



Resetting the course for population health

Evidence and recommendations to address
stalled mortality improvements in Scotland
and the rest of the UK.

May 2022



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A note on terminology

For readers unaware of different metrics of population health, it is important to note that life expectancy is not (as it is sometimes misreported to be) a measure of the average lifespan of someone born today. Rather, period life expectancy at birth is a measure of the average number of years a newborn is expected to live if current mortality rates continue to apply.¹ It is calculated from exactly the same data that are used to calculate age-standardised mortality rates and is simply a different (and arguably more intuitive) way of showing the same information. In this report both life expectancy and age-standardised mortality rates are used as summary measures of population mortality.

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Summary

Background

Mortality rates, and related indicators such as life expectancy, are important markers of the overall health of a population. This report summarises the nature and causes of the deeply concerning changes to these indicators that have been seen in Scotland, and across the UK, since around 2012. While the focus is on Scotland and the UK nations, relevant data and evidence from around the world have been used where appropriate.

Trends in mortality

With a few notable exceptions (e.g. during periods of war or pandemic, or in particular circumstances such as in the former USSR in the 1990s) mortality rates in high-income countries have improved for more than a century. However, around 2012 these improvements stalled in many countries, including all the UK nations. The stalling was seen for males and females, across almost all age groups, and for almost all causes of death. Mortality rates for people living in the most deprived areas increased, and as a consequence inequalities rapidly widened. These stalled trends predate the COVID-19 pandemic, but have been exacerbated by it.

Suggested factors in the change in trends, and evidence for these

Several hypotheses have been suggested as possible contributors to the stalled mortality trends: reduced improvements in cardiovascular disease mortality; increased drug-related deaths; increased deaths due to dementia and Alzheimer's disease; increased deaths due to influenza; increased prevalence of obesity; demographic factors; UK Government economic 'austerity' policies (implemented as cuts to public spending including social security and important services); and increased deaths due to weather and temperature extremes.

For some of these hypotheses there is little evidence that they are contributing causes. For several others there are identifiable inter-relationships, and it is possible to use the evidence to position them on a causal pathway.

Austerity is evidenced as making an important and substantial causal contribution, and is likely to underpin a number of the other observed changes. Obesity is also likely to be making some contribution, although this is unlikely to be large and is due to the increase in obesity during the 1990s and up to 2010. In contrast, influenza, weather/temperature, and all of the demographic factors (population ageing, age-standardisation issues, population estimates and migration, so-called 'tempo effects' and mortality shifts over time, limits to life expectancy, and cohort effects) are unlikely to be making any meaningful, causal, contribution to the stalled trends. The specific causes of death that contribute most to the overall stalling are reduced improvements in cardiovascular mortality and increased drug-related deaths. While there are some actions which can moderate these specific causes of mortality, substantial changes in trends will depend on also addressing the linked underlying 'causes of the causes'.

Recommendations

A series of recommendations have been developed, based on evidence of what would be the most effective responses to address the identified economic causes of stalled mortality trends. These include proposals made by other organisations and experts. The recommendations are arranged in terms of different levels of governance (at UK Government level, Scottish Government level, and at local government/health board level). More detail on the rationale for the recommendations is provided in Section 6.

Macroeconomic policy

At UK level

1. Design fiscal policy to avoid austerity approaches which limit public spending, especially during periods of economic downturn.

At all levels

2. Seek opportunities to change the economic structures that lead to large wealth and income inequalities by introducing appropriate policies to reverse or mitigate the processes of rent extraction (e.g. rent controls and public/community ownership); capital gains (e.g. land value taxation); profit (e.g. plural ownership of industry); monopoly (e.g. anti-trust regulations) and speculation (e.g. through financial regulation); and to diversify economic ownership (e.g. public ownership and co-operatives) as with Community Wealth Building.

Social security

At UK level

3. Increase all benefits and tax credits in line with inflation every year, and put in place a one-off increase now to compensate for the loss of real income since 2010. The reinstatement of the £20 per week uplift in Universal Credit that was in place during the early part of the COVID-19 pandemic would be a contribution towards this.
4. Reduce welfare conditionality, starting with the increases in conditionality introduced since 2010.
5. Ensure that access to the social security system across the UK is seen as a right, and that citizens using the system are treated with dignity and respect.

