



**Trends in Mortality and Life Expectancy in
NHS Highland**

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Public Health Intelligence

The Public Health Intelligence team are part of the Directorate of Public Health of NHS Highland and provide an expert resource on epidemiology, demography and population health evidence.



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Introduction

To measure mortality is to measure deaths within a population. By collecting data on mortality, it is possible to make assertions about the health of the population of focus. As well as providing crude values of deaths, inferences can be made about the causes and rates of death and life expectancy; amongst other measures. These measures can be used to make comparisons between and within populations.

The primary source of data on mortality in Scotland comes from the National Records of Scotland (NRS). The most recently published complete annual data is for 2021.

Trends in mortality and life expectancy

Mortality rates and life expectancy in high-income countries had shown steady improvements over the last 100 years however, in the early 2010s these trends started to stagnate in some countries such as Iceland, Germany, the Netherlands, the USA and the UK ¹. With the onset of the COVID-19 pandemic in 2020, a time series analysis using data from the Human Mortality Database found life expectancy had dropped in 31 of 37 high and upper-middle income countries². If this decline in life expectancy is transient, with resolution of the pandemic it would be expected that life expectancy and mortality trends would return to their pre-pandemic levels.

Scotland

The observed international trends have been mirrored in Scotland; with a stagnation in mortality rate and life expectancy improvements starting in 2012-14, before going into decline in 2020 and 2021^{1,3}. These trends are being observed in both sexes, across almost all age groups and particularly amongst the most deprived^{1,4}. Scotland has the highest mortality rate in Western Europe⁵, meaning that these adverse trends have been superimposed on an already poor situation.

Scotland's high mortality rate relative to other comparable countries has been attributed to two principal factors: a slower rate of improvement than other comparable countries along with widening socioeconomic inequality and their consequent health inequalities^{3,6}. Further complicating this is the so-called "Glasgow effect" where in Scotland and particularly Glasgow, mortality and premature mortality are higher than would be expected in an area with similar levels of deprivation. The precise mechanisms for this remain unclear though it is likely that the explanation is multi-factorial⁷.

A report in 2022, *Resetting the course for population health: evidence and recommendations to address stalled mortality improvements in Scotland and the rest of the UK*, published by

the Glasgow Centre for Population Health has proposed possible explanations to explain the stagnation in life expectancy and mortality, these include¹:

- Slowed decline in cardiovascular disease (CVD) mortality following a long period of improvement, this is true and is likely a contributing factor though, it could not account for the entire effect.
- Drug related deaths (DRDs) have increased in Scotland since the 1990s and there has been a particularly sharp increase since 2013. DRDs are now the most common cause of death among 15-44-year-old males having overtaken deaths by suicide in 2013⁸. These deaths contribute significantly to life expectancy estimates as they tend to affect younger members of the population⁹. These deaths may be a contributing factor however, alone they cannot account for stalled mortality trends¹.
- An increase in dementia and Alzheimer's disease deaths. Deaths recorded as due to dementia or Alzheimer's are increasing however, these increases may be largely attributed to changed reporting practices regarding dementia deaths on death certification as well as a true increase. These deaths should not have a significant impact on stalled mortality trends^{1, 10}.
- Influenza has been cited as a potential cause for stalled mortality however, this could not explain why the effects are being felt across all age groups when influenza mortality is concentrated amongst those at the extremes of age¹.
- Obesity and its consequences such as diabetes and CVD may be contributing in part to stalled mortality in Scotland^{1, 11}.
- Mortality displacement is the concept that a time of high-mortality, due to for example influenza or, typically, COVID-19 or extreme weather could lead to more deaths amongst those at risk of death; this would be followed by a period of low mortality. This is unlikely due to the prolonged trends of stalling mortality though, may be contributing to the acute decline in life expectancy due to the COVID-19 pandemic.
- Natural limits to life expectancy. Increases in life expectancy are still being experienced by some countries such as Japan and South Korea which have higher life expectancies than Scotland¹. Additionally, mortality rates are continuing to fall amongst the least deprived in Scotland. This renders the explanation implausible as there are not underlying biological factors which could account for these differences.
- Extreme weather, a focal point considering climate concerns. However, at present the effect appears small. There are few deaths from extreme heat in Northern Europe and patterns of increased mortality in winter are longstanding^{1, 12}.
- Austerity, the political and economic policies aiming to reduce public spending. The rationale being that economic hardship and reduced spending on health and social care is associated with poorer mortality and life expectancy and are thought to be a leading contributor to the stalled mortality trends^{1, 4, 10, 13}. This is thought to occur by two mechanisms:

- Healthcare effect, a rise in unmet need due to lack of funding of health and social care services¹⁰. Between 2010/11-2019/20, real terms spending on healthcare increased by 1% per annum whereas prior to this it was 5%⁴.
- Social risk effect where those who are on an economic knife edge: at risk of homelessness, food insecurity and unemployment without an adequate social safety net with consequent negative health effects¹⁰.
- A study in England in 2021 estimated that a 1% increase in healthcare spending was associated with a 0.5% reduction in mortality and a 1% increase in social care spending associated with a 0.3% decrease in mortality¹³.

The evidence suggests that austerity is likely to be having the largest impact on stalled mortality and life expectancy and may be driving other causes such as DRDs and excess winter mortality^{1, 4, 10, 14}.

NHS Highland

NHS Highland has historically had lower mortality rates and higher life expectancy than Scotland, this was true as recently as 2018¹⁵. Given the recent changes at the national level, it is important to think how this may be reflected at the level of the health board. NHS Highland has notable differences to the profile of Scotland in terms of population and geography which may impact on these trends.

NHS Highland is the largest health board in Scotland, in terms of land area (41%) however, the population density is low at 10 people per square kilometre¹⁶ making NHS Highland one of the least densely populated regions in Europe¹⁷. As a result, many residents of NHS Highland live in remote and rural areas, more than Scottish averages¹⁸. It has been shown that in the UK, those in rural areas have better life expectancy however, there is variation within this which is not always captured in population level data¹⁸. Like urban areas, rural areas are not immune to deprivation however, there are differences and limitations to the measurement of rural deprivation. Deprivation in Scotland is measured at the intermediate and data zone level. These areas are likely to be more homogenous in urban areas, however, in rural areas this can lead to more dispersed and hidden deprivation^{19, 20}. This can be illustrated by way of an example:

In rural areas, only 1 in 4 people who live in a deprived area are income deprived, while 9 in 10 income deprived people do not live in a deprived area. The contrasts with Scotland where 2 in 3 income deprived people do not live in a deprived area while 1 in 3 do²⁰. As such, the assessment of deprivation on life expectancy and mortality in rural areas will have limitations.

NHS Highland is composed of two council areas: Highland and Argyll & Bute. Both council areas are comparable in terms of population structure and geography though Highland council area is more than 2.5 times the size of Argyll & Bute. For the purposes of this report data at the health board level will be used. The justification for this is, on analysis at the council area level, statistics on mortality were not meaningfully different and when they were, the large confidence intervals produced for Argyll & Bute due to its lower population rendered these differences not statistically significant.

Aim

The focus of this report is to describe:

1. Mortality rates and life expectancy in NHS Highland
2. How these trends have evolved over time
3. How the trends in NHS Highland compare to Scotland

Methods

All data used are open data available from the National Records of Scotland, Scottish Public Health Observatory (ScotPHO), Public Health Scotland (PHS), Scottish Government and Office for National Statistics (ONS). Data on area level deprivation used the Scottish Index of Multiple Deprivation (SIMD), this was first published by the Scottish Government in 2004 and has been regularly updated including, 2006, 2012, 2016 with the most recent edition being released in 2020. SIMD quintiles have been used where 1 is the most and 5 the least deprived.

Values presented in the text will contain 95% confidence intervals in brackets where this data is available for example, 10 (9-11). Results were reported to be statistically significant at the 5% level if the confidence intervals of comparison populations did not overlap. For line charts, shaded bands represent the 95% confidence interval and on bar charts, these are represented by error bars.

The age-standardised mortality rate (ASMR) is a weighted average of age-specific mortality rates which takes account of the age structure and allows comparison of populations with different age structures. In the report, ASMR is reported per 100,000 population unless otherwise stated. The NRS and ONS use the 2013 European Standard Population for calculating ASMR.

Once data had been downloaded from the source, it was collated in Microsoft Excel.

Graphics were produced using R version 4.2.2 and R Studio 2022.12.0.

Mortality

Age-standardised mortality rate

In 2021, the ASMR for all persons was significantly lower in NHS Highland at 1084.3 (1052-1116.7) than in Scotland at 1200.4 (1191.5-1209.4). The ASMR for males is higher than for females in NHS Highland and Scotland. In 2021, males in NHS Highland had an ASMR of 1268.9 (1215.6-1322.1) compared to 1404.2 (1389.2-1419.1) in Scotland: Females in NHS Highland had an ASMR of 925.5 (885.8-965.3) compared to 1038.2 (1027.3-1049.2) in Scotland.

In NHS Highland, the ASMR for females declined until 2016 before beginning to rise: for males, this did not occur until 2019 (Figure 1).

Figure 1: ASMR for NHS Highland and Scotland by Sex, 2006 to 2021



Source: National Records of Scotland²¹

Mortality and deprivation

The ASMR in NHS Highland has a moderate positive linear association ($r=0.53$) with respect income deprivation at the intermediate zone level: as the percentage of population income deprived increases so too does ASMR (Figure 2). This reflects the social gradient in ASMR that is seen in Scotland and other high-income countries^{1, 10, 14}.

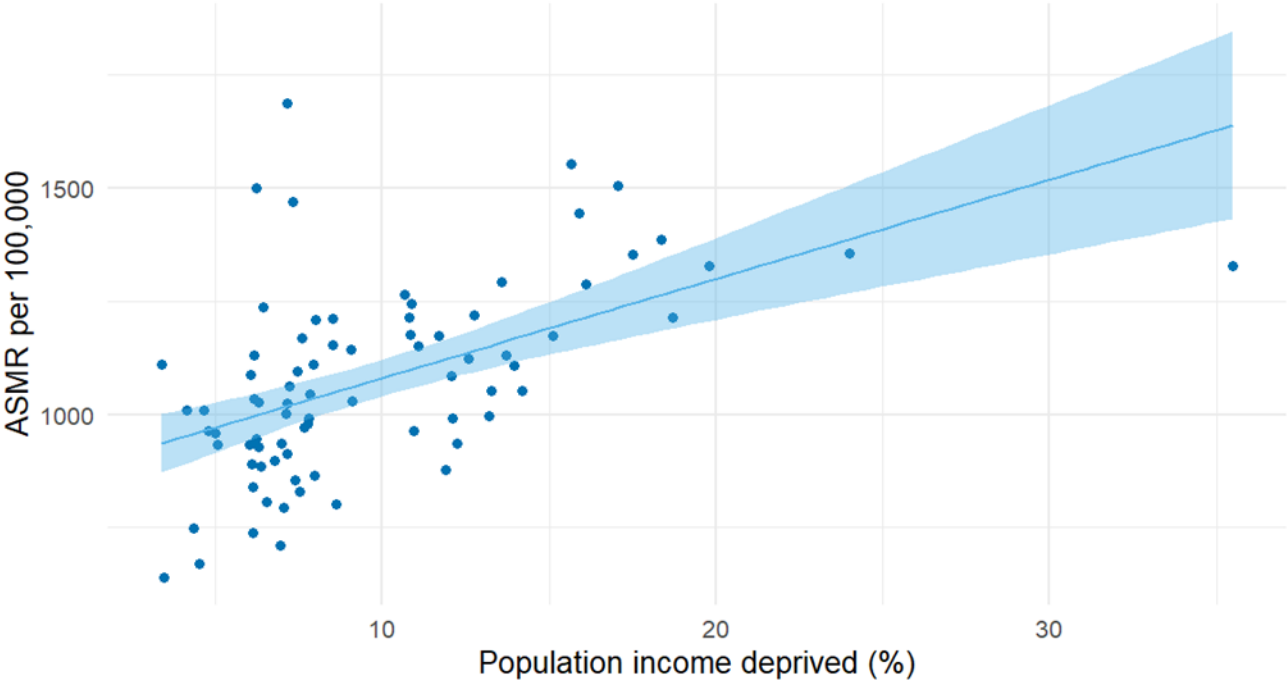
These trends persist when the SIMD, a more comprehensive measure of deprivation is used. In NHS Highland the ASMR is not significantly different to Scotland for the least deprived

quintiles (4&5). However, those in quintiles 1-3 in NHS Highland have lower ASMR than the Scotland averages (Figure 3).

