression, hopelessness, financial difficulties, lack of social support and social networking, and low job control are more prevalent in people with low socioeconomic position and they are all factors associated with high mortality [66–68].

The protective effect of being married against the socioeconomic inequality, found in the present study, is consistent with previous studies, showing that married people have better health than their unmarried counterparts [69–72]. The proposed reasons for the beneficial effect of being married includes having more material resource, less risky behaviors, less psychological stress and stronger social support and social networks, resulting in a healthier lifestyle and a more awareness of the own health status [73].

5.3 Strengths and limitations

This is one of the largest cohorts ever used to evaluate socioeconomic inequality in mortality, which provide precise estimates also for the less common causes of death. Thus, since there are no national data so far, it provides unique and representative data to be used for international comparisons.

The estimate of the socioeconomic inequality in absolute terms is of particular interest for the public health perspective since it provides a measure of the global impact of the socioeconomic disparities and the amount of excess mortality that could be avoided through social and political interventions. In fact, through the calculation of the SII, we quantified the share of socioeconomic inequality attributable to each specific causes of death. This measure results from the combined effect of the relative difference between the lowest and the highest social stratum, and the mortality rate for the specific disease – the higher the relative difference and/or the mortality rate, the higher will be the absolute inequality.

The study has also some limitations. The main limitations may be ascribed to the quality of death certification that may be affected by low specificity and misclassification of some causes. For example, some cervical cancers may have been coded in the group of cancers of other unspecified part of the uterus, or a specific diagnosis was not available for a share of death certificates reporting unspecified circulatory diseases. Underreporting probably affected also the estimates for diabetes, dementia and Alzheimer.

We could not consider the job loss, occupational mobility and professional career since data on occupation were collected only once at census. Thus, some individuals may have lost or changed their job over the follow-up, although, most job changes were likely within the same or similar EGP category. In addition, people experiencing a favourable occupational move have a reduced risk of mortality as compared to their counterparts who remained in their job [74]. However, this limitation is unlikely to have affected our estimates, as occupational data were collected quite close to the event as the study covered all deaths observed over a 4-year period. In addition, we could not evaluate the contribution of lifestyle risk factors on the socioeconomic disparities in mortalities since this information was not collected in the census.

Finally, reverse causation partly contributes to socioeconomic inequality [75]. In fact, subjects with physical or psychologic/psychiatric diseases are likely to have a lower SES and a high mortality rate due to their underlying conditions. The amount of inequality explained by reverse causation is difficult to quantify, but it

may be more relevant in egalitarian societies, which offer similar opportunities to their populations.

5.4 Conclusions

Socioeconomic inequality in premature mortality is still a major public health problem in Italy. It is more pronounced among some groups of the population, such as singles, separated and divorced individuals, those living in large municipalities, and women living in southern Italy or in municipalities with high social and material vulnerability.

There is a high degree of socioeconomic inequality for a wide range of causes of death, however, lung cancer (in men), circulatory system diseases (in both sexes) and diabetes (in women) are the major contributors to the absolute socioeconomic inequality in Italy.

Urgent and specific interventions should therefore be planned to reduce the unfavourable gap in the distribution across socioeconomic strata of lifestyle risk factors, access to early diagnosis, monitoring and effective treatment for these diseases.

5.5 Implications

The successful linkage of national databases allowed, for the first time, to provide a comprehensive picture of socioeconomic inequality in Italy. The findings of this study will have important implications for planning policies to reduce the existing disparities in mortality in Italy. Our data can be used by policy makers to detect potential areas of intervention toward specific groups of the population in order to plan successful awareness campaigns, and more effective health and social security systems.

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7. REFERENCES

[1] Sommer I, Griebler U, Mahlknecht P, Thaler K, Bouskill K, Gartlehner G, et al. Socioeconomic inequalities in non-communicable diseases and their risk factors: an overview of systematic reviews. BMC Public Health 2015;15:914. doi:10.1186/s12889-015-2227-y.

[2] GBD 2015 SDG Collaborators. Measuring the health-related Sustainable Development Goals in 188 countries : a baseline analysis from the Global Burden of Disease Study 2015. Lancet 2016. doi:10.1016/S0140-6736(16)31467-2.

[3] Galobardes B, Shaw M, Lawlor DA, Lynch JW, Davey Smith G. Indicators of socioeconomic position (part 2). J Epidemiol Community Health 2006;60:7–12. doi:10.1136/jech.2004.023531.

[4] Geyer S. Education, income, and occupational class cannot be used interchangeably in social epidemiology. Empirical evidence against a common practice. J Epidemiol Community Heal 2006;60:804–10. doi:10.1136/jech.2005.041319.

[5] Fujishiro K, Xu J, Gong F. What does 'occupation' represent as an indicator of socioeconomic status?: Exploring occupational prestige and health. Soc Sci Med 2010;71:2100–7. doi:10.1016/j.socscimed.2010.09.026.

[6] Peter R, Siegrist J, Hallqvist J, Reuterwall C, Theorell T. Psychosocial work environment and myocardial infarction: improving risk estimation by combining two complementary job stress models in the SHEEP Study. J Epidemiol Community Health 2002;56:294–300. doi:10.1136/jech.56.4.294.

[7] Mackenbach JP, Stirbu I, Roskam A-JRA-JR, Schaap MM, Menvielle G, Leinsalu M, et al. Socioeconomic inequalities in health in 22 European countries. N Engl J Med 2008;358:2468–81.

[8] Suresh S, Sabanayagam C, Shankar A. Socioeconomic Status, Self-Rated Health, and Mortality in a Multiethnic Sample of US Adults. J Epidemiol 2011;21:337–45. doi:10.2188/jea.JE20100142.

[9] Stringhini S, Carmeli C, Jokela M, Avendaño M, Muennig P, Guida F, et

al. Socioeconomic status and the 25 × 25 risk factors as determinants of premature mortality: a multicohort study and meta-analysis of 1·7 million men and women. Lancet 2017;389:1229–37. doi:10.1016/S0140-6736(16)32380-7.

[10] Wong MD, Shapiro MF, Boscardin WJ, Ettner SL. Contribution of major diseases to disparities in mortality. N Engl J Med 2002;347:1585–92. doi:10.1056/NEJMsa012979.

[11] Byers T, Wolf H, Bauer K, Bolick-Aldrich S, Chen V, Finch J, et al. The impact of socioeconomic status on survival after cancer in the United States : findings from the National Program of Cancer Registries Patterns of Care Study. Cancer 2008;113:582–91.

[12] Kumachev A, Trudeau ME, Chan KKW. Associations among socioeconomic status, patterns of care and outcomes in breast cancer patients in a universal health care system: Ontario's experience. Cancer 2016;122:893–8. doi:10.1002/cncr.29838.

[13] Damiani G, Federico B, Basso D, Ronconi A, Bianchi CBNA, Anzellotti GM, et al. Socioeconomic disparities in the uptake of breast and cervical cancer screening in Italy: A cross sectional study. BMC Public Health 2012;12:99. doi:10.1186/1471-2458-12-99.

[14] Mehta NK, House JS, Elliott MR. Dynamics of Health Behaviors and Socioeconomic Differences in Mortality in the United States. J Epidemiol Community Heal Author 2015;69:416–22.

[15] Clegg L, Reichman ME, Miller B a, Hankey BF, Singh G, Lin YD, et al. Impact of socioeconomic status on cancer incidence and stage at diagnosis: selected findings from the surveillance, epidemiology, and end results: National Longitudinal Mortality Study. Cancer Causes Control 2009;20:417–35. doi:10.1007/s10552-008-9256-0.Impact.

[16] Toch-Marquardt M, Menvielle G, Eikemo TA, Kulhánová I, Kulik MC, Bopp M, et al. Occupational class inequalities in all-cause and cause-specific mortality among middle-aged men in 14 European populations during the early 2000s. PLoS One 2014;9:e108072. doi:10.1371/journal.pone.0108072.

[17] Mackenbach JP, Kulhánová I, Menvielle G, Bopp M, Borrell C, Costa G,

et al. Trends in inequalities in premature mortality: a study of 3.2 million deaths in 13 European countries. J Epidemiol Community Heal 2015;69:207–17. doi:10.1136/jech-2014-204319.

[18] Marinacci C, Grippo F, Pappagallo M, Sebastiani G, Demaria M, Vittori P, et al. Social inequalities in total and cause-specific mortality of a sample of the Italian population, from 1999 to 2007. Eur J Public Health 2013;23:582–7. doi:10.1093/eurpub/cks184.

[19] Sarti S, Terraneo M, Tognetti Bordogna M. Poverty and private health expenditures in Italian households during the recent crisis. Health Policy (New York) 2017;121:307–14. doi:10.1016/j.healthpol.2016.12.008.

[20] Maynou L, Saez M. Economic crisis and health inequalities: evidence from the European Union. Int J Equity Health 2016;15:135. Erratum in: Int J Equity Health. 2016;15(1):1.

[21] Mackenbach JP, Valverde JR, Artnik B, Bopp M, Brønnum-Hansen H, Deboosere P, et al. Trends in health inequalities in 27 European countries. Proc Natl Acad Sci 2018;115:6440–5. doi:10.1073/pnas.1800028115.

[22] Petrelli A, Di Napoli A, Rossi A, Costanzo G, Mirisola C, Gargiulo L. The variation in the health status of immigrants and Italians during the global crisis and the role of socioeconomic factors. Int J Equity Health 2017;16:98. doi:10.1186/s12939-017-0596-9.

[23] Regidor E, Vallejo F, Granados JAT, Viciana-Fernández FJ, de la Fuente L, Barrio G. Mortality decrease according to socioeconomic groups during the economic crisis in Spain: a cohort study of 36 million people. Lancet 2016;388:2642–52. doi:10.1016/S0140-6736(16)30446-9.

[24] Marrone M, Borrelli F, Carbonetti G, De Felici L, Fiorello E. La progettazione dei censimenti generali 2010-2011: disegni campionari e stima di errori di campionamento. ISTAT Work Pap 2011;2.

[25] ILO. International Standard Classification of Occupations: ISCO-08. Geneva: International Labour Office. ISBN 978-92-2- 125953-4. 2012.

[26] Erikson R, Goldthorpe JH. The Constant Flux: A Study of Class Mobility in Industrial Societies. 1993. doi:10.2307/2074401.

[27] ISTAT. L’indice di vulnerabilità sociale e materiale.

http://ottomilacensus.istat.it/fileadmin/download/Indice_di_vulnerabilità_sociale_e_materiale.pdf (accessed 15 May 2018).

[28] EUROSTAT. Revision of the European Standard Population, Report of Eurostat's Task Force, Methodologies and Working Paper, 2013 edition. 2013.

[29] Cameron C, Trivedi P. Regression Analysis of Count Data. Cambridge University Press; 1998.

[30] Mackenbach JP, Kunst AE. Measuring the magnitude of socio-economic inequalities in health: An overview of available measures illustrated with two examples from Europe. Soc Sci Med 1997;44:757–71. doi:10.1016/S0277-9536(96)00073-1.

[31] Regidor E. Measures of health inequalities: part 2. J Epidemiol Community Heal 2004. doi:10.1136/jech.2004.023036.

[32] Moreno-Betancur M, Latouche A, Menvielle G, Kunst AE, Rey G. Relative Index of Inequality and Slope Index of Inequality: A Structured Regression Framework for Estimation. Epidemiology 2015;26:518–27. doi:10.1097/ede.0000000000000311.

[33] Marschner I. glm2: Fitting generalized linear models with convergence problems. R J 2011;3:12–5.

[34] Reques L, Giráldez-garcía C, Miqueleiz E, Belza MJ, Regidor E. Educational differences in mortality and the relative importance of different causes of death: a 7-year follow-up study of Spanish adults. J Epidemiol Community Health 2014;68:1151–60. doi:10.1136/jech-2014-204186.

[35] Saurel-Cubizolles M-J, Chastang J-F, Menvielle G, Leclerc A, Luce D. Social inequalities in mortality by cause among men and women in France. J Epidemiol Community Health 2009;63:197–202. doi:10.1136/jech.2008.078923.

[36] Heine B, Kunst A, Huisman M, Menvielle G, Glickman M, Bopp M, et al. The reversed social gradient: Higher breast cancer mortality in the higher educated compared to lower educated. A comparison of 11 European populations during the 1990s. Eur J Cancer 2007;43:1200–7. doi:10.1016/j.ejca.2007.01.021.

[37] Strand BH, Tverdal A, Claussen B, Zahl PH. Is birth history the key to highly educated women's higher breast cancer mortality? A follow-up study of 500,000 women aged 35-54. Int J Cancer 2005;117:1002–6. doi:10.1002/ijc.21239.

[38] Gadeyne S, Menvielle G, Kulhanova I, Bopp M, Deboosere P, Eikemo TA, et al. The turn of the gradient? Educational differences in breast cancer mortality in 18 European populations during the 2000s. Int J Cancer 2017;141:33–44. doi:10.1002/ijc.30685.

[39] Sprague BL, Trentham-Dietz A, Gangnon RE, Ramchandani R, Hampton JM, Robert SA, et al. Socioeconomic status and survival after an invasive breast cancer diagnosis. Cancer 2011;117:1542–51. doi:10.1002/cncr.25589.

[40] Van der Heyden JHA, Schaap MM, Kunst AE, Esnaola S, Borrell C, Cox B, et al. Socioeconomic inequalities in lung cancer mortality in 16 European populations. Lung Cancer 2009;63:322–30. doi:10.1016/j.lungcan.2008.06.006.

[41] Tramacere I, Gallus S, Zuccaro P, Colombo P, Rossi S, Boffetta P, et al. Socio-demographic variation in smoking habits. Italy, 2008. Prev Med (Baltim) 2009;48:213–7. doi:10.1016/j.ypmed.2008.12.014.

[42] Federico B, Capelli G, Costa G, Mackenbach JP, Kunst AE. Looking at the smoking epidemic through the lens of population pyramids: Sociodemographic patterns of smoking in Italy, 1983 to 2005. Popul Health Metr 2012;10:23. doi:10.1186/1478-7954-10-23.

[43] Fidler MM, Soerjomataram I, Bray F. A global view on cancer incidence and national levels of the human development index. Int J Cancer 2016;139:2436–46. doi:10.1002/ijc.30382.

[44] Kinsey T, Jemal A, Liff J, Ward E, Thun M. Secular Trends in Mortality From Common Cancers in the United States by Educational Attainment , 1993 – 2001. JNCI 2008:1003–12. doi:10.1093/jnci/djn207.

[45] Aarts MJ, Lemmens VEPP, Willem J, Coebergh W, Louwman MWJ, Kunst AE. Socioeconomic status and changing inequalities in colorectal cancer ? A review of the associations with risk , treatment and outcome. Eur J Cancer 2010;46:2681–95. doi:10.1016/j.ejca.2010.04.026.

[46] Rosso S, Faggiano F, Zanetti R, Costa G. Social class and cancer survival in Turin, Italy. J Epidemiol Community Health 1997;51:30–4.

[47] Menvielle G, Franck J, Radoi L, Sanchez M, Févotte J, Guizard A, et al. Quantifying the mediating effects of smoking and occupational exposures in the relation between education and lung cancer : the ICARE study. Eur J Epidemiol 2016. doi:10.1007/s10654-016-0182-2.

[48] Gandini S, Sera F, Sofia M, Pasquini P, Picconi O, Boyle P, et al. Meta-analysis of risk factors for cutaneous melanoma : II . Sun exposure. Eur J Cancer 2005;41:45–60.

[49] Veronesi G, Ferrario MM, Kuulasmaa K, Bobak M, Chambless LE, Salomaa V, et al. Educational class inequalities in the incidence of coronary heart disease in Europe. Heart 2016;102:958–65. doi:10.1136/heartjnl-2015-308909.

[50] De Smedt D, De Bacquer D, De Sutter J, Dallongeville J, Gevaert S, De Backer G, et al. The gender gap in risk factor control: Effects of age and education on the control of cardiovascular risk factors in male and female coronary patients. the EUROASPIRE IV study by the European Society of Cardiology. Int J Cardiol 2016;209:284–90. doi:10.1016/j.ijcard.2016.02.015.

[51] Hagström E, Norlund F, Stebbins A, Armstrong PW, Chiswell K, Granger CB, et al. Psychosocial stress and major cardiovascular events in patients with stable coronary heart disease. J Intern Med 2017;283:83–92. doi:10.1111/joim.12692.

[52] Huxley R. Excess risk of fatal coronary heart disease associated with diabetes in men and women: meta-analysis of 37 prospective cohort studies. BMJ 2006;332:73–8. doi:10.1136/bmj.38678.389583.7C.

[53] Russo G, Pintaudi B, Giorda C, Lucisano G, Nicolucci A, Cristofaro MR, et al. Age- and gender-related differences in LDL-cholesterol management in outpatients with type 2 diabetes mellitus. Int J Endocrinol 2015:957105. doi:10.1155/2015/957105.

[54] Robbins JM, Vaccarino V, Zhang H KS. Socioeconomic status and diagnosed diabetes incidence. Diabetes Res Clin Pr 2005;68:230–6.

[55] Bosetti C, Turati F, La Vecchia C. Hepatocellular carcinoma

epidemiology. Best Pract Res Clin Gastroenterol 2014;28:753–70. doi:10.1016/j.bpg.2014.08.007.

[56] Borrell C, Azlor E, Rodriguez-Sanz M, Puigpinos R, Cano-Serral G, Pasarin MI, et al. Trends in socioeconomic mortality inequalities in a southern European urban setting at the turn of the 21st century. J Epidemiol Community Heal 2008;62:258–66. doi:10.1136/jech.2006.057166.

[57] Renard F, Gadeyne S, Devleesschauwer B, Tafforeau J, Deboosere P. Trends in educational inequalities in premature mortality in Belgium between the 1990s and the 2000s: the contribution of specific causes of deaths. J Epidemiol Community Health 2016;71:371–80. doi:10.1136/jech-2016-208370.

[58] Strand BH, Langballe EM, Rosness TA, Bergem ALM, Engedal K, Nafstad P, et al. Age, education and dementia related deaths. The Norwegian Counties Study and the Cohort of Norway. J Neurol Sci 2014;345:75–82. doi:10.1016/j.jns.2014.07.009.

[59] Russ TC, Stamatakis E, Hamer M, Starr JM, Kivimäki M, Batty GD. Socioeconomic status as a risk factor for dementia death: Individual participant meta-analysis of 86 508 men and women from the UK. Br J Psychiatry 2013;203:10–7.

[60] Gregoraci G, Lenthe FJ Van, Artnik B, Bopp M, Deboosere P, Kovács K, et al. Contribution of smoking to socioeconomic inequalities in mortality: a study of 14 European countries , 1990–2004. Tob Control 2016. doi:10.1136/tobaccocontrol-2015-052766.

[61] Stringhini S, Sabia S, Shipley M, Brunner E, Nabi H, Kivimaki M, et al. Association of socioeconomic position with health behaviors and mortality. JAMA 2010;303:1159–66. doi:10.1001/jama.2010.297.

[62] Nandi A, Glymour M, Subramanian S. Association among socioeconomic status, health behaviors, and all-cause mortality in the United States. Epidemiology 2014;25:170–7.

[63] Bucher HC, Ragland DR. Socioeconomic indicators and mortality from coronary heart disease and cancer: A 22-year follow-up of middle-aged men. Am J Public Health 1995;85:1231–6. doi:10.2105/AJPH.85.9.1231.

[64] McFadden E, Luben R, Wareham N, Bingham S, Khaw KT. Occupational social class, educational level, smoking and body mass index, and cause-specific mortality in men and women: A prospective study in the European Prospective Investigation of Cancer and Nutrition in Norfolk (EPIC-Norfolk) cohort. Eur J Epidemiol 2008;23:511–22. doi:10.1007/s10654-008-9267-x.

[65] Hastert TA, Ruterbusch JJ, Beresford SAA, Sheppard L, White E. Contribution of health behaviors to the association between area-level socioeconomic status and cancer mortality. Soc Sci Med 2016;148:52–8. doi:10.1016/j.socscimed.2015.11.023.

[66] Fishta A, Maria E. Psychosocial stress at work and cardiovascular diseases: an overview of systematic reviews. Int Arch Occup Environ Health 2015;88:997–1014. doi:10.1007/s00420-015-1019-0.

[67] Rutters F, Pilz S, Koopman AD, Rauh SP, Te Velde SJ, Stehouwer CD, et al. The association between psychosocial stress and mortality is mediated by lifestyle and chronic diseases: The Hoorn Study. Soc Sci Med 2014;118:166–72. doi:10.1016/j.socscimed.2014.08.009.

[68] Arnold S V., Smolderen KG, Buchanan DM, Li Y, Spertus JA. Perceived stress in myocardial infarction: Long-term mortality and health status outcomes. J Am Coll Cardiol 2012;60:1756–63. doi:10.1016/j.jacc.2012.06.044.

[69] Pinquart M, Duberstein P. Associations of social networks with cancer mortality: A meta- analysis. Crit Rev Oncol Hematol 2010;75:122–37. doi:10.1016/j.critrevonc.2009.06.003.

[70] Martinez M, Anderson K, Murphy JD, Hurley S, Canchola AJ, Keegan THM, et al. Differences in marital status and mortality by race/ethnicity and nativity among California cancer patients. Cancer 2016;122:1570–8. doi:10.1002/cncr.29886.

[71] Kang J, Kim J, Lee M-A. Marital status and mortality: Does family structure in childhood matter? Soc Sci Med 2016;159:152–60. doi:10.1016/j.socscimed.2016.05.010.