At Scottish level

6. Use fiscal powers to top up reserved benefits and reverse UK cuts.
7. Create new benefits and increase existing benefits to support those in low-income households. Specifically, increase the Scottish Child Payment to £40 per week to meet child poverty reduction targets.

At local level

8. Provide high-quality money advice and welfare rights services to ensure people receive all the benefits and other entitlements for which they are eligible.

Work

At UK level (and other levels where appropriate)

9. Improve the availability of 'good work' by increasing in-work benefits, improving employee control at work and minimising health and safety risks in the work environment.
10. Increase the statutory living wage to the Real Living Wage.
11. Provide 30 hours per week of funded, good-quality and flexible education and childcare for all children from age one to five.
12. Eradicate the restrictions on trade unions.

At Scottish level

13. Measure economic and social progress through health and wellbeing measures instead of Gross Domestic Product.

At local level

14. Use public spend to advance progressive employment practices, including good/fair work, and to create healthier working environments.
15. Maximise the potential of City and Regional Growth Deals to reduce inequality and improve health.
16. Implement the principles of inclusive economies to ensure that the economy is redesigned to achieve economic, social and health equity.

Taxation

At UK level

17. Address tax evasion and avoidance among individuals and corporations as a means of achieving fairer taxation across the UK.
18. Increase taxation of wealth, assets and corporate profits, reverse the concentration of asset ownership and reregulate the financial industry.

At UK and Scottish level

19. Introduce more progressive, and therefore fairer, income tax bands and rates to narrow income inequalities across society.

At Scottish level

20. Use fiscal powers to narrow inequalities by replacing Council Tax with a fairer alternative.

Public services

At UK and Scottish level

21. Increase public sector funding for preventative services, resist privatisation of clinical care and ensure proportionate universalism of service provision.
22. Reverse the reductions to social care funding and put in place an increase now to compensate for the loss of real income incurred since 2010.
23. Change drugs legislation to reduce drug harms as part of accepting the recommendations of the cross-party Westminster committee on drugs harms in Scotland.

At Scottish level

24. Increase funding for public services back to 2010 levels as a minimum, particularly for local government.
25. Implement a public-health approach to drugs services.

At local level

26. Design local services for the populations they serve, involving citizens in the design of services where possible.

Material needs

At UK and Scottish level

27. In addition to the actions above to increase social security, we also need to eliminate fuel poverty through action on housing insulation and heating.
28. Help prevent poverty by growing a social rented housing sector that is accessible, affordable and provides secure tenancies.

29. Extend the housing quality standard to the private rented and tied housing sectors, avoiding associated rental increases or reduced housing availability.
30. Eliminate food poverty by addressing the causes of poverty and implementing a human-rights based approach to food access.
31. Develop and commit to targets to reduce child poverty across the UK.

At Scottish level

32. Increase the provision of social housing in Scotland.

At a local level

33. Reduce the cost of public transport for those most in need.

Obesity

At all levels

34. Implement and evaluate an evidence-based whole-system obesity strategy which prioritises actions that addresses the commercial determinants of obesity and takes a structural approach.

Improved understanding

UK level

35. Facilitate linkage between Department for Work and Pensions (DWP), Her Majesty's Revenue and Customs (HMRC), NHS and mortality records to allow for the health and mortality impact of policy changes to be accurately evaluated.

At all levels

36. Commit to taking the necessary action to respond to the changes in life expectancy trends.
37. Public health leaders should advocate for action to reduce the health inequity that leads to stark inequalities in premature mortality.
38. Commit to a programme of ongoing monitoring and research in relation to the stalled trends (including for groups where there are limited data, such as ethnic minorities), and to broaden understanding of the trends beyond high-income countries.
39. Improve and modernise the measurement of poverty.

Social recovery from COVID-19

At all levels

40. Incorporate and prioritise the actions in this document within the plans for social recovery from the COVID-19 pandemic.

Given the substantial loss of life both from the stalled mortality trends and the COVID-19 pandemic, urgent policy action is now required if we are to reset our course towards improving population health.

1. Background

Mortality rates, and related indicators such as life expectancy, are important markers of the overall health of a population. Using such indicators, we know a lot about how health in Scotland – and in other countries, including the different nations of the UK – has fared over time. We know that mortality rates increased (and life expectancy consequently decreased) in the last two years (2020 and 2021) because of the COVID-19 pandemic.^{2 3} However, we would expect them to return to pre-pandemic levels once we emerge from the current crisis. Indeed, it is those pre-pandemic trajectories for population health, and in particular changes that have occurred to them in the last decade, that are the principal focus of this report.

