UNRAVELLING PAST TRENDS

IN SOCIO-ECONOMIC LONGEVITY INEQUALITIES

BY **FANNY JANSSEN**

In my previous research, I have demonstrated the added value for mortality forecasting of a detailed understanding of past trends, and of separately projecting non-linear trends in lifestyle-attributable mortality (such as smoking-attributable mortality) next to the more linear trends in non-lifestyle-attributable mortality. Similarly, I argue that a better understanding of past trends in socio-economic mortality inequalities and its different components is essential for an accurate forecast of future socio-economic inequalities in longevity. As the first part of the '*Future Longevity Inequalities*' research project, my research team and I have examined the individual and combined impact of smoking, alcohol, and obesity on past trends in educational inequalities in life expectancy in England & Wales, Finland and Italy.

EXPECTED IMPORTANT ROLE OF LIFESTYLE FACTORS

In modern welfare states, people in a disadvantaged socio-economic position (SEP), either measured by income, occupation, or education, live on average 3-10 years less than people in an advantaged SEP. Those with lower SEP generally have worse opportunities to avoid premature death. They generally have higher risks of material deprivation (e.g. inadequate housing), higher risks of unemployment and – related - psychosocial stress, worse health behaviours, and more limited access to quality health care.

In recent decades, these unjust and undesirable socioeconomic inequalities in mortality and life expectancy have even widened in several European countries despite efforts to reduce them. This increase has puzzled researchers in the field of socio-economic health inequalities, and has raised concerns about how these inequalities will develop in the future. To fully grasp the past trends in socio-economic mortality inequalities, and to accurately predict them into the future, it is essential to examine potential trend breaks and to assess the role of lifestyle factors.

Smoking, alcohol misuse, and behaviours resulting in obesity (unhealthy diets, insufficient physical activity) are likely determinants of past trends in socio-economic inequalities in life expectancy. First, they are important preventable risk factors of mortality in Europe, whose prevalence and associated mortality are currently higher among people with low SEP compared to those with high SEP. Consequently, these lifestyle factors are known to importantly contribute to socioeconomic mortality inequalities in high-income countries. Second, smoking, alcohol misuse, and obesity have strong effects on trends in national life expectancy, as these lifestyle factors typically develop over time as wave-shaped epidemics, with their prevalence and associated mortality increasing strongly and then (eventually) declining. Third, the timing and the impact of these lifestyle 'epidemics' differ between socio-economic groups. Smoking, obesity, and alcohol 'epidemics' occurred relatively late among those with a less advantaged SEP, but with larger effects.

TRENDS IN EDUCATIONAL INEQUALITIES IN LIFE EXPECTANCY

For England & Wales (1972-2017), Finland (1971-2017), and Italy (Turin, 1972-2019), several phases and breakpoints in the trends in educational inequalities in remaining life expectancy at age 30 (e30) can be observed. See Figure 1 for the trends since around 1990. Whereas long-term decreases in educational inequalities in e30 occurred among Italian women (1972-2003), and among British males (1972-2008) and British females (1992-2017), long-term increases occurred among Finnish males (1982–2008), Finnish females (1985–2017) and Italian males (1976–2018). Among males, clear recent reversals in the trends occurred. British males exhibited a reversal from decreasing to increasing inequality around 2006-2008, Finnish males experienced a reversal from increasing to decreasing inequality around 2008.