In NHS Highland in the period 2019-21, the ASMR for quintile1 was 1348.2 (1257.8-1443.2) compared to 929.8 (858.6-1005.2) in quintile 5. The relative index of inequality (RII) is 23.6% meaning the ASMR is 23.6% higher for the most deprived quintile than the average of the population²². The fraction of deaths in this group attributable to deprivation is 38.5% and is 11.9% across the whole population²².

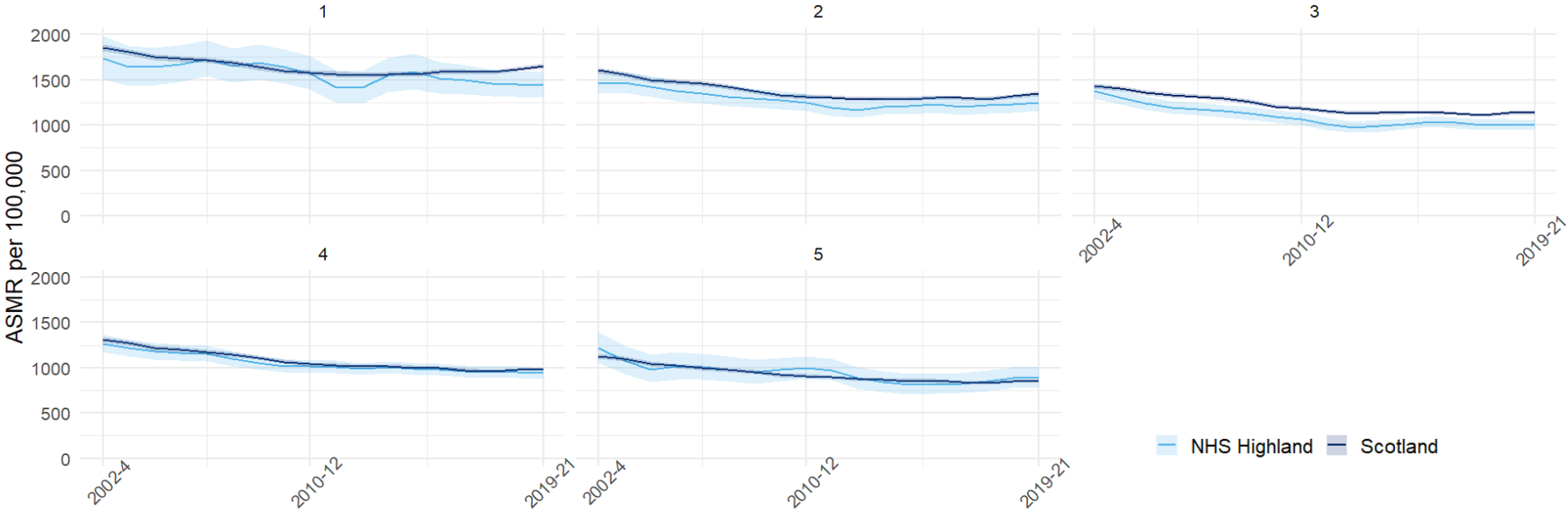
In Scotland ASMR have continued to fall in quintiles 3-5, albeit at a slower rate since around 2010-12. The most deprived quintiles, 1 & 2 showed stagnation of reduction in ASMR around 2012-12 before beginning to rise in 2018-20. In NHS Highland stagnation in ASMR can be seen across all quintiles since 2010-12.

Figure 2: Association between ASMR (2019-21) and income deprivation (2017) in NHS Highland at the Intermediate zone level



Source: Scottish Public Health Observatory Profiles^{22, 23}

Figure 3: ASMR by SIMD quintile in NHS Highland and Scotland, 2002-04 to 2019-21

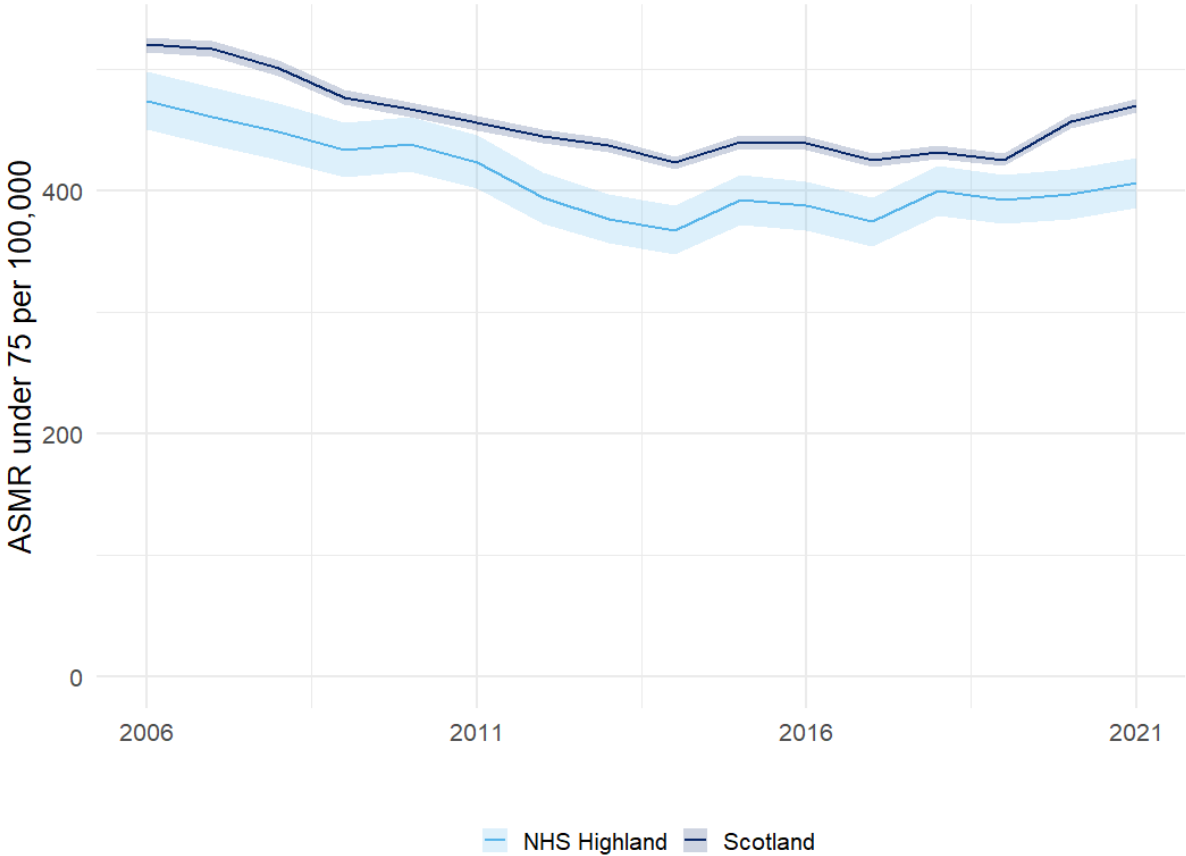


Source: Scottish Public Health Observatory²²

Premature mortality

Premature mortality is defined as death before the age of 75. In NHS Highland, premature mortality has remained lower than the levels seen in Scotland. In 2021 in NHS Highland the ASMR for deaths under 75 was 407.2 (386.7-427.7) compared to 470.6 (465-476.2) in Scotland. Premature mortality declined in both Scotland and NHS Highland until 2013 (Figure 4). Since then, in NHS Highland there has been an increase; while in Scotland there was a period of stagnation between 2013 and 2019 before it began to rise.

Figure 4: Premature mortality in NHS Highland and Scotland, 2006-21



Source: National Records of Scotland²⁴

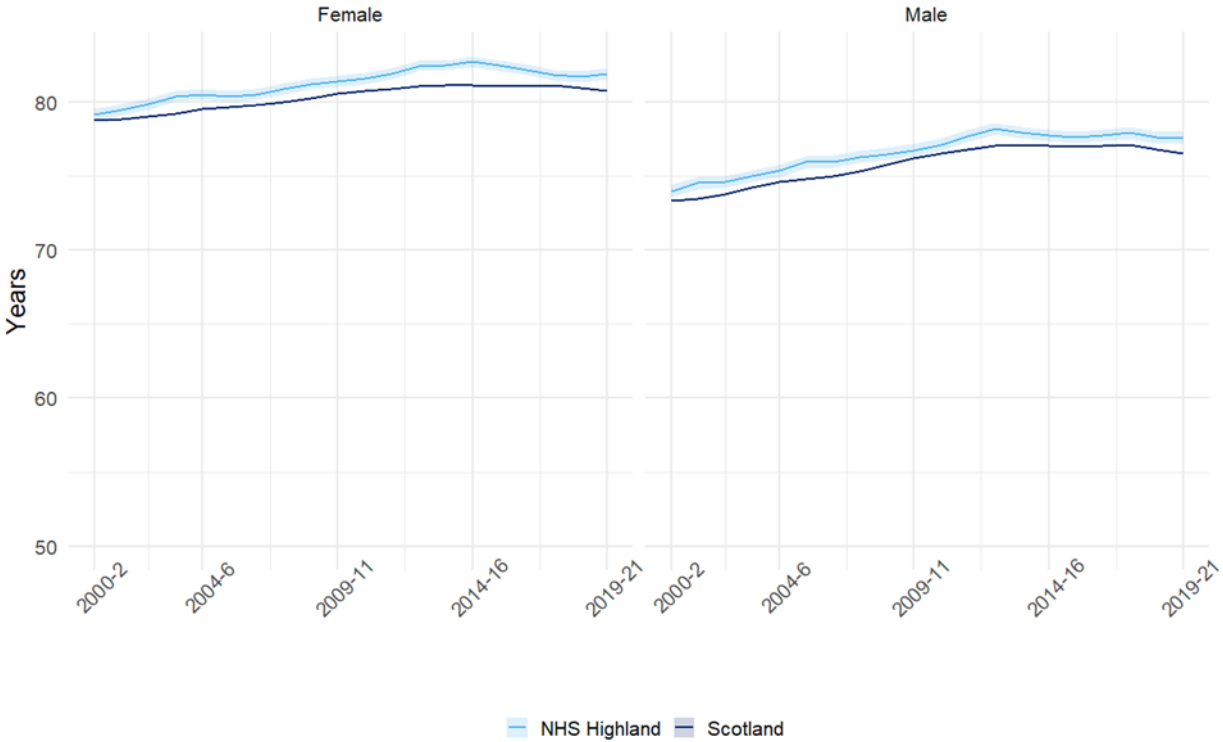
Life expectancy

Life expectancy at birth

Life expectancy can be calculated from a life table using age-specific mortality rates, these are the mortality rates for each age or age-group. Life expectancy is calculated using data from a three-year period.