We also know that prior to the pandemic, Scotland's mortality rates were higher than in other Western European countries. This has been influenced by two related factors: a slower rate of improvement from the latter half of the twentieth century onwards (including, especially, from the start of the 1980s); and very wide inequalities in mortality, driven by correspondingly wide socioeconomic inequalities, the well understood 'fundamental causes' of health inequalities.^{4 5} Importantly, however, despite this slower rate of improvement over time, rates in Scotland had still been improving. And this is what we would expect: in high-income countries, mortality rates have fallen consistently over time as a result of improved living conditions, public health interventions (e.g. vaccination programmes), medical advances and a range of other factors.⁶ Indeed, in the hundred years or so before 2020, the only observed increases in UK mortality rates occurred at the time of the two world wars and the influenza pandemic of 1918–20.^{4 5 6 7 8}

However, a profound change in mortality rates has been observed across the whole of the UK since the early 2010s. Described in much more detail in section 3 of this report, there has been a stalling of improvement overall, accompanied by increasing death rates among large sections of the population living in more socioeconomically deprived areas.^{9 10 11} This is hugely worrying. Put simply, we should not see such trends in a wealthy society such as the UK.

These changes have also resulted in a dramatic widening of health inequalities across and within different parts of Scotland, England, Northern Ireland¹⁰ and

Wales¹² – inequalities that, apart from anything else, are hugely important context for understanding the scale of COVID-19 inequalities that have been much publicised and discussed recently.^{13 14} There is an urgent need, therefore, to understand the causes of these changes, and consequently what we need to do to reset our course towards improving population health. The aims of this report, therefore, are to do precisely that: to assess and synthesise all the evidence for these changing mortality and life expectancy trends across Scotland and the rest of the UK, and to propose solutions to address them.

The structure of the report is as follows: in Section 2 we briefly describe the methods employed in this research; in Section 3 we summarise the descriptive epidemiology that has been undertaken, including details of the timing and composition of the changes and international comparisons; in Section 4 we present a critical appraisal of the evidence pertaining to various hypotheses that have been put forward to explain the changes; in Section 5 we provide a synthesis of that evidence and identify the most likely causes of the trends and their inter-relationships; and in Section 6 we set out policy recommendations which we believe must be implemented if we are to address the issues highlighted here – and ultimately, therefore, prevent more unnecessary premature deaths occurring among us.

2. Methods

The general methodological approach for this report is described briefly below in relation to each of the substantive parts. More detailed methods for the individual contributing studies and analyses are provided as appropriate in the references, footnotes and appendix.

Descriptive epidemiology

The section on the descriptive epidemiology of the trends aims to provide the reader with an understanding of the nature of the problem we have identified and seek to explain. Using published data and analyses it covers the timing of the change in the mortality trends; the magnitude of the change; the specific causes of death and age-specific mortality rates contributing to the rate of change in life expectancy; and a description of the inequalities in the trends.^a The focus is on Scotland and the UK, but reference to data from other countries is included where it is available and

^a The best measures of mortality take into account the changing size of the population in each age group and for each sex over time, and are termed Age-Sex Standardised Mortality Rates (ASMRs). Life expectancy is a summary measure of the mortality rates that occur in any given population at a point in time. Life expectancy at birth changes more with an increase or decrease in deaths at younger ages than with the same number of deaths at older ages. Life expectancy can be a more accessible number for public understanding than a mortality rate which involves a numerator and denominator that are of an unfamiliar scale, especially when these numbers have been further adjusted through the standardisation process. However, it is also easily misunderstood, as it is not a prediction of the age at which people will die. For smaller populations (e.g. local authorities or for younger age groups), ASMRs and life expectancy measures can be more variable over time due to their being fewer deaths and the random variation that can occur in their timing. For smaller populations and for populations with a small number of deaths, it is therefore more appropriate to consider trends over time (or averages over several years), instead of the data for any single year.

relevant. It covers the period up to 2019 (where data are available) so as not to confuse the trends with the mortality effects of the COVID-19 pandemic.

Critical appraisal of causal evidence

Hypotheses identified from workshops,^b discussions and publications to explain the changed trends are described, and then the relevant published literature and data relevant to each hypothesis are summarised. Each hypothesis is then critically appraised in terms of its cogency in explaining a contribution to the stalled trends; the sources of bias in the underlying evidence; and remaining uncertainties. An assessment of the causal contribution is undertaken at the synthesis stage.