[72] van Hedel K, van Lenthe F, Avendano M, Bopp M, Esnaola S, Kovàcs K, et al. Marital status, labour force activity and mortality: A study of the

United States and 6 European countries. Scand J Public Health 2015;43:229–62. doi:10.1007/978-1-4614-5915-6.

[73] Wyke S FG. Competing explanations for associations between marital status and health. Soc Sci Med 1992;34:523–32.

[74] Cambois E. Careers and mortality in France: Evidence on how far occupational mobility predicts differentiated risks. Soc Sci Med 2004;58:2545–58. doi:10.1016/j.socscimed.2003.09.028.

[75] Hofoss D, Dahl E, Ivar Elstad J, Cvancarova M. Selection and mortality: A ten-year follow-up of income decile mortality in Norway. Eur J Public Health 2013;23:558–63. doi:10.1093/eurpub/cks126.

8. TABLES

Table 1. List of the variables retrieved from the administrative databases

Database	Variables	Levels	Data availability
2011 census	Tax code	-	All individuals
	Date of birth	-	All individuals
	Sex	Male Female	All individuals
	Municipality of residence	8092 municipalities	All individuals
	Marital status	Single Married Separated but still legally married Divorced Widowed	All individuals
	Educational attainment	None Primary school Middle school High school University	All individuals
	Employment status	Employed Looking for the first employment Unemployed Retired Student Housewife Other conditions	All individuals
	Occupation	Non-skilled manual work Personnel working in manufacturing, machinery, assembly lines or drivers Skilled manual work Agriculture and farming Sales and service work Clerical work Medium-qualified technical, administrative, sport or artistic activities Highly-qualified activities including management, intellectual, scientific and artistic activities Management of private or public companies Armed forces	A sample the census population (see section 3.3)
	Type of job	Employee Term-contract worker Casual worker Entrepreneur Professional; Self-employee Member of a cooperative Family worker	A sample of the census population (see section 3.3)
Mortality registry	Tax code	-	All individuals
	Date of deaths	-	All individuals
	Cause of death	4-digit code of the International Classification of Diseases (ICD), 10th Revision	All individuals
Registry of residents	Tax code	-	All individuals
	Date of immigration/emigration	-	All individuals
	Type of transfer	Immigration Emigration	All individuals

Table 2. Scheme used to convert the questions of the Italian census questionnaire into the Erikson-Goldthorpe (EGP) classification.

EGP category	Census Question 1 (Type of occupation)	Census Question 2 (Type of job)	ISCO-08 Major Group
1 Upper non-manual workers	7 Medium-qualified technical, administrative, sport or artistic activities	5 Professional	2 Professionals
	8 Highly-qualified activities including management, intellectual, scientific and artistic activities	1 Employee 2 Term-contract worker 3 Casual worker 5 Professional 7 Member of a cooperative	2 Professionals
	9 Management of private or public companies	1 Employee 2 Term-contract worker 3 Casual worker 4 Entrepreneur 7 Member of a cooperative	1 Managers
2 Routine non-manual workers	5 Sales and service work	1 Employee 2 Term-contract worker 3 Casual worker 7 Member of a cooperative 8 Family worker	5 Services and Sales Workers
	6 Clerical work	1 Employee 2 Term-contract worker 3 Casual worker	4 Clerical Support Workers
	7 Medium-qualified technical, administrative, sport or artistic activities	1 Employee 2 Term-contract worker 3 Casual worker 7 Member of a cooperative	3 Technicians and Associate Professionals
3 Self-employees	1 Non-skilled manual work	6 Self-employee	-
	2 Personnel working in manufacturing, machinery, assembly lines or drivers	6 Self-employee	-
	3 Skilled manual work	6 Self-employee	-
	5 Sales and service work	6 Self-employee	-
	7 Medium-qualified technical, administrative, sport or artistic activities	6 Self-employee	-
	9 Management of private or public companies	6 Self-employee	-
4 Farmers	4 Agriculture and farming	1 Employee 2 Term-contract worker 3 Casual worker 6 Self-employee 7 Member of a cooperative 8 Family worker	6 Skilled Agricultural, Forestry and Fishery Workers
5 Skilled manual workers	3 Skilled manual work	1 Employee 2 Term-contract worker 3 Casual worker 7 Member of a cooperative 8 Family worker	7 Craft and Related Trades Workers
6 Non-skilled manual workers	1 Non-skilled manual work	1 Employee 2 Term-contract worker 3 Casual worker 8 Family worker	9 Elementary Occupations
	2 Personnel working in manufacturing, machinery, assembly lines or drivers	1 Employee 2 Term-contract worker 3 Casual worker 7 Member of a cooperative 8 Family worker	8 Plant and Machine Operators and Assemblers

EGP: Erikson-Goldthorpe; ISCO-08: International Standard Classification of Occupations 2008.

Table 3. Population according to level of education and occupation-based social class by sex

	Men	Women	All sexes	Men (%)	Women (%)	All sexes (%)
Level of education [a]						
No education/Primary school	2869033	4140476	7009509	16.5	22.6	19.6
Middle school	6215192	5366642	11581834	35.7	29.3	32.4
High school	6048594	6086720	12135314	34.7	33.3	34.0
University	2281829	2699959	4981788	13.1	14.8	14.0
All educational levels	*17414648*	*18293797*	*35708445*	*100*	*100*	*100*
Occupation-based social class [b]						
Upper non-manual worker	1545944	1198052	2743996	19.4	20.7	20.0
Routine non-manual worker	1885565	2616512	4502077	23.7	45.3	32.8
Self-employee	1170683	423205	1593888	14.7	7.3	11.6
Farmers	178039	79461	257500	2.2	1.4	1.9
Skilled manual worker	1270457	250852	1521309	16.0	4.3	11.1
Non-skilled manual worker	1912286	1210717	3123003	24.0	21.0	22.7
All occupation-based social classes	*7962974*	*5778799*	*13741773*	*100*	*100*	*100*

[a] *All individuals aged between 30 and 74 years* of age on 1 January 2012
[b] *Working Italian population aged between 30 and 64 years* of age on 1 January 2012 *with available data on occupation*

Table 4. Deaths and age-standardized mortality rates (ASMRs) by level of education, men, period 2012-2015.

	Deaths				Age-standardized mortality rate per 100,000 person-years (ASMR)			
	No education/ Primary school	Middle school	High school	University	No education/ Primary school	Middle school	High school	University
All deaths	136696	117434	79034	23882	717.1	559.7	460.6	356.3
HIV/AIDS (B20-B24)	345	950	383	112	4.5	3.5	1.6	1.3
Other infectious and parasitic diseases (rest of A00-B99)	2764	2596	1365	444	16.4	12.0	8.1	6.8
All neoplasms (C00-D48)	63909	54805	37815	11779	307.8	266.3	225.8	177.3
Cancer of buccal cavity, pharynx (C00-C14)	1826	1693	958	256	11.4	7.5	5.2	3.7
Cancer of oesophagus (C15)	1112	1019	664	184	5.9	4.7	3.7	2.7
Cancer of stomach (C16)	3872	3182	2005	568	18.4	15.1	11.5	8.2
Cancer of colon-rectum (C18-C21)	5886	5223	4019	1363	27.4	25.4	23.8	20.4
Cancer of liver (C22)	5123	4526	2487	668	26.6	21.4	15.1	10.4
Cancer of larynx (C32)	1286	886	428	90	6.9	4.1	2.5	1.4
Cancer of trachea, bronchus and lung (C33-C34)	19760	15112	9296	2605	92.9	74.7	57.6	40.6
Melanoma (C43)	555	782	845	319	3.0	3.6	4.4	4.3
Cancer of prostate (C61)	2463	1708	1247	496	9.6	9.3	8.6	8.2
Cancer of bladder (C67)	2173	1697	1065	301	9.5	8.8	6.9	4.9
Cancer of kidney and other urinary organs except bladder (C64-C66, C68)	1688	1640	1363	406	7.8	8.0	8.0	5.9
Hodgkin's disease (C81)	132	156	129	42	0.7	0.7	0.6	0.5
Leukemia (C91-C95)	1689	1676	1263	446	8.2	8.2	7.5	6.7
Other neoplasms (rest of C00-D48)	16160	15310	11856	3978	78.2	74.1	69.4	58.6
Diabetes Mellitus (E10-E14)	5131	3274	2014	541	24.4	16.2	12.6	8.5
Dementia and Alzheimer's diseases (F01, F03, G30)	1504	794	561	179	5.6	4.5	4.1	3.2
All circulatory system diseases (I00-I99)	34011	27705	19192	5842	169.5	133.7	113.6	89.0
Ischaemic heart disease (I20-I25)	14661	12666	8933	2549	72.5	60.9	52.5	38.9
Cerebrovascular disease (I60-I69)	6898	4788	3262	1012	32.4	24.0	20.2	16.0
Other circulatory system diseases (rest of I00-I99)	12452	10251	6997	2281	64.6	48.8	40.9	34.1
All respiratory system diseases (J00-J99)	5102	2657	1533	395	23.9	13.9	10.3	6.5
Pneumonia/influenza (J10-J18)	1147	734	502	161	6.2	3.7	3.3	2.6
COPD (J40-J44, J47)	3838	1829	969	217	17.0	9.7	6.6	3.7
Other respiratory system diseases (rest of J00-J99)	117	94	62	17	0.7	0.4	0.3	0.2
Chronic liver diseases (K70, K74)	3317	3159	1561	338	23.0	13.6	8.4	5.0

	Deaths				Age-standardized mortality rate per 100,000 person-years (ASMR)			
	No education/ Primary school	Middle school	High school	University	No education/ Primary school	Middle school	High school	University
Symptoms and ill-defined conditions (R00-R99)	1266	1700	1152	332	11.2	7.2	5.5	4.4
All external causes (V01-Y98)	5239	8618	6098	1752	42.2	35.9	27.5	21.6
Road traffic accidents (V01-V89, Y85)	1201	2343	1729	442	11.0	9.6	7.5	5.3
Suicide (X60-X84, Y87.0)	1557	3175	2486	764	12.8	12.9	10.6	8.9
Other external causes (rest of V01-Y98)	2481	3100	1883	546	18.4	13.4	9.3	7.5
All other causes of death (not listed above)	2419	2061	1187	302	14.9	9.5	6.7	4.5

Table 5. Deaths and age-standardized mortality rates (ASMRs) by level of education, women, period 2012-2015.

	Deaths				Age-standardized mortality rate per 100,000 person-years (ASMR)			
	No education/ Primary school	Middle school	High school	University	No education/ Primary school	Middle school	High school	University
All deaths	101821	56071	43529	14868	354.8	299.0	266.1	237.2
HIV/AIDS (B20-B24)	76	252	128	24	0.8	1.0	0.5	0.2
Other infectious and parasitic diseases (rest of A00-B99)	2659	1128	725	219	8.9	6.3	4.8	4.1
All neoplasms (C00-D48)	48745	32865	27549	9914	168.8	171.7	162.9	151.9
Cancer of buccal cavity, pharynx (C00-C14)	625	452	324	99	2.4	2.3	1.9	1.6
Cancer of oesophagus (C15)	288	206	149	46	1.1	1.1	1.0	0.8
Cancer of stomach (C16)	2451	1393	937	278	8.5	7.1	5.3	3.9
Cancer of colon-rectum (C18-C21)	4706	2972	2465	894	15.6	15.7	15.2	14.2
Cancer of liver (C22)	2281	986	638	217	7.0	5.4	4.3	3.9
Cancer of larynx (C32)	136	93	59	16	0.5	0.5	0.4	0.4
Cancer of trachea, bronchus and lung (C33-C34)	6557	5314	4207	1434	23.7	28.0	26.3	24.2
Melanoma (C43)	469	464	464	178	1.8	2.3	2.3	2.2
Cancer of breast (C50)	7585	6529	6485	2491	30.1	32.4	34.2	34.0
Cancer of cervix uteri (C53)	348	342	281	84	2.0	1.6	1.3	1.0
Cancer of other parts of uterus (C54-C55)	2065	1237	970	338	7.4	6.4	5.8	5.1
Cancer of bladder (C67)	526	303	217	78	1.6	1.7	1.6	1.3
Cancer of kidney and other urinary organs except bladder (C64-C66, C68)	882	516	421	132	2.6	2.8	2.6	2.1
Hodgkin's disease (C81)	111	73	79	35	0.4	0.4	0.4	0.4
Leukemia (C91-C95)	1475	887	726	287	4.7	4.8	4.5	4.2
Other neoplasms (rest of C00-D48)	18240	11098	9127	3307	59.2	59.2	55.7	52.7
Diabetes Mellitus (E10-E14)	4459	1203	643	199	13.7	6.8	4.6	4.0
Dementia and Alzheimer's diseases (F01, F03, G30)	1862	599	372	118	4.5	3.9	3.2	2.9
All circulatory system diseases (I00-I99)	23456	9340	6368	1912	73.4	52.3	43.4	35.7
Ischaemic heart disease (I20-I25)	7223	2797	1838	512	21.9	15.7	12.9	10.0
Cerebrovascular disease (I60-I69)	6169	2563	1776	605	19.3	14.3	11.9	11.2
Other circulatory system diseases (rest of I00-I99)	10064	3980	2754	795	32.2	22.3	18.6	14.5
All respiratory system diseases (J00-J99)	2793	1151	735	207	9.7	6.7	5.3	4.3
Pneumonia/influenza (J10-J18)	795	326	216	58	3.1	1.8	1.5	1.1
COPD (J40-J44, J47)	1845	739	463	136	5.6	4.4	3.6	2.9

	Deaths				Age-standardized mortality rate per 100,000 person-years (ASMR)			
	No education/ Primary school	Middle school	High school	University	No education/ Primary school	Middle school	High school	University
Other respiratory system diseases (rest of J00-J99)	153	86	56	13	1.0	0.5	0.3	0.2
Chronic liver diseases (K70, K74)	1851	915	533	135	7.0	4.7	3.3	2.2
Symptoms and ill-defined conditions (R00-R99)	770	481	419	170	3.7	2.4	2.3	2.3
All external causes (V01-Y98)	2345	1970	1796	736	10.1	9.8	8.8	8.5
Road traffic accidents (V01-V89, Y85)	435	425	376	167	2.0	2.1	1.8	1.8
Suicide (X60-X84, Y87.0)	530	750	830	331	3.0	3.5	3.6	3.4
Other external causes (rest of V01-Y98)	1380	795	590	238	5.1	4.2	3.4	3.4
All other causes of death (not listed above)	1663	776	488	131	6.7	4.2	3.0	2.1

Table 6 Mortality rate ratios and corresponding 95% confidence intervals by level of education, men, period 2012-2015.

	High school	Middle school	No education/Primary school
All deaths	1.30 (1.10-1.53)	1.64 (1.40-1.92)	1.93 (1.65-2.27)
HIV/AIDS (B20-B24)	1.23 (0.76-1.98)	2.80 (1.80-4.37)	3.06 (1.87-5.02)
Other infectious and parasitic diseases (rest of A00-B99)	1.20 (0.82-1.74)	1.93 (1.35-2.75)	2.20 (1.54-3.16)
All neoplasms (C00-D48)	1.27 (1.14-1.42)	1.54 (1.39-1.71)	1.71 (1.54-1.90)
Cancer of buccal cavity, pharynx (C00-C14)	1.44 (1.04-1.98)	2.19 (1.61-2.98)	2.99 (2.19-4.07)
Cancer of oesophagus (C15)	1.41 (1.15-1.72)	1.83 (1.51-2.22)	2.18 (1.79-2.66)
Cancer of stomach (C16)	1.39 (1.23-1.56)	1.86 (1.66-2.08)	2.26 (2.01-2.53)
Cancer of colon-rectum (C18-C21)	1.17 (1.10-1.25)	1.27 (1.19-1.35)	1.35 (1.26-1.43)
Cancer of liver (C22)	1.46 (1.08-1.98)	2.22 (1.66-2.97)	2.51 (1.88-3.36)
Cancer of larynx (C32)	1.85 (1.31-2.62)	3.25 (2.33-4.52)	5.10 (3.67-7.08)
Cancer of trachea, bronchus and lung (C33-C34)	1.43 (1.20-1.70)	1.92 (1.62-2.26)	2.27 (1.92-2.67)
Melanoma (C43)	1.02 (0.90-1.16)	0.82 (0.72-0.94)	0.70 (0.61-0.81)
Cancer of prostate (C61)	1.04 (0.94-1.15)	1.12 (1.02-1.24)	1.16 (1.05-1.28)
Cancer of bladder (C67)	1.43 (1.18-1.74)	1.85 (1.54-2.23)	1.92 (1.60-2.31)
Cancer of kidney and other urinary organs except bladder (C64-C66, C68)	1.33 (1.19-1.49)	1.34 (1.20-1.49)	1.31 (1.18-1.47)
Hodgkin's disease (C81)	1.19 (0.84-1.68)	1.30 (0.93-1.83)	1.44 (1.01-2.07)
Leukemia (C91-C95)	1.13 (1.00-1.27)	1.26 (1.12-1.41)	1.20 (1.06-1.34)
Other neoplasms (rest of C00-D48)	1.18 (1.10-1.27)	1.28 (1.19-1.37)	1.31 (1.22-1.40)
Diabetes Mellitus (E10-E14)	1.48 (1.17-1.89)	1.99 (1.58-2.51)	2.82 (2.24-3.53)
Dementia and Alzheimer's diseases (F01, F03, G30)	1.32 (1.10-1.57)	1.44 (1.21-1.70)	1.75 (1.48-2.06)
All circulatory system diseases (I00-I99)	1.30 (1.12-1.50)	1.57 (1.36-1.81)	1.86 (1.62-2.14)
Ischaemic heart disease (I20-I25)	1.38 (1.21-1.58)	1.64 (1.44-1.87)	1.85 (1.62-2.10)
Cerebrovascular disease (I60-I69)	1.29 (1.09-1.53)	1.56 (1.33-1.84)	1.97 (1.68-2.32)
Other circulatory system diseases (rest of I00-I99)	1.21 (1.02-1.42)	1.50 (1.28-1.75)	1.83 (1.56-2.14)
All respiratory system diseases (J00-J99)	1.57 (1.06-2.32)	2.21 (1.52-3.22)	3.42 (2.37-4.94)
Pneumonia/influenza (J10-J18)	1.25 (0.74-2.09)	1.51 (0.92-2.48)	2.05 (1.26-3.34)
COPD (J40-J44, J47)	1.82 (1.19-2.80)	2.76 (1.83-4.16)	4.44 (2.98-6.64)
Other respiratory system diseases (rest of J00-J99)	1.41 (0.82-2.41)	1.85 (1.10-3.11)	2.71 (1.61-4.56)
Chronic liver diseases (K70, K74)	1.75 (1.12-2.74)	3.09 (2.01-4.73)	4.48 (2.91-6.90)
Symptoms and ill-defined conditions (R00-R99)	1.31 (0.97-1.78)	1.79 (1.33-2.41)	2.27 (1.66-3.11)
All external causes (V01-Y98)	1.31 (1.15-1.49)	1.76 (1.55-1.99)	2.03 (1.78-2.33)
Road traffic accidents (V01-V89, Y85)	1.47 (1.24-1.75)	1.95 (1.64-2.31)	2.21 (1.83-2.67)
Suicide (X60-X84, Y87.0)	1.22 (1.09-1.36)	1.48 (1.32-1.65)	1.56 (1.38-1.77)

Other external causes (rest of V01-Y98)	1.31 (1.01-1.71)	2.00 (1.55-2.57)	2.48 (1.90-3.24)
All other causes of death (not listed above)	1.52 (1.07-2.17)	2.28 (1.62-3.21)	3.10 (2.20-4.37)

Reference category: University

Table 7. Mortality rate ratios and 95% confidence intervals by level of education, women, period 2012-2015.

