

Summary

- The decade from 2011 saw over a million people dying earlier than they otherwise would have done had they experienced the death rates seen in the least deprived decile of areas.
- 148,000 of these deaths were additional to what might have been expected based on levels in the two years prior to 2011.
- In 2020, the level of excess deaths rose by a further 28,000 compared to that over the previous five years.

Introduction`

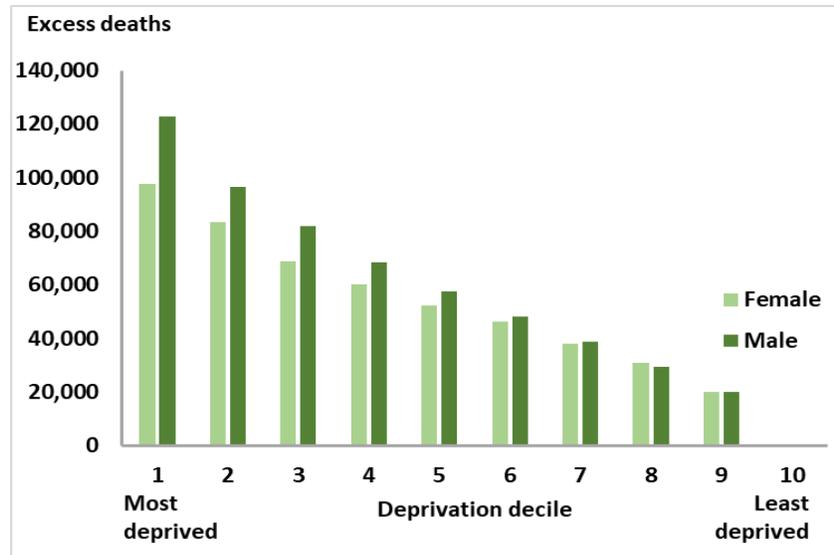
Life expectancy at birth in England has been increasing at a markedly slower rate since 2011 than in previous decades. In a previous note IHE provided an estimate of the proportion of the slowdown associated with changes in seasonal factors. (1)

In this note we provide an estimate of the role of inequalities in mortality in sustaining lower levels of life expectancy than might have been predicted from trends in mortality improvement in previous decades. We do this by comparing mortality in each decile of deprived local areas with that in the least deprived decile in each of the years 2011 to 2019. This provides not only the total burden of excess deaths associated with inequality, but also the trend over time and the association with level of deprivation. Comparison with the burden in 2009 and 2010 also provides an indication of how much the effect of inequality had increased in 2011 to 2019. The same method also enables us to assess the additional contribution of inequality during the COVID-19 pandemic in 2020.

Findings

In 2011 to 2019, over one million people died earlier than they would have done if they had lived in areas with the same age and sex specific death rates as the least deprived area decile. As Figure 1 shows, the more deprived the area in which they lived, the greater the excess number of deaths – around a fifth of the total excess occurred in the most deprived tenth of areas and over half the excess was in the 30 percent of areas that were most deprived. In the seven most deprived deciles, there were more excess deaths among males than females.

Figure 1 Excess¹ deaths in each decile of area deprivations, based on the Index of Multiple Deprivation 2019, by sex, England