Synthesis

The framework for assessing causal contributions from observational evidence described by Gordis^c is applied to each hypothesis in turn.¹⁵ This involves assessment of the totality of the evidence for each hypothesis by four major and three other considerations. The major considerations are: evidence of a temporal relationship (i.e. cause before effect); biologic[al] plausibility; consistency (across data sources, methods, research groups, contexts); and the presence of alternative explanations (i.e. the likelihood of 'residual confounding'^d in the effect estimates).

^b A series of workshops involving colleagues from the national public health agencies of Scotland, England, Wales and Northern Ireland were held in 2018 and 2019 to discuss possible causes of the stalled mortality trends. See www.scotpho.org.uk/population-dynamics/recent-mortality-trends/mortality-trends-uk-wide-workshops

^c This is a causal inference framework developed for observational epidemiology. It builds upon the Bradford-Hill framework for assessing whether an association is causal or not.

^d Confounding is where a third factor, or set of factors, might explain the association between an exposure and outcome. Residual confounding is more specifically when there remains confounding after adjusting for measured confounding factors, from unmeasured variables.

The other considerations are: presence of a dose-response gradient (whereby a greater exposure leads to a greater effect); strength of association (where a larger effect size makes causality more likely); and cessation effects (where the reduction or cessation of an exposure is followed by a reduction or elimination of an observed effect). The hypotheses assessed to have evidence of a causal relationship to the stalled trends are then considered together for their fit into a single causal model with any uncertainties described.

Recommendations

The recommendations included in this report were developed following discussion of the evidence of the causes of the stalled trends, to identify opportunities for intervention. In addition, an online scoping search was carried out to identify existing relevant recommendations, the ideas in which were summarised and synthesised.⁷

^{8 16 17 18 19 20 21 22 23} The final recommendations echo what other organisations such as Oxfam, NHS Health Scotland, Joseph Rowntree Foundation and the Child Poverty Action Group have proposed would make a difference to the population's ability to lead long and healthy lives.

They were discussed, adapted and refined after presentation to the Scottish Mortality Special Interest Group and the Scottish Directors of Public Health Group (see www.scotphn.net). The recommendations were organised under seven headings:

- Macroeconomic policy
- Social security
- Work
- Taxation
- Public services
- Material needs
- Improved understanding

We have made recommendations for action at UK, Scottish and local level.

Following on from this, a further heading has been added to acknowledge the need for incorporation and prioritisation of these actions within the social recovery from the COVID-19 pandemic.

3. Descriptive epidemiology

Timing of the stalled trends across countries

Since at least the mid-nineteenth century, average mortality rates for the UK have tended to improve year on year with exceptions only for times of pandemic disease (e.g. influenza in 1918–1919) and war (1940–1945).^{4 5} However, around 2012–2014, the trends for all the UK nations changed,⁹ with little or no subsequent improvement up until 2020 and the COVID-19 pandemic (which led to a rise in mortality rates). The net result of this was that life expectancy by 2018 across the UK nations was substantially below what would have been expected had the improving trends seen between 1990 and 2011 continued (Figure 3.1). In Scotland this meant that life expectancy was 1.3 and 1.4 years less, for females and males respectively, than would have been expected had those previous trends continued.²⁴

Across many, but not all, high-income countries a similar change in trend was observed such that the rate of improvement in life expectancy and mortality was much less after around 2012–14 than beforehand (Figure 3.2). Up until 2012, all of the high-income countries with available data were gaining between 10 and 20 weeks of additional life expectancy each year. However, after 2012 the rate of improvement decreased in about half of those countries, with Iceland, the USA, England & Wales, Scotland, Germany and the Netherlands all displaying much slower rates of improvement. However, some other countries, such as Japan and South Korea, had more rapid rates of improvement than previously.^{11 e}

^e The exact timing and extent of the stalling varies depending on the length of the baseline period considered and the method of ascertaining a breakpoint, but consistent evidence of a stalling after 2010 is seen across many countries (see Minton et al, 2020).