	High school	Middle school	No education/Primary school
All deaths	1.14 (1.01- 1.29)	1.31 (1.16- 1.48)	1.44 (1.28- 1.63)
HIV/AIDS (B20-B24)	2.15 (1.24- 3.74)	4.72 (2.77- 8.04)	3.33 (1.82- 6.09)
Other infectious and parasitic diseases (rest of A00-B99)	1.28 (0.93- 1.77)	1.73 (1.28- 2.36)	2.20 (1.63- 2.97)
All neoplasms (C00-D48)	1.08 (1.01- 1.17)	1.16 (1.08- 1.25)	1.09 (1.02- 1.17)
Cancer of buccal cavity, pharynx (C00-C14)	1.29 (0.92- 1.81)	1.65 (1.19- 2.29)	1.59 (1.14- 2.20)
Cancer of oesophagus (C15)	1.24 (0.84- 1.84)	1.49 (1.02- 2.19)	1.21 (0.83- 1.78)
Cancer of stomach (C16)	1.32 (1.13- 1.54)	1.79 (1.54- 2.08)	2.09 (1.80- 2.42)
Cancer of colon-rectum (C18-C21)	1.07 (0.95- 1.19)	1.13 (1.02- 1.26)	1.08 (0.97- 1.21)
Cancer of liver (C22)	1.13 (0.89- 1.43)	1.49 (1.19- 1.87)	1.85 (1.49- 2.31)
Cancer of larynx (C32)	1.41 (0.69- 2.88)	1.93 (0.97- 3.84)	1.76 (0.89- 3.49)
Cancer of trachea, bronchus and lung (C33-C34)	1.13 (0.91- 1.40)	1.25 (1.01- 1.53)	0.94 (0.76- 1.15)
Melanoma (C43)	1.06 (0.89- 1.26)	1.04 (0.87- 1.24)	0.86 (0.71- 1.03)
Cancer of breast (C50)	1.02 (0.96- 1.09)	0.97 (0.91- 1.03)	0.86 (0.80- 0.92)
Cancer of cervix uteri (C53)	1.39 (1.03- 1.87)	1.78 (1.32- 2.38)	2.09 (1.54- 2.85)
Cancer of other parts of uterus (C54-C55)	1.12 (0.97- 1.30)	1.28 (1.11- 1.47)	1.39 (1.21- 1.60)
Cancer of bladder (C67)	1.07 (0.81- 1.40)	1.24 (0.95- 1.61)	1.10 (0.85- 1.42)
Cancer of kidney and other urinary organs except bladder (C64-C66, C68)	1.23 (1.01- 1.50)	1.30 (1.07- 1.57)	1.25 (1.04- 1.51)
Hodgkin's disease (C81)	0.96 (0.64- 1.43)	0.91 (0.60- 1.36)	1.11 (0.73- 1.69)
Leukemia (C91-C95)	1.01 (0.85- 1.19)	1.11 (0.94- 1.31)	1.09 (0.92- 1.28)
Other neoplasms (rest of C00-D48)	1.07 (1.01- 1.15)	1.15 (1.08- 1.23)	1.13 (1.06- 1.20)
Diabetes Mellitus (E10-E14)	1.23 (0.86- 1.78)	1.94 (1.37- 2.74)	3.63 (2.60- 5.05)
Dementia and Alzheimer's diseases (F01, F03, G30)	1.16 (0.93- 1.44)	1.41 (1.15- 1.74)	1.64 (1.34- 1.99)
All circulatory system diseases (I00-I99)	1.28 (1.05- 1.56)	1.61 (1.33- 1.95)	2.10 (1.75- 2.53)
Ischaemic heart disease (I20-I25)	1.37 (1.08- 1.74)	1.76 (1.40- 2.21)	2.30 (1.84- 2.88)
Cerebrovascular disease (I60-I69)	1.12 (0.93- 1.36)	1.39 (1.16- 1.68)	1.74 (1.45- 2.08)
Other circulatory system diseases (rest of I00-I99)	1.34 (1.08- 1.67)	1.68 (1.36- 2.08)	2.26 (1.84- 2.77)
All respiratory system diseases (J00-J99)	1.36 (0.80- 2.33)	1.79 (1.07- 3.00)	2.15 (1.30- 3.55)
Pneumonia/influenza (J10-J18)	1.45 (0.82- 2.58)	1.93 (1.11- 3.36)	2.62 (1.52- 4.50)
COPD (J40-J44, J47)	1.28 (0.78- 2.12)	1.66 (1.03- 2.69)	1.88 (1.18- 3.00)
Other respiratory system diseases (rest of J00-J99)	1.77 (0.55- 5.67)	2.63 (0.85- 8.15)	3.44 (1.11-10.70)
Chronic liver diseases (K70, K74)	1.52 (1.09- 2.11)	2.36 (1.72- 3.24)	3.17 (2.32- 4.33)
Symptoms and ill-defined conditions (R00-R99)	1.01 (0.73- 1.40)	1.15 (0.83- 1.59)	1.45 (1.05- 2.01)
All external causes (V01-Y98)	1.02 (0.93- 1.11)	1.14 (1.04- 1.24)	1.17 (1.06- 1.28)

Road traffic accidents (V01-V89, Y85)	0.98 (0.81- 1.17)	1.18 (0.98- 1.41)	1.18 (0.97- 1.44)
Suicide (X60-X84, Y87.0)	1.05 (0.90- 1.23)	1.01 (0.86- 1.19)	0.85 (0.71- 1.03)
Other external causes (rest of V01-Y98)	1.00 (0.85- 1.18)	1.28 (1.09- 1.49)	1.44 (1.23- 1.68)
All other causes of death (not listed above)	1.48 (1.01- 2.17)	2.16 (1.49- 3.11)	2.94 (2.05- 4.23)

Reference category: University

Table 8. Deaths and age-standardized mortality rates by occupation-based social class, men, period 2012-2015.

	Deaths						Age-standardized mortality rate per 100,000 person-years					
	Upper non-manual workers	Routine non-manual workers	Self-employees	Farmers	Skilled manual workers	Non-skilled manual workers	Upper non-manual workers	Routine non-manual workers	Self-employees	Farmers	Skilled manual workers	Non-skilled manual workers
All deaths	9116	11949	9071	1722	8417	15417	142.6	178.7	185.3	210.9	196.2	229.1
HIV/AIDS (B20-B24)	57	95	58	4	60	146	0.8	1.2	1.0	0.5	1.1	1.7
Other infectious and parasitic diseases (rest of A00-B99)	122	176	125	20	115	251	1.9	2.6	2.6	2.4	2.4	3.4
All neoplasms (C00-D48)	4501	5704	4207	710	3992	6807	71.3	88.8	87.4	86.5	101.0	108.3
Cancer of buccal cavity, pharynx (C00-C14)	122	166	114	22	147	276	1.9	2.4	2.3	2.6	3.5	4.4
Cancer of oesophagus (C15)	73	103	89	22	100	149	1.1	1.5	1.8	2.8	2.4	2.2
Cancer of stomach (C16)	271	368	295	46	302	462	4.2	5.6	6.1	5.6	7.4	7.1
Cancer of colon-rectum (C18-C21)	515	621	444	69	400	626	8.2	9.7	9.1	8.4	9.4	9.8
Cancer of liver (C22)	258	365	311	62	269	563	4.1	6.0	6.4	7.3	6.5	8.9
Cancer of larynx (C32)	23	67	43	15	59	122	0.4	1.1	0.9	1.8	1.7	2.0
Cancer of trachea, bronchus and lung (C33-C34)	856	1257	1051	150	1013	1821	13.9	21.1	22.5	18.5	28.2	31.1
Melanoma (C43)	177	172	115	14	83	138	2.7	2.4	2.2	1.7	1.6	1.8
Cancer of prostate (C61)	116	94	77	15	62	89	2.0	1.6	1.8	1.9	2.0	1.7
Cancer of bladder (C67)	76	115	81	16	93	137	1.3	1.9	1.7	2.0	2.6	2.5
Cancer of kidney and other urinary organs except bladder (C64-C66, C68)	191	206	128	29	124	196	3.0	3.0	2.5	3.4	3.0	3.0
Hodgkin's disease (C81)	15	30	16	3	18	28	0.2	0.4	0.3	0.4	0.3	0.4
Leukemia (C91-C95)	182	218	139	29	119	207	2.8	3.2	2.8	3.7	2.9	3.2
Other neoplasms (rest of C00-D48)	1589	1885	1292	216	1189	1953	24.9	28.3	26.7	26.0	29.1	29.8
Diabetes Mellitus (E10-E14)	150	225	176	36	112	304	2.5	3.8	3.8	4.5	2.8	5.0
Dementia and Alzheimer's diseases (F01, F03, G30)	8	9	2	0	4	6	0.1	0.2	0.1	0.0	0.1	0.1
All circulatory system diseases (I00-I99)	2129	2851	2094	398	1796	3502	33.3	43.4	42.3	48.2	42.4	52.6
Ischaemic heart disease (I20-I25)	1022	1368	1029	198	853	1670	16.0	21.1	21.0	24.2	19.9	25.2
Cerebrovascular disease (I60-I69)	292	399	279	60	236	475	4.6	6.3	5.6	7.5	5.9	7.5

	Deaths						Age-standardized mortality rate per 100,000 person-years					
	Upper non-manual workers	Routine non-manual workers	Self-employees	Farmers	Skilled manual workers	Non-skilled manual workers	Upper non-manual workers	Routine non-manual workers	Self-employees	Farmers	Skilled manual workers	Non-skilled manual workers
Other circulatory system diseases (rest of I00-I99)	815	1084	786	140	707	1357	12.7	16.0	15.7	16.5	16.6	19.9
All respiratory system diseases (J00-J99)	60	103	71	21	69	179	1.0	1.7	1.5	2.4	1.6	2.9
Pneumonia/influenza (J10-J18)	25	46	28	10	25	61	0.4	0.7	0.6	1.2	0.5	0.9
COPD (J40-J44, J47)	29	44	37	7	38	101	0.5	0.8	0.8	0.8	1.0	1.8
Other respiratory system diseases (rest of J00-J99)	6	13	6	4	6	17	0.1	0.1	0.1	0.5	0.1	0.2
Chronic liver diseases (K70, K74)	110	249	198	50	182	421	1.7	3.7	3.9	5.9	3.7	5.9
Symptoms and ill-defined conditions (R00-R99)	189	226	157	38	177	340	2.8	2.9	3.1	4.9	3.5	4.5
All external causes (V01-Y98)	1170	1471	1368	328	1394	2406	17.5	18.4	27.1	41.5	25.6	29.1
Road traffic accidents (V01-V89, Y85)	340	496	438	97	438	826	5.1	6.2	8.8	11.9	7.8	9.9
Suicide (X60-X84, Y87.0)	534	645	565	127	523	847	7.9	7.9	11.1	16.5	9.6	10.1
Other external causes (rest of V01-Y98)	296	330	365	104	433	733	4.4	4.3	7.2	13.2	8.2	9.1
All other causes of death (not listed above)	119	152	136	28	130	254	1.9	2.1	2.7	3.3	3.1	3.7

Table 9. Deaths and age-standardized mortality rates by occupation-based social class, women, period 2012-2015.

	Deaths						Age-standardized mortality rate per 100,000 person-years (ASMR)					
	Upper non-manual workers	Routine non-manual workers	Self-employees	Farmers	Skilled manual workers	Non-skilled manual workers	Upper non-manual workers	Routine non-manual workers	Self-employees	Farmers	Skilled manual workers	Non-skilled manual workers
All deaths	4397	8799	1873	386	899	4941	95.2	102.2	108.3	95.3	100.3	102.5
HIV/AIDS (B20-B24)	6	37	11	2	2	25	0.1	0.3	0.5	0.4	0.2	0.4
Other infectious and parasitic diseases (rest of A00-B99)	41	92	15	5	11	57	1.0	1.0	0.8	1.1	1.9	1.3
All neoplasms (C00-D48)	3253	6294	1359	245	634	3253	70.6	73.5	78.7	60.7	71.0	67.7
Cancer of buccal cavity, pharynx (C00-C14)	26	51	17	1	9	40	0.7	0.7	1.1	0.2	1.2	0.9
Cancer of oesophagus (C15)	8	23	12	1	4	22	0.2	0.3	0.7	0.2	0.4	0.5
Cancer of stomach (C16)	108	274	72	14	29	192	2.3	3.3	4.3	3.3	2.8	4.1
Cancer of colon-rectum (C18-C21)	301	499	114	27	57	288	6.6	5.8	6.8	6.4	6.1	6.0
Cancer of liver (C22)	63	129	31	7	14	83	1.4	1.5	1.9	1.7	2.1	1.8
Cancer of larynx (C32)	2	7	5	0	0	5	0.1	0.1	0.3	0.0	0.0	0.1
Cancer of trachea, bronchus and lung (C33-C34)	420	989	199	36	99	499	9.8	12.5	11.7	8.7	12.6	11.0
Melanoma (C43)	58	151	19	4	12	66	1.2	1.4	1.0	1.2	1.1	1.3
Cancer of breast (C50)	944	1629	326	47	120	622	19.4	17.1	17.7	11.5	12.2	11.9
Cancer of cervix uteri (C53)	32	90	18	2	21	76	0.6	0.9	0.9	0.5	1.8	1.3
Cancer of other parts of uterus (C54-C55)	113	201	55	14	15	156	2.5	2.5	3.5	3.6	1.7	3.4
Cancer of bladder (C67)	18	33	8	2	7	24	0.4	0.5	0.5	0.5	0.8	0.6
Cancer of kidney and other urinary organs except bladder (C64-C66, C68)	34	86	25	4	7	41	0.7	1.2	1.4	0.9	0.9	0.8
Hodgkin's disease (C81)	10	23	1	1	1	9	0.2	0.2	0.1	0.2	0.1	0.1
Leukemia (C91-C95)	90	150	38	7	18	91	1.9	1.6	2.1	1.8	2.0	2.0
Other neoplasms (rest of C00-D48)	1026	1959	419	78	221	1039	22.6	23.9	24.7	20.0	25.2	21.9
Diabetes Mellitus (E10-E14)	28	42	17	3	6	45	0.6	0.6	1.1	0.7	0.7	1.1
Dementia and Alzheimer's diseases (F01, F03, G30)	4	3	1	0	0	5	0.1	0.1	0.1	0.0	0.0	0.1
All circulatory system diseases (I00-I99)	444	999	200	58	95	689	9.9	12.4	11.7	14.0	11.0	14.3

	Deaths						Age-standardized mortality rate per 100,000 person-years (ASMR)					
	Upper non-manual workers	Routine non-manual workers	Self-employees	Farmers	Skilled manual workers	Non-skilled manual workers	Upper non-manual workers	Routine non-manual workers	Self-employees	Farmers	Skilled manual workers	Non-skilled manual workers
Ischaemic heart disease (I20-I25)	126	268	68	18	26	193	2.9	3.7	4.1	4.3	3.5	4.3
Cerebrovascular disease (I60-I69)	144	295	64	21	33	220	3.1	3.4	3.7	5.1	3.6	4.3
Other circulatory system diseases (rest of I00-I99)	174	436	68	19	36	276	3.8	5.2	3.9	4.5	3.9	5.7
All respiratory system diseases (J00-J99)	32	66	12	5	4	45	0.8	1.0	0.7	1.4	0.6	1.1
Pneumonia/influenza (J10-J18)	16	26	4	3	4	11	0.4	0.3	0.2	0.9	0.6	0.2
COPD (J40-J44, J47)	10	28	5	1	0	27	0.3	0.5	0.3	0.3	0.0	0.7
Other respiratory system diseases (rest of J00-J99)	6	12	3	1	0	7	0.1	0.1	0.2	0.2	0.0	0.2
Chronic liver diseases (K70, K74)	31	70	18	10	9	63	0.7	0.9	1.1	2.5	0.8	1.4
Symptoms and ill-defined conditions (R00-R99)	40	106	10	4	14	69	0.8	1.0	0.6	0.9	1.5	1.3
All external causes (V01-Y98)	266	578	118	33	73	355	5.1	5.4	6.4	8.3	6.4	6.8
Road traffic accidents (V01-V89, Y85)	79	168	39	7	22	113	1.5	1.6	2.3	1.6	1.8	2.3
Suicide (X60-X84, Y87.0)	120	279	55	16	29	156	2.3	2.4	2.8	4.2	2.5	2.8
Other external causes (rest of V01-Y98)	67	131	24	10	22	86	1.3	1.4	1.3	2.6	2.2	1.8
All other causes of death (not listed above)	29	59	14	4	4	64	0.6	0.7	0.9	1.0	0.5	1.4

Table 10. Mortality rate ratios and corresponding 95% confidence intervals by occupation-based social class, men, period 2012-2015.

	Routine non-manual workers	Self-employees	Farmers	Skilled manual workers	Non-skilled manual workers
All deaths	1.24 (1.18- 1.30)	1.31 (1.24- 1.38)	1.48 (1.35- 1.63)	1.37 (1.30- 1.45)	1.63 (1.55- 1.71)
HIV/AIDS (B20-B24)	1.40 (1.01- 1.94)	1.30 (0.90- 1.88)	0.58 (0.21- 1.60)	1.31 (0.91- 1.89)	2.11 (1.56- 2.87)
Other infectious and parasitic diseases (rest of A00-B99)	1.37 (1.03- 1.82)	1.34 (0.99- 1.82)	1.28 (0.72- 2.30)	1.40 (1.02- 1.92)	1.97 (1.51- 2.58)
All neoplasms (C00-D48)	1.24 (1.18- 1.31)	1.24 (1.17- 1.32)	1.22 (1.09- 1.36)	1.40 (1.32- 1.48)	1.53 (1.45- 1.61)
Cancer of buccal cavity, pharynx (C00-C14)	1.31 (0.97- 1.78)	1.23 (0.88- 1.72)	1.40 (0.77- 2.52)	1.85 (1.35- 2.53)	2.23 (1.69- 2.95)
Cancer of oesophagus (C15)	1.36 (1.00- 1.83)	1.61 (1.18- 2.19)	2.32 (1.44- 3.74)	2.10 (1.55- 2.85)	2.02 (1.53- 2.68)
Cancer of stomach (C16)	1.31 (1.09- 1.56)	1.44 (1.19- 1.73)	1.32 (0.92- 1.88)	1.70 (1.41- 2.06)	1.68 (1.41- 1.99)
Cancer of colon-rectum (C18-C21)	1.17 (1.03- 1.33)	1.14 (0.99- 1.31)	1.03 (0.79- 1.36)	1.20 (1.04- 1.39)	1.21 (1.06- 1.37)
Cancer of liver (C22)	1.39 (1.17- 1.65)	1.59 (1.33- 1.90)	1.83 (1.36- 2.47)	1.65 (1.37- 1.98)	2.21 (1.88- 2.59)
Cancer of larynx (C32)	2.93 (1.83- 4.71)	2.49 (1.50- 4.13)	4.95 (2.58- 9.48)	4.22 (2.60- 6.85)	5.56 (3.56- 8.69)
Cancer of trachea, bronchus and lung (C33-C34)	1.50 (1.37- 1.65)	1.64 (1.48- 1.80)	1.33 (1.10- 1.60)	1.99 (1.80- 2.19)	2.26 (2.07- 2.47)
Melanoma (C43)	0.87 (0.70- 1.08)	0.85 (0.67- 1.08)	0.64 (0.37- 1.11)	0.65 (0.50- 0.84)	0.70 (0.56- 0.88)
Cancer of prostate (C61)	0.88 (0.67- 1.16)	0.90 (0.67- 1.19)	0.96 (0.56- 1.64)	0.99 (0.72- 1.35)	0.88 (0.67- 1.17)
Cancer of bladder (C67)	1.57 (1.17- 2.10)	1.43 (1.04- 1.95)	1.58 (0.92- 2.71)	2.11 (1.55- 2.86)	1.96 (1.48- 2.60)
Cancer of kidney and other urinary organs except bladder (C64-C66, C68)	1.04 (0.84- 1.28)	0.88 (0.70- 1.12)	1.18 (0.78- 1.78)	0.99 (0.78- 1.26)	1.01 (0.82- 1.25)
Hodgkin's disease (C81)	1.75 (0.94- 3.25)	1.41 (0.70- 2.86)	1.66 (0.48- 5.74)	1.60 (0.81- 3.19)	1.64 (0.87- 3.07)
Leukemia (C91-C95)	1.12 (0.92- 1.37)	1.01 (0.81- 1.26)	1.26 (0.85- 1.87)	0.97 (0.77- 1.22)	1.09 (0.89- 1.33)
Other neoplasms (rest of C00-D48)	1.14 (1.06- 1.22)	1.07 (1.00- 1.15)	1.06 (0.92- 1.22)	1.14 (1.06- 1.23)	1.21 (1.13- 1.29)

	Routine non-manual workers	Self-employees	Farmers	Skilled manual workers	Non-skilled manual workers
Diabetes Mellitus (E10-E14)	1.52 (1.22- 1.90)	1.56 (1.23- 1.97)	1.82 (1.23- 2.69)	1.24 (0.95- 1.61)	2.14 (1.73- 2.64)
Dementia and Alzheimer's diseases (F01, F03, G30)	1.32 (0.51- 3.44)	0.34 (0.07- 1.61)	.	1.04 (0.31- 3.48)	0.95 (0.33- 2.75)
All circulatory system diseases (I00-I99)	1.28 (1.17- 1.39)	1.29 (1.18- 1.42)	1.46 (1.24- 1.71)	1.27 (1.16- 1.40)	1.60 (1.47- 1.73)
Ischaemic heart disease (I20-I25)	1.29 (1.15- 1.45)	1.33 (1.17- 1.50)	1.50 (1.21- 1.87)	1.28 (1.12- 1.45)	1.61 (1.44- 1.80)
Cerebrovascular disease (I60-I69)	1.32 (1.11- 1.58)	1.26 (1.04- 1.53)	1.60 (1.15- 2.22)	1.24 (1.01- 1.52)	1.60 (1.35- 1.90)
Other circulatory system diseases (rest of I00-I99)	1.25 (1.12- 1.40)	1.27 (1.13- 1.43)	1.35 (1.09- 1.69)	1.28 (1.13- 1.45)	1.59 (1.43- 1.77)
All respiratory system diseases (J00-J99)	1.70 (1.24- 2.34)	1.57 (1.11- 2.22)	2.70 (1.64- 4.43)	1.84 (1.30- 2.60)	3.04 (2.27- 4.08)
Pneumonia/influenza (J10-J18)	1.76 (1.07- 2.88)	1.47 (0.85- 2.54)	3.13 (1.49- 6.59)	1.50 (0.86- 2.64)	2.36 (1.47- 3.79)
COPD (J40-J44, J47)	1.57 (0.94- 2.63)	1.71 (1.01- 2.90)	1.82 (0.74- 4.48)	2.25 (1.33- 3.82)	3.78 (2.41- 5.94)
Other respiratory system diseases (rest of J00-J99)	1.94 (0.73- 5.11)	1.32 (0.43- 4.11)	5.40 (1.52- 19.14)	1.39 (0.45- 4.31)	2.57 (1.01- 6.53)
Chronic liver diseases (K70, K74)	2.10 (1.63- 2.71)	2.34 (1.80- 3.05)	3.57 (2.44- 5.21)	2.40 (1.83- 3.14)	3.59 (2.83- 4.56)
Symptoms and ill-defined conditions (R00-R99)	1.03 (0.85- 1.26)	1.09 (0.88- 1.35)	1.67 (1.18- 2.37)	1.23 (1.00- 1.51)	1.56 (1.30- 1.86)
All external causes (V01-Y98)	1.05 (0.97- 1.14)	1.53 (1.41- 1.67)	2.39 (2.10- 2.72)	1.49 (1.37- 1.62)	1.70 (1.58- 1.83)
Road traffic accidents (V01-V89, Y85)	1.19 (1.02- 1.39)	1.70 (1.45- 1.99)	2.48 (1.93- 3.19)	1.57 (1.34- 1.83)	1.96 (1.71- 2.26)
Suicide (X60-X84, Y87.0)	1.01 (0.90- 1.13)	1.38 (1.23- 1.56)	2.02 (1.66- 2.45)	1.22 (1.09- 1.38)	1.31 (1.18- 1.46)
Other external causes (rest of V01-Y98)	0.95 (0.81- 1.11)	1.62 (1.39- 1.89)	2.95 (2.36- 3.69)	1.88 (1.62- 2.18)	2.10 (1.83- 2.40)
All other causes of death (not listed above)	1.19 (0.92- 1.54)	1.50 (1.16- 1.96)	1.86 (1.20- 2.89)	1.60 (1.23- 2.09)	2.03 (1.61- 2.56)

Note: The MRRs were not estimated for some group of causes and occupation-based social classes due to the limited number of deaths.