Life expectancy at birth for females remains higher than for males in both Scotland and NHS Highland. In NHS Highland life expectancy at birth is higher for both sexes than the Scottish average though, follows the same pattern of stagnation and decline (Figure 5). In 2019-21 life expectancy for women was 81.8 years (81.6-82.3) compared to 80.8 years (80.7-80.9) in Scotland and 77.6 years (77.2-78) compared to 76.5 years (76.4-76.6) for males. In NHS Highland female life expectancy at birth rose until 2014-16 whereupon, it began to decline. Male life expectancy continued to rise until 2012-14, it declined until 2015-17 and has remained stagnant since. In Scotland life expectancy stalled in 2012-14 before beginning to decline in 2018-20.

Figure 5: Life expectancy at birth in NHS Highland and Scotland, 2000-02 to 2019-21



Source: National Records of Scotland²⁵

Life expectancy is calculated from mortality data across three year periods

Although NHS Highland compares favourably to Scotland, in the context of Scotland having the highest mortality rate in Western Europe it is important to consider how NHS Highland

compares to another country. England is an obvious choice and data is readily available from the ONS²⁶. For life expectancy, 2018-20 was used for comparison as these are the latest available data for England; while 2021 has been used for ASMR. As Table 1 shows, ASMR is lower and life expectancy higher in England than NHS Highland and Scotland and these differences are statistically significant.

Table 1: Comparison of life expectancy and ASMR in NHS Highland, Scotland and England

Area	Life expectancy (2018-20)	ASMR (2021)
Females		
NHS Highland	81.8 (81.4-82.1)	925.5 (885.8-965.3)
Scotland	81.0 (80.9-81.1)	1038.2 (1027.3-1049.2)
England	83.1 (83.12-83.17)	844.1 (840.9-847.3)
Males		
NHS Highland	77.6 (77.2-78.1)	1268.9 (1215.6-1322.1)
Scotland	76.8 (76.7-76.9)	1404.2 (1389.2-1419.1)
England	79.4 (79.34-79.43)	1152.7 (1148.3-1157.0)

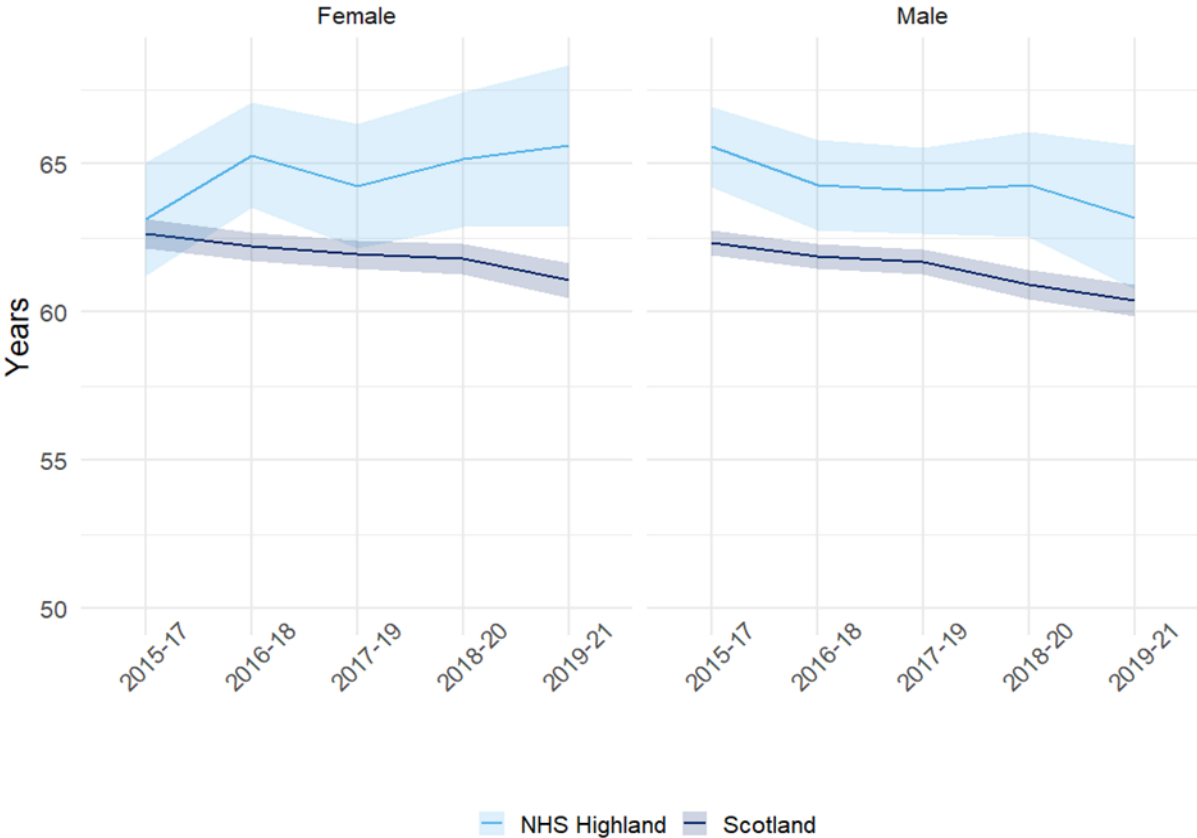
Source: National Records of Scotland^{21, 25}, Office for Health Improvement & Disparities²⁷ and Office for National Statistics²⁸

Healthy life expectancy

Life expectancy is a measure of crude duration of life, a more qualitative measure is healthy life expectancy which captures how many years a person could be expected to live in good or better health. Healthy life expectancy is calculated using data from the Annual Population Survey component on self-assessed health. Not only do the population of NHS Highland live longer than the Scottish average they also spend more of their life in good health.

Although male life expectancy is lower than for females, there is no statistically significant difference in healthy life expectancy. In 2019-21 in NHS Highland healthy life expectancy was 63.2 years (60.8-65.6) for males and 65.6 years (62.9-68.3) females. A male in NHS Highland could expect to spend 81.4% (78.7-84.1) of his life in good health compared to 78.9% (78.3-79.5) in Scotland and a female could expect to spend 80.1% (77.1-83) of her life in good health compared to 75.6% (74.9-76.3) in Scotland. Healthy life expectancy is decreasing for both sexes in Scotland. Although in NHS Highland healthy life expectancy is increasing for females and decreasing for males (Figure 6) these differences aren't statistically significant though still concerning.

Figure 6: Healthy life expectancy at birth in NHS Highland and Scotland, 2015-17 to 2019-21



Source: National Records of Scotland²⁵

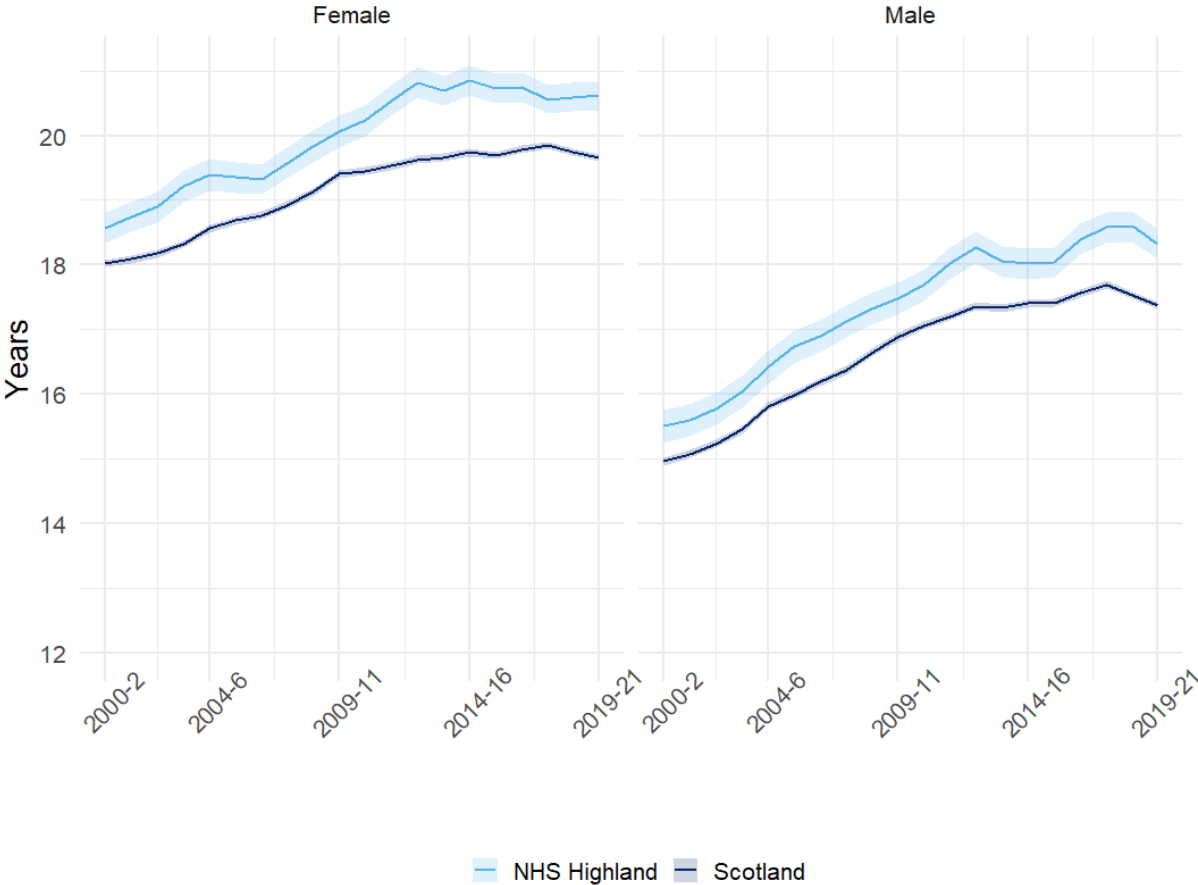
Life expectancy at 65

Life expectancy at age 65 is higher in NHS Highland than Scotland for both males and females. In 2019-21 male life expectancy at 65 in NHS Highland was 18.3 years (18.1-18.5) compared to 17.4 years (17.3-17.4) in Scotland: For females it was 20.6 years (20.4-20.8) while in Scotland it was 19.7 years (19.6-19.7).

