



INSTITUTE *of*  
HEALTH EQUITY

# HEALTH INEQUALITIES, LIVES CUT SHORT JANUARY 2024



# ACKNOWLEDGEMENTS

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## SUMMARY

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- The period from 2011 to 2019 saw 890,000 people dying earlier than they otherwise would have done had they experienced the death rates seen in the least deprived quintile (20 percent) of areas.
- Around 102,000 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 over a further 24,000 compared to that over the previous five years.
- Based on weekly monitoring figures published by the Office for Health Improvement and Disparities (OHID), there were nearly 11,000 more excess deaths in the most deprived 80 percent of areas during the COVID-19 pandemic in 2020 than in the least deprived 20 percent.
- This suggests that over 13,000 deaths in 2020 (the difference between 24,000 and 11,000 deaths) were associated with the pre-existing trend in mortality due to inequality.
- **If the above comparisons are made with a less deprived group, the least deprived decile (10 percent) of areas, these figures reduce, but only slightly:**
  - > **Over a million people dying earlier than they otherwise would have done in 2011-19.**
  - > **Around 148,000 of these were additional to what might have been expected based on levels in the two years prior to 2011.**
  - > **About a further 28,000 deaths in 2020 in excess of the level in the previous five years.**

## INTRODUCTION

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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 quintile and decile of deprived local areas with that in the least deprived quintile and decile, respectively, 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.

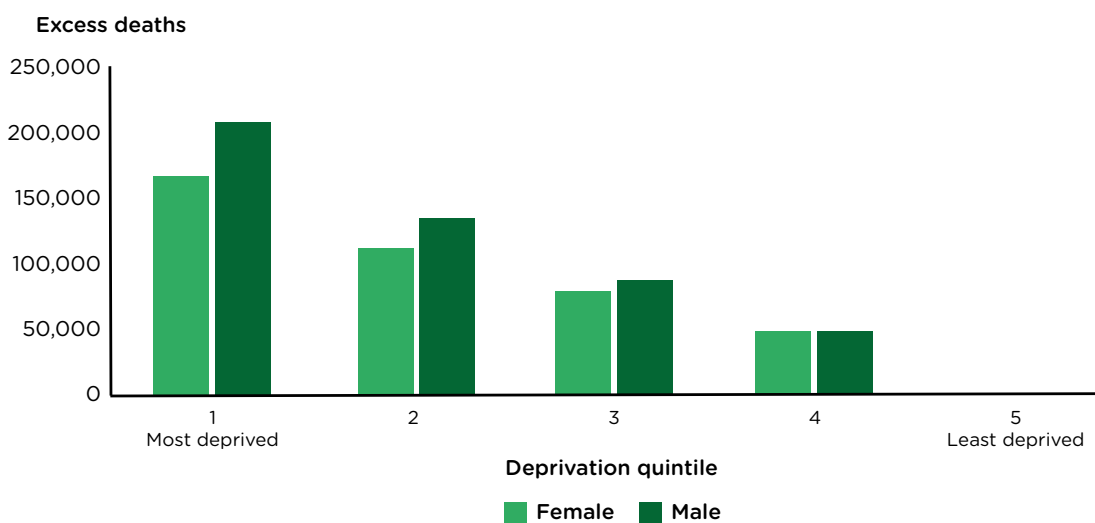
Comparison with the burden in 2009 and 2010 also provides an indication of how much the effect of inequality had increased in 2011 to 2019. The same method also enables us to assess the additional contribution of inequality during the COVID-19 pandemic in 2020 and, by comparing this with figures used by OHID to monitor excess mortality in area quintiles during the pandemic, to assess how many excess deaths in 2020 were associated with the pre-existing trend in mortality due to inequality.