Reference category: Upper non-manual workers

Table 11. Mortality rate ratios and corresponding 95% confidence intervals by occupation-based social class, women, period 2012-2015.

	Routine non-manual workers	Self-employees	Farmers	Skilled manual workers	Non-skilled manual workers
All deaths	1.07 (1.02- 1.13)	1.14 (1.06- 1.23)	1.03 (0.89- 1.19)	1.08 (0.98- 1.20)	1.09 (1.03- 1.16)
HIV/AIDS (B20-B24)	2.83 (1.01- 7.97)	4.93 (1.50- 16.23)	4.58 (0.67- 31.24)	1.51 (0.22-10.28)	3.82 (1.31-11.12)
Other infectious and parasitic diseases (rest of A00-B99)	1.22 (0.84- 1.76)	0.97 (0.54- 1.75)	1.41 (0.56- 3.57)	1.45 (0.74- 2.81)	1.37 (0.91- 2.04)
All neoplasms (C00-D48)	1.05 (0.99- 1.10)	1.12 (1.03- 1.21)	0.87 (0.74- 1.02)	1.04 (0.93- 1.15)	0.97 (0.91- 1.03)
Cancer of buccal cavity, pharynx (C00-C14)	1.13 (0.67- 1.91)	1.72 (0.88- 3.38)	0.42 (0.05- 3.83)	1.99 (0.86- 4.59)	1.55 (0.90- 2.68)
Cancer of oesophagus (C15)	1.65 (0.74- 3.69)	3.99 (1.63- 9.77)	1.36 (0.17- 10.89)	2.80 (0.84- 9.30)	2.68 (1.19- 6.03)
Cancer of stomach (C16)	1.38 (1.11- 1.73)	1.78 (1.32- 2.40)	1.49 (0.85- 2.60)	1.44 (0.96- 2.17)	1.73 (1.37- 2.19)
Cancer of colon-rectum (C18-C21)	0.90 (0.78- 1.04)	1.01 (0.81- 1.25)	1.03 (0.69- 1.52)	1.01 (0.76- 1.34)	0.92 (0.79- 1.09)
Cancer of liver (C22)	1.15 (0.78- 1.70)	1.33 (0.77- 2.30)	1.24 (0.46- 3.37)	1.24 (0.59- 2.60)	1.30 (0.85- 1.97)
Cancer of larynx (C32)	2.04 (0.42- 9.86)	6.71 (1.30- 34.62)	.	.	2.44 (0.47-12.58)
Cancer of trachea, bronchus and lung (C33-C34)	1.35 (1.16- 1.57)	1.26 (1.01- 1.57)	0.94 (0.60- 1.46)	1.32 (1.00- 1.76)	1.16 (0.98- 1.38)
Melanoma (C43)	1.28 (0.93- 1.76)	0.89 (0.52- 1.53)	0.90 (0.31- 2.59)	1.02 (0.53- 1.95)	1.09 (0.75- 1.58)
Cancer of breast (C50)	0.88 (0.82- 0.96)	0.92 (0.81- 1.05)	0.60 (0.45- 0.81)	0.64 (0.53- 0.77)	0.63 (0.57- 0.69)
Cancer of cervix uteri (C53)	1.33 (0.89- 1.99)	1.54 (0.87- 2.75)	0.87 (0.21- 3.62)	3.12 (1.80- 5.41)	2.27 (1.50- 3.44)
Cancer of other parts of uterus (C54-C55)	0.99 (0.79- 1.25)	1.30 (0.94- 1.79)	1.40 (0.80- 2.44)	0.73 (0.43- 1.26)	1.36 (1.07- 1.73)
Cancer of bladder (C67)	1.11 (0.62- 1.98)	1.16 (0.51- 2.68)	1.17 (0.27- 5.05)	2.33 (0.97- 5.59)	1.35 (0.73- 2.50)
Cancer of kidney and other urinary organs except bladder (C64-C66, C68)	1.41 (0.95- 2.10)	1.96 (1.17- 3.29)	1.32 (0.47- 3.72)	1.13 (0.50- 2.55)	1.18 (0.75- 1.85)
Hodgkin's disease (C81)	1.09 (0.51- 2.35)	0.28 (0.03- 2.29)	1.37 (0.17- 11.35)	0.48 (0.06- 3.98)	0.87 (0.34- 2.18)
Leukemia (C91-C95)	0.87 (0.67- 1.13)	1.15 (0.78- 1.68)	0.96 (0.44- 2.06)	1.04 (0.63- 1.73)	0.99 (0.74- 1.33)
Other neoplasms (rest of C00-D48)	1.05 (0.96- 1.15)	1.09 (0.95- 1.24)	0.87 (0.66- 1.13)	1.17 (0.98- 1.38)	0.99 (0.89- 1.09)
Diabetes Mellitus (E10-E14)	0.88 (0.52- 1.47)	1.59 (0.83- 3.04)	1.15 (0.32- 4.15)	1.24 (0.48- 3.20)	1.61 (0.97- 2.67)
Dementia and Alzheimer's diseases (F01, F03, G30)	0.48 (0.11- 2.16)	0.66 (0.07- 5.91)	.	.	1.30 (0.35- 4.84)
All circulatory system diseases (I00-I99)	1.22 (1.09- 1.37)	1.20 (1.02- 1.42)	1.51 (1.15- 1.98)	1.15 (0.92- 1.44)	1.52 (1.35- 1.71)
Ischaemic heart disease (I20-I25)	1.22 (0.99- 1.51)	1.42 (1.06- 1.91)	1.56 (0.95- 2.55)	1.16 (0.76- 1.77)	1.51 (1.21- 1.89)
Cerebrovascular disease (I60-I69)	1.08 (0.89- 1.32)	1.19 (0.88- 1.59)	1.72 (1.09- 2.72)	1.20 (0.82- 1.75)	1.48 (1.20- 1.82)
Other circulatory system diseases (rest of I00-I99)	1.34 (1.12- 1.60)	1.05 (0.79- 1.39)	1.29 (0.80- 2.07)	1.10 (0.77- 1.58)	1.55 (1.28- 1.88)
All respiratory system diseases (J00-J99)	1.21 (0.79- 1.85)	0.99 (0.51- 1.91)	1.70 (0.66- 4.37)	0.73 (0.26- 2.07)	1.43 (0.91- 2.25)
Pneumonia/influenza (J10-J18)	0.90 (0.47- 1.71)	0.66 (0.22- 2.03)	2.14 (0.61- 7.56)	1.37 (0.45- 4.21)	0.68 (0.31- 1.50)

	Routine non-manual workers	Self-employees	Farmers	Skilled manual workers	Non-skilled manual workers
COPD (J40-J44, J47)	1.85 (0.90- 3.82)	1.29 (0.44- 3.78)	0.99 (0.13- 7.76)	.	2.83 (1.37- 5.86)
Other respiratory system diseases (rest of J00-J99)	0.99 (0.37- 2.66)	1.35 (0.34- 5.40)	2.17 (0.26- 18.06)	.	1.14 (0.38- 3.40)
Chronic liver diseases (K70, K74)	1.27 (0.82- 1.97)	1.53 (0.84- 2.80)	3.56 (1.70- 7.48)	1.60 (0.74- 3.46)	1.98 (1.27- 3.10)
Symptoms and ill-defined conditions (R00-R99)	1.30 (0.90- 1.87)	0.68 (0.34- 1.37)	1.32 (0.47- 3.69)	1.73 (0.94- 3.18)	1.67 (1.13- 2.47)
All external causes (V01-Y98)	1.04 (0.86- 1.25)	1.23 (0.94- 1.63)	1.72 (1.09- 2.73)	1.33 (0.96- 1.85)	1.30 (1.06- 1.59)
Road traffic accidents (V01-V89, Y85)	1.01 (0.77- 1.32)	1.40 (0.95- 2.06)	1.27 (0.58- 2.77)	1.37 (0.85- 2.22)	1.42 (1.06- 1.90)
Suicide (X60-X84, Y87.0)	1.09 (0.85- 1.40)	1.27 (0.88- 1.86)	1.87 (1.01- 3.46)	1.15 (0.71- 1.85)	1.25 (0.94- 1.65)
Other external causes (rest of V01-Y98)	0.96 (0.68- 1.36)	0.98 (0.57- 1.68)	1.96 (0.91- 4.23)	1.63 (0.94- 2.86)	1.25 (0.86- 1.81)
All other causes of death (not listed above)	1.06 (0.66- 1.71)	1.31 (0.66- 2.61)	1.69 (0.55- 5.22)	0.72 (0.23- 2.22)	2.17 (1.35- 3.48)

Note: The MRRs were not estimated for some groups of causes and occupation-based social classes due to the limited number of deaths.

Reference category: Upper non-manual workers

Table 12. Mortality rate ratios and corresponding 95% confidence intervals by level of education, unadjusted and mutually adjusted for occupation-based social class, men, age 30-64 years, period 2012-2015.

	Model	High school	Middle school	No education/Primary school
All deaths	unadjusted	1.29 (1.20- 1.38)	1.64 (1.54- 1.75)	1.75 (1.62- 1.89)
	adjusted	1.19 (1.12-1.25)	1.44 (1.36-1.53)	1.51 (1.41-1.61)
HIV/AIDS (B20-B24)	unadjusted	1.23 (0.75- 2.03)	2.08 (1.29- 3.35)	1.82 (0.98- 3.38)
	adjusted	1.14 (0.65-1.98)	1.89 (1.06-3.35)	1.62 (0.79-3.29)
Other infectious and parasitic diseases (rest of A00-B99)	unadjusted	1.04 (0.79- 1.37)	1.77 (1.37- 2.28)	1.67 (1.23- 2.28)
	adjusted	0.92 (0.68-1.23)	1.51 (1.11-2.05)	1.40 (0.98-2.00)
All neoplasms (C00-D48)	unadjusted	1.24 (1.16- 1.33)	1.53 (1.43- 1.64)	1.62 (1.50- 1.76)
	adjusted	1.14 (1.08-1.22)	1.37 (1.29-1.46)	1.44 (1.33-1.55)
Cancer of buccal cavity, pharynx (C00-C14)	unadjusted	1.30 (0.96- 1.76)	2.04 (1.53- 2.72)	2.71 (1.97- 3.74)
	adjusted	1.18 (0.85-1.63)	1.71 (1.22-2.40)	2.20 (1.52-3.19)
Cancer of oesophagus (C15)	unadjusted	1.58 (1.11- 2.25)	2.30 (1.64- 3.24)	2.49 (1.70- 3.66)
	adjusted	1.36 (0.92-2.01)	1.77 (1.18-2.66)	1.84 (1.17-2.89)
Cancer of stomach (C16)	unadjusted	1.19 (1.00- 1.42)	1.72 (1.45- 2.04)	1.93 (1.59- 2.35)
	adjusted	1.06 (0.87-1.29)	1.46 (1.19-1.80)	1.62 (1.29-2.05)
Cancer of colon-rectum (C18-C21)	unadjusted	1.19 (1.05- 1.35)	1.25 (1.10- 1.42)	1.11 (0.95- 1.31)
	adjusted	1.11 (0.96-1.29)	1.15 (0.98-1.34)	1.02 (0.84-1.23)
Cancer of liver (C22)	unadjusted	1.42 (1.15- 1.77)	2.51 (2.04- 3.08)	2.77 (2.21- 3.48)
	adjusted	1.31 (1.05-1.65)	2.22 (1.76-2.80)	2.40 (1.86-3.10)
Cancer of larynx (C32)	unadjusted	2.34 (1.15- 4.76)	4.46 (2.25- 8.87)	6.25 (3.06-12.76)
	adjusted	1.42 (0.73-2.77)	2.32 (1.18-4.57)	3.06 (1.51-6.20)
Cancer of trachea, bronchus and lung (C33-C34)	unadjusted	1.50 (1.30- 1.74)	2.26 (1.96- 2.60)	2.68 (2.30- 3.13)
	adjusted	1.28 (1.12-1.46)	1.77 (1.54-2.04)	2.06 (1.77-2.40)
Melanoma (C43)	unadjusted	0.83 (0.67- 1.03)	0.65 (0.52- 0.81)	0.56 (0.40- 0.78)
	adjusted	0.86 (0.67-1.11)	0.70 (0.52-0.93)	0.61 (0.41-0.91)
Cancer of prostate (C61)	unadjusted	0.95 (0.72- 1.26)	0.97 (0.73- 1.29)	0.91 (0.65- 1.27)
	adjusted	1.02 (0.73-1.40)	1.04 (0.73-1.49)	0.98 (0.65-1.47)
Cancer of bladder (C67)	unadjusted	1.80 (1.25- 2.60)	2.33 (1.63- 3.33)	2.34 (1.57- 3.47)
	adjusted	1.54 (1.04-2.28)	1.87 (1.24-2.83)	1.84 (1.17-2.89)
Cancer of kidney and other urinary organs except bladder (C64-C66, C68)	unadjusted	1.28 (1.02- 1.60)	1.15 (0.92- 1.44)	1.11 (0.84- 1.47)
	adjusted	1.34 (1.05-1.72)	1.23 (0.94-1.62)	1.19 (0.86-1.64)
Hodgkin's disease (C81)	unadjusted	1.32 (0.68- 2.56)	1.16 (0.59- 2.28)	0.95 (0.37- 2.48)
	adjusted	0.97 (0.48-1.92)	0.78 (0.37-1.66)	0.62 (0.23-1.70)

	Model	High school	Middle school	No education/Primary school
Leukemia (C91-C95)	unadjusted	1.09 (0.88- 1.36)	1.25 (1.01- 1.55)	1.09 (0.83- 1.44)
	adjusted	1.12 (0.88-1.42)	1.35 (1.04-1.75)	1.18 (0.86-1.64)
Other neoplasms (rest of C00-D48)	unadjusted	1.14 (1.06- 1.23)	1.22 (1.13- 1.32)	1.16 (1.06- 1.28)
	adjusted	1.10 (1.01-1.19)	1.17 (1.07-1.28)	1.10 (0.99-1.23)
Diabetes Mellitus (E10-E14)	unadjusted	1.40 (1.08- 1.82)	1.84 (1.43- 2.37)	2.45 (1.86- 3.22)
	adjusted	1.21 (0.92-1.58)	1.53 (1.16-2.04)	2.00 (1.47-2.73)
Dementia and Alzheimer's diseases (F01, F03, G30)	unadjusted	1.09 (0.42- 2.82)	0.38 (0.11- 1.24)	0.43 (0.11- 1.71)
	adjusted	0.86 (0.28-2.65)	0.28 (0.06-1.20)	0.31 (0.06-1.66)
All circulatory system diseases (I00-I99)	unadjusted	1.36 (1.24- 1.49)	1.62 (1.48- 1.77)	1.68 (1.52- 1.87)
	adjusted	1.26 (1.15-1.37)	1.44 (1.32-1.58)	1.47 (1.33-1.63)
Ischaemic heart disease (I20-I25)	unadjusted	1.47 (1.30- 1.66)	1.75 (1.56- 1.97)	1.74 (1.51- 2.00)
	adjusted	1.37 (1.21-1.55)	1.58 (1.39-1.80)	1.54 (1.33-1.79)
Cerebrovascular disease (I60-I69)	unadjusted	1.44 (1.18- 1.74)	1.54 (1.27- 1.86)	1.81 (1.45- 2.26)
	adjusted	1.31 (1.06-1.62)	1.36 (1.08-1.70)	1.56 (1.21-2.01)
Other circulatory system diseases (rest of I00-I99)	unadjusted	1.22 (1.07- 1.38)	1.51 (1.33- 1.70)	1.59 (1.37- 1.84)
	adjusted	1.11 (0.98-1.27)	1.32 (1.15-1.52)	1.37 (1.17-1.61)
All respiratory system diseases (J00-J99)	unadjusted	1.39 (0.91- 2.11)	2.39 (1.60- 3.56)	3.25 (2.11- 5.01)
	adjusted	1.11 (0.72-1.70)	1.75 (1.12-2.71)	2.27 (1.41-3.65)
Pneumonia/influenza (J10-J18)	unadjusted	1.25 (0.67- 2.32)	1.85 (1.02- 3.35)	2.32 (1.18- 4.56)
	adjusted	0.99 (0.51-1.91)	1.41 (0.71-2.80)	1.71 (0.79-3.69)
COPD (J40-J44, J47)	unadjusted	1.45 (0.79- 2.64)	3.08 (1.75- 5.44)	4.47 (2.47- 8.10)
	adjusted	1.20 (0.63-2.26)	2.25 (1.18-4.28)	3.09 (1.57-6.10)
Other respiratory system diseases (rest of J00-J99)	unadjusted	1.69 (0.58- 4.98)	2.07 (0.71- 6.00)	2.10 (0.59- 7.53)
	adjusted	1.29 (0.39-4.24)	1.45 (0.41-5.11)	1.37 (0.31-5.95)
Chronic liver diseases (K70, K74)	unadjusted	2.08 (1.36- 3.17)	3.80 (2.53- 5.72)	4.83 (3.11- 7.50)
	adjusted	1.56 (1.03-2.37)	2.61 (1.71-3.97)	3.16 (2.01-4.98)
Symptoms and ill-defined conditions (R00-R99)	unadjusted	1.25 (0.97- 1.61)	1.66 (1.30- 2.13)	1.87 (1.37- 2.54)
	adjusted	1.26 (0.96-1.65)	1.60 (1.20-2.13)	1.73 (1.22-2.45)
All external causes (V01-Y98)	unadjusted	1.37 (1.20- 1.57)	1.86 (1.63- 2.12)	2.13 (1.80- 2.52)
	adjusted	1.26 (1.13-1.41)	1.52 (1.36-1.71)	1.67 (1.45-1.92)
Road traffic accidents (V01-V89, Y85)	unadjusted	1.53 (1.25- 1.88)	2.14 (1.75- 2.62)	2.47 (1.92- 3.19)
	adjusted	1.36 (1.12-1.66)	1.70 (1.38-2.10)	1.87 (1.45-2.41)
Suicide (X60-X84, Y87.0)	unadjusted	1.19 (1.02- 1.39)	1.45 (1.25- 1.69)	1.39 (1.13- 1.71)
	adjusted	1.14 (0.98-1.32)	1.28 (1.10-1.50)	1.19 (0.98-1.46)
Other external causes (rest of V01-Y98)	unadjusted	1.54 (1.22- 1.93)	2.34 (1.88- 2.93)	3.23 (2.50- 4.19)

	Model	High school	Middle school	No education/Primary school
	adjusted	1.40 (1.15-1.70)	1.78 (1.46-2.19)	2.30 (1.82-2.89)
All other causes of death (not listed above)	unadjusted	1.36 (1.03- 1.80)	2.13 (1.63- 2.78)	2.32 (1.70- 3.16)
	adjusted	1.25 (0.93-1.70)	1.77 (1.29-2.43)	1.86 (1.30-2.65)

Reference category: University

Table 13. Mortality rate ratios by level of education and corresponding confidence intervals, unadjusted and mutually adjusted for occupation-based social class, women, age 30-64 years, period 2012-2015.