In absolute terms, in NHS Highland both sexes could expect to live one year longer at birth and 1.1 years longer at 65 than in Scotland. In relative terms the life expectancy of an individual in NHS Highland is 1.4% longer at birth than in Scotland. By the age of 65, life expectancy in NHS Highland is 5.5% longer for males and 4.9% longer for females than in Scotland. This represents a divergence in life expectancy with age.

Female life expectancy at 65 has stagnated since 2012-14 and has begun to decline. Male life expectancy has a more complex pattern with an overall upward trajectory until 2012-14 before dropping until 2015-17 (Figure 7). At this point it began to rise again before declining in 2019-21.

Figure 7: Life expectancy at 65 in NHS Highland and Scotland, 2002-02 to 2019-21



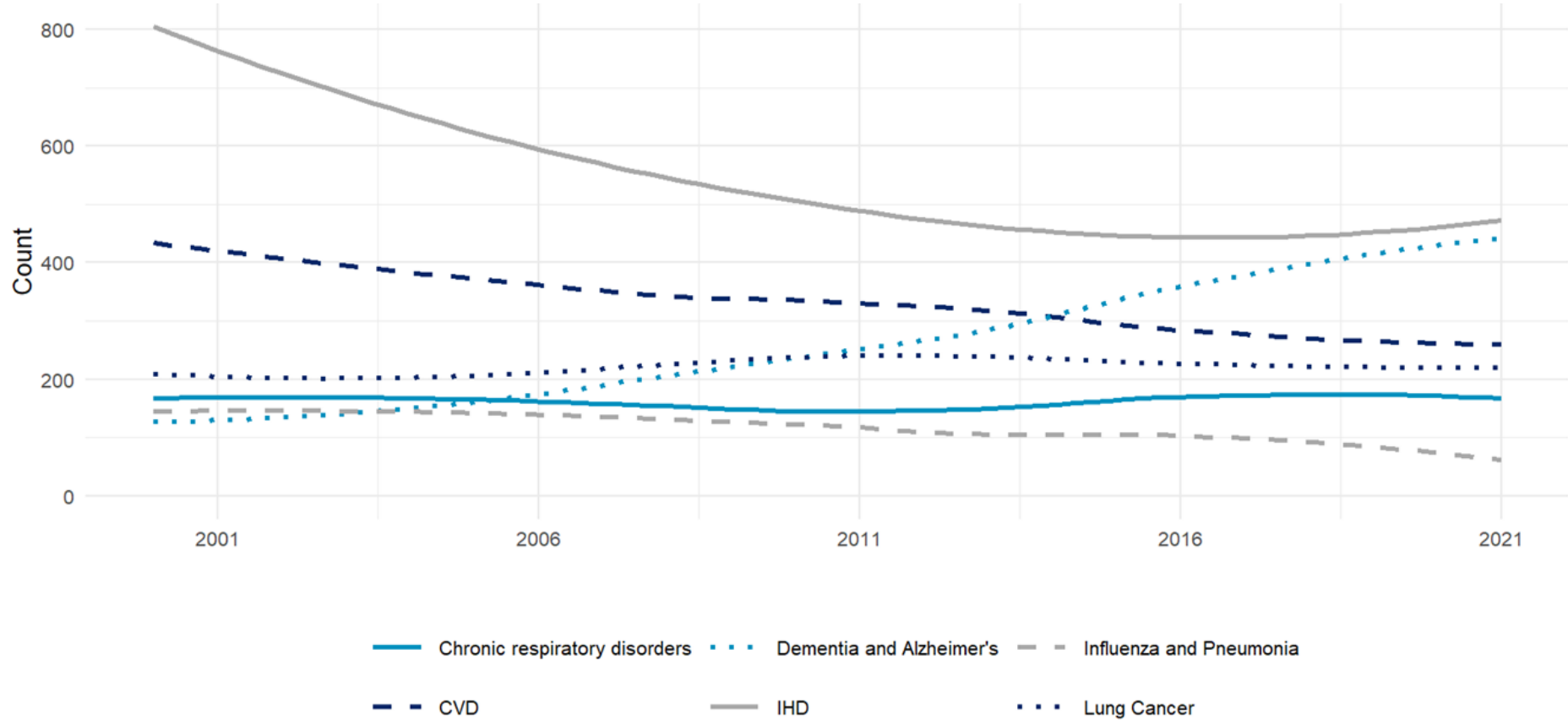
Source: National Records of Scotland²⁹

Causes of death

Leading causes of death

In 2000 ischaemic heart disease (IHD) and cerebrovascular disease (CVD) were the most common causes of death in NHS Highland (Figure 8). IHD and CVD deaths have declined while dementia and Alzheimer’s disease deaths have risen. In 2014 dementia and Alzheimer’s overtook CVD to become the second leading cause of death in NHS Highland. 2021 has shown an increase in IHD deaths, whether this is normal variation, a persistent change or related to the COVID-19 pandemic is unclear. COVID-19 became the fifth leading cause of death in 2021 in NHS Highland while it was the third largest behind IHD and dementia and Alzheimer’s in Scotland. If current trends are to continue, dementia and Alzheimer’s may become the leading cause of death in NHS Highland. This rise may be attributed to changes in death certification practices where acknowledgement of dementia is becoming common as well as true increases.

Figure 8: Leading causes of death in NHS Highland, 2000 to 2021



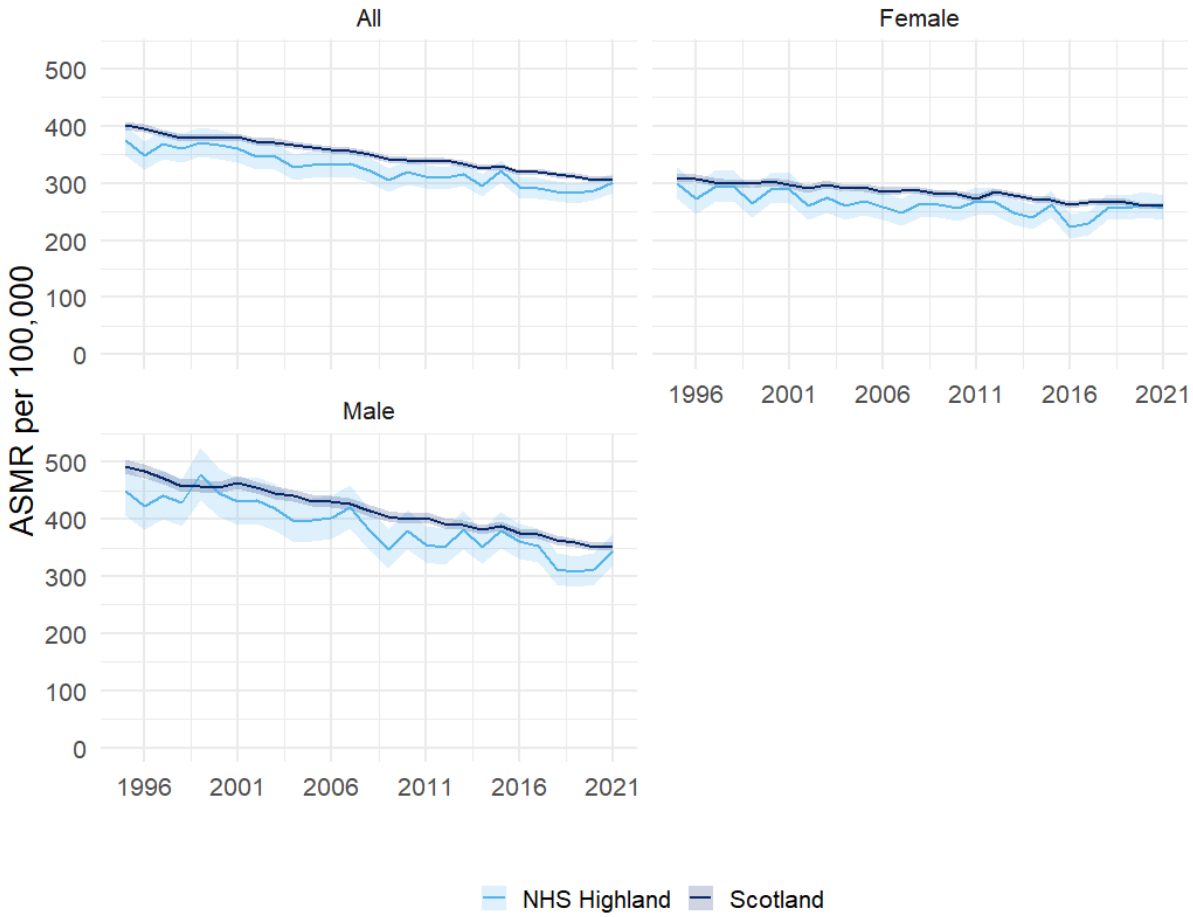
Source: National Records of Scotland³⁰

Line smoothed using geom_smooth function of ggplot2 producing a smooth conditional mean which smooths annual variation. COVID-19 has not been included.

Cancer deaths

Cancer deaths in NHS Highland and Scotland had been declining since 1995 particularly in males; the ASMR for cancer deaths between males and females was converging though remains higher for males than females (Figure 9). In NHS Highland in 1995 the ASMR for cancer deaths for all sexes was 374.5 (348.9-401.1) dropping to 282.3 (265.1-300) in 2019. This trend reversed in 2020 and continued in 2021, this trend has not been seen in Scotland. In 2021 there are no statistically significant difference in cancer ASMR between NHS Highland and Scotland.

Figure 9: Cancer deaths in NHS Highland and Scotland, 1995-2021



Source: Public Health Scotland³¹

Further measures of mortality

Avoidable mortality

Avoidable mortality is the sum of preventable and treatable mortality in those aged under 75. Preventable mortality is defined as deaths which could be prevented through effective public health measures and primary prevention; this includes deaths from COVID-19, pandemics being deemed preventable. Treatable mortality are those deaths which could have been avoided through timely and effective healthcare intervention^{32, 33}. Examples can be seen in Table 2.