# FINDINGS

## Area deprivation quintiles

In 2011 to 2019, 890,000 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 quintile. As Figure 1 shows, the more deprived the area in which they lived, the greater the excess number of deaths – around two fifths of the total excess occurred in the most deprived fifth (20 percent of areas) of areas and three fifths in the two fifths (40 percent of areas) of areas that were most deprived. In the three most deprived quintiles, there were more excess deaths among males than females.

**Figure 1. Excess<sup>1</sup> deaths in each quintile of area deprivations, based on the Index of Multiple Deprivation, by sex, England, 2011-2019**

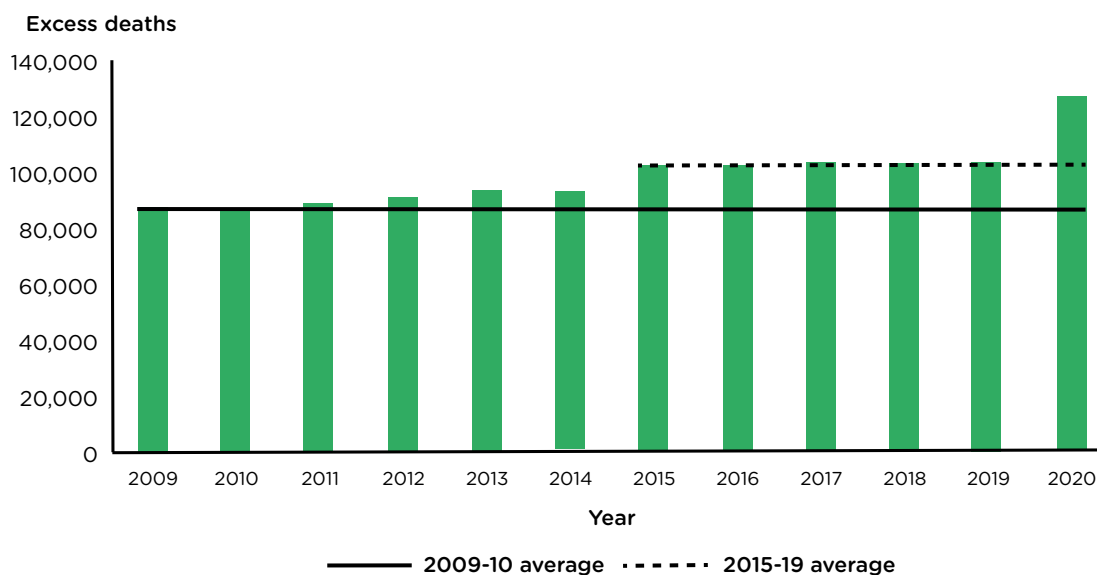


**Source:** ONS population estimates and death rates for deprivation deciles in England (2) (3) (4) (5) (6)

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

The numbers of excess deaths associated with area inequality between quintiles increased over time. In the two years prior to 2011, the annual average excess was around 87,00 (Figure 2). Between 2011 and 2015, the figure increased to over 103,00 and then remained at this level until 2019. This means that, compared to the 2009-10 average, there were 102,000 additional excess deaths associated with mortality rates greater than in the least deprived area quintile. Much of this increase was accounted for by additional female deaths (61,000 additional excess deaths to women, compared to 41,000 to men).

Figure 2. Excess<sup>1</sup> deaths in each year 2009 to 2020, based on the Index of Multiple Deprivation