Age, sex and certified causes of death

The stalled trends in life expectancy at birth across the UK are not the result of a change in mortality due to a particular age group, sex or specific certified cause of death.^{12 25 26 27} Using the data from Scotland as an example, it can be seen that the rate of improvement in mortality has slowed across almost every age group, for both females and males (Figure 3.3), with some age groups displaying increasing mortality after 2012–14 (in particular 30–49-year-old and 85+ year-old females; and 40–54-year-old, and 90+ year-old males). Furthermore, the rate of improvement in almost all certified causes of death has also slowed in the later time period for females and males (Figure 3.4), indicating that it is not a single specific cause of death which has been driving the stalled overall trends. Declines in deaths due to ischaemic heart disease were the largest contributor to improved life expectancy prior to the stalling, and although these have continued to improve, they have improved much more slowly and make the largest contribution to the stagnation. Drug-related deaths are notable because of their exponential rise over this time period and the large contribution to lost life expectancy they make because they impact on middle-aged adults.¹⁰ There have also been substantial rises in deaths certified as forms of dementia. The patterning of the stalling in Scotland is a very similar pattern to that in England & Wales, where the stalled trends are also due to changes across all ages, both sexes, and almost all causes of death.^{12 26 27}

Figure 3.1: Projected life expectancy trends based on the 1990–2011 baseline compared with actual life expectancy trends (UK nations, females and males, 2012–2018)²⁴