Table 2: Examples of preventable and treatable mortality

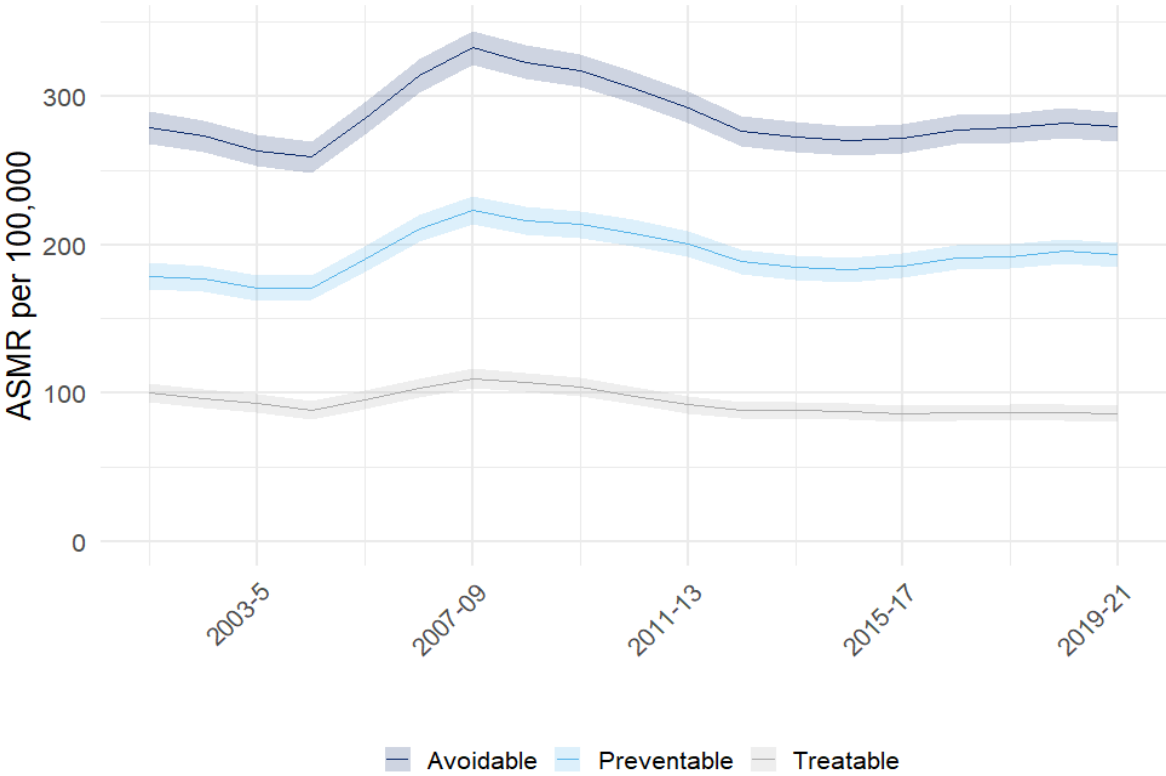
Preventable	Treatable
Infectious diseases	Breast cancer
Lung cancer	Colorectal cancer
Stomach cancer	Testicular cancer
Skin cancer	Diabetes mellitus
Diabetes mellitus	Epilepsy
Hypertensive disease	Venous thromboembolism
Chronic lower respiratory diseases	Hypertensive disease
Tetanus	Asthma
Certain congenital malformations	Bronchiectasis
Injuries	Appendicitis
Intentional self-harm	Renal failure

Source: Organisation for Economic Co-operation and Development³³
 Some diseases can be both preventable and treatable and are weighted accordingly.

In Scotland, avoidable mortality had been decreasing since 2001 before stagnating in 2014 then rising in 2020 and 2021. In NHS Highland avoidable mortality has remained unchanged from 2001-03 to 2019-21 (Figure 10), there was period of higher avoidable mortality between 2004-06 and 2007-09 before these regressed to previous trends. Avoidable mortality was higher in 2018-20 than in 2017-19 and 2019-21. This is caused by an increase in preventable mortality in 2018-20, COVID-19 deaths could account for this increase.

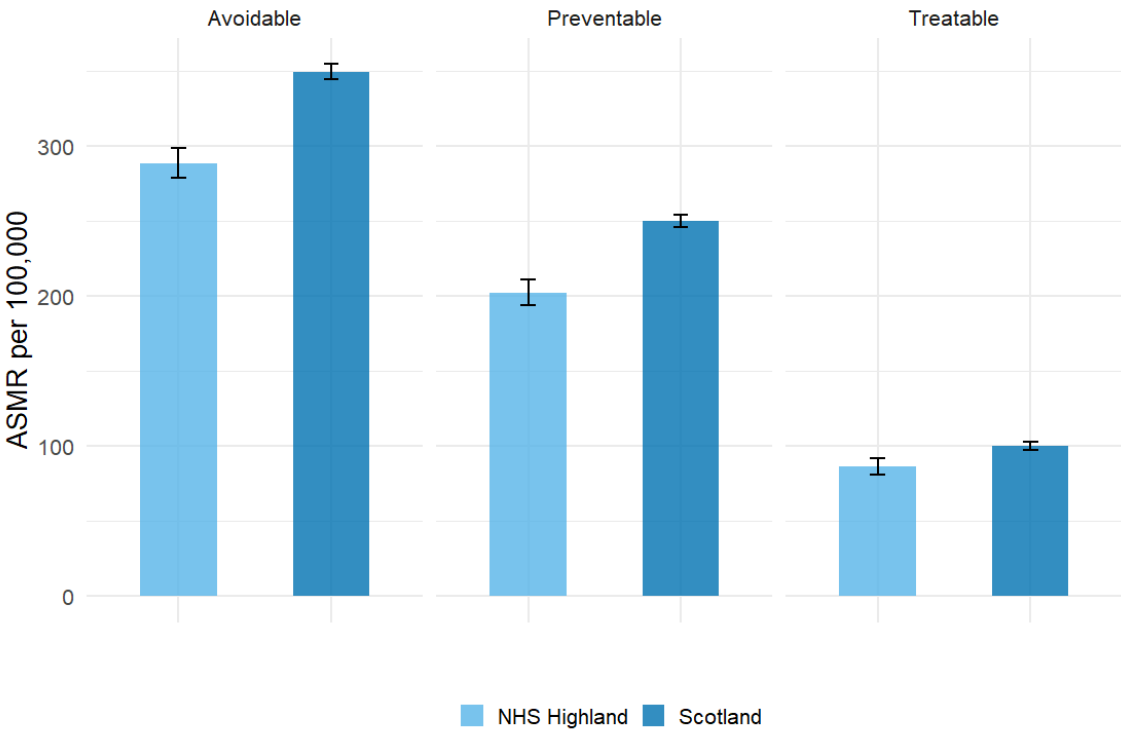
From 2019-21 (Figure 11) the ASMR from avoidable mortality was 288.8 (278.7-298.9) in NHS Highland lower than Scotland which had a rate of 349.9 (345.1-354.8). However, this still represents 26.6% of deaths in NHS Highland.

Figure 10: Avoidable mortality in NHS Highland 2001-03 to 2019-21



Source: National Records of Scotland³⁴

Figure 11: Avoidable mortality in NHS Highland and Scotland, 2019-21



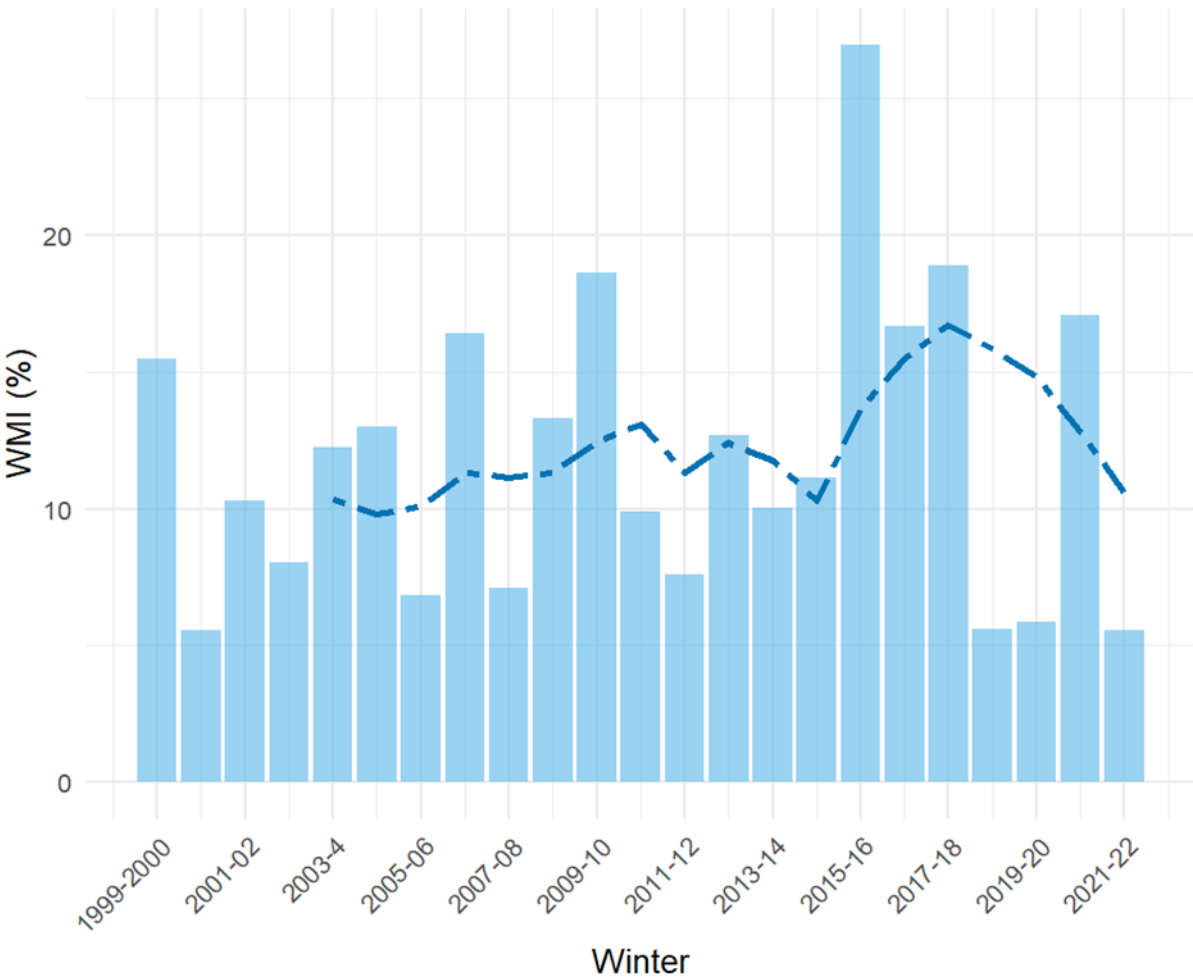
Source: National Records of Scotland³⁵

Avoidable mortality is presented as an average ASMR over the three years 2019-21

Winter Mortality

In Scotland, in winter there are more deaths than at other times of year. The reasons for this are believed to be as a direct result of cold and of the increased circulation of viruses such as influenza¹². Additional deaths tend to be concentrated in the elderly, with those over 85 displaying the most significant effects¹². Excess winter mortality can be expressed using the winter mortality index (WMI) which is the number of additional deaths in each winter period (December – March) divided by the average number of deaths in the four-month periods preceding and following the winter; this is presented as a percentage.