	Model	High school	Middle school	No education/Primary school
All deaths	unadjusted	1.05 (1.00- 1.09)	1.11 (1.06- 1.16)	1.05 (0.99- 1.13)
	adjusted	1.02 (0.97- 1.07)	1.07 (1.01- 1.13)	1.02 (0.94- 1.09)
HIV/AIDS (B20-B24)	unadjusted	4.54 (1.34-15.39)	8.60 (2.56-28.84)	12.90 (3.31-50.37)
	adjusted	3.87 (0.90-16.63)	7.42 (1.66-33.16)	11.37 (2.11-61.41)
Other infectious and parasitic diseases (rest of A00-B99)	unadjusted	1.34 (0.88- 2.02)	1.59 (1.04- 2.42)	1.77 (1.03- 3.06)
	adjusted	1.34 (0.85- 2.11)	1.61 (0.96- 2.68)	1.80 (0.95- 3.39)
All neoplasms (C00-D48)	unadjusted	1.00 (0.95- 1.05)	1.01 (0.96- 1.07)	0.88 (0.82- 0.95)
	adjusted	0.98 (0.93- 1.03)	0.99 (0.94- 1.06)	0.88 (0.81- 0.96)
Cancer of buccal cavity, pharynx (C00-C14)	unadjusted	1.40 (0.84- 2.36)	1.66 (0.98- 2.82)	1.50 (0.76- 2.96)
	adjusted	1.33 (0.75- 2.35)	1.37 (0.72- 2.60)	1.21 (0.55- 2.66)
Cancer of oesophagus (C15)	unadjusted	1.21 (0.56- 2.59)	1.82 (0.86- 3.84)	1.32 (0.49- 3.59)
	adjusted	0.83 (0.36- 1.93)	0.91 (0.37- 2.24)	0.62 (0.20- 1.93)
Cancer of stomach (C16)	unadjusted	1.22 (0.96- 1.55)	1.72 (1.35- 2.19)	1.64 (1.20- 2.25)
	adjusted	1.09 (0.84- 1.41)	1.43 (1.07- 1.90)	1.33 (0.93- 1.92)
Cancer of colon-rectum (C18-C21)	unadjusted	0.90 (0.77- 1.04)	0.98 (0.84- 1.15)	0.79 (0.62- 1.00)
	adjusted	0.92 (0.78- 1.09)	1.00 (0.82- 1.22)	0.79 (0.60- 1.04)
Cancer of liver (C22)	unadjusted	1.24 (0.88- 1.76)	1.68 (1.18- 2.38)	1.87 (1.22- 2.87)
	adjusted	1.30 (0.88- 1.92)	1.83 (1.19- 2.83)	2.08 (1.23- 3.51)
Cancer of larynx (C32)	unadjusted	.	.	.
	adjusted	.	.	.
Cancer of trachea, bronchus and lung (C33-C34)	unadjusted	1.12 (0.96- 1.31)	1.31 (1.12- 1.53)	1.13 (0.91- 1.39)
	adjusted	1.02 (0.86- 1.22)	1.24 (1.02- 1.51)	1.11 (0.86- 1.43)
Melanoma (C43)	unadjusted	1.12 (0.83- 1.51)	0.85 (0.61- 1.19)	0.83 (0.48- 1.44)
	adjusted	0.99 (0.71- 1.38)	0.74 (0.50- 1.11)	0.72 (0.39- 1.33)
Cancer of breast (C50)	unadjusted	0.89 (0.82- 0.97)	0.71 (0.65- 0.78)	0.58 (0.49- 0.68)
	adjusted	0.93 (0.85- 1.03)	0.81 (0.72- 0.91)	0.70 (0.59- 0.83)
Cancer of cervix uteri (C53)	unadjusted	1.30 (0.85- 1.99)	1.97 (1.29- 3.01)	1.94 (1.03- 3.69)
	adjusted	1.11 (0.71- 1.74)	1.36 (0.83- 2.23)	1.25 (0.63- 2.50)
Cancer of other parts of uterus (C54-C55)	unadjusted	1.11 (0.85- 1.45)	1.17 (0.89- 1.55)	1.35 (0.95- 1.92)
	adjusted	1.09 (0.82- 1.45)	1.05 (0.75- 1.45)	1.14 (0.76- 1.71)
Cancer of bladder (C67)	unadjusted	1.12 (0.61- 2.08)	1.23 (0.65- 2.31)	0.92 (0.39- 2.17)
	adjusted	1.00 (0.51- 1.95)	0.91 (0.43- 1.95)	0.65 (0.24- 1.71)

	Model	High school	Middle school	No education/Primary school
Cancer of kidney and other urinary organs except bladder (C64-C66, C68)	unadjusted	1.04 (0.69- 1.57)	1.22 (0.80- 1.86)	1.30 (0.75- 2.25)
	adjusted	0.89 (0.57- 1.42)	1.06 (0.64- 1.78)	1.18 (0.62- 2.26)
Hodgkin's disease (C81)	unadjusted	1.00 (0.49- 2.04)	0.61 (0.26- 1.45)	.
	adjusted	0.91 (0.41- 2.04)	0.54 (0.19- 1.53)	.
Leukemia (C91-C95)	unadjusted	0.77 (0.59- 1.01)	0.85 (0.64- 1.13)	0.48 (0.29- 0.81)
	adjusted	0.73 (0.54- 0.97)	0.71 (0.51- 1.00)	0.38 (0.22- 0.67)
Other neoplasms (rest of C00-D48)	unadjusted	1.02 (0.94- 1.11)	1.02 (0.93- 1.11)	0.88 (0.77- 1.00)
	adjusted	0.99 (0.90- 1.09)	0.98 (0.87- 1.09)	0.85 (0.73- 0.98)
Diabetes Mellitus (E10-E14)	unadjusted	0.85 (0.51- 1.41)	1.13 (0.68- 1.87)	2.27 (1.30- 3.95)
	adjusted	0.86 (0.49- 1.51)	1.00 (0.53- 1.88)	1.91 (0.95- 3.85)
Dementia and Alzheimer's diseases (F01, F03, G30)	unadjusted	0.62 (0.14- 2.78)	0.99 (0.24- 4.15)	0.44 (0.05- 4.34)
	adjusted	0.76 (0.14- 4.03)	1.03 (0.15- 7.01)	0.42 (0.03- 6.03)
All circulatory system diseases (I00-I99)	unadjusted	1.32 (1.16- 1.50)	1.57 (1.38- 1.80)	1.74 (1.46- 2.06)
	adjusted	1.28 (1.11- 1.47)	1.48 (1.26- 1.73)	1.59 (1.30- 1.94)
Ischaemic heart disease (I20-I25)	unadjusted	1.56 (1.21- 2.02)	1.97 (1.52- 2.55)	2.06 (1.51- 2.81)
	adjusted	1.59 (1.19- 2.13)	1.99 (1.44- 2.74)	2.05 (1.40- 3.01)
Cerebrovascular disease (I60-I69)	unadjusted	1.16 (0.90- 1.51)	1.53 (1.18- 1.99)	1.54 (1.08- 2.19)
	adjusted	1.16 (0.87- 1.53)	1.43 (1.04- 1.96)	1.37 (0.91- 2.07)
Other circulatory system diseases (rest of I00-I99)	unadjusted	1.31 (1.08- 1.58)	1.39 (1.14- 1.70)	1.72 (1.34- 2.21)
	adjusted	1.21 (0.98- 1.49)	1.25 (0.99- 1.59)	1.52 (1.13- 2.04)
All respiratory system diseases (J00-J99)	unadjusted	1.79 (0.66- 4.84)	1.89 (0.68- 5.26)	2.01 (0.59- 6.85)
	adjusted	1.88 (0.46- 7.78)	2.04 (0.41-10.03)	2.12 (0.32-14.04)
Pneumonia/influenza (J10-J18)	unadjusted	1.23 (0.21- 7.20)	1.43 (0.23- 8.75)	0.77 (0.04-13.53)
	adjusted	1.45 (0.23- 9.39)	1.90 (0.22-16.17)	1.03 (0.05-23.27)
COPD (J40-J44, J47)	unadjusted	2.61 (1.01- 6.78)	3.30 (1.27- 8.57)	2.57 (0.87- 7.56)
	adjusted	2.29 (0.83- 6.33)	2.61 (0.88- 7.74)	1.95 (0.57- 6.64)
Other respiratory system diseases (rest of J00-J99)	unadjusted	2.31 (0.67- 8.01)	0.93 (0.21- 4.18)	8.10 (1.97-33.30)
	adjusted	2.81 (0.74-10.68)	1.30 (0.24- 7.03)	11.62 (2.17-62.22)
Chronic liver diseases (K70, K74)	unadjusted	1.31 (0.82- 2.10)	2.16 (1.36- 3.42)	1.82 (1.01- 3.28)
	adjusted	1.22 (0.72- 2.05)	1.75 (1.00- 3.07)	1.35 (0.68- 2.68)
Symptoms and ill-defined conditions (R00-R99)	unadjusted	0.98 (0.66- 1.45)	1.36 (0.91- 2.03)	1.56 (0.87- 2.79)
	adjusted	0.88 (0.55- 1.40)	1.16 (0.69- 1.96)	1.28 (0.62- 2.62)
All external causes (V01-Y98)	unadjusted	0.96 (0.82- 1.11)	1.19 (1.02- 1.39)	1.06 (0.81- 1.38)
	adjusted	0.90 (0.76- 1.05)	1.01 (0.84- 1.21)	0.86 (0.65- 1.13)
Road traffic accidents (V01-V89, Y85)	unadjusted	0.98 (0.75- 1.28)	1.30 (0.98- 1.71)	1.77 (1.18- 2.64)

	Model	High school	Middle school	No education/Primary school
	adjusted	0.95 (0.71- 1.28)	1.15 (0.82- 1.61)	1.51 (0.95- 2.40)
Suicide (X60-X84, Y87.0)	unadjusted	1.12 (0.90- 1.39)	1.23 (0.98- 1.56)	0.70 (0.44- 1.11)
	adjusted	1.04 (0.82- 1.32)	1.06 (0.80- 1.39)	0.57 (0.35- 0.93)
Other external causes (rest of V01-Y98)	unadjusted	0.69 (0.50- 0.94)	1.01 (0.74- 1.39)	0.91 (0.54- 1.52)
	adjusted	0.62 (0.45- 0.85)	0.80 (0.56- 1.15)	0.67 (0.39- 1.15)
All other causes of death (not listed above)	unadjusted	1.60 (0.97- 2.63)	1.70 (1.01- 2.86)	4.20 (2.35- 7.48)
	adjusted	1.63 (0.95- 2.82)	1.51 (0.81- 2.80)	3.39 (1.69- 6.78)

Note: The MRRs were not estimated for some groups of causes and levels of education due to the limited number of deaths.

Reference category: University

Table 14. Mortality rate ratios and corresponding 95% confidence intervals by occupation-based social class, unadjusted and mutually adjusted for level of education, men, age 30-64 years, period 2012-2015.

	Model	Routine non-manual workers	Self-employees	Farmers	Skilled manual workers	Non-skilled manual workers
All deaths	unadjusted	1.24 (1.15- 1.33)	1.31 (1.22- 1.41)	1.48 (1.30- 1.69)	1.37 (1.27- 1.48)	1.63 (1.52- 1.74)
	adjusted	1.12 (1.07- 1.18)	1.09 (1.03- 1.14)	1.21 (1.11- 1.32)	1.12 (1.06- 1.18)	1.31 (1.25- 1.38)
HIV/AIDS (B20-B24)	unadjusted	1.40 (0.92- 2.13)	1.30 (0.82- 2.08)	0.58 (0.16- 2.11)	1.31 (0.83- 2.09)	2.11 (1.43- 3.13)
	adjusted	1.23 (0.77- 1.99)	0.95 (0.55- 1.64)	0.42 (0.11- 1.65)	0.94 (0.54- 1.63)	1.48 (0.91- 2.41)
Other infectious and parasitic diseases (rest of A00-B99)	unadjusted	1.37 (1.06- 1.76)	1.34 (1.02- 1.76)	1.28 (0.76- 2.16)	1.40 (1.06- 1.86)	1.97 (1.55- 2.51)
	adjusted	1.30 (1.00- 1.70)	1.06 (0.79- 1.43)	1.00 (0.60- 1.67)	1.09 (0.81- 1.48)	1.50 (1.15- 1.98)
All neoplasms (C00-D48)	unadjusted	1.24 (1.16- 1.33)	1.24 (1.15- 1.34)	1.22 (1.06- 1.40)	1.40 (1.30- 1.51)	1.53 (1.43- 1.63)
	adjusted	1.14 (1.08- 1.21)	1.05 (0.99- 1.11)	1.01 (0.91- 1.13)	1.17 (1.10- 1.24)	1.26 (1.19- 1.33)
Cancer of buccal cavity, pharynx (C00-C14)	unadjusted	1.31 (0.99- 1.74)	1.23 (0.90- 1.68)	1.40 (0.80- 2.43)	1.85 (1.38- 2.48)	2.23 (1.72- 2.90)
	adjusted	1.15 (0.87- 1.52)	0.89 (0.65- 1.22)	0.97 (0.58- 1.62)	1.30 (0.96- 1.76)	1.53 (1.16- 2.03)
Cancer of oesophagus (C15)	unadjusted	1.36 (1.00- 1.83)	1.61 (1.18- 2.19)	2.32 (1.44- 3.74)	2.10 (1.55- 2.85)	2.02 (1.53- 2.68)
	adjusted	1.16 (0.83- 1.61)	1.21 (0.85- 1.73)	1.72 (1.03- 2.86)	1.56 (1.10- 2.21)	1.48 (1.06- 2.06)
Cancer of stomach (C16)	unadjusted	1.31 (1.09- 1.56)	1.44 (1.19- 1.73)	1.32 (0.92- 1.88)	1.70 (1.41- 2.05)	1.68 (1.42- 1.99)
	adjusted	1.21 (1.02- 1.44)	1.15 (0.95- 1.39)	1.03 (0.74- 1.42)	1.34 (1.10- 1.62)	1.29 (1.08- 1.55)
Cancer of colon-rectum (C18-C21)	unadjusted	1.17 (1.04- 1.31)	1.14 (1.00- 1.29)	1.03 (0.80- 1.33)	1.20 (1.05- 1.37)	1.21 (1.07- 1.36)
	adjusted	1.12 (0.98- 1.27)	1.08 (0.94- 1.26)	1.00 (0.77- 1.29)	1.15 (0.98- 1.33)	1.16 (1.00- 1.33)
Cancer of liver (C22)	unadjusted	1.39 (1.12- 1.73)	1.59 (1.27- 1.99)	1.83 (1.26- 2.66)	1.65 (1.31- 2.08)	2.21 (1.81- 2.70)
	adjusted	1.15 (0.96- 1.38)	1.04 (0.86- 1.27)	1.16 (0.85- 1.59)	1.05 (0.85- 1.29)	1.37 (1.14- 1.65)
Cancer of larynx (C32)	unadjusted	2.93 (1.80- 4.78)	2.49 (1.48- 4.19)	4.95 (2.53- 9.68)	4.22 (2.56- 6.95)	5.56 (3.51- 8.81)
	adjusted	2.36 (1.38- 4.04)	1.55 (0.86- 2.79)	2.92 (1.41- 6.05)	2.54 (1.44- 4.49)	3.23 (1.89- 5.54)
Cancer of trachea, bronchus and lung (C33-C34)	unadjusted	1.50 (1.30- 1.73)	1.64 (1.41- 1.90)	1.33 (1.00- 1.76)	1.99 (1.71- 2.30)	2.26 (1.98- 2.59)
	adjusted	1.29 (1.15- 1.44)	1.19 (1.06- 1.34)	0.93 (0.75- 1.15)	1.41 (1.25- 1.60)	1.58 (1.40- 1.77)
Melanoma (C43)	unadjusted	0.87 (0.69- 1.10)	0.85 (0.65- 1.10)	0.64 (0.35- 1.17)	0.65 (0.48- 0.87)	0.70 (0.55- 0.90)
	adjusted	0.95 (0.75- 1.22)	1.03 (0.78- 1.38)	0.79 (0.44- 1.44)	0.80 (0.58- 1.10)	0.88 (0.66- 1.17)
Cancer of prostate (C61)	unadjusted	0.88 (0.67- 1.16)	0.90 (0.67- 1.19)	0.96 (0.56- 1.64)	0.99 (0.72- 1.35)	0.88 (0.67- 1.17)
	adjusted	0.87 (0.64- 1.18)	0.89 (0.63- 1.24)	0.95 (0.54- 1.69)	0.98 (0.68- 1.41)	0.88 (0.63- 1.23)
Cancer of bladder (C67)	unadjusted	1.57 (1.17- 2.10)	1.43 (1.04- 1.95)	1.58 (0.92- 2.71)	2.11 (1.55- 2.86)	1.96 (1.48- 2.60)
	adjusted	1.29 (0.94- 1.78)	1.07 (0.75- 1.53)	1.18 (0.67- 2.07)	1.56 (1.10- 2.21)	1.44 (1.03- 2.01)
Cancer of kidney and other urinary organs except bladder (C64-C66, C68)	unadjusted	1.04 (0.85- 1.26)	0.88 (0.71- 1.10)	1.18 (0.80- 1.74)	0.99 (0.79- 1.25)	1.01 (0.83- 1.23)
	adjusted	0.94 (0.75- 1.16)	0.82 (0.63- 1.05)	1.10 (0.73- 1.65)	0.92 (0.71- 1.19)	0.94 (0.74- 1.20)
Hodgkin's disease (C81)	unadjusted	1.75 (0.94- 3.25)	1.41 (0.70- 2.86)	1.66 (0.48- 5.74)	1.60 (0.81- 3.19)	1.64 (0.87- 3.07)

	Model	Routine non-manual workers	Self-employees	Farmers	Skilled manual workers	Non-skilled manual workers
	adjusted	1.83 (0.92- 3.61)	1.64 (0.74- 3.63)	1.98 (0.54- 7.24)	1.88 (0.85- 4.15)	1.96 (0.93- 4.14)
Leukemia (C91-C95)	unadjusted	1.12 (0.92- 1.37)	1.01 (0.81- 1.26)	1.26 (0.85- 1.87)	0.97 (0.77- 1.22)	1.09 (0.89- 1.33)
	adjusted	1.05 (0.84- 1.30)	0.88 (0.69- 1.14)	1.10 (0.73- 1.67)	0.84 (0.64- 1.09)	0.94 (0.74- 1.19)
Other neoplasms (rest of C00-D48)	unadjusted	1.14 (1.06- 1.22)	1.07 (0.99- 1.16)	1.06 (0.91- 1.23)	1.14 (1.05- 1.23)	1.21 (1.13- 1.29)
	adjusted	1.09 (1.01- 1.17)	1.00 (0.92- 1.09)	0.99 (0.85- 1.15)	1.06 (0.97- 1.16)	1.12 (1.03- 1.22)
Diabetes Mellitus (E10-E14)	unadjusted	1.52 (1.20- 1.92)	1.56 (1.22- 2.00)	1.82 (1.21- 2.74)	1.24 (0.94- 1.63)	2.14 (1.71- 2.67)
	adjusted	1.35 (1.08- 1.70)	1.20 (0.93- 1.54)	1.34 (0.91- 1.97)	0.93 (0.70- 1.23)	1.56 (1.23- 1.98)
Dementia and Alzheimer's diseases (F01, F03, G30)	unadjusted	1.32 (0.51- 3.44)	0.34 (0.07- 1.61)	.	1.04 (0.31- 3.48)	0.95 (0.33- 2.75)
	adjusted	1.62 (0.53- 4.89)	0.64 (0.12- 3.45)	.	2.09 (0.51- 8.61)	2.03 (0.54- 7.58)
All circulatory system diseases (I00-I99)	unadjusted	1.28 (1.18- 1.39)	1.29 (1.19- 1.41)	1.46 (1.25- 1.70)	1.27 (1.16- 1.39)	1.60 (1.48- 1.73)
	adjusted	1.15 (1.06- 1.23)	1.08 (1.00- 1.18)	1.21 (1.06- 1.38)	1.05 (0.97- 1.15)	1.31 (1.22- 1.42)
Ischaemic heart disease (I20-I25)	unadjusted	1.29 (1.16- 1.44)	1.33 (1.18- 1.49)	1.50 (1.23- 1.84)	1.28 (1.13- 1.44)	1.61 (1.45- 1.78)
	adjusted	1.12 (1.01- 1.24)	1.08 (0.96- 1.21)	1.21 (1.00- 1.46)	1.02 (0.91- 1.16)	1.28 (1.15- 1.43)
Cerebrovascular disease (I60-I69)	unadjusted	1.32 (1.11- 1.57)	1.26 (1.05- 1.52)	1.60 (1.17- 2.19)	1.24 (1.02- 1.51)	1.60 (1.36- 1.89)
	adjusted	1.18 (0.99- 1.42)	1.08 (0.88- 1.32)	1.34 (0.97- 1.85)	1.05 (0.85- 1.30)	1.35 (1.11- 1.63)
Other circulatory system diseases (rest of I00-I99)	unadjusted	1.25 (1.12- 1.40)	1.27 (1.12- 1.43)	1.35 (1.08- 1.69)	1.28 (1.13- 1.45)	1.59 (1.43- 1.77)
	adjusted	1.17 (1.04- 1.31)	1.09 (0.96- 1.25)	1.15 (0.93- 1.43)	1.09 (0.96- 1.25)	1.34 (1.19- 1.52)
All respiratory system diseases (J00-J99)	unadjusted	1.70 (1.19- 2.43)	1.57 (1.07- 2.31)	2.70 (1.54- 4.72)	1.84 (1.24- 2.71)	3.04 (2.19- 4.23)
	adjusted	1.51 (1.04- 2.17)	1.11 (0.74- 1.67)	1.81 (1.04- 3.16)	1.26 (0.83- 1.91)	2.02 (1.39- 2.93)
Pneumonia/influenza (J10-J18)	unadjusted	1.76 (1.02- 3.03)	1.47 (0.81- 2.69)	3.13 (1.38- 7.11)	1.50 (0.81- 2.80)	2.36 (1.40- 3.98)
	adjusted	1.66 (0.92- 2.99)	1.18 (0.60- 2.30)	2.41 (1.01- 5.76)	1.18 (0.59- 2.36)	1.80 (0.97- 3.34)
COPD (J40-J44, J47)	unadjusted	1.57 (0.94- 2.63)	1.71 (1.01- 2.91)	1.82 (0.74- 4.49)	2.25 (1.33- 3.82)	3.78 (2.40- 5.94)
	adjusted	1.31 (0.78- 2.20)	1.04 (0.59- 1.82)	1.03 (0.43- 2.49)	1.31 (0.75- 2.31)	2.12 (1.28- 3.51)
Other respiratory system diseases (rest of J00-J99)	unadjusted	1.94 (0.73- 5.11)	1.32 (0.43- 4.11)	5.40 (1.52-19.14)	1.39 (0.45- 4.31)	2.57 (1.01- 6.53)
	adjusted	1.73 (0.60- 4.98)	1.12 (0.32- 3.92)	4.55 (1.14-18.22)	1.16 (0.33- 4.13)	2.14 (0.71- 6.46)
Chronic liver diseases (K70, K74)	unadjusted	2.10 (1.50- 2.93)	2.34 (1.66- 3.31)	3.57 (2.17- 5.86)	2.40 (1.68- 3.41)	3.59 (2.63- 4.91)
	adjusted	1.65 (1.20- 2.28)	1.44 (1.02- 2.04)	2.10 (1.31- 3.38)	1.43 (1.00- 2.03)	2.07 (1.50- 2.87)
Symptoms and ill-defined conditions (R00-R99)	unadjusted	1.03 (0.82- 1.31)	1.09 (0.84- 1.41)	1.67 (1.09- 2.56)	1.23 (0.96- 1.58)	1.56 (1.25- 1.93)
	adjusted	0.92 (0.72- 1.17)	0.86 (0.66- 1.13)	1.30 (0.85- 1.98)	0.96 (0.73- 1.26)	1.19 (0.93- 1.52)
All external causes (V01-Y98)	unadjusted	1.05 (0.94- 1.17)	1.53 (1.37- 1.72)	2.39 (2.00- 2.86)	1.49 (1.33- 1.67)	1.70 (1.53- 1.88)
	adjusted	0.94 (0.85- 1.04)	1.25 (1.12- 1.39)	1.91 (1.63- 2.23)	1.19 (1.07- 1.33)	1.34 (1.21- 1.49)
Road traffic accidents (V01-V89, Y85)	unadjusted	1.19 (0.99- 1.43)	1.70 (1.40- 2.06)	2.48 (1.83- 3.37)	1.57 (1.29- 1.90)	1.96 (1.65- 2.33)
	adjusted	1.03 (0.86- 1.23)	1.31 (1.09- 1.59)	1.89 (1.42- 2.51)	1.19 (0.98- 1.45)	1.47 (1.23- 1.76)
Suicide (X60-X84, Y87.0)	unadjusted	1.01 (0.89- 1.15)	1.38 (1.21- 1.57)	2.02 (1.63- 2.49)	1.22 (1.07- 1.40)	1.31 (1.16- 1.48)