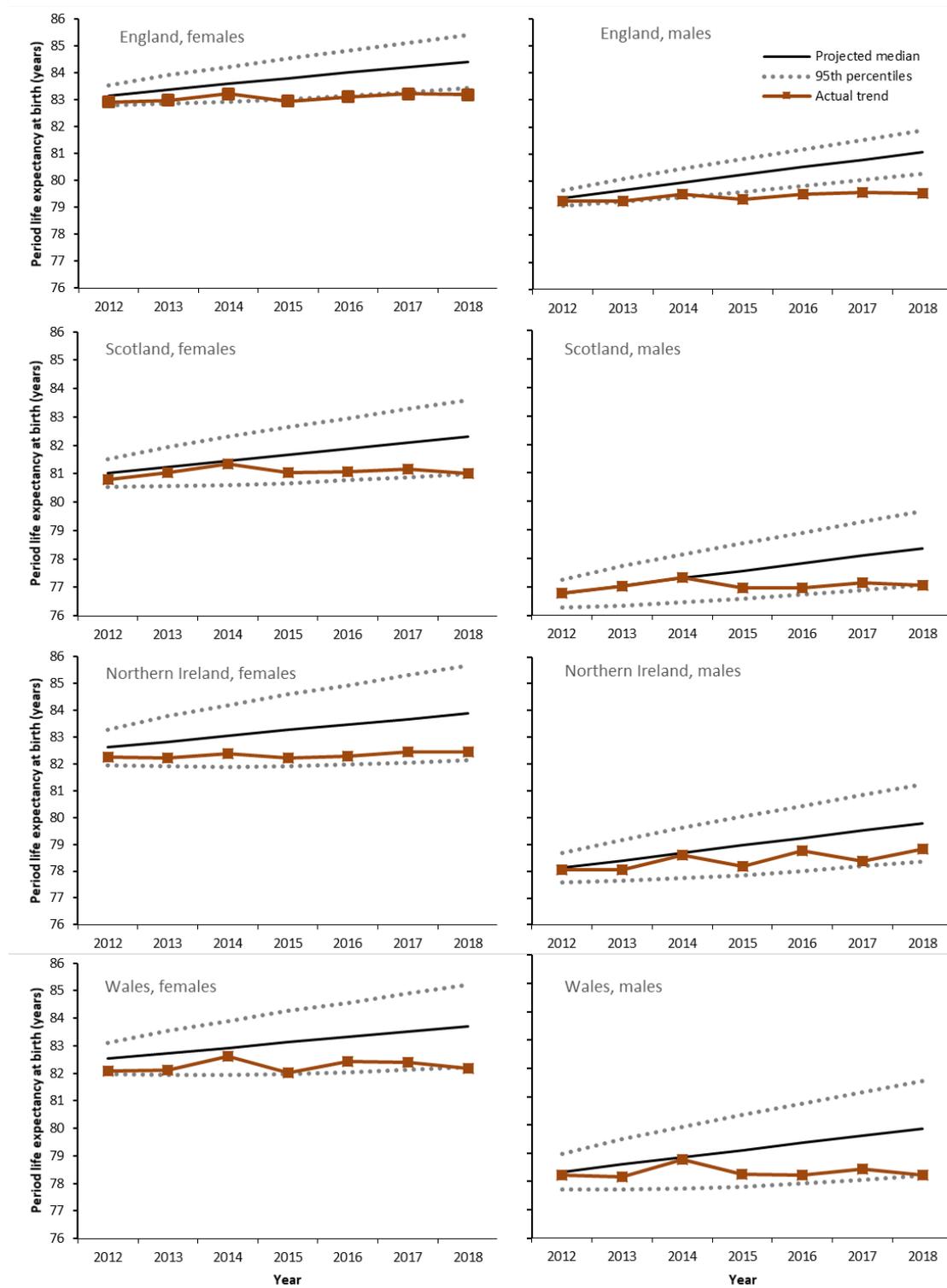


Figure 3.2: Annualised change in period life expectancy at birth for five-year periods (1992–2016) for high-income countries with data available via the Human Mortality Database, total population⁹

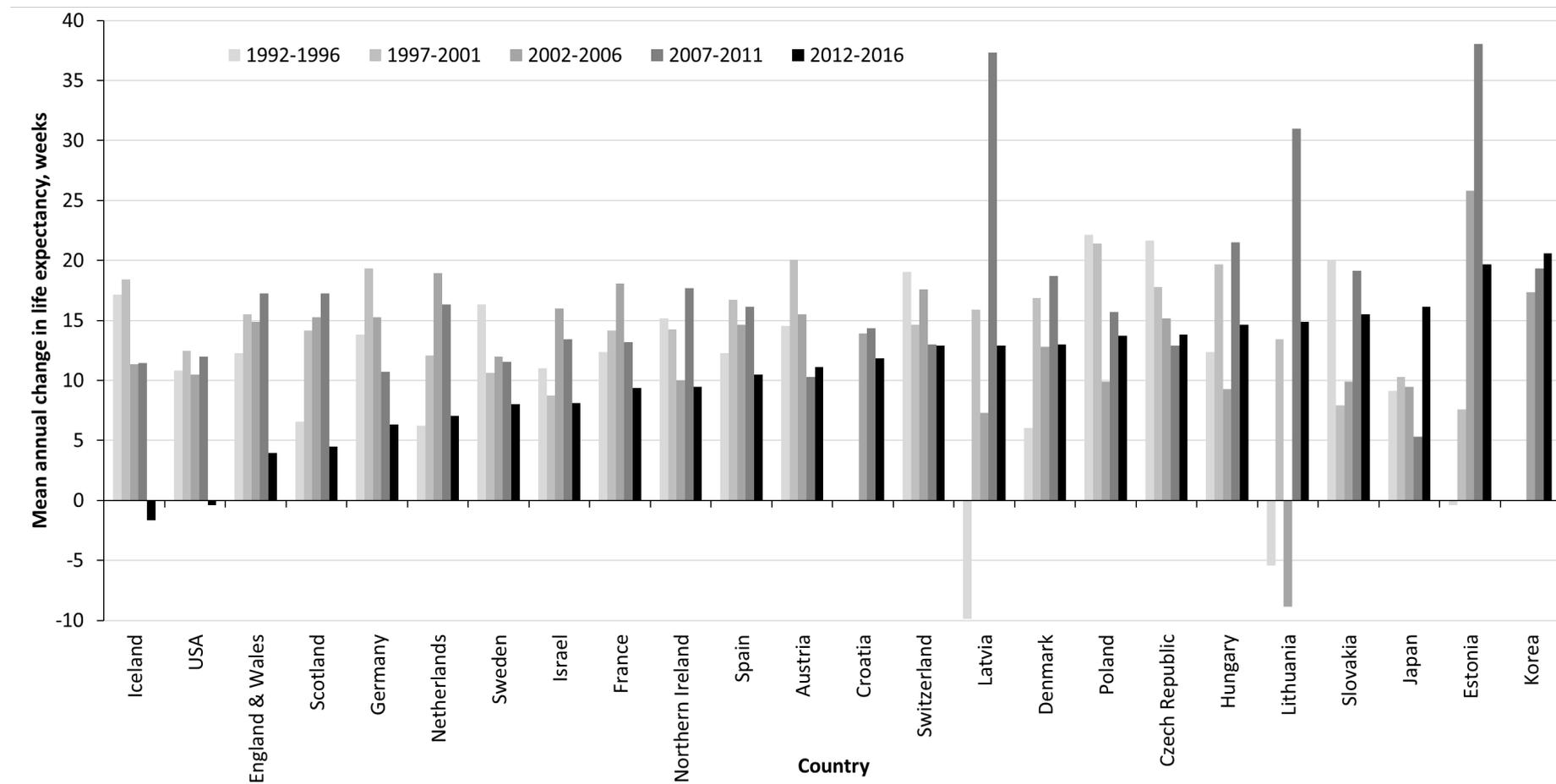


Figure 3.3: Contribution of changes in age-specific mortality to the change in life expectancy trends, Scotland, males and females²⁵