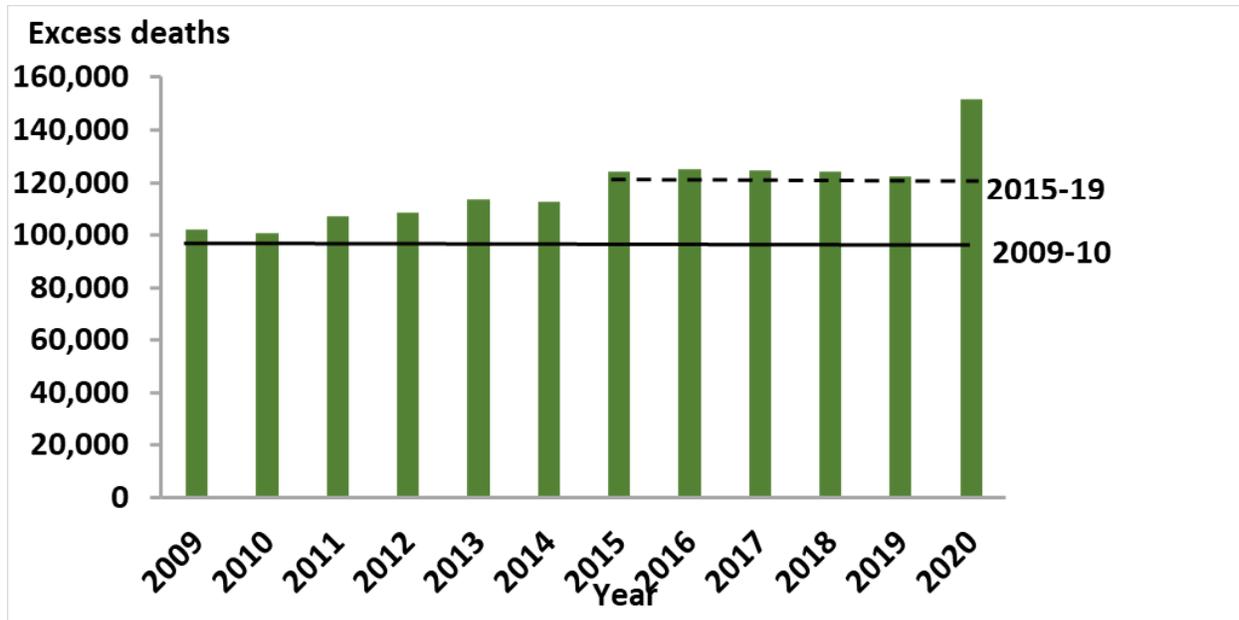


Source: ONS population estimates and death rates for deprivation deciles in England (2) (3) (4) (5) (6)

Note: (1) See statistical appendix for method of calculation of excess deaths

The numbers of excess deaths associated with area inequality increased over time. In the two years prior to 2011, the annual average excess was around 100,00 (Figure 2). Between 2011 and 2015, the figure increased to 124,00 and then remained at this level until 2019. This means that, compared to the 2009-10 average, there were 148,000 additional excess deaths associated with area deprivation. Much of this increase was accounted for by additional female deaths (92,000 additional excess deaths to women, compared to 56,000 to men).

Figure 2 Excess¹ deaths in each year 2009 to 2020, based on the Index of Multiple Deprivation 2019, by sex, England



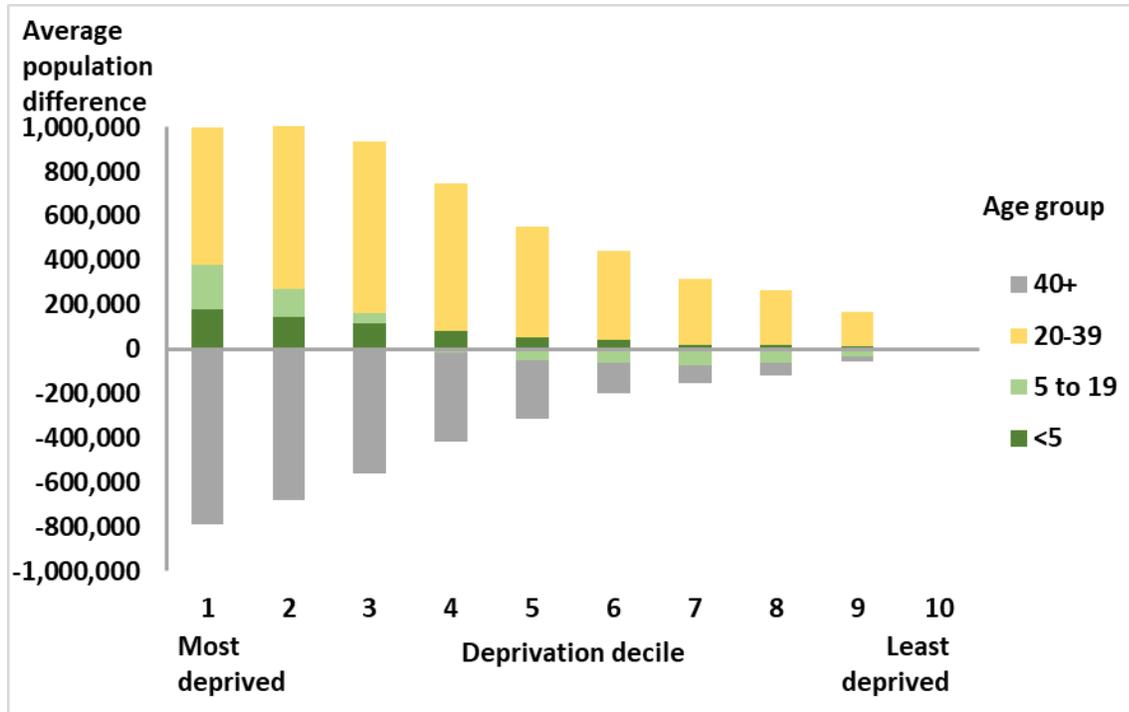
Source: ONS population estimates and death rates for deprivation deciles in England (2) (3) (4) (5) (6)

Note: (1) See statistical appendix for method of calculating excess deaths

In 2020, the first year of the COVID-19 pandemic, the number of excess deaths associated with area deprivation increased to nearly 152,000. That was nearly 28,000 more than the average for the five years 2015-19.