	Model	Routine non-manual workers	Self-employees	Farmers	Skilled manual workers	Non-skilled manual workers
	adjusted	0.95 (0.83- 1.09)	1.23 (1.06- 1.43)	1.79 (1.43- 2.25)	1.09 (0.93- 1.26)	1.16 (1.00- 1.33)
Other external causes (rest of V01-Y98)	unadjusted	0.95 (0.78- 1.16)	1.62 (1.33- 1.97)	2.95 (2.22- 3.93)	1.88 (1.55- 2.27)	2.10 (1.76- 2.50)
	adjusted	0.81 (0.68- 0.96)	1.20 (1.01- 1.44)	2.12 (1.66- 2.71)	1.37 (1.15- 1.63)	1.49 (1.26- 1.76)
All other causes of death (not listed above)	unadjusted	1.19 (0.93- 1.54)	1.50 (1.16- 1.95)	1.86 (1.21- 2.86)	1.60 (1.23- 2.08)	2.03 (1.61- 2.55)
	adjusted	1.04 (0.80- 1.35)	1.12 (0.85- 1.48)	1.35 (0.88- 2.09)	1.17 (0.88- 1.56)	1.45 (1.12- 1.89)

Note: The MRRs were not estimated for some groups of causes and levels of education due to the limited number of deaths.

Reference category: University

Table 15. Mortality rate ratios and corresponding 95% confidence intervals by occupation-based social class, unadjusted and mutually adjusted for level of education, women, age 30-64 years, period 2012-2015.

	Model	Routine non-manual workers	Self-employees	Farmers	Skilled manual workers	Non-skilled manual workers
All deaths	unadjusted	1.07 (1.03- 1.12)	1.14 (1.07- 1.21)	1.03 (0.91- 1.16)	1.08 (1.00- 1.18)	1.09 (1.04- 1.14)
	adjusted	1.05 (1.00- 1.10)	1.11 (1.03- 1.18)	1.00 (0.88- 1.13)	1.04 (0.96- 1.14)	1.05 (1.00- 1.12)
HIV/AIDS (B20-B24)	unadjusted	2.83 (0.68-11.87)	4.93 (0.94-25.70)	4.58 (0.32-65.45)	1.51 (0.11-21.52)	3.82 (0.87-16.79)
	adjusted	1.48 (0.51- 4.34)	1.99 (0.57- 6.98)	1.61 (0.23-11.33)	0.53 (0.08- 3.72)	1.32 (0.41- 4.24)
Other infectious and parasitic diseases (rest of A00-B99)	unadjusted	1.22 (0.84- 1.76)	0.97 (0.54- 1.75)	1.41 (0.56- 3.57)	1.45 (0.74- 2.81)	1.37 (0.91- 2.04)
	adjusted	1.02 (0.67- 1.54)	0.75 (0.39- 1.42)	1.04 (0.39- 2.75)	1.07 (0.52- 2.21)	1.01 (0.62- 1.66)
All neoplasms (C00-D48)	unadjusted	1.05 (1.00- 1.09)	1.12 (1.04- 1.19)	0.87 (0.76- 1.00)	1.04 (0.95- 1.14)	0.97 (0.92- 1.02)
	adjusted	1.06 (1.01- 1.11)	1.13 (1.05- 1.22)	0.90 (0.78- 1.04)	1.06 (0.96- 1.17)	0.99 (0.93- 1.06)
Cancer of buccal cavity, pharynx (C00-C14)	unadjusted	1.13 (0.70- 1.82)	1.72 (0.94- 3.18)	0.42 (0.06- 3.13)	1.99 (0.93- 4.25)	1.55 (0.95- 2.55)
	adjusted	1.00 (0.59- 1.70)	1.50 (0.76- 2.99)	0.38 (0.05- 2.86)	1.72 (0.74- 3.98)	1.36 (0.74- 2.49)
Cancer of oesophagus (C15)	unadjusted	1.65 (0.74- 3.69)	3.99 (1.63- 9.77)	1.36 (0.17-10.89)	2.80 (0.84- 9.30)	2.68 (1.19- 6.03)
	adjusted	1.78 (0.73- 4.37)	4.38 (1.58-12.12)	1.57 (0.18-13.52)	3.11 (0.82-11.70)	3.01 (1.13- 7.97)
Cancer of stomach (C16)	unadjusted	1.38 (1.10- 1.73)	1.78 (1.32- 2.40)	1.49 (0.85- 2.62)	1.44 (0.95- 2.18)	1.73 (1.36- 2.20)
	adjusted	1.24 (0.97- 1.60)	1.47 (1.06- 2.06)	1.20 (0.67- 2.16)	1.14 (0.73- 1.79)	1.38 (1.04- 1.85)
Cancer of colon-rectum (C18-C21)	unadjusted	0.90 (0.78- 1.04)	1.01 (0.81- 1.25)	1.03 (0.69- 1.52)	1.01 (0.76- 1.34)	0.92 (0.79- 1.09)
	adjusted	0.92 (0.78- 1.09)	1.03 (0.81- 1.31)	1.08 (0.72- 1.63)	1.04 (0.76- 1.41)	0.95 (0.78- 1.17)
Cancer of liver (C22)	unadjusted	1.15 (0.85- 1.57)	1.33 (0.85- 2.06)	1.24 (0.56- 2.76)	1.24 (0.69- 2.24)	1.30 (0.93- 1.81)
	adjusted	0.93 (0.65- 1.32)	0.94 (0.57- 1.53)	0.82 (0.35- 1.90)	0.82 (0.43- 1.56)	0.86 (0.57- 1.30)
Cancer of larynx (C32)	unadjusted	2.04 (0.42- 9.86)	6.71 (1.30-34.62)	.	.	2.44 (0.47-12.58)
	adjusted	1.02 (0.21- 5.04)	3.29 (0.59-18.53)	.	.	1.25 (0.21- 7.42)
Cancer of trachea, bronchus and lung (C33-C34)	unadjusted	1.35 (1.16- 1.57)	1.26 (1.01- 1.57)	0.94 (0.60- 1.46)	1.32 (0.99- 1.76)	1.16 (0.98- 1.38)
	adjusted	1.27 (1.08- 1.50)	1.13 (0.89- 1.44)	0.83 (0.53- 1.31)	1.16 (0.85- 1.57)	1.03 (0.84- 1.26)
Melanoma (C43)	unadjusted	1.28 (0.94- 1.73)	0.89 (0.53- 1.50)	0.90 (0.33- 2.48)	1.02 (0.55- 1.89)	1.09 (0.77- 1.55)
	adjusted	1.36 (0.97- 1.91)	1.03 (0.59- 1.80)	1.09 (0.38- 3.08)	1.24 (0.63- 2.40)	1.33 (0.87- 2.03)
Cancer of breast (C50)	unadjusted	0.88 (0.82- 0.96)	0.92 (0.81- 1.05)	0.60 (0.45- 0.81)	0.64 (0.53- 0.77)	0.63 (0.57- 0.69)
	adjusted	0.95 (0.86- 1.04)	1.04 (0.91- 1.20)	0.71 (0.53- 0.96)	0.75 (0.61- 0.91)	0.73 (0.65- 0.83)
Cancer of cervix uteri (C53)	unadjusted	1.33 (0.87- 2.02)	1.54 (0.85- 2.80)	0.87 (0.20- 3.80)	3.12 (1.76- 5.51)	2.27 (1.48- 3.49)
	adjusted	1.21 (0.77- 1.92)	1.33 (0.70- 2.52)	0.73 (0.17- 3.23)	2.59 (1.37- 4.88)	1.89 (1.13- 3.16)
Cancer of other parts of uterus (C54-C55)	unadjusted	0.99 (0.78- 1.27)	1.30 (0.93- 1.82)	1.40 (0.78- 2.51)	0.73 (0.42- 1.29)	1.36 (1.05- 1.76)
	adjusted	0.96 (0.73- 1.27)	1.26 (0.86- 1.83)	1.34 (0.72- 2.48)	0.71 (0.39- 1.29)	1.31 (0.96- 1.81)
Cancer of bladder (C67)	unadjusted	1.11 (0.62- 1.98)	1.16 (0.51- 2.68)	1.17 (0.27- 5.05)	2.33 (0.97- 5.59)	1.35 (0.73- 2.50)

	Model	Routine non-manual workers	Self-employees	Farmers	Skilled manual workers	Non-skilled manual workers
	adjusted	1.16 (0.60- 2.21)	1.29 (0.51- 3.24)	1.40 (0.30- 6.45)	2.67 (0.99- 7.18)	1.56 (0.73- 3.33)
Cancer of kidney and other urinary organs except bladder (C64-C66, C68)	unadjusted	1.41 (0.95- 2.10)	1.96 (1.17- 3.29)	1.32 (0.47- 3.72)	1.13 (0.50- 2.55)	1.18 (0.75- 1.85)
	adjusted	1.41 (0.90- 2.22)	1.85 (1.03- 3.33)	1.20 (0.40- 3.55)	1.03 (0.43- 2.48)	1.07 (0.62- 1.87)
Hodgkin's disease (C81)	unadjusted	1.09 (0.48- 2.48)	0.28 (0.03- 2.64)	1.37 (0.14-13.13)	0.48 (0.05- 4.60)	0.87 (0.32- 2.33)
	adjusted	1.28 (0.56- 2.94)	0.39 (0.05- 3.23)	2.40 (0.29-20.08)	0.78 (0.09- 6.59)	1.46 (0.50- 4.23)
Leukemia (C91-C95)	unadjusted	0.87 (0.66- 1.14)	1.15 (0.77- 1.71)	0.96 (0.43- 2.14)	1.04 (0.61- 1.77)	0.99 (0.73- 1.34)
	adjusted	1.03 (0.77- 1.39)	1.46 (0.96- 2.22)	1.33 (0.60- 2.96)	1.38 (0.79- 2.39)	1.33 (0.92- 1.91)
Other neoplasms (rest of C00-D48)	unadjusted	1.05 (0.97- 1.14)	1.09 (0.97- 1.23)	0.87 (0.68- 1.11)	1.17 (1.00- 1.36)	0.99 (0.90- 1.08)
	adjusted	1.06 (0.97- 1.16)	1.12 (0.98- 1.28)	0.92 (0.71- 1.18)	1.21 (1.03- 1.43)	1.03 (0.92- 1.16)
Diabetes Mellitus (E10-E14)	unadjusted	0.88 (0.54- 1.42)	1.59 (0.87- 2.91)	1.15 (0.35- 3.80)	1.24 (0.51- 3.00)	1.61 (1.00- 2.58)
	adjusted	0.86 (0.50- 1.49)	1.39 (0.69- 2.78)	0.87 (0.25- 3.06)	1.02 (0.39- 2.67)	1.28 (0.69- 2.37)
Dementia and Alzheimer's diseases (F01, F03, G30)	unadjusted	0.48 (0.11- 2.16)	0.66 (0.07- 5.91)	.	.	1.30 (0.35- 4.84)
	adjusted	0.52 (0.09- 2.86)	0.72 (0.06- 8.33)	.	.	1.46 (0.24- 8.84)
All circulatory system diseases (I00-I99)	unadjusted	1.22 (1.08- 1.38)	1.20 (1.00- 1.44)	1.51 (1.11- 2.04)	1.15 (0.90- 1.47)	1.52 (1.33- 1.73)
	adjusted	1.06 (0.93- 1.20)	0.97 (0.80- 1.18)	1.18 (0.87- 1.59)	0.90 (0.70- 1.16)	1.19 (1.02- 1.39)
Ischaemic heart disease (I20-I25)	unadjusted	1.22 (0.98- 1.52)	1.42 (1.04- 1.93)	1.56 (0.93- 2.60)	1.16 (0.75- 1.80)	1.51 (1.20- 1.91)
	adjusted	0.95 (0.74- 1.22)	1.01 (0.71- 1.42)	1.06 (0.61- 1.84)	0.78 (0.49- 1.27)	1.03 (0.77- 1.38)
Cerebrovascular disease (I60-I69)	unadjusted	1.08 (0.85- 1.38)	1.19 (0.83- 1.69)	1.72 (0.99- 2.99)	1.20 (0.76- 1.89)	1.48 (1.15- 1.90)
	adjusted	0.97 (0.74- 1.26)	0.99 (0.67- 1.45)	1.40 (0.79- 2.48)	0.96 (0.59- 1.56)	1.19 (0.87- 1.62)
Other circulatory system diseases	unadjusted	1.34 (1.12- 1.60)	1.05 (0.79- 1.39)	1.29 (0.80- 2.07)	1.10 (0.77- 1.58)	1.55 (1.28- 1.88)
	adjusted	1.21 (0.99- 1.48)	0.91 (0.67- 1.24)	1.08 (0.66- 1.76)	0.94 (0.64- 1.38)	1.32 (1.04- 1.66)
All respiratory system diseases (J00-J99)	unadjusted	1.21 (0.54- 2.71)	0.99 (0.28- 3.48)	1.70 (0.28-10.24)	0.73 (0.10- 5.29)	1.43 (0.60- 3.39)
	adjusted	0.92 (0.28- 3.02)	0.71 (0.12- 4.36)	1.19 (0.10-14.88)	0.51 (0.03- 7.98)	1.00 (0.25- 4.07)
Pneumonia/influenza (J10-J18)	unadjusted	0.90 (0.28- 2.92)	0.66 (0.08- 5.19)	2.14 (0.21-21.84)	1.37 (0.17-10.82)	0.68 (0.16- 2.89)
	adjusted	0.73 (0.14- 3.83)	0.51 (0.03- 8.15)	1.74 (0.08-40.02)	1.03 (0.06-17.66)	0.52 (0.06- 4.56)
COPD (J40-J44, J47)	unadjusted	1.85 (0.90- 3.82)	1.29 (0.44- 3.78)	0.99 (0.13- 7.76)	.	2.83 (1.37- 5.86)
	adjusted	1.34 (0.61- 2.94)	0.90 (0.28- 2.86)	0.71 (0.09- 5.89)	.	1.98 (0.83- 4.73)
Other respiratory system diseases (rest of J00-J99)	unadjusted	0.99 (0.37- 2.66)	1.35 (0.34- 5.40)	2.17 (0.26-18.06)	.	1.14 (0.38- 3.40)
	adjusted	0.69 (0.24- 1.99)	0.85 (0.19- 3.83)	0.99 (0.10- 9.51)	.	0.61 (0.16- 2.28)
Chronic liver diseases (K70, K74)	unadjusted	1.27 (0.83- 1.94)	1.53 (0.86- 2.74)	3.56 (1.75- 7.27)	1.60 (0.76- 3.36)	1.98 (1.29- 3.04)
	adjusted	1.06 (0.66- 1.72)	1.16 (0.61- 2.22)	2.69 (1.23- 5.88)	1.16 (0.52- 2.60)	1.46 (0.86- 2.49)
Symptoms and ill-defined conditions (R00-R99)	unadjusted	1.30 (0.83- 2.04)	0.68 (0.29- 1.61)	1.32 (0.37- 4.70)	1.73 (0.81- 3.67)	1.67 (1.03- 2.70)
	adjusted	1.29 (0.80- 2.07)	0.63 (0.27- 1.47)	1.15 (0.34- 3.95)	1.52 (0.70- 3.31)	1.46 (0.83- 2.55)

	Model	Routine non-manual workers	Self-employees	Farmers	Skilled manual workers	Non-skilled manual workers
All external causes (V01-Y98)	unadjusted	1.04 (0.89- 1.20)	1.23 (0.99- 1.53)	1.72 (1.20- 2.47)	1.33 (1.03- 1.73)	1.30 (1.11- 1.52)
	adjusted	1.07 (0.90- 1.26)	1.25 (0.99- 1.59)	1.75 (1.20- 2.56)	1.34 (1.01- 1.78)	1.31 (1.07- 1.59)
Road traffic accidents (V01-V89, Y85)	unadjusted	1.01 (0.77- 1.32)	1.40 (0.95- 2.05)	1.27 (0.58- 2.74)	1.37 (0.86- 2.21)	1.42 (1.07- 1.90)
	adjusted	0.98 (0.73- 1.33)	1.27 (0.83- 1.95)	1.09 (0.49- 2.42)	1.21 (0.72- 2.03)	1.23 (0.86- 1.76)
Suicide (X60-X84, Y87.0)	unadjusted	1.09 (0.88- 1.35)	1.27 (0.93- 1.75)	1.87 (1.11- 3.16)	1.15 (0.77- 1.73)	1.25 (0.98- 1.58)
	adjusted	1.08 (0.85- 1.37)	1.28 (0.90- 1.81)	1.99 (1.15- 3.44)	1.17 (0.75- 1.81)	1.29 (0.97- 1.73)
Other external causes (rest of V01-Y98)	unadjusted	0.96 (0.71- 1.30)	0.98 (0.61- 1.58)	1.96 (0.99- 3.87)	1.63 (1.00- 2.68)	1.25 (0.90- 1.73)
	adjusted	1.15 (0.82- 1.60)	1.14 (0.68- 1.90)	2.28 (1.12- 4.63)	1.88 (1.10- 3.24)	1.43 (0.96- 2.14)
All other causes of death (not listed above)	unadjusted	1.06 (0.68- 1.65)	1.31 (0.69- 2.48)	1.69 (0.59- 4.82)	0.72 (0.25- 2.05)	2.17 (1.40- 3.37)
	adjusted	0.84 (0.52- 1.38)	0.96 (0.48- 1.93)	1.08 (0.36- 3.24)	0.50 (0.17- 1.51)	1.47 (0.85- 2.54)

Note: The MRRs were not estimated for some groups of causes and levels of education due to the limited number of deaths.

Reference category: University

Table 16. Relative index of inequality and corresponding 95% confidence intervals according to causes of death and sex, age 30-74 years, period 2012-2015.