Figure 12: Excess winter mortality in NHS Highland in winters 2010/11 to 2021/22



Source: National Records of Scotland³⁶

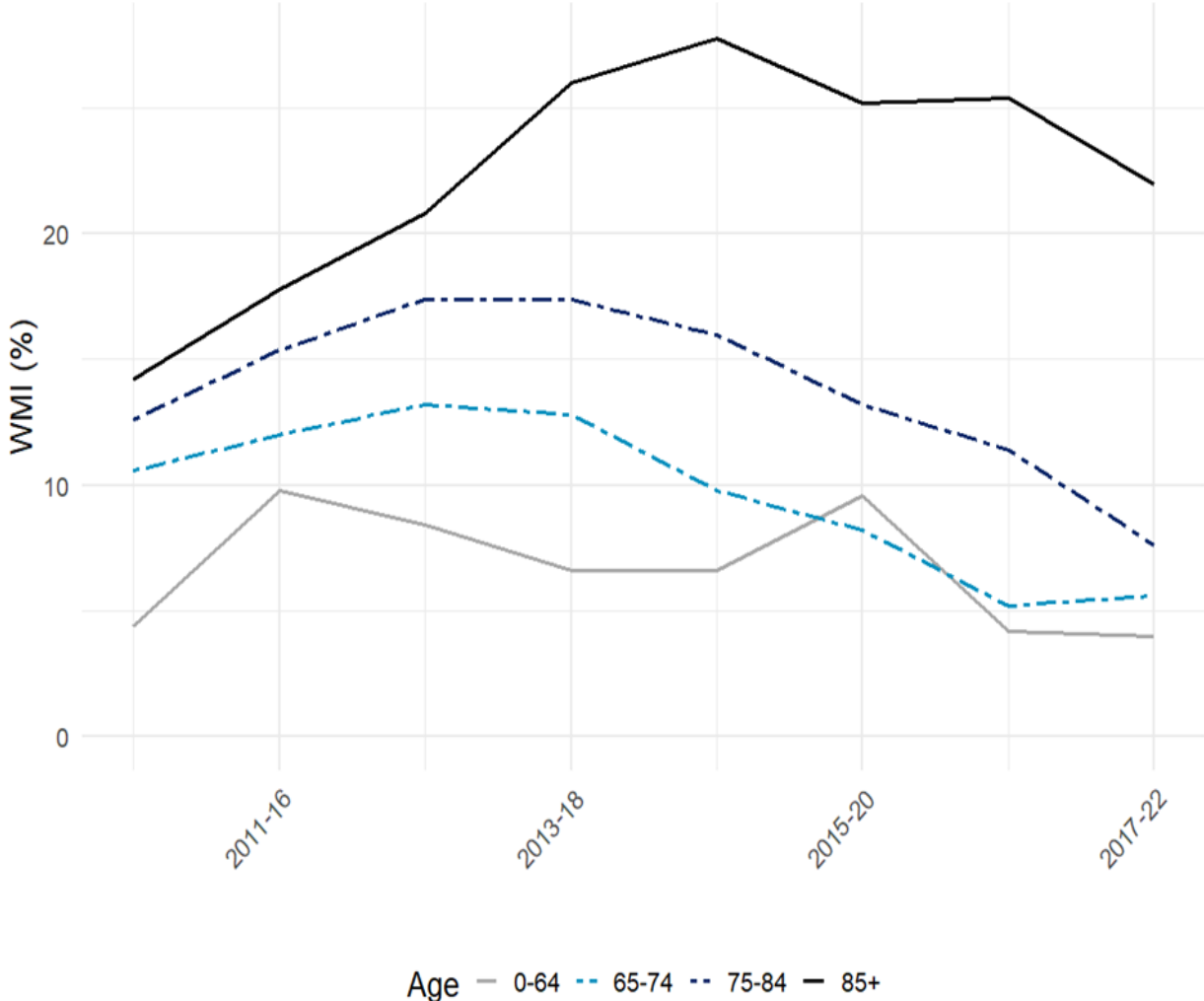
Bars represent WMI in each winter period. The dotted trend line is the five-year average for the preceding years.

The WMI is prone to wide annual variation which make interpretation of trends difficult: for this reason, a five-year average can be used. Winter mortality had shown a downward trend in Scotland when assessing these five-year averages until the 2010s¹². However, there were three consecutive winters with higher mortality (2015-18) reflecting extreme weather and

winters with high levels of influenza. There was then a return to lower levels of winter mortality. In NHS Highland, five-year averages were static from 2003-04 until 2014-15 when there was an increase mirroring the Scottish trend peaking in 2017-18 at 16.7% then declining back to 10.6% in 2020/21 which was similar to the pre-2013-14 levels (Figure 12).

As in Scotland, excess winter deaths are experienced more profoundly in older age groups in NHS Highland (Figure 13). The five-year average WMI from 2017-22 for those aged 85+ was 22 compared to 4 in those aged less than 64, 5.6 in 65-74 and 7.6 in 75-84. The five-year average WMI has fallen for all age groups except the 85+ since 2011-16. This reflects the vulnerability of the elderly to winter mortality.

Figure 13: Five-year average WMI by age-group in NHS Highland, 2010-15 to 2017-22



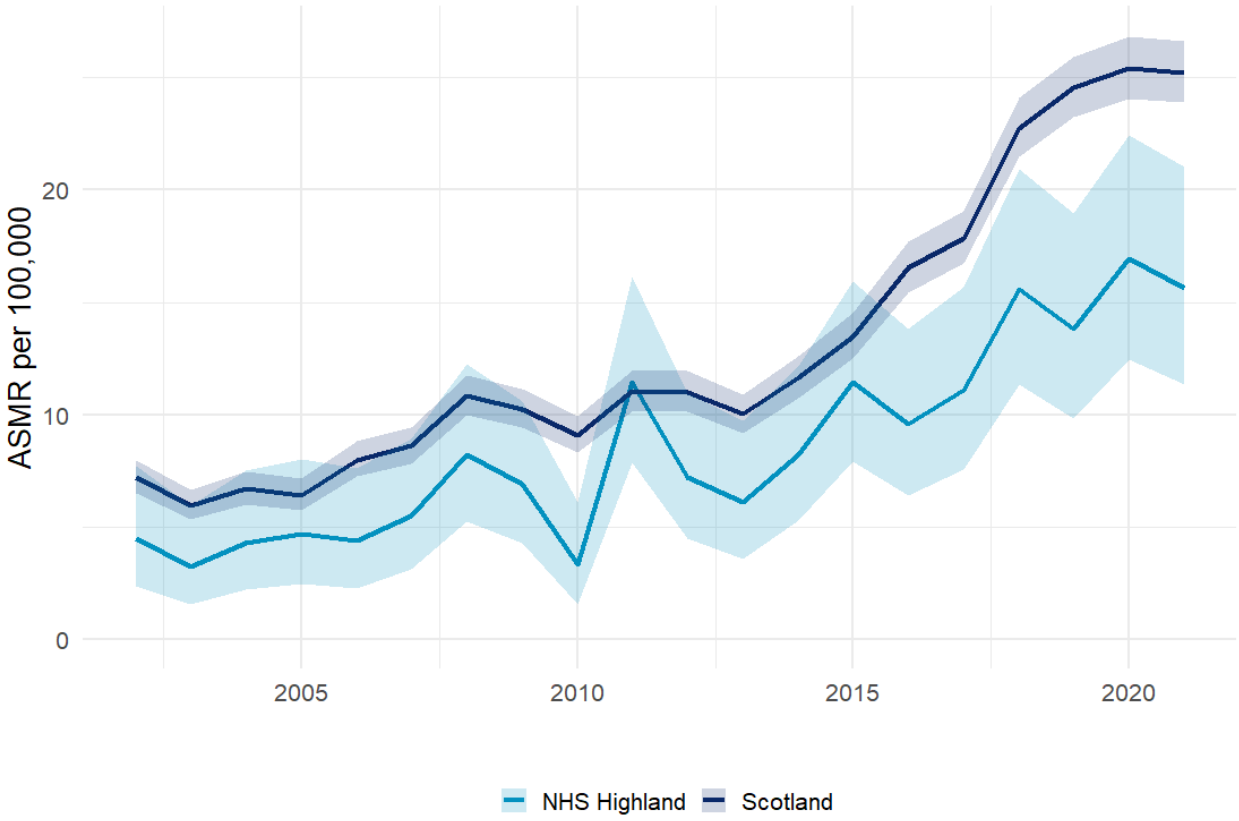
Source: National Records of Scotland³⁶

Drug-related deaths

DRDs in Scotland have been rising since the 1980s and steeply since 2012 resulting in the highest rate of DRDs of any European country³⁷. DRDs in NHS Highland, with an ASMR of 15.6 (11.3-21.0) are significantly lower than Scotland with 25.2 (23.9-26.6) however, the increasing trend is similar (Figure 14). There was a reduction in DRDs in both NHS Highland and Scotland in 2021 however, and whether this trend continues or is variation will require further monitoring. DRDs are more common in males than females in NHS Highland with an ASMR of 21.3 (14.3-30.4) and 7.8 (3.9-13.9) respectively in the period 2017-21.

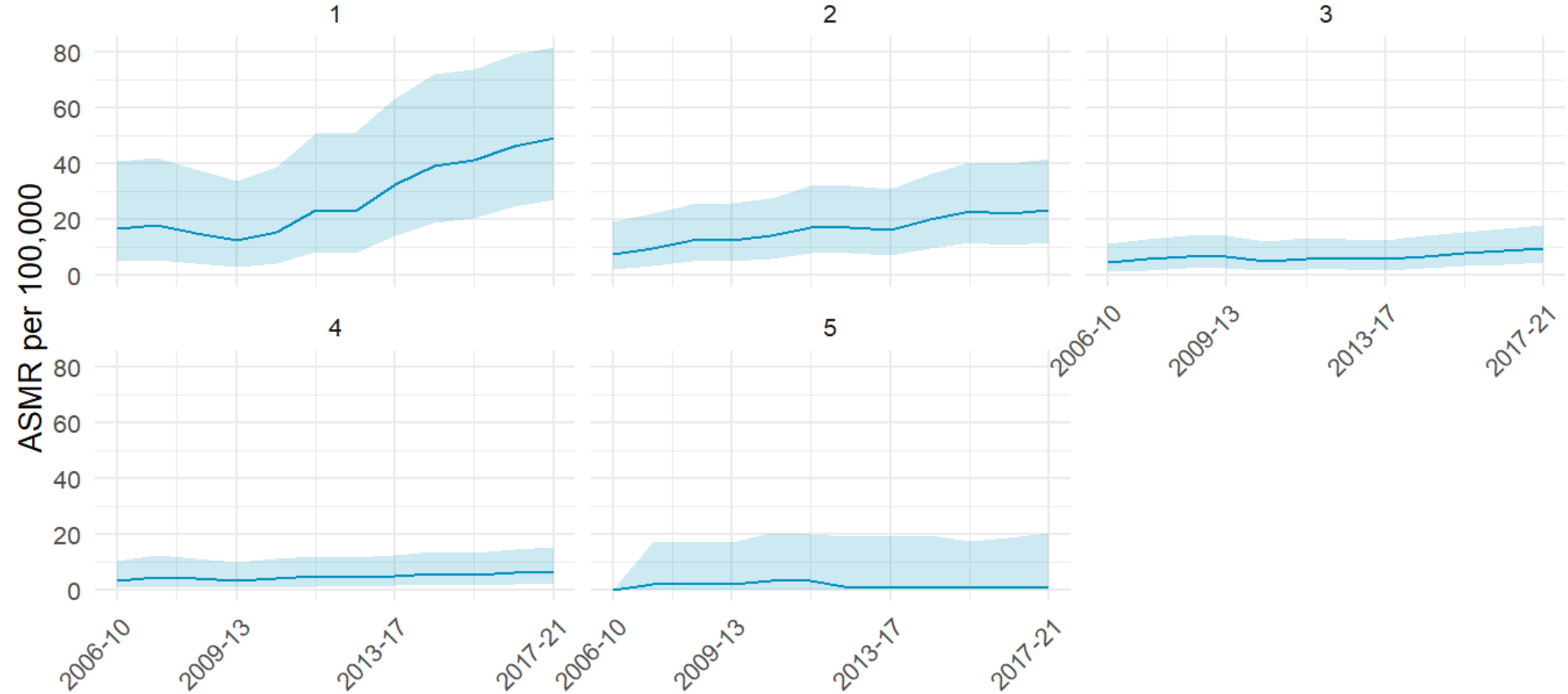
The burden of DRDs is felt more acutely in the most deprived sections of society (Figure 15). In quintiles 3-5 DRDs are low with little increase over the period 2006-21. DRDs have increased over the same period from 16.9 (5.1-40.9) to 49.3 (27.3-81.7) in quintile 1 and 7.8 (2.3-19.3) to 23.5 (11.8-41.7) in quintile 2. This reflects national data where DRDs have a higher incidence in more deprived areas^{8, 37, 38}.