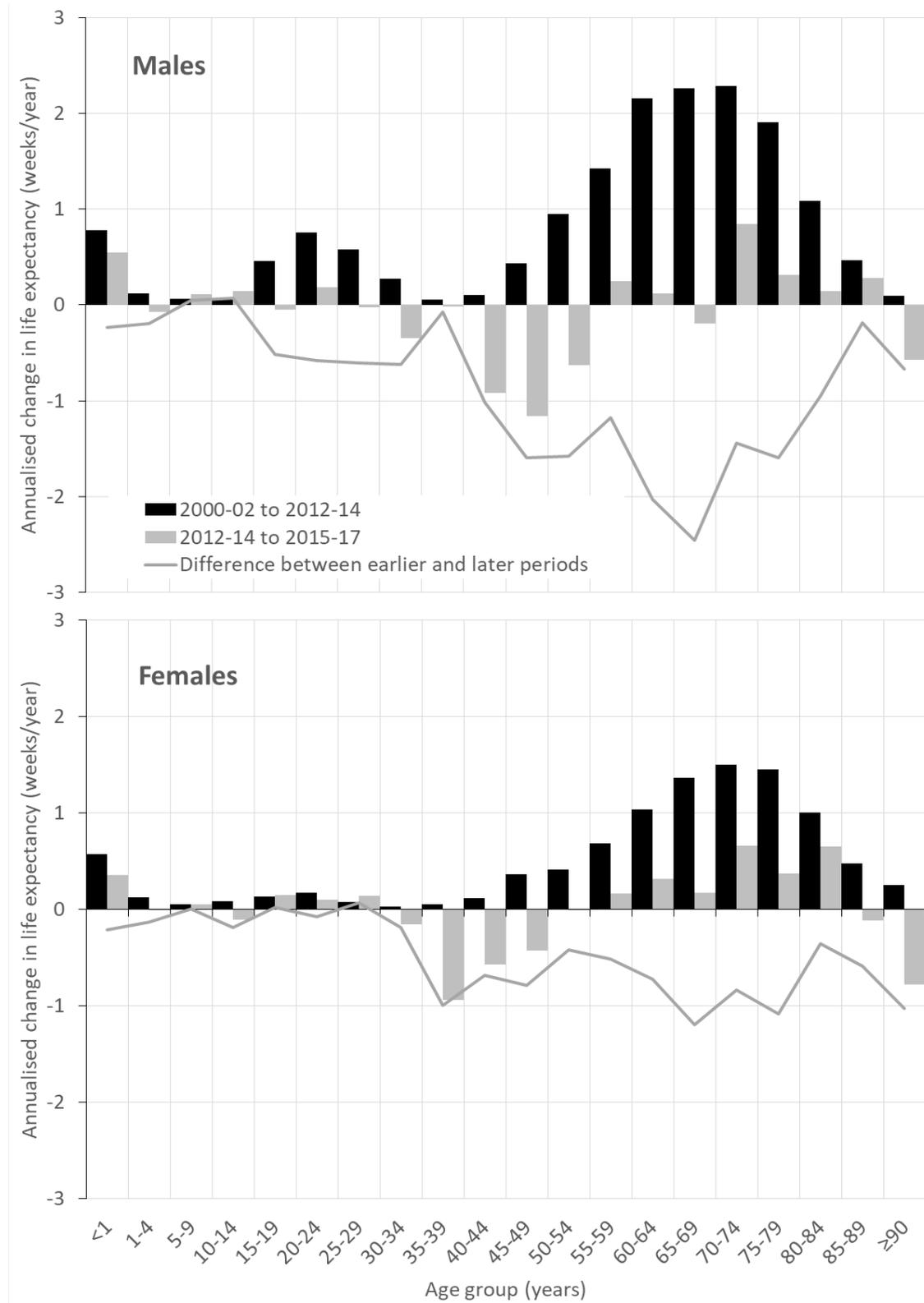