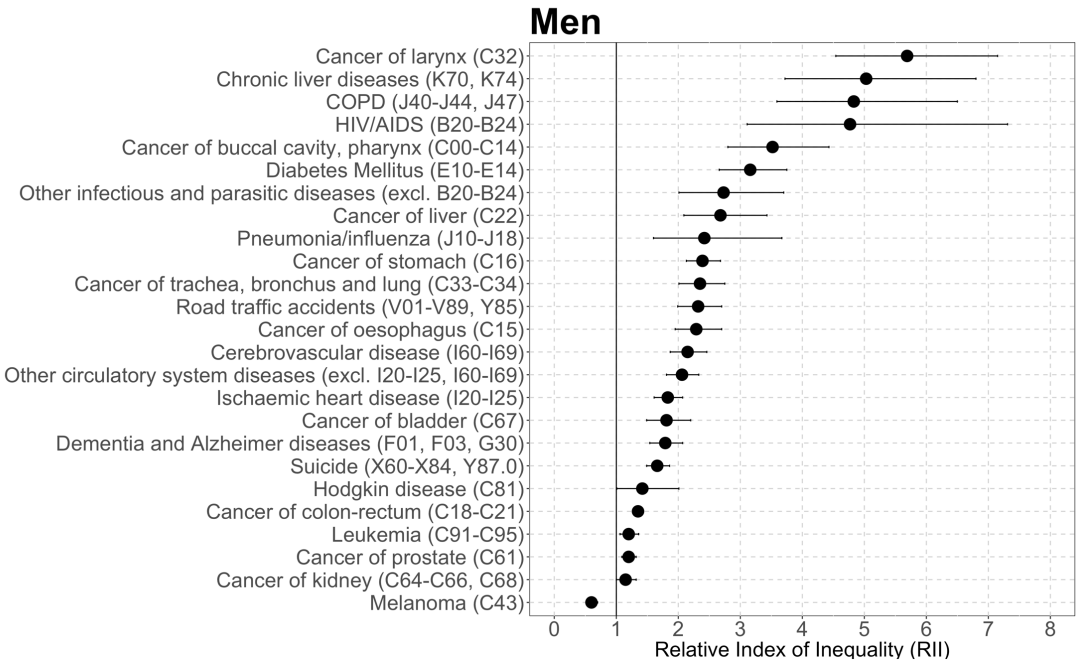
	Men	Women	*P* value
All deaths	2.07 (1.81-2.37)	1.51 (1.35-1.68)	0.001
HIV/AIDS (B20-B24)	4.77 (3.11-7.31)	4.33 (2.55-7.38)	0.873
Other infectious and parasitic diseases (rest of A00-B99)	2.76 (2.02-3.76)	2.43 (1.89-3.12)	0.526
All neoplasms (C00-D48)	1.76 (1.58-1.96)	1.06 (0.98-1.16)	0.001
Cancer of buccal cavity, pharynx (C00-C14)	3.52 (2.80-4.43)	1.59 (1.18-2.14)	<0.0001
Cancer of oesophagus (C15)	2.29 (1.95-2.70)	1.08 (0.75-1.54)	0.002
Cancer of stomach (C16)	2.39 (2.13-2.68)	2.18 (1.87-2.54)	0.566
Cancer of colon-rectum (C18-C21)	1.35 (1.27-1.44)	1.07 (0.96-1.19)	0.035
Cancer of liver (C22)	2.68 (2.09-3.43)	2.22 (1.86-2.66)	0.374
Cancer of larynx (C32)	5.69 (4.54-7.15)	1.60 (0.92-2.76)	<0.0001
Cancer of trachea, bronchus and lung (C33-C34)	2.35 (2.01-2.75)	0.83 (0.65-1.06)	<0.0001
Melanoma (C43)	0.60 (0.52-0.70)	0.80 (0.67-0.97)	0.052
Cancer of prostate (C61)	1.20 (1.09-1.32)	.	
Cancer of breast (C50)	.	0.80 (0.74-0.86)	
Cancer of cervix uteri (C53)	.	2.18 (1.67-2.85)	
Cancer of other parts of uterus (C54-C55)	.	1.45 (1.27-1.65)	
Cancer of bladder (C67)	1.81 (1.49-2.20)	1.05 (0.82-1.34)	0.016
Cancer of kidney and other urinary organs except bladder (C64-C66, C68)	1.15 (1.00-1.32)	1.12 (0.93-1.35)	0.837
Hodgkin's disease (C81)	1.42 (1.01-2.01)	1.13 (0.73-1.74)	0.361
Leukemia (C91-C95)	1.20 (1.06-1.36)	1.11 (0.95-1.31)	0.544
Other neoplasms (rest of C00-D48)	1.28 (1.18-1.39)	1.12 (1.04-1.20)	0.056
Diabetes Mellitus (E10-E14)	3.16 (2.66-3.75)	5.75 (4.48-7.37)	0.001
Dementia and Alzheimer's diseases (F01, F03, G30)	1.79 (1.54-2.07)	1.75 (1.49-2.06)	0.865
All circulatory system diseases (I00-I99)	1.97 (1.75-2.21)	2.37 (2.05-2.74)	0.152
Ischaemic heart disease (I20-I25)	1.83 (1.61-2.07)	2.52 (2.13-2.98)	0.052
Cerebrovascular disease (I60-I69)	2.15 (1.87-2.46)	2.05 (1.77-2.37)	0.679
Other circulatory system diseases (rest of I00-I99)	2.06 (1.81-2.33)	2.50 (2.12-2.94)	0.189
All respiratory system diseases (J00-J99)	3.93 (2.96-5.22)	2.18 (1.46-3.25)	0.025
Pneumonia/influenza (J10-J18)	2.42 (1.60-3.67)	2.81 (1.83-4.30)	0.613
COPD (J40-J44, J47)	4.83 (3.59-6.50)	1.90 (1.31-2.75)	<0.0001
Other respiratory system diseases (rest of J00-J99)	2.90 (1.85-4.54)	2.84 (1.15-6.99)	0.972
Chronic liver diseases (K70, K74)	5.03 (3.72-6.80)	3.47 (2.71-4.44)	0.110
Symptoms and ill-defined conditions (R00-R99)	2.55 (1.97-3.29)	1.71 (1.26-2.34)	0.085
All external causes (V01-Y98)	2.25 (2.04-2.47)	1.24 (1.13-1.36)	<0.0001
Road traffic accidents (V01-V89, Y85)	2.32 (1.99-2.70)	1.33 (1.09-1.62)	0.003
Suicide (X60-X84, Y87.0)	1.66 (1.49-1.86)	0.84 (0.69-1.02)	<0.0001
Other external causes (rest of V01-Y98)	3.00 (2.47-3.64)	1.69 (1.45-1.96)	0.008
All other causes of death (not listed above)	3.48 (2.68-4.51)	3.13 (2.30-4.26)	0.579

Table 17. Slope index of inequality and corresponding 95% confidence intervals according to causes of death and sex, age 30-74 years, period 2012-2015.

	Men	Women
All deaths	373 (327-419)	113 (88-138)
HIV/AIDS (B20-B24)	3 (2-4)	0 (0-1)
Other infectious and parasitic diseases (rest of A00-B99)	9 (7-11)	5 (4-6)
All neoplasms (C00-D48)	141 (125-157)	8 (0-16)
Cancer of buccal cavity, pharynx (C00-C14)	8 (7-9)	0 (0-1)
Cancer of oesophagus (C15)	3 (3-4)	0 (0-0)
Cancer of stomach (C16)	12 (11-13)	5 (4-6)
Cancer of colon-rectum (C18-C21)	7 (6-8)	0 (0-1)
Cancer of liver (C22)	18 (15-20)	4 (3-4)
Cancer of larynx (C32)	6 (5-6)	0 (0-0)
Cancer of trachea, bronchus and lung (C33-C34)	58 (52-64)	-5 (-8--2)
Melanoma (C43)	-1 (-2--1)	0 (0-0)
Cancer of prostate (C61)	1 (0-2)	.
Cancer of breast (C50)	.	-7 (-8--5)
Cancer of cervix uteri (C53)	.	1 (0-1)
Cancer of other parts of uterus (C54-C55)	.	2 (1-2)
Cancer of bladder (C67)	4 (3-5)	0 (0-0)
Cancer of kidney and other urinary organs except bladder (C64-C66, C68)	1 (0-2)	0 (0-0)
Hodgkin's disease (C81)	0 (0-0)	0 (0-0)
Leukemia (C91-C95)	1 (0-2)	0 (0-1)
Other neoplasms (rest of C00-D48)	18 (13-22)	5 (2-8)
Diabetes Mellitus (E10-E14)	17 (15-19)	12 (10-14)
Dementia and Alzheimer's diseases (F01, F03, G30)	2 (1-3)	2 (1-2)
All circulatory system diseases (I00-I99)	85 (76-94)	43 (37-49)
Ischaemic heart disease (I20-I25)	35 (30-39)	14 (12-15)
Cerebrovascular disease (I60-I69)	17 (14-20)	9 (8-11)
Other circulatory system diseases (rest of I00-I99)	32 (28-36)	19 (16-22)
All respiratory system diseases (J00-J99)	18 (14-21)	4 (2-6)
Pneumonia/influenza (J10-J18)	2 (1-4)	1 (1-2)
COPD (J40-J44, J47)	14 (12-17)	2 (1-3)
Other respiratory system diseases (rest of J00-J99)	0 (0-0)	0 (0-0)
Chronic liver diseases (K70, K74)	17 (14-20)	5 (4-5)
Symptoms and ill-defined conditions (R00-R99)	5 (4-7)	1 (0-1)
All external causes (V01-Y98)	25 (23-27)	2 (1-2)
Road traffic accidents (V01-V89, Y85)	7 (6-8)	0 (0-1)
Suicide (X60-X84, Y87.0)	6 (4-7)	0 (-1-0)
Other external causes (rest of V01-Y98)	12 (10-13)	2 (1-2)
All other causes of death (not listed above)	10 (8-11)	4 (3-5)

9. FIGURES

Figure 1. Causes of deaths ranked by relative index of inequality according to sex, men, age 30-74 years, period 2012-2014.



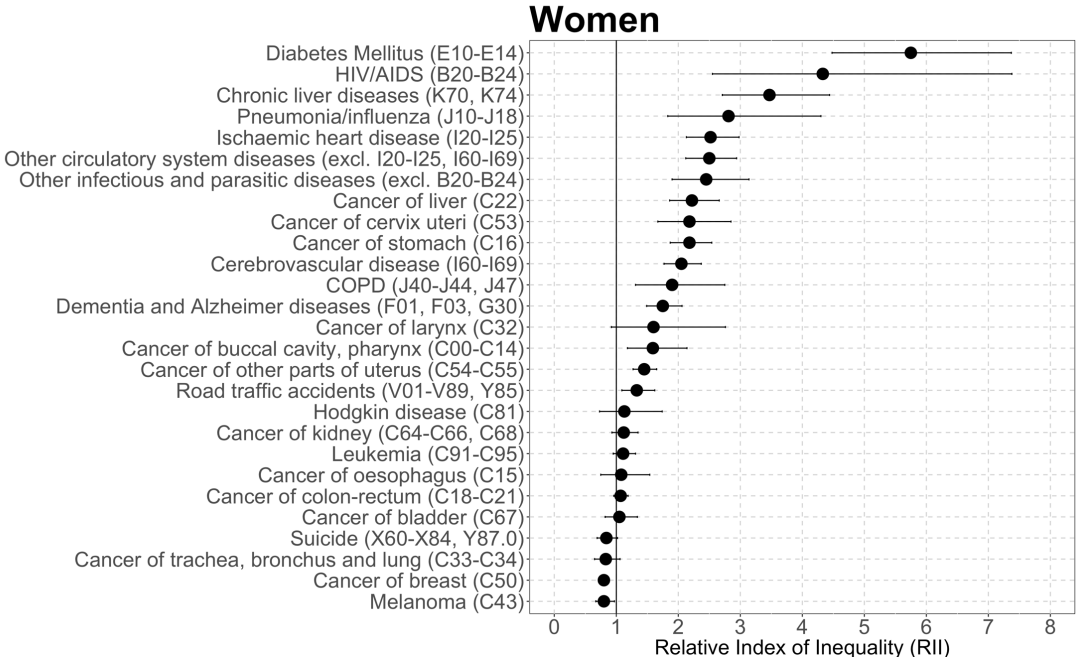
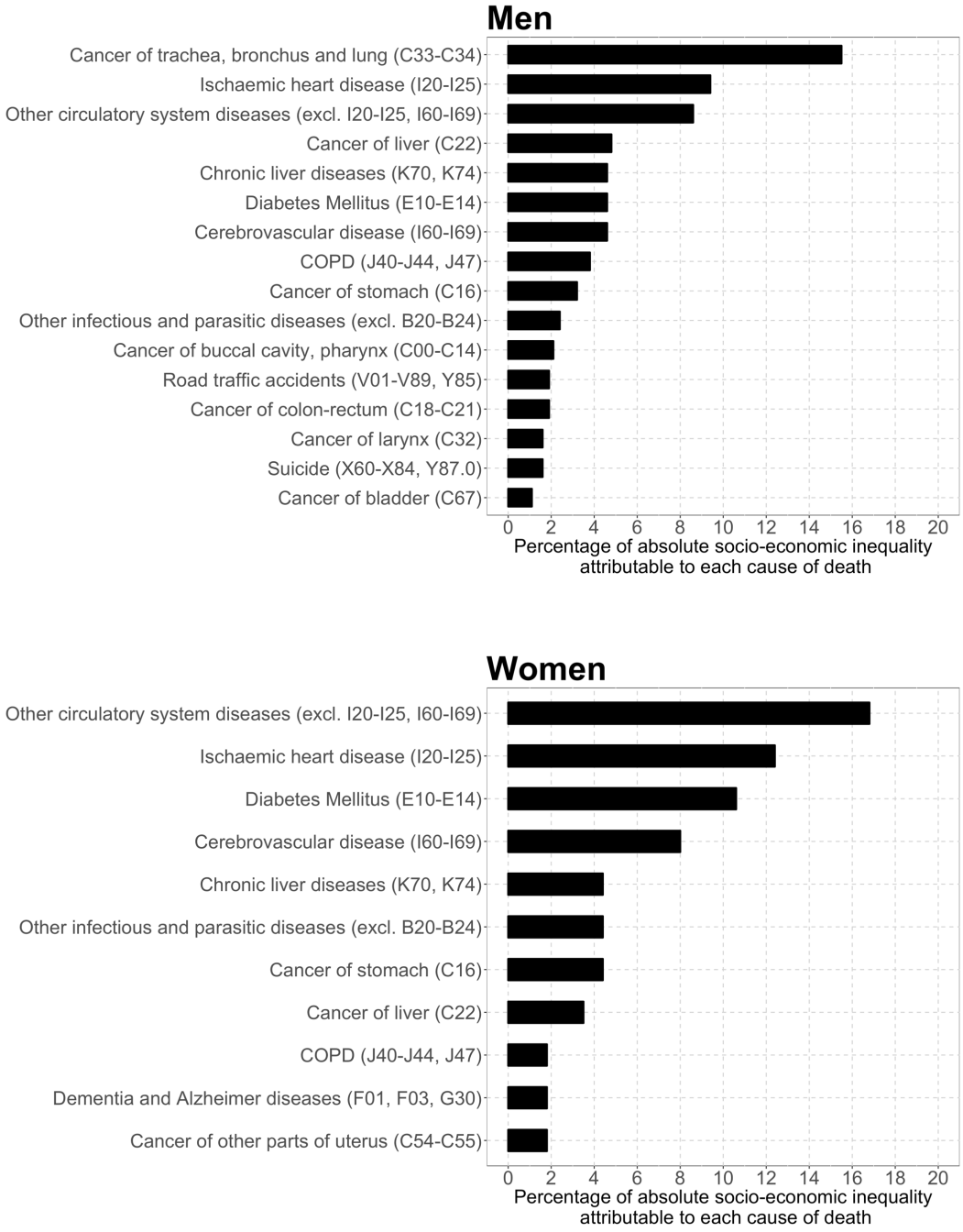


Figure 2. Causes of deaths ranked by slope index of inequality (SII) according to sex, age 30-74 years, period 2012-2014.



Note: The figure shows the percentage of total absolute socioeconomic inequality attributable to each cause of death. It was computed by dividing the slope index of inequality of each cause to that of all-cause mortality. Only causes contributed at least to 1% of total absolute inequality is depicted in the figure.

Figure 3. Relative index of inequality (RII) and corresponding 95% confidence intervals by marital status and cause of death, men, age 30-74 years, period 2012-2015.

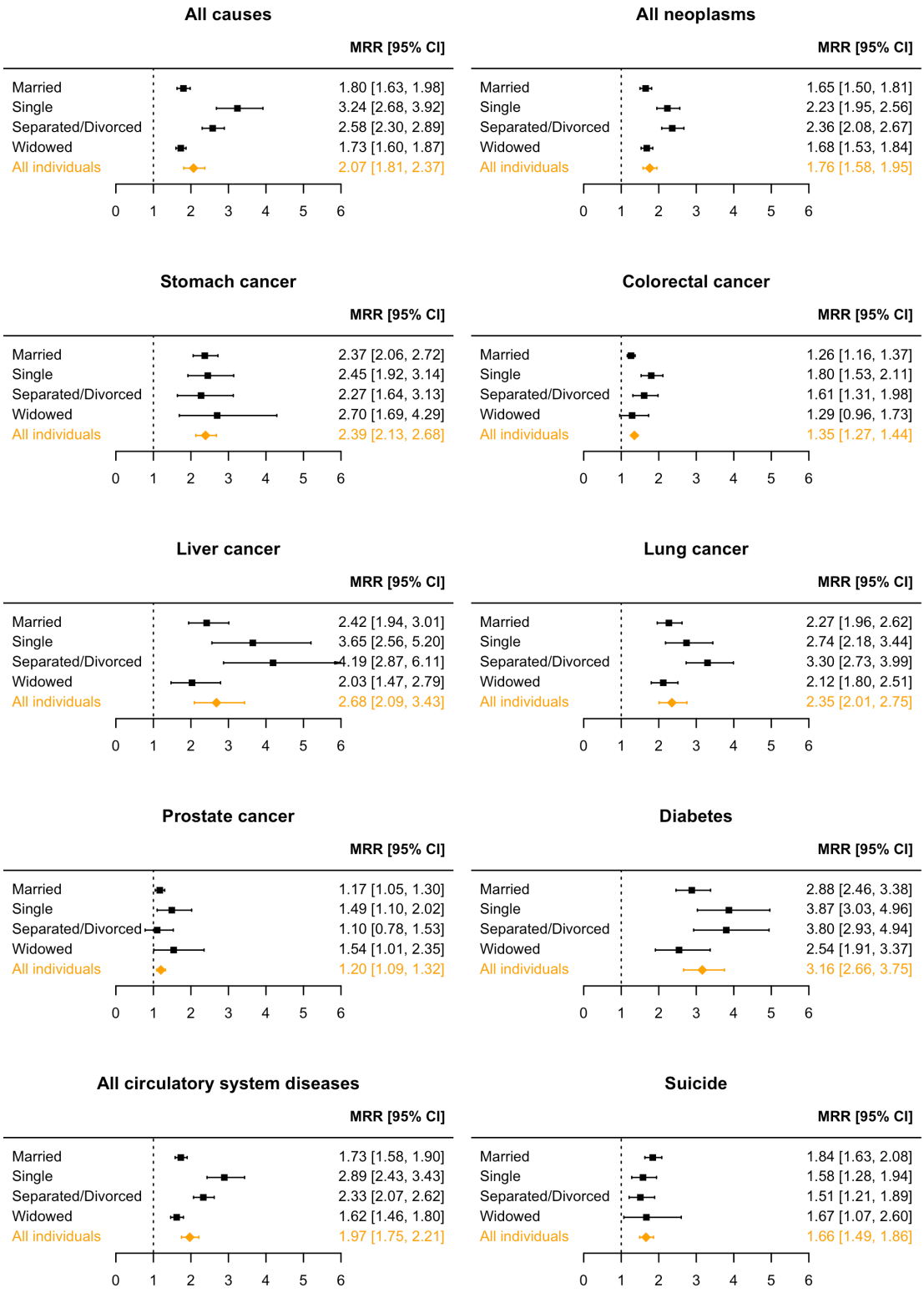


Figure 4. Relative index of inequality (RII) and corresponding 95% confidence intervals by marital status and cause of death, women, age 30-74 years, period 2012-2015.

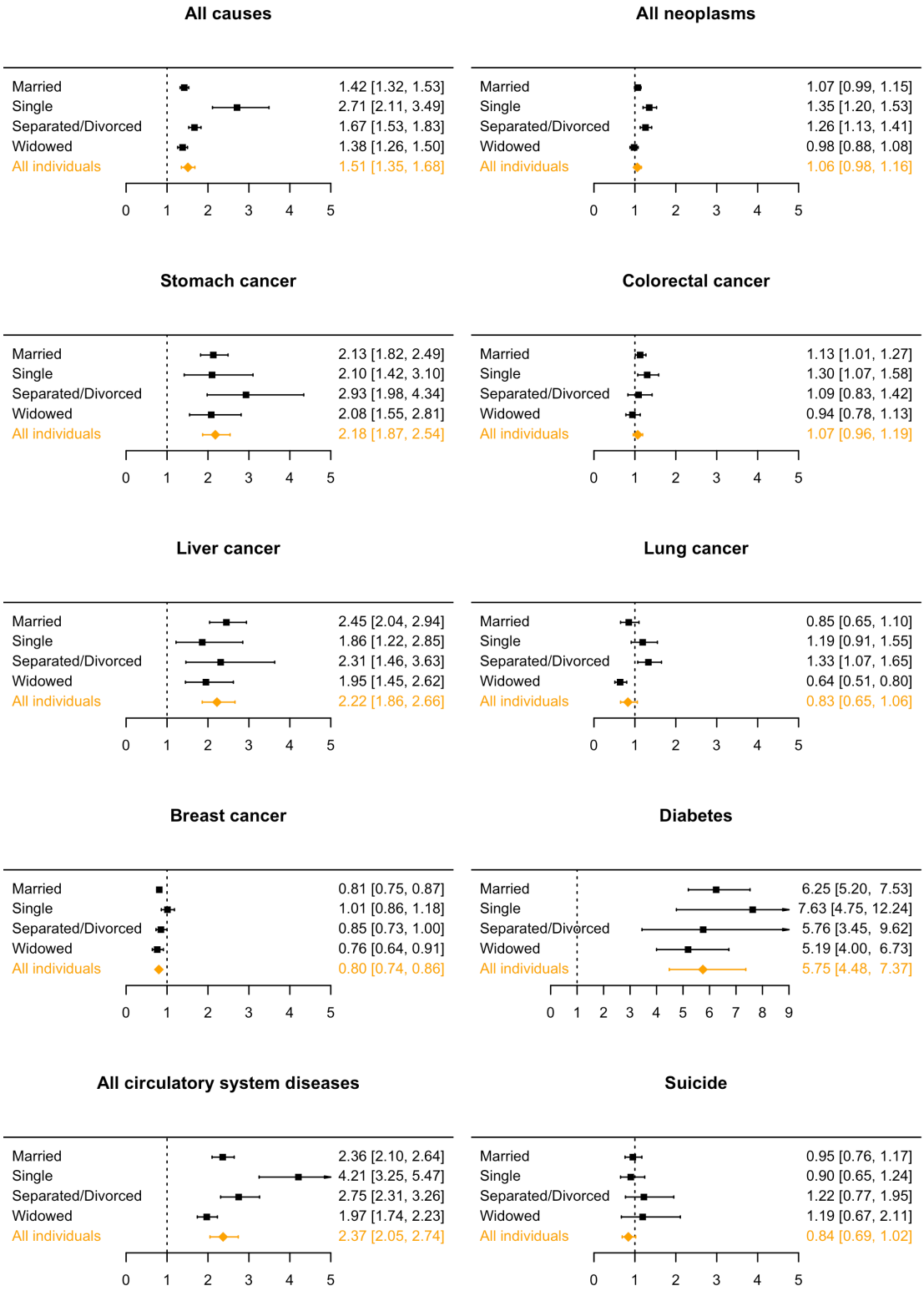


Figure 5. Relative index of inequality (RII) and corresponding 95% confidence intervals by geographic area of residence, men, age 30-74 years, period 2012-2015.