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

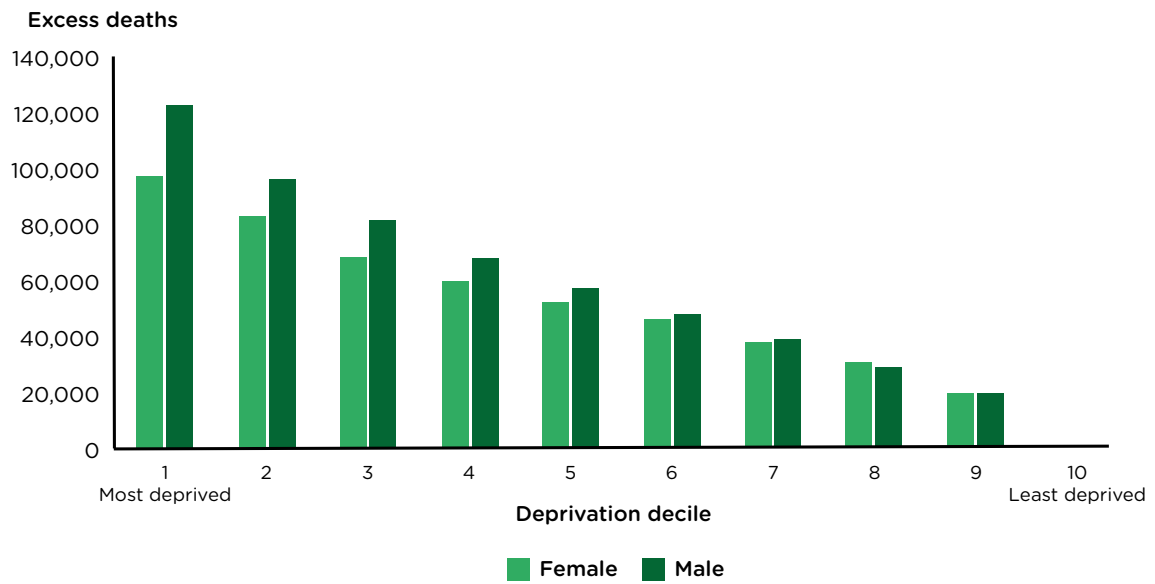
Note: (1) See statistical appendix for method of calculating excess deaths

### Area deprivation deciles

If attention is focused on comparison with the least deprived decile, rather than the least deprived quintile, then the estimate of additional deaths to inequality increases. This is for two reasons. First death rates are lower in the least deprived decile than in the second least deprived decile, as there is a gradient in mortality by area decile, and rates in the least deprived quintile are an average of the rates in the two least deprived decile. Second, the second least deprived decile contributes to the excess when comparisons are made with the least deprived decile, but does not do so as a part of the least deprived quintile (of which it is a part).

**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 3 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.**

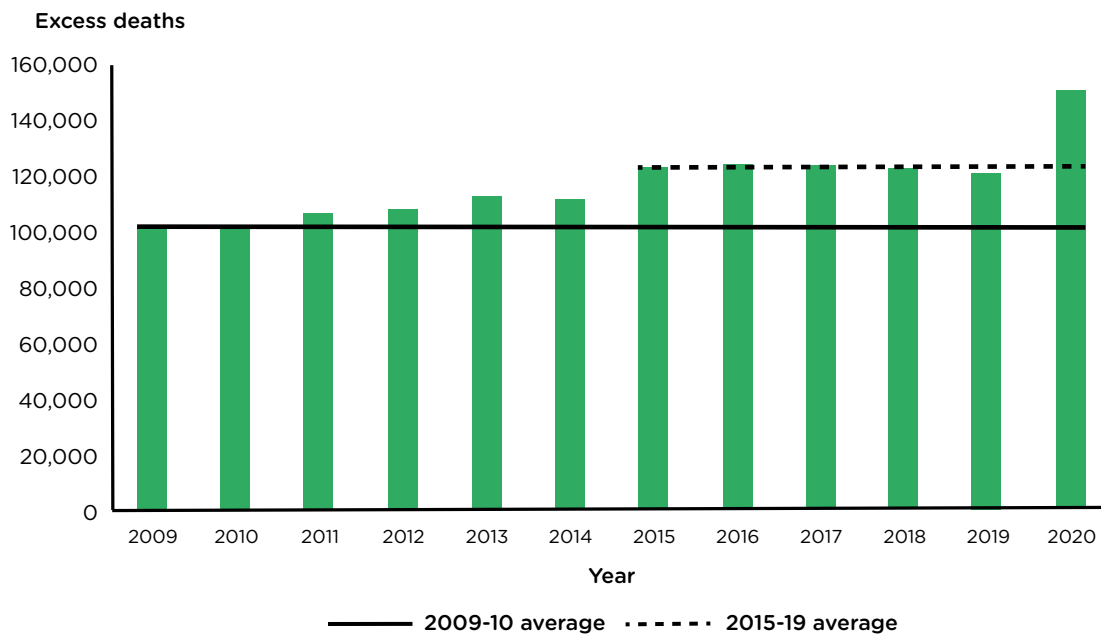
**Figure 3. Excess<sup>1</sup> deaths in each decile of area deprivations, based on the Index of Multiple Deprivation, by sex, England, 2011-2019**