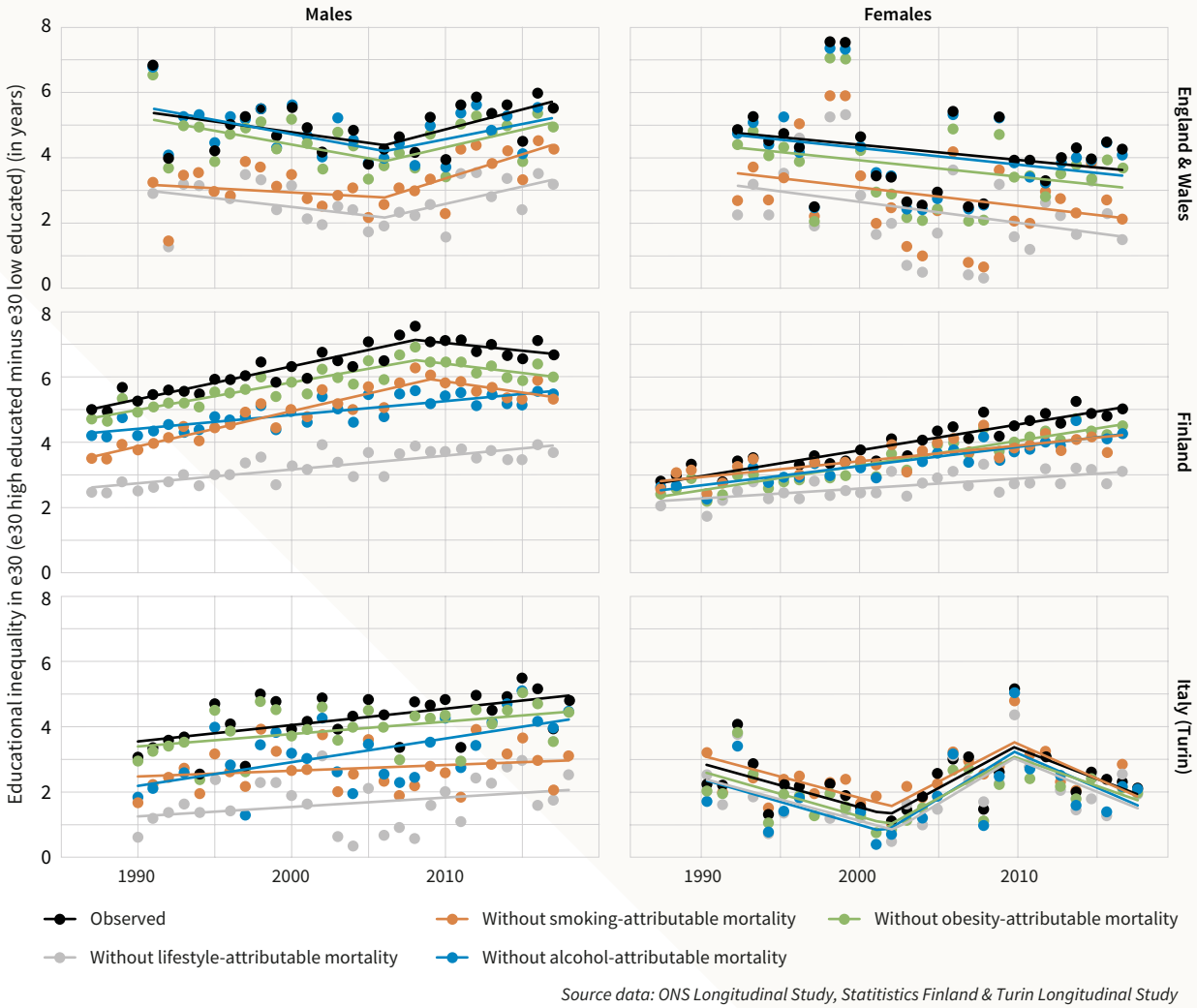
The long-term increases (Finnish males 1982–2008; Finnish females 1985–2017; Italian males 1976–2018) were driven by faster mortality declines among the highly-educated aged 65–84, and by mortality increases among the low-educated aged 30–59. The long-term decreases among British males (1976–2008) and Italian females (1972–2003) were driven by faster mortality improvements among the low-educated than among the high-educated at age 65+. The recent reversals were driven by mortality trend changes among the low-educated aged 30–54. >

THE ROLE OF LIFESTYLE FACTORS ON TRENDS IN EDUCATIONAL INEQUALITIES IN E30

Figure 1 illustrates that smoking, alcohol, and obesity not only play a significant role in explaining the levels of educational inequalities in e30, but also in explaining the secular trends in educational inequalities in e30. That is, without mortality due to smoking, alcohol, and obesity (hereafter referred to as 'lifestyle-attributable mortality'), educational inequalities in e30 are considerably lower, and trends in educational inequalities in e30 are quite different.

For Finnish males, the reversal from increasing to declining educational inequalities in e30 in 2008 disappears upon removing 'lifestyle-attributable mortality' and alcohol-attributable mortality >

FIGURE 1 Time trends in educational inequalities in remaining life expectancy at age 30 (e30) with and without smoking-, alcohol-, and obesity-attributable mortality (individual and combined), by sex and country. England & Wales (1991-2017 males; 1992-2017 females), Finland 1987-2017, Italy (Turin) 1990-2018.



Source data: ONS Longitudinal Study, Statitistics Finland & Turin Longitudinal Study

Dots represent the observed values; lines represent the fitted values from the segmented regression analysis. 'Lifestyle-attributable mortality' refers to mortality that is attributable to smoking, alcohol, and obesity combined. The high educated are those with tertiary education. The low educated are those with no, pre-primary, primary, and lower secondary education. For females in England & Wales, the segmented regression is performed over the years 1992-2017, because of an outlier in 1991.

Source: Janssen et al. 2025 - Figure S4

(AAM). This can almost entirely be attributed to a similar reversal in trends in educational inequalities in AAM, largely driven by alcohol taxes and prices. Before 2008, increases in AAM occurred particularly among the low- and middle-educated because of reducing alcohol taxes and prices. The introduction of stricter alcohol policies around 2008 resulted mainly in declines among those with the highest level of excessive alcohol consumption: low educated males.

In addition, without 'lifestyle-attributable mortality', the observed increases in educational inequalities in e30 were approximately halved not only among Finnish males (1987-2008), but also among Finnish females (1987-2017) and Italian males (1990-2018). Moreover, among British females (1992-2017), the decline in educational inequalities in e30 would have been 38% larger without 'lifestyle-attributable mortality'. For British males, the trends with and without 'lifestyle-attributable mortality' are largely similar.

Next to the increasing educational inequalities in AAM for Finland up to 2008, the population-specific trends in educational inequalities in smoking-attributable mortality (SAM) prove to be important. British (and Finnish) males who are frontrunners in the smoking epidemic, and already exhibited declines in SAM for quite some time, exhibit declining inequalities in SAM due to smaller declines in smoking-attributable mortality among the high educated – who already reached low SAM levels – compared to the low educated. Italian males reached the peak in SAM more recently, albeit later for the low than the high educated, resulting in lower declines for the low educated, and consequently increases in educational inequalities in SAM. Females only exhibited increases in SAM recently, which were stronger for the low educated, particularly among Finnish females, resulting, for them, in increasing educational inequalities in SAM.

Without 'lifestyle-attributable mortality', a largely similar, modestly increasing trend for Finnish males and females, and – to a lesser extent – for Italian males and females, can be observed. This modest increase could be the result of gradual increases in general inequalities in material or other social resources, potentially resulting from the lower educated becoming a more homogeneous group with worse health because of educational expansion, or from the increasing inflow of people from low-income countries.

CONCLUSION

The identified trend breaks in educational inequalities in e30 indicate that socio-economic inequalities in longevity are plastic. Smoking, alcohol misuse, and obesity combined proved responsible for the recent reversal in educational inequalities in e30 among Finnish males and proved important determinants of the observed increases in educational inequalities in Finland and among Italian males.

Regarding future trends in socio-economic longevity inequalities, uniform trends in educational inequalities in e30 without 'lifestyle-attributable mortality' could provide a strong basis, as these trends likely point to structural determinants that have a more gradual effect. In addition, the highly time-varying social gradient of, particularly, smoking- and alcohol-attributable mortality, should be taken into account, by separate – advanced - projections. Finally, the effects of potential modifying factors should ideally be taken into account; in particular, the effects of preventive health policies for the lifestyle component, and anticipated societal changes for the non-lifestyle component. This will be the goal of the second part of the '*Future Longevity Inequalities*' research project by Fanny Janssen. >

NOTES

Fanny Janssen's work is supported by the Dutch Research Council (NWO) in relation to the research programme 'Forecasting future socio-economic inequalities in longevity: the impact of lifestyle 'epidemics'' under grant no. VI.C.191.019. See www.futurelongevitybyeducation.com.

Socio-economic position (SEP) is operationalised by highest level of completed education. Education is considered a more stable measure of SEP than occupation and income, because it is not subject to reverse causation problems at higher ages. In addition, education data are available for both males and females and for more countries and longer time periods than data for occupation and income.

Individually linked (cause-specific) mortality data by educational level (low, middle, high) for those aged 30 and over, by five-year age groups and single calendar year were analyzed for England & Wales (E&W), Finland and Italy (Turin). The trends in educational inequalities in remaining life expectancy at age 30 (e30) (e30 high educated minus e30 low educated) were fitted by means of segmented regression to identify trend breaks. Subsequently, the fitted trends in educational inequalities in e30 were compared with similar trends but then without 'lifestyle-attributable mortality' to assess the role of smoking, alcohol, and obesity combined. 'Lifestyle-attributable mortality' by educational level was estimated by multiplicatively aggregating previous estimates of smoking-, alcohol-, and obesity-attributable mortality by educational level.

MAIN SOURCES

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