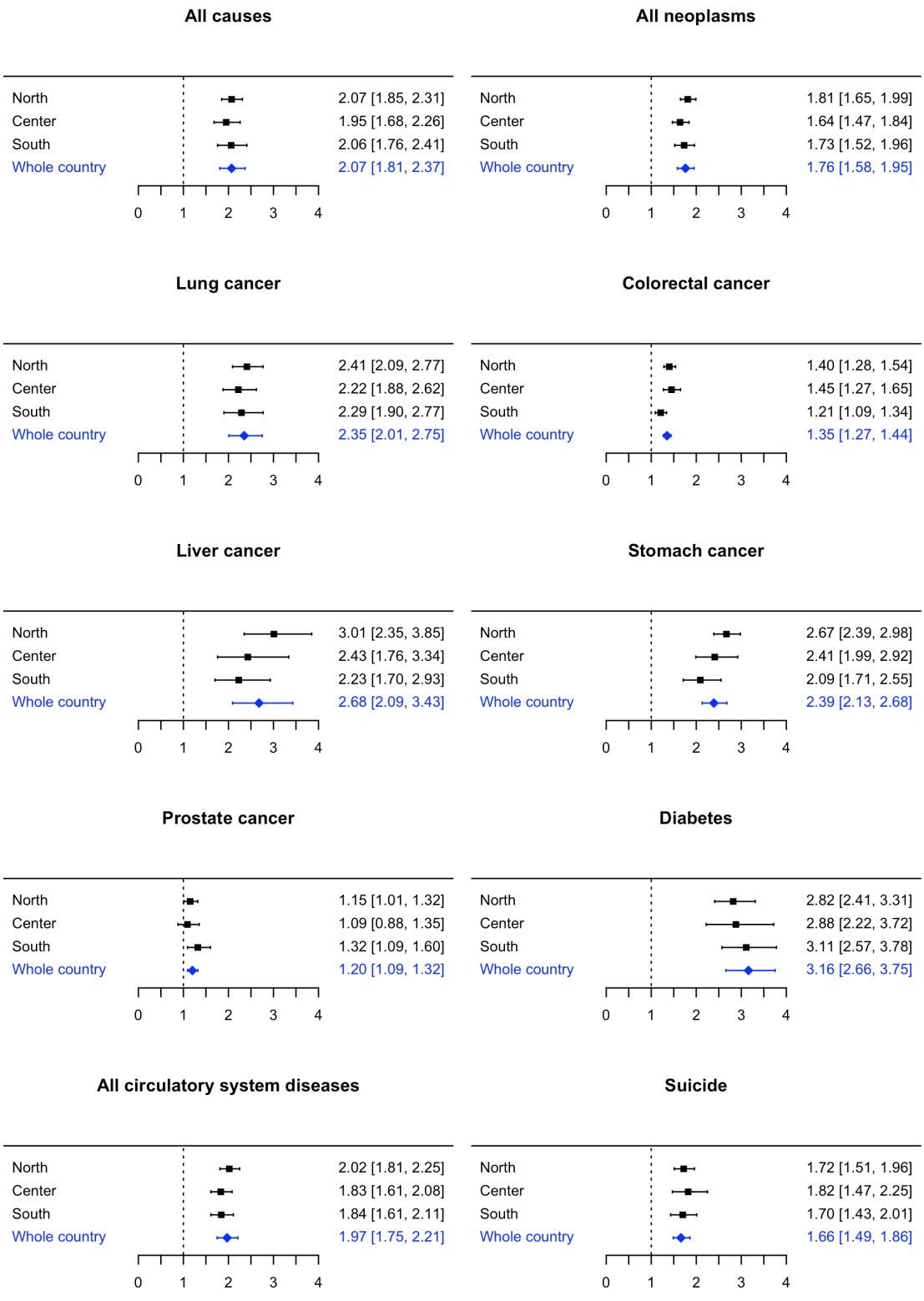


Figure 6. Relative index of inequality (RII) and 95% confidence intervals by geographic area of residence, women, age 30-74 years, period 2012-2015.

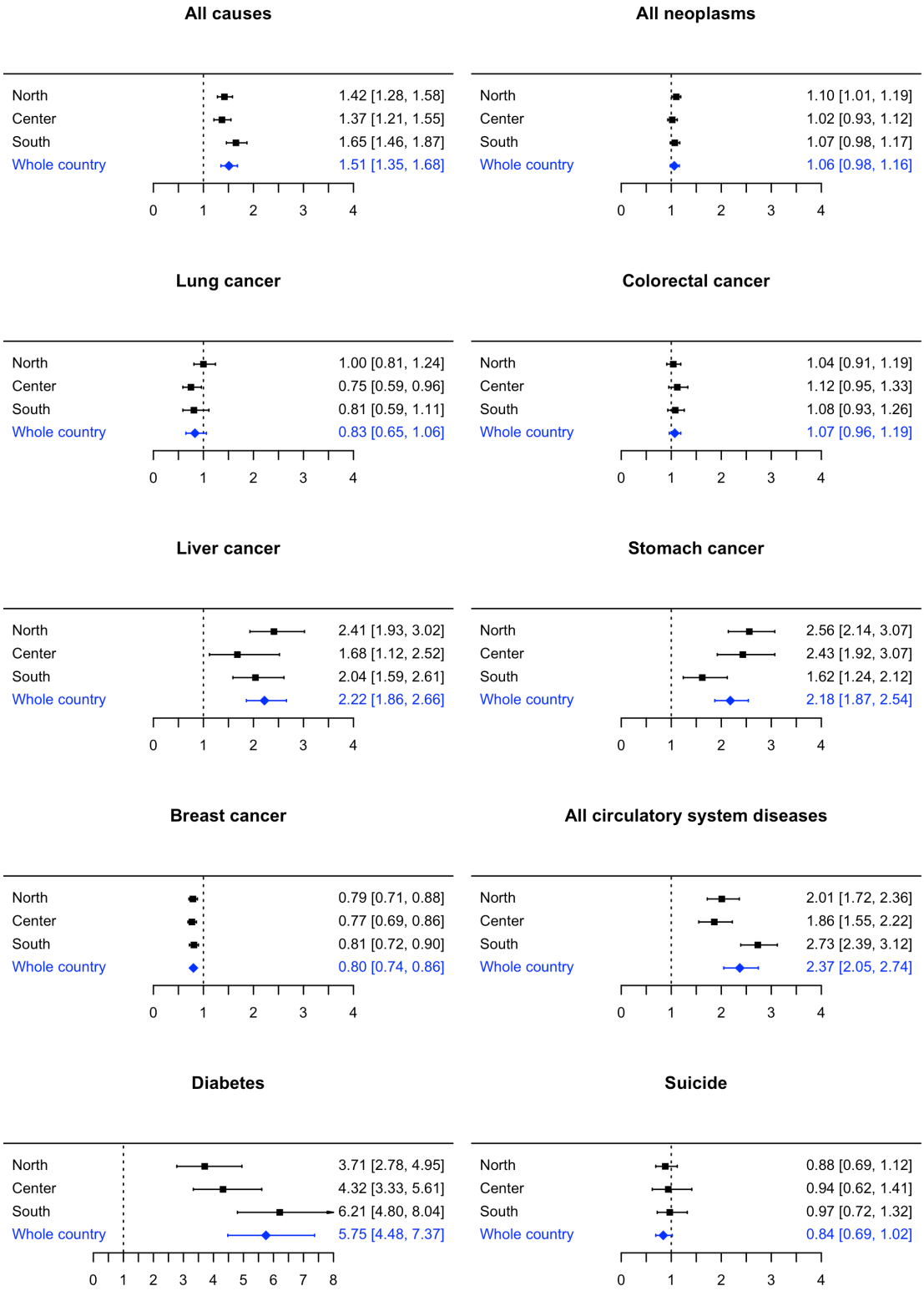


Figure 7. Relative index of inequality (RII) and corresponding 95% confidence intervals by size of the municipality of residence and cause of death, men, age 30-74 years, period 2012-2015.

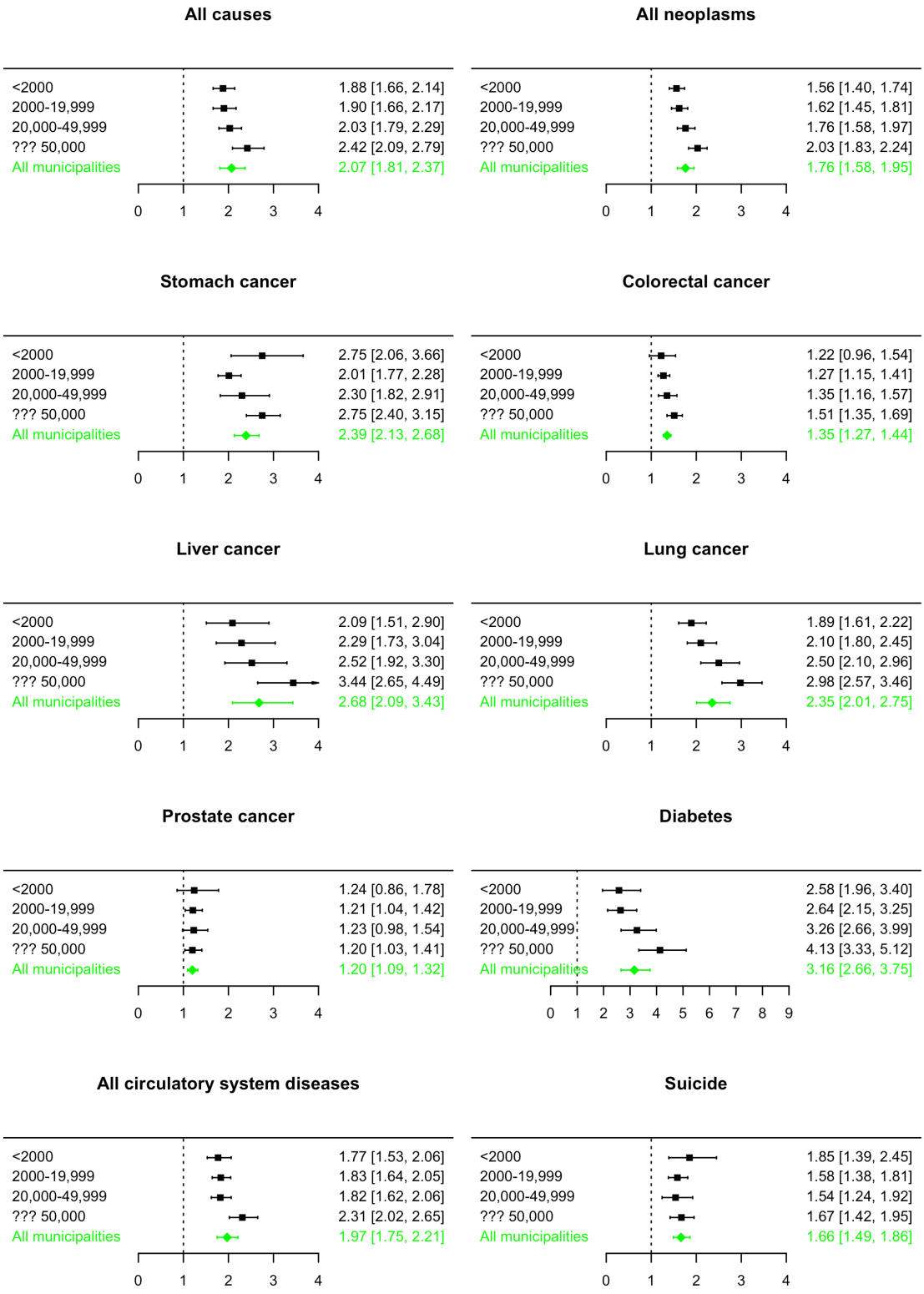


Figure 8. Relative index of inequality (RII) and corresponding 95% confidence intervals by size of the municipality of residence and cause of death, women, age 30-74 years, period 2012-2015.

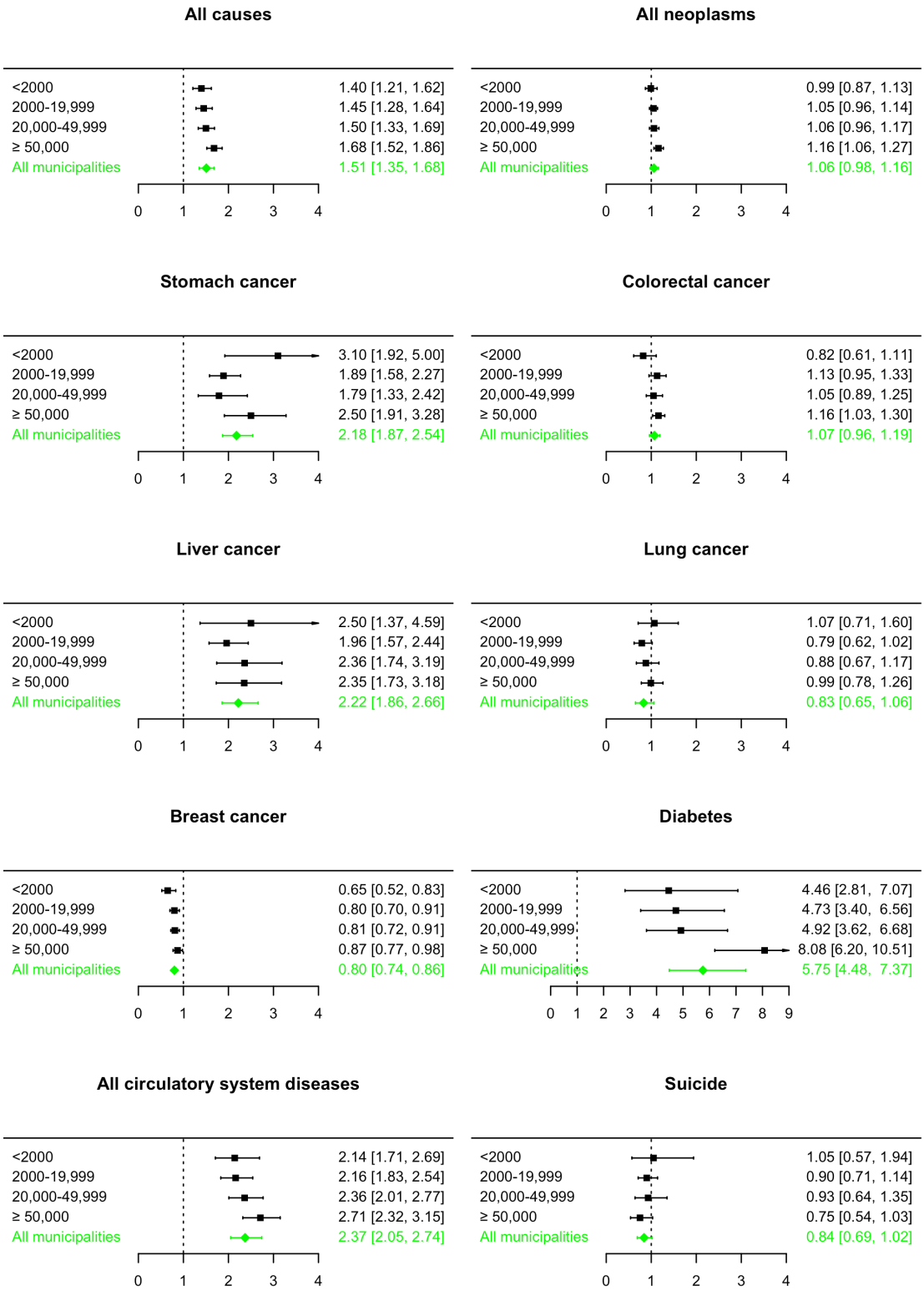


Figure 9. Relative index of inequality (RII) and corresponding 95% confidence intervals according to the quintiles (Q) of the vulnerability index distribution of the municipality of residence and cause of death, men, age 30-74 years, period 2012-2015.

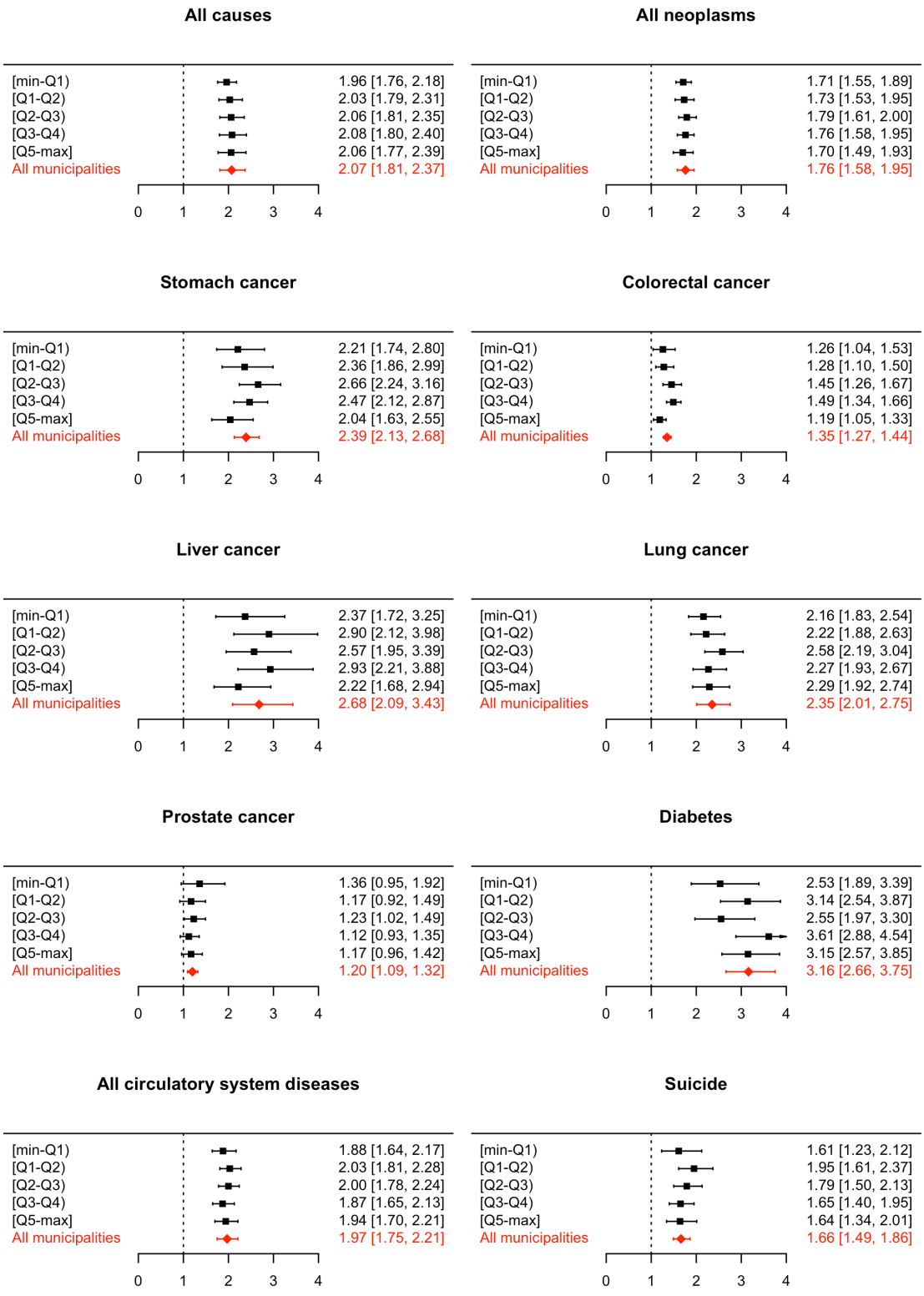


Figure 10. Relative index of inequality (RII) and corresponding 95% confidence intervals according to the quintiles (Q) of the vulnerability index distribution of the municipality of residence and cause of death, women, age 30-74 years, period 2012-2015.