**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 inequality compared to the least deprived decile increased over time. In the two years prior to 2011, the annual average excess was around 100,00 (Figure 4). 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 deprivation compared to the least deprived decile. 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 4. Excess<sup>1</sup> deaths in each year 2009 to 2020, based on the Index of Multiple Deprivation**

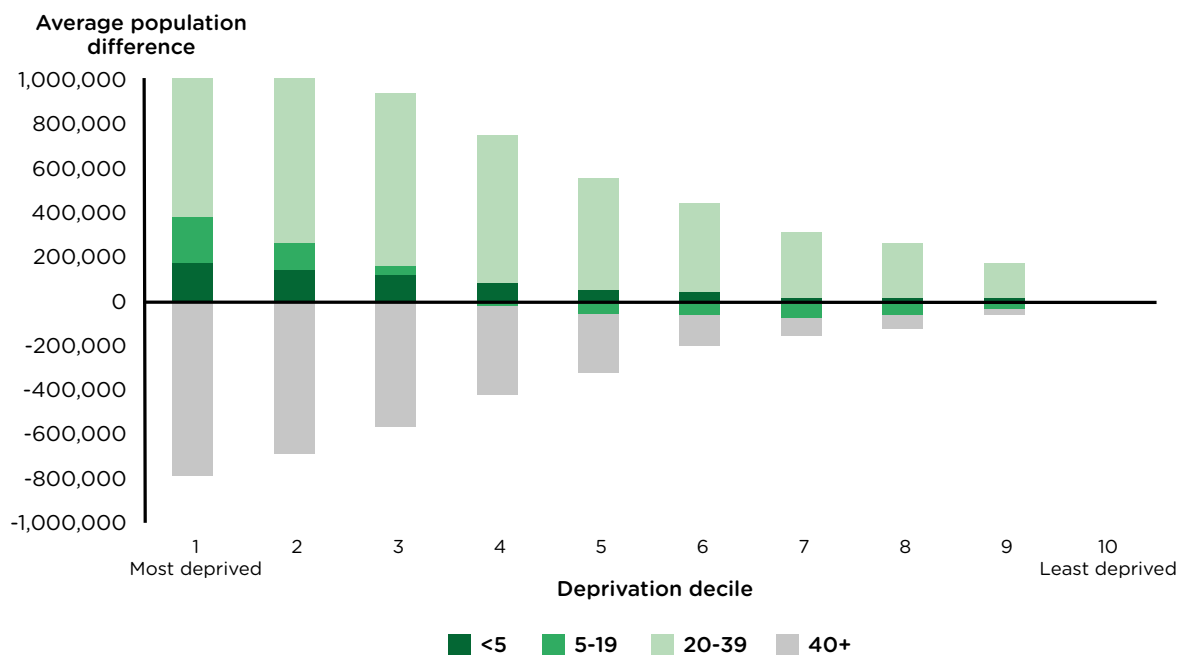


**Source:** ONS population estimates and death rates for deprivation deciles in England (2) (3) (4) (5) (6)  
**Note:** (1) See statistical appendix for method of calculating excess deaths