Figure 14: Drug-related deaths in NHS Highland 2002 to 2021



Source: National Records of Scotland^{37, 39}

Figure 15: Drug-related deaths by SIMD quintile in NHS Highland, 2006-10 to 2017-21

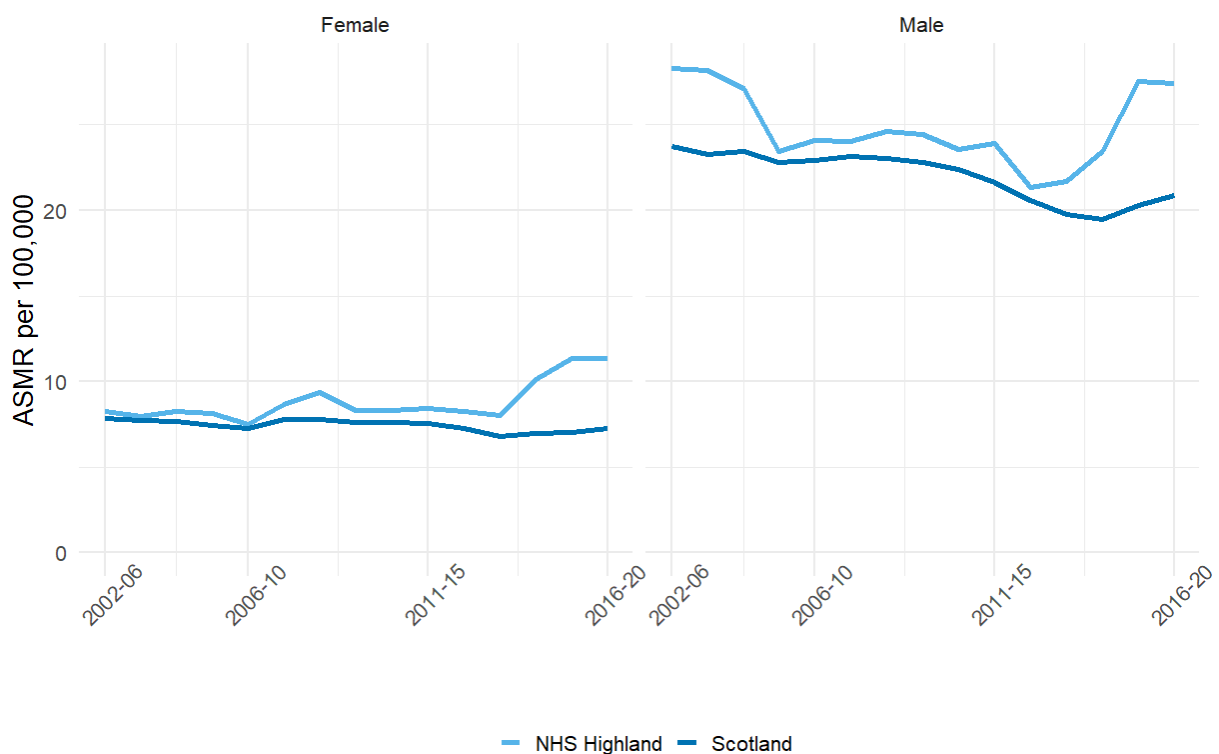


Source: Scottish Public Health Observatory³⁹

Suicide

Deaths by suicide had been decreasing in Scotland and NHS Highland until 2013-17 when they started to increase. In both NHS Highland and Scotland males have a higher ASMR for death by suicide than females. Deaths by suicide were higher in NHS Highland over the five-year period 2016-20 at 27.4 (19.7-37.1) for males and 11.3 (6.60-18.1) for females compared to 20.9 (19.2-22.7) and 7.26 (6.3-8.3) in Scotland (Figure 16). The high levels of death from suicide in NHS Highland are driven primarily by the high levels in the Highland Council area, the reasons for this remain unclear and are under further investigation⁴⁰.

Figure 16: Deaths by suicide in NHS Highland and Scotland, 2002-06 to 2016-20



Source: Scottish Public Health Observatory⁴¹

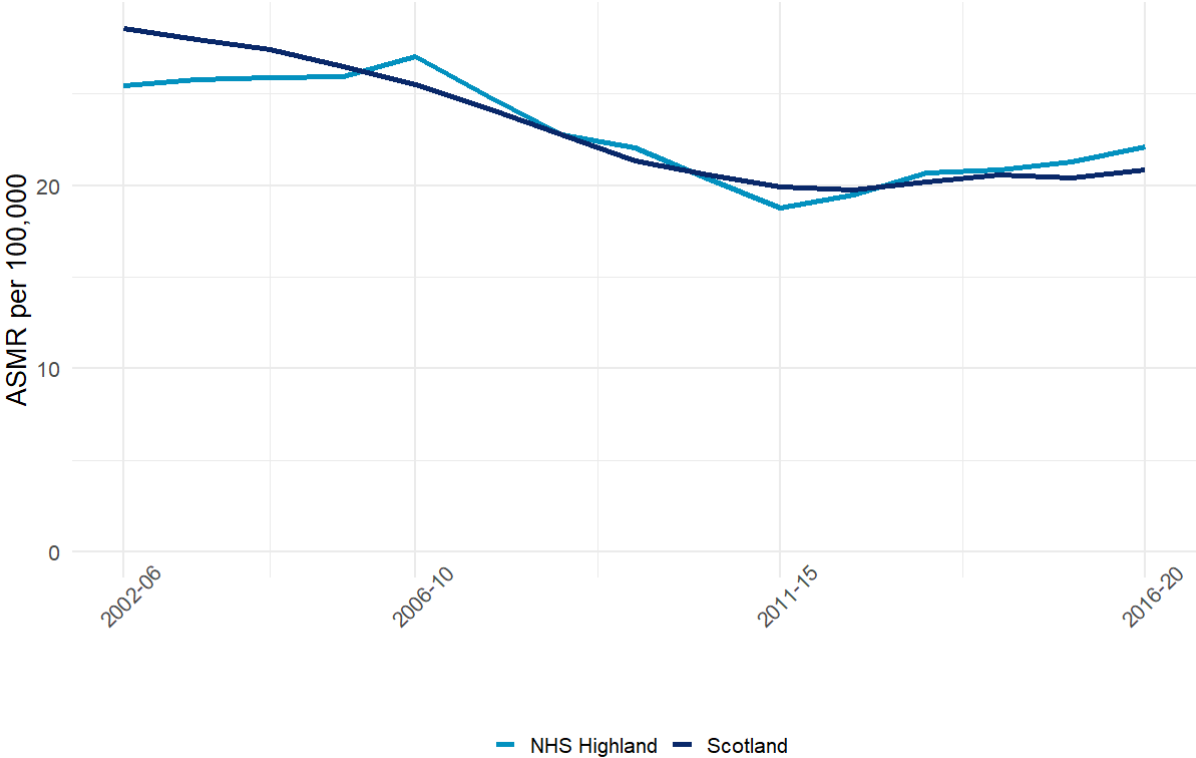
Alcohol-specific deaths

Alcohol specific deaths had been falling in both Scotland and NHS Highland prior to 2011-15 before increasing (Figure 17). In the period 2016-2021 the ASMR for NHS Highland was 22.1 (17.5-27.7) which is higher than Scotland at 20.8 (19.6-22.1) though this is not statistically significant.

As with DRDs, there is a social gradient in alcohol-specific deaths in NHS Highland (Figure 18). The most deprived quintile 1 has an ASMR for alcohol-specific deaths of 70.7 (42.6-110.3) compared with 7.3 (0.9-25.1) in quintile 5. In 2016-20 in NHS Highland, alcohol-

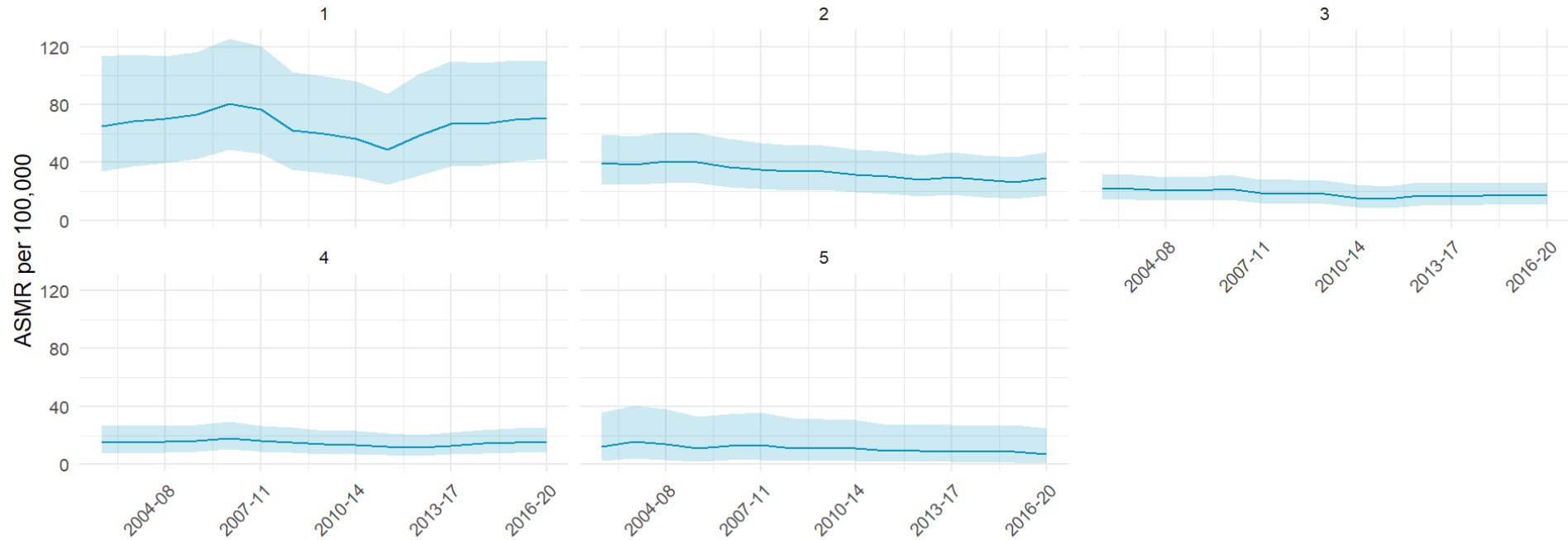
specific deaths were 101.9% higher in the most deprived quintile than the population average. There is evidence that those in higher income groups are more likely to consume over the recommended limits of alcohol than those with lower income. However, those in low-income groups who do exceed recommended limits tend to have a higher individual consumption of 44.3 units/week compared to 27.8 units/week in the higher income groups⁴².

