Do differences in mortality across educational groups explain the stagnation in life expectancy growth in England & Wales?

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Abstract

Growth in life expectancy at birth has stagnated since 2010 in England and Wales. Prior research suggests that the stagnation in life expectancy improvement is related with an increase in mortality at young ages after 2008. We used data from the ONS Longitudinal Study, from 2003 to 2017 to estimate trends in life expectancy at age 30 (e30) at the national level under different counterfactual scenarios, considering previous (2003-10) education-specific mortality improvements. Our analysis revealed that if the mortality conditions from 2003-2010 of all three educational attainment groups had continued into 2010-2017, e30 would have increased by 1.49 and 1.96 years for males and females respectively in the 2010-2017 period, whereas the observed increase was only 0.81 years for males and 0.55 for females. When looking at counterfactual scenarios by educational attainment groups, we can assess the contribution of each educational group to national life expectancy trends. We observed that after 2010, the mortality trends of the low-educated contributed the most to the observed stagnation in life expectancy growth. Our preliminary results revealed that after 2010 mortality conditions in England and Wales have worsened unevenly across different educational groups in different age groups, this highlights that health inequalities have negative consequences on life expectancy improvements.

Keywords: Mortality, population health, stagnation, England and Wales, life expectancy, educational inequalities.

Introduction

Life expectancy is a common mortality metric to monitor population health, which allows the comparison of different population subgroups across time since it is not affected by population age structures (1). Life expectancy at birth indicates the average number of years that someone is expected to live given the prevailing mortality conditions. Increases in life expectancy reflect a general improvement in population health, while a sudden decrease or stagnation of increase might be a worrying sign of public health concern (2).

In England and Wales, growth in life expectancy at birth has stagnated since 2010 (3). Demographers and public health researchers have highlighted the mortality differences between England and Wales against other high-income countries. Leon et al (4) compared life expectancy and age-specific mortality trends in England and Wales with the median value for 22 high-income countries (2011-16), concluding that the slowdown in life expectancy growth between 2010-16 seems to be driven by negative trends in all adult age groups. Another explanation is related to the increase in drug overdose among adults of working age (5).

An additional explanation for the slowdown in life expectancy improvement seems to be related to austerity policies implemented in recent years, which might partially explain it (6). The increase in mortality at adult ages and deaths by drug overdose at working ages seem to support the austerity measures explanation, given that both the increase in mortality at adult ages and the rise in mortality due to drug overdose have affected those living in deprived areas (7). In this context of life expectancy stagnation, differences in life expectancy between the high and the low-educated groups had widened after 2008 (8). Before 2008, differences in life expectancy at age 30 between the high and low-educated were narrowing, however this reversal from a decline to an increase in educational inequalities in life expectancy at age 30, has been mostly due to higher mortality among the low-educated groups at age (30-49) and deterioration of mortality at older ages among the high educated group The reversal in the trend in educational inequalities in e30 reflects that after 2010 trends in mortality across educational attainment groups have been different affecting more the low-educated groups compared to the high-educated.

However, despite the relevance of the socio-economic inequalities' explanation, it is unknown how specific mortality trends across educational attainment groups contributed to the slowdown in the national life expectancy trend after 2010. Identifying this is informative from a public health perspective to have a deeper understanding of how the worsening of the mortality condition of one specific group has important consequences on national life expectancy trends and trends in educational inequalities in life expectancy. In this brief article, we aimed to estimate trends in life expectancy at age 30 (e30) at the national level under different counterfactual scenarios, considering previous (2003-2010) education-specific mortality improvements.

Data and Methods

We used census-linked data from the ONS-Longitudinal Study, which contains census and life events data beginning in 1971, which portrays 1% of the Census in England and Wales (9). The sample was updated at the 1981, 1991, 2001 and 2011 Censuses, and registrations of life events (e.g., deaths, births, and cancer registrations) are updated annually. Using the ONS-LS study we estimated mortality by educational attainment groups (Low, Middle, and High) by single age groups (30, 31, ,32… 100) and sex (9) from 2003 to 2017.