## Contribution of age groups to excess deaths in each area deprivation decile

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 5. 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. Excess<sup>1</sup> deaths in each decile of area deprivations, based on the Index of Multiple Deprivation, by sex and broad age group, England, 2011-2019**

Sex and broad age group	Deprivation decile										
	1	2	3	4	5	6	7	8	9	10	All deciles
<b>Females</b>											
<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
<b>All ages</b>	<b>97,789</b>	<b>83,301</b>	<b>68,750</b>	<b>60,273</b>	<b>52,246</b>	<b>46,525</b>	<b>38,230</b>	<b>30,876</b>	<b>20,220</b>	<b>0</b>	<b>498,210</b>
<b>Males</b>											
<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
<b>All ages</b>	<b>122,967</b>	<b>96,592</b>	<b>81,832</b>	<b>68,413</b>	<b>57,695</b>	<b>48,132</b>	<b>39,037</b>	<b>29,455</b>	<b>20,000</b>	<b>0</b>	<b>564,124</b>
<b>Persons</b>											
<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
<b>All ages</b>	<b>220,756</b>	<b>179,893</b>	<b>150,582</b>	<b>128,686</b>	<b>109,941</b>	<b>94,658</b>	<b>77,267</b>	<b>60,331</b>	<b>40,220</b>	<b>0</b>	<b>1,062,334</b>

**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

## Contribution of the COVID-19 pandemic to excess deaths in 2020

In 2020, the first year of the COVID-19 pandemic, the number of excess deaths associated with the comparison with the least deprived area decile increased to nearly 152,000. That was nearly 28,000 more than the average for the five years 2015-19 (see Figure 4).

If the same comparison is made with the least deprived area quintile (see Figure 2), the number of excess deaths associated with the comparison with the least deprived area quintile increased to 128,000 in 2020. That was 24,393 more than the average for the five years 2015-19.

From March 2020, OHID monitored excess deaths in each area deprivation quintile by comparing actual numbers of deaths registered in each week to the number expected based on the trend in death rates in each quintile prior to the pandemic i.e. in 2015-19 (7) (8). Figure 5 shows that in 2020 there were a total of 69,308 deaths compared to the pre-existing trend, of which 11,715 were in the least deprived decile. The excess in other quintiles, compared to the latter figure, is shown in the final column of Figure 5 and these figures sum to 10,733. The difference between this figure and the 24,393 excess deaths using the comparison above is 13,660. This corresponds to the excess due to the pre-existing trend in health inequalities based on comparison with the least deprived quintile.

Table 2. Deaths in the week ending 27 March 2020 to 31 December 2020

Deprivation quintile	Registered deaths	Expected deaths	COVID-19 deaths	All Excess deaths	Excess deaths compared to IMD5
IMD 1 - most deprived	92,988	75,604	17,920	17,384	5,669
IMD 2	87,554	73,420	15,678	14,134	2,419
IMD 3	88,724	75,294	14,005	13,430	1,715
IMD 4	86,653	74,008	13,828	12,645	930
IMD 5 - least deprived	80,349	68,634	12,357	11,715	0
All quintiles	436,268	366,960	73,788	69,308	10,733

Source: OHID (2023) Excess mortality by deprivation quintile (8)

## 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.

Comparison with the least deprived quintile indicates slightly lower figures than comparison with the least deprived decile, but allows us to separately identify how much of excess due to inequalities in 2020 was associated with the COVID-19 pandemic (nearly 11,00 deaths) and how much was due to the pre-existing trend in health inequalities (over 13,000 deaths).



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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 quintile or decile from those observed. Numbers of expected deaths are obtained by multiplying age, sex and year specific death rates in the least deprived quintile or decile by the corresponding population estimates for the area quintile or decile in question and then summing the figures obtained to arrive at the desired age, sex, year grouping. For example, for deciles:

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

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 quintile or decile from the comparable rates for the quintile or decile in question and multiplying the answer by the relevant population of the quintile or decile in question, namely replacing the formula on the right by:

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

where:

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