Figure 17: Alcohol specific deaths in NHS Highland and Scotland, 2002-06 to 2016-20



Source: Scottish Public Health Observatory⁴³

Figure 18: Alcohol-specific deaths by SIMD quintile in NHS Highland, 2002-06 to 2016-20



Source: Scottish Public Health Observatory⁴³

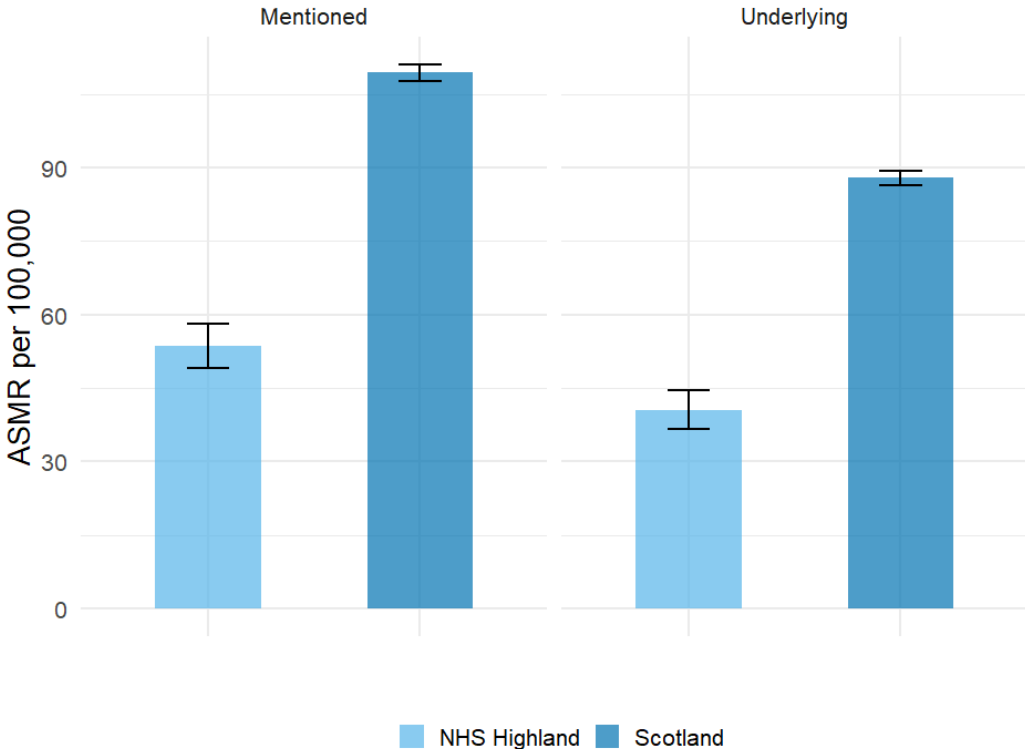
COVID-19

The SARS-CoV-2 virus which causes the illness COVID-19 emerged in China in 2019. The first registered death from COVID-19 occurred in NHS Highland in the week beginning 16th March 2020⁴⁴ and in 2021 it was the fifth most common cause of death in NHS Highland³⁰.

An important consideration when measuring COVID-19 mortality is that the true values may be higher as a result of under-reporting of deaths to COVID-19 due to limited testing capacity at the beginning of the pandemic.

NHS Highland has experienced less direct impact than Scotland from COVID-19 (Figure 19), if measured in terms of death where COVID-19 was the underlying cause, with an ASMR of 40.6 (36.7-44.5) less than half that of Scotland 87.9 (86.4-89.4).

Figure 19: COVID-19 mortality in NHS Highland and Scotland, 05/01/2020 to 27/11/2022



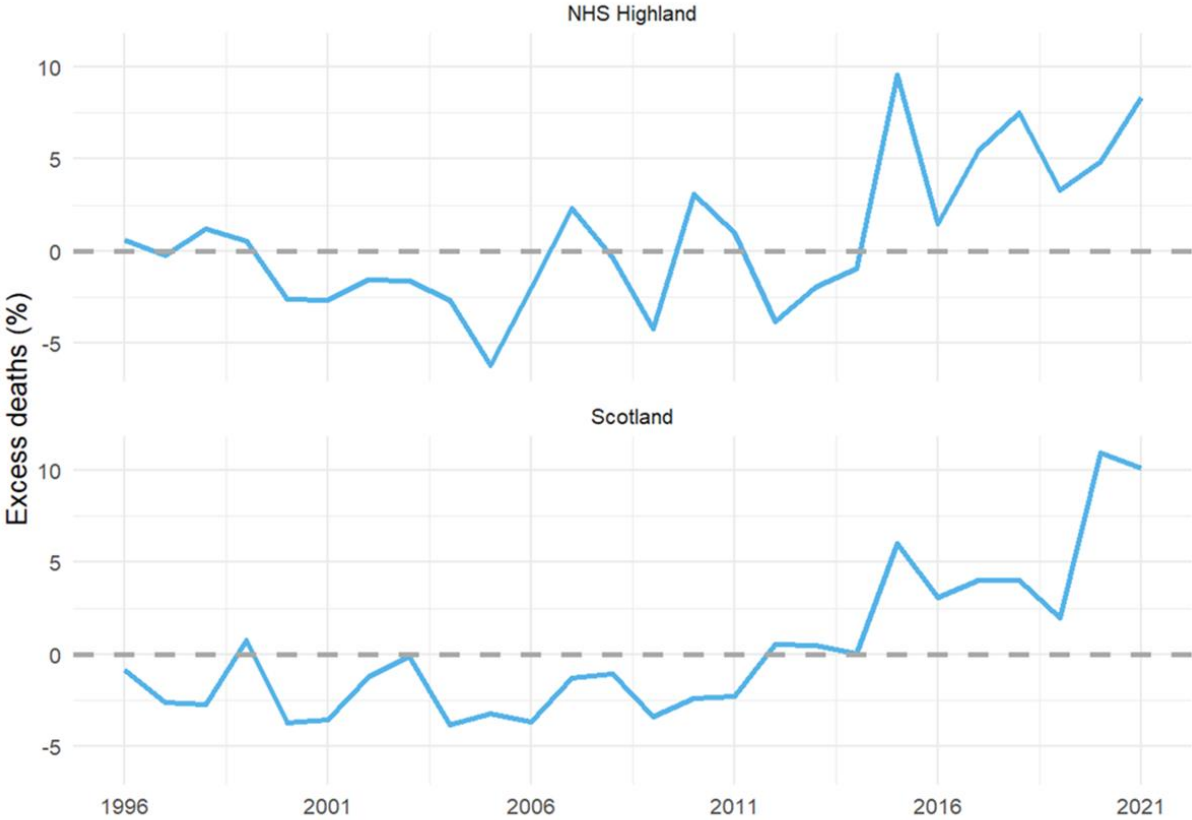
Source: National Records of Scotland⁴⁵

Split by whether COVID-19 was the underlying cause of death or mentioned on death certification.

The indirect effects may be felt equally in NHS Highland to the rest of Scotland. The suspension of preventive and non-emergency care as well as the social upheaval may have indirect health impacts in the future as people sought care later and primary prevention was deferred. From 5/1/2020 to 27/11/2022 NHS Highland has seen 846 excess deaths (8%) compared to the 2015-19 weekly averages: this figure was 9.9% in Scotland during the same

period⁴⁶. COVID-19 deaths alone cannot account for this excess and may reflect the broader trends in stalled mortality. The rise in excess deaths does predate the COVID-19 pandemic; excess deaths have been rising since 2015 (Figure 20) and other causes for these excess deaths require further investigation.

Figure 20: Excess deaths in NHS Highland Scotland, 1996 to 2021



Source: National Records of Scotland⁴⁷

Excess deaths as a percentage compared to average of the preceding five year period. Years 2020 and 2021 are based on the 2015-19 average.

Discussion

Mortality in NHS Highland compares well when measured against Scotland in most respects. This must be interpreted cautiously as Scotland has the highest mortality in Western Europe and with respect to England, NHS Highland has higher mortality and lower life expectancy. This demonstrates the importance of the comparator population used.

Despite mortality being lower in NHS Highland than Scotland, the trends are similar with stagnating life expectancy and mortality since the early 2010s. Since 2020 there has been an increase in mortality and a decrease in life expectancy in the context of the COVID-19 pandemic which has resulted in direct and indirect harm. The excess deaths since 2020 may reflect mortality displacement, in which case a period of lower mortality would be expected in the coming years. Whether these trends will improve with the resolution of the pandemic requires ongoing surveillance.

The effect of deprivation can be seen across many of the measures and strengthens the argument that austerity and its impact on the most economically vulnerable in society are being felt acutely. This disparity may be increased with the effects of the cost-of-living crisis and potential future austerity.

Strengths of this report are the use of reliable sources such as NRS and ONS data.

Limitations of this report are that full data is not yet available for 2022 and deprivation in rural areas may not be captured adequately by the measures used.

Recommendations

In NHS Highland, those living in deprived areas are contributing more to stalled mortality and life expectancy than the least deprived areas. A preventative approach which addresses inequalities and the needs of these communities is paramount.

Continued action is required on DRDs and alcohol-specific deaths as well as further research and action on deaths by suicide in NHS Highland.

Ongoing surveillance, research and reporting of life expectancy, mortality and measures of population health should be developed to monitor and respond to changing trends in NHS Highland.

Glossary

Age-standardised mortality rate (ASMR)	A weighted average of age-specific mortality rates when age-specific rates are applied to a standard population.
Avoidable mortality	Deaths due to preventable or treatable causes in those aged under 75.
Data zone	Small geographical areas containing around 500-1000 people, based on the 2011 census.
Excess deaths	Deaths in a period of time compared to a historical average.
Intermediate zone	Intermediate zones contain around 2500-6000 people, based on the 2011 census.
Life expectancy	The average number of years an individual could expect to live if they were exposed to the age-specific mortality rates of a given area for the rest of their life.
Mortality displacement	The phenomenon where deaths occur earlier than they would have otherwise. Resulting in a period of higher then lower than average mortality. These may be caused by external events such as extreme weather, famine, epidemics or pandemics.
Premature mortality	Deaths which occur before the age of 75
Preventable mortality	Deaths which can be prevented by primary care/prevention and public health interventions.
Relative inequality index (RII)	The relative difference in a statistic between the most deprived and population average.
Scottish index of multiple deprivation (SIMD)	A tool for measuring deprivation of a data or intermediate zone across seven domains: Income, employment, health, education, access to services, crime and housing.
Treatable mortality	Deaths which could be prevented by timely and appropriate medical intervention.
Winter mortality index (WMI)	The number of excess deaths in a four-month winter period compared to the average deaths of the preceding and following four-month periods. Can be expressed in absolute or relative terms.

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