For the analysis, we constructed period life tables to obtain the remaining life expectancy at age 30 (e30). We computed national life expectancy by computing weighted age-specific mortality rates where the weight is the share of individuals within each educational group similar to Luy et al.(10). To construct the counterfactual scenarios, we followed the same approach as Abrams et al (11). We created four counterfactual scenarios; three scenarios assess the impact of each educational attainment group, and one scenario reflects the combined effect of the three educational attainment groups. The counterfactual scenarios indicate what e30 would have been if the 2003 to 2010 pace of age-specific mortality in ages 30+ (under different scenarios) had continued into the 2010 to 2017 period. To create the counterfactual scenarios, we linearly extrapolate the age-educational-specific mortality trends between 2003-2010, and we applied those extrapolated age-specific mortality trends, to the period 2010-2017. To assess the impact of different age groups on the counterfactual scenarios, we compute rate-ratios in age-specific mortality rates by counterfactual scenario, this reflects how the age-specific mortality differs in the counterfactual scenarios with respect to the observed values.

Preliminary results

Growth in remaining life expectancy at age 30 (e30) has stagnated in England and Wales since 2010. Between 2003 and 2010 e30 increased by 2.26 years and 1.71 years for males and females respectively. While between 2010-2017, it increased by 0.81 years and 0.55 years for females (See Table 1).

Counterfactual scenarios revealed that life expectancy for males would have grown between 2010 and 2017 by 1.49 years for males and 1.96 years for females if the 2003 to 2010 pace of age-specific mortality in ages 30+ (counterfactual all) had continued into the 2010 to 2017 period (See Figure 1). Allowing only low educated mortality to continue at its 2003 up to 2010 pace into 2010-2017, while holding middle and high-educated groups trends at their real level, isolates the low-educated effect. Under this scenario, the increase in e30 over the 2010-2017 period would be 2.38 and 1.78 years for males and females respectively. Counterfactual scenarios of middle and high groups reflect, that for both males and females, growth in e30 would continue to stagnate.

We looked at the rate ratio in age-specific mortality between the different counterfactual scenarios and the observed age-specific mortality (See Figure 2). This analysis reflects at which age the mortality was higher or lower compared to the observed age-specific mortality rates. Values below 1 (horizontal line) in Figure 2 indicate that the age-specific mortality rate is lower in the counterfactual scenario compared with the observed age-specific mortality, indicating that mortality in that age-specific group has been worsening among this educational group. We observed that for both males and females, the differences with the observed age-specific mortality rates in 2011-2017 are higher for the counterfactual low scenario compared to the counterfactual high scenario.

Preliminary conclusion

Our preliminary analysis revealed that if the mortality condition from 2003-2010 of all three educational attainment groups had continued into 2010-2017, e30 would have increased by 1.49 years and 1.96 years for males and females respectively in the 2010-2017 period, whereas the observed increase was only 0.81 years for males, and 0.55 for females.

When looking at counterfactual scenarios by educational attainment groups, we can assess the contribution of each educational group to national life expectancy trends. We

observed that after 2010, the mortality trends of the low-educated contributed the most to the observed stagnation in the growth of life expectancy. First, because higher increases in e30 over the 2010-2017 period would occur under the low-education counterfactual scenario. Second, the rate ratios in age-specific mortality rates revealed lower mortality below age 75 in the counterfactual low compared to the observed. Third, we observed that counterfactual scenarios of middle and high groups reflect, that for both males and females, growth in e30 would continue to stagnate.

Our preliminary results revealed that after 2010 mortality conditions in England and Wales have worsened unevenly across different educational groups in different age groups, this highlights that health inequalities have negative consequences on life expectancy improvements.

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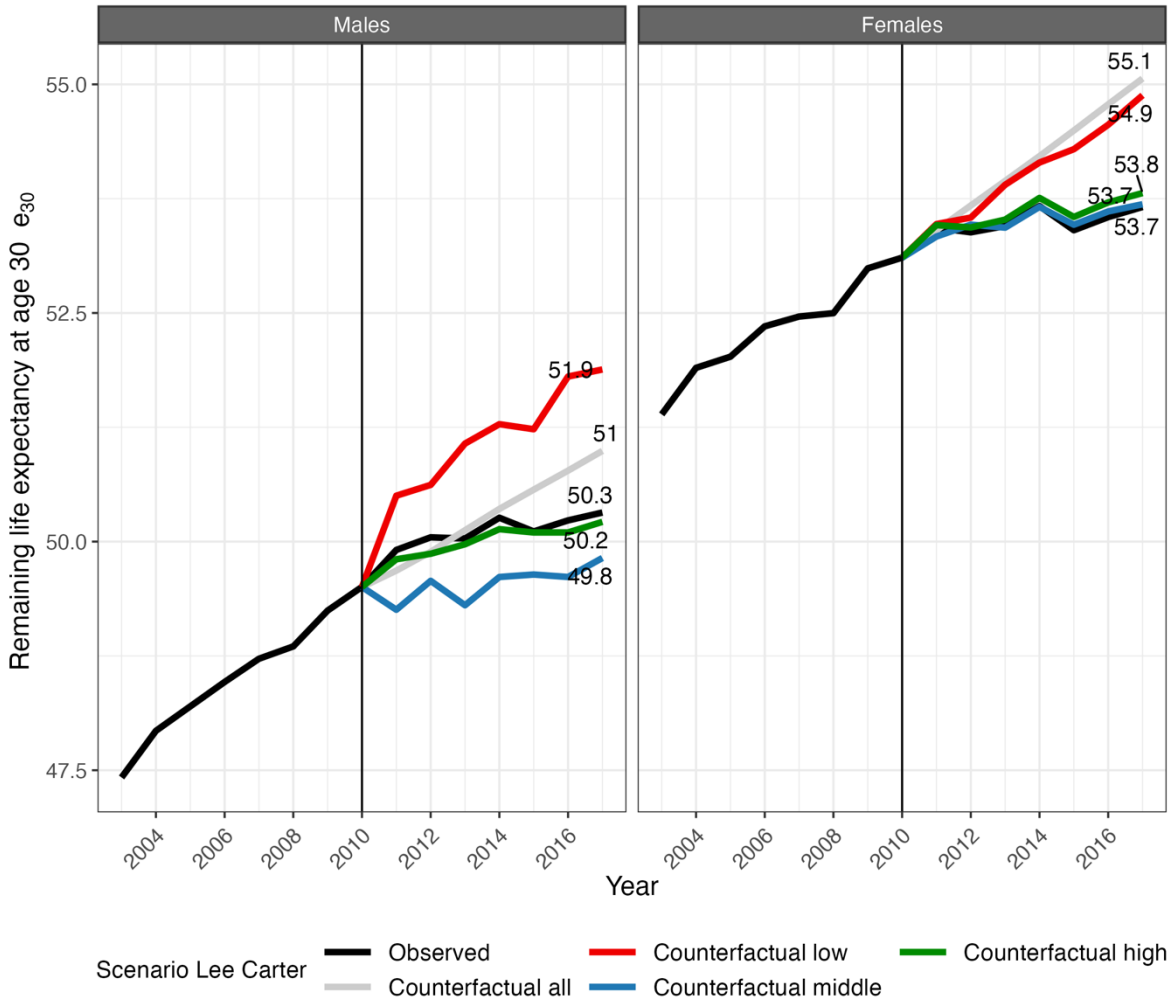
Main table and figures

Table 1. Changes in remaining life expectancy at age 30 (e30) in England and Wales from 2003 to 2010 and from 2010 to 2017 under different counterfactual scenarios, and absolute and relative differences in life expectancy changes from 2010 to 2017 between the observed and counterfactual scenarios.

Scenario	Increased in e30 (in years)		Differences in e30 changes in 2010-17 between observed and counterfactual scenarios	
	2003-10	2010-17	Absolute	Relative (%)
		Males		
Observed	2.26	0.81		
Counterfactual				
All		1.49	0.68	83%
Low		2.38	1.56	192%
Middle		-0.68	-1.50	-184%
High		0.71	-0.10	-12%
		Females		
Observed	1.71	0.55		
Counterfactual				
All		1.96	1.41	254%
Low		1.78	1.23	221%
Middle		0.58	0.03	5%
High		0.71	0.15	27%

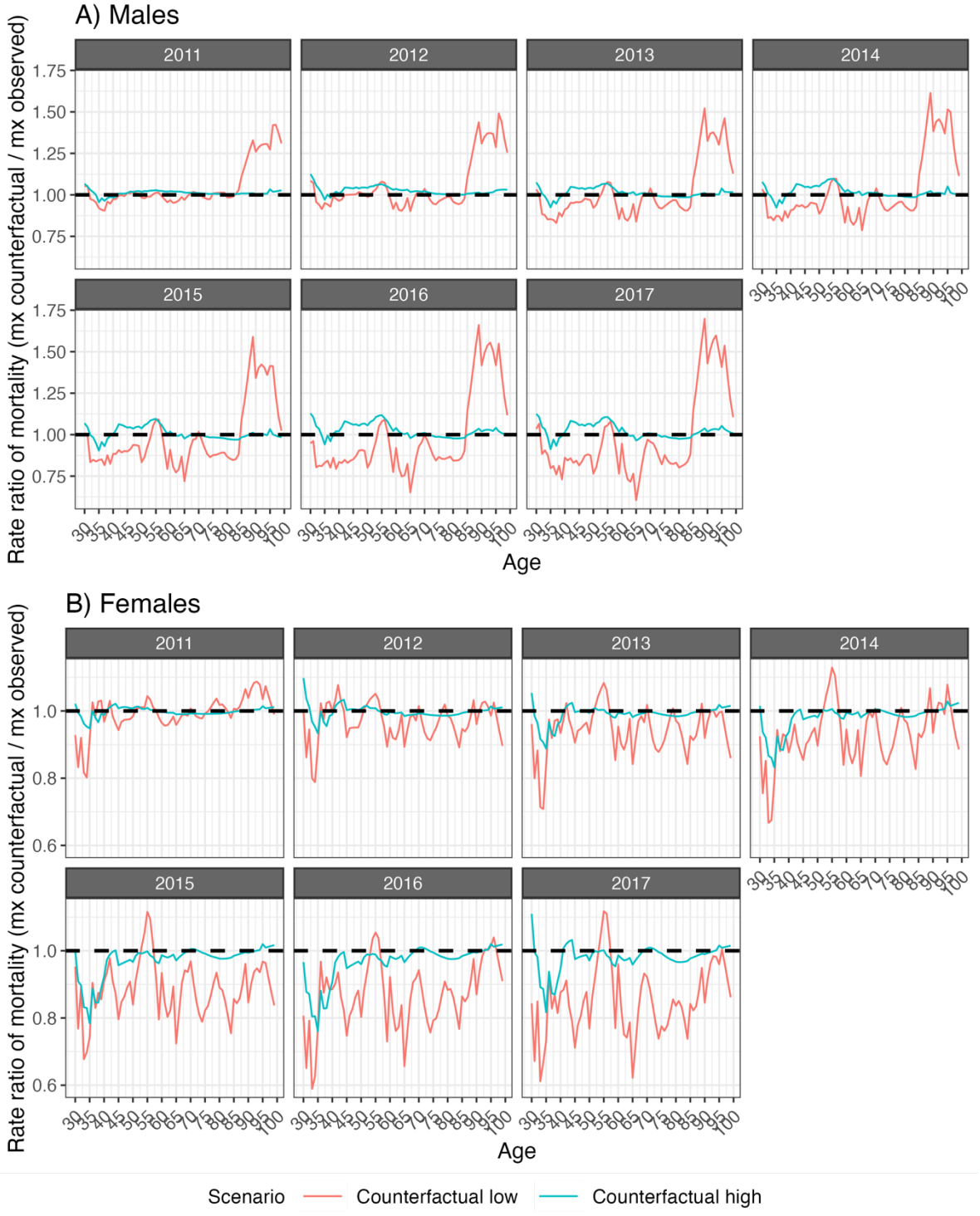
Source data. ONS-Longitudinal study

Figure 1. Remaining life expectancy at age 30 (e30) observed and by different counterfactual scenarios, by sex in England & Wales, 2003-2017. The numbers above the line represent e30 in 2017.



Source data: ONS-Longitudinal Study

Figure 2. Age-specific mortality rate rations between the observed and counterfactual scenarios, by sex. England & Wales, 2011-2017. Results only counterfactual low and counterfactual high.



Source data: ONS-Longitudinal Study