In each year and each area deprivation decile, death rates in each quinary age group and each sex were generally higher than those in the least deprived decile. However, these higher death rates related to populations with very different age structures than the least deprived decile (Figure 3). In the two most deprived deciles, there were substantially more people aged under 40 and substantially less aged 40 and over than in the least deprived decile. While this broad pattern held true in other deciles, although with progressively smaller differences as level of deprivation decreased, several deciles contained fewer school age children than in the least deprived decile and slightly more of those aged 90 and over.

Figure 3 Area deprivation deciles: average difference in population numbers in 2011-19, compared to the least deprived area decile, based on the Index of Multiple Deprivation 2019, England



Source: ONS population estimates for deprivation deciles in England (3) (4) (5) (6)

The result of this combinations of high death rates and younger populations in more deprived areas is that while there are only relatively small differences between deciles in total numbers of deaths, this compares to the relatively small number of deaths that would have been expected in the more deprived deciles on the basis of death rates in the least deprived decile. The contribution to excess deaths in each of the broad age groups highlighted in Figure 3 are presented in Table 1. Most excess deaths are seen at ages 40 and over, but differences between deciles are most marked in the under-fives (due principally to infant deaths) and in the 20-39 age group, particularly among males.

Table 1 Excess¹ deaths in each decile of area deprivations, based on the Index of Multiple Deprivation 2019, by sex and broad age group, England

Sex and broad age group	Deprivation decile										All deciles
	1	2	3	4	5	6	7	8	9	10	
Females											
<5	1,283	863	493	440	295	195	67	37	48	0	3,721
5 to 19	262	210	147	133	100	105	64	47	20	0	1,088
20-39	2,689	1,610	1,091	727	604	328	231	239	101	0	7,621
40+	93,554	80,618	67,018	58,973	51,247	45,897	37,869	30,553	20,051	0	485,781
All ages	97,789	83,301	68,750	60,273	52,246	46,525	38,230	30,876	20,220	0	498,210
Males											
<5	1,845	1,144	810	621	416	263	233	132	109	0	5,574
5 to 19	499	386	249	210	169	152	105	118	74	0	1,963
20-39	6,061	3,818	2,597	1,701	1,389	929	677	392	207	0	17,771
40+	114,561	91,245	78,175	65,881	55,721	46,788	38,021	28,813	19,611	0	538,816
All ages	122,967	96,592	81,832	68,413	57,695	48,132	39,037	29,455	20,000	0	564,124
Persons											
<5	3,129	2,007	1,303	1,061	711	458	300	169	156	0	9,294
5 to 19	762	596	396	343	269	257	169	165	95	0	3,051
20-39	8,751	5,429	3,688	2,428	1,993	1,257	908	631	308	0	25,392
40+	208,116	171,863	145,194	124,854	106,968	92,685	75,890	59,365	39,662	0	1,024,597
All ages	220,756	179,893	150,582	128,686	109,941	94,658	77,267	60,331	40,220	0	1,062,334

Source: ONS population estimates and death rates for deprivation deciles in England (2) (3) (4) (5) (6)

Note: (1) See statistical appendix for method of calculating excess deaths

Conclusions

The decade from 2011 saw over a million people dying earlier than they otherwise would have done had they experienced the death rates seen in the least deprived decile of areas. Of this excess number of deaths, 148,000 were additional to what might have been expected based on levels in the two years prior to 2011. In 2020, the level of excess deaths rose by a further 28,000 compared to that over the previous five years.

References

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Statistical Appendix

Excess deaths are calculated in this note by subtracting the number of deaths expected in the population of an area decile from those observed. Numbers of expected deaths are obtained by multiplying age, sex and year specific death rates in the least deprived decile by the corresponding population estimates for the area decile in question and then summing the figures obtained to arrive at the desired age, sex, year grouping.

$$\text{Excess deaths in a grouping by age}(i), \text{sex}(j), \text{year}(k) = \sum [\text{Obs}_n(i,j,k) - (r_{10}(i,j,k) \times p_n(i,j,k))]$$

where:

$\text{Obs}_n(i,j,k)$ is the number of deaths observed in decile n at age i for sex j in year k

$r_{10}(i,j,k)$ is the death rate observed in decile 10 (the least deprived decile) at age i for sex j in year k

$p_n(i,j,k)$ is the population of decile n at age i for sex j in year k .

It is evident from this formula that excess deaths can also be calculated by subtracting death rates for the least deprived decile from the comparable rates for the decile in question and multiplying the answer by the relevant population of the decile in question, namely replacing the formula on the right by:

$$\sum [(r_n(i,j,k) - r_{10}(i,j,k)) \times p_n(i,j,k)]$$

where:

$r_n(i,j,k)$ is the death rate observed in decile n at age i for sex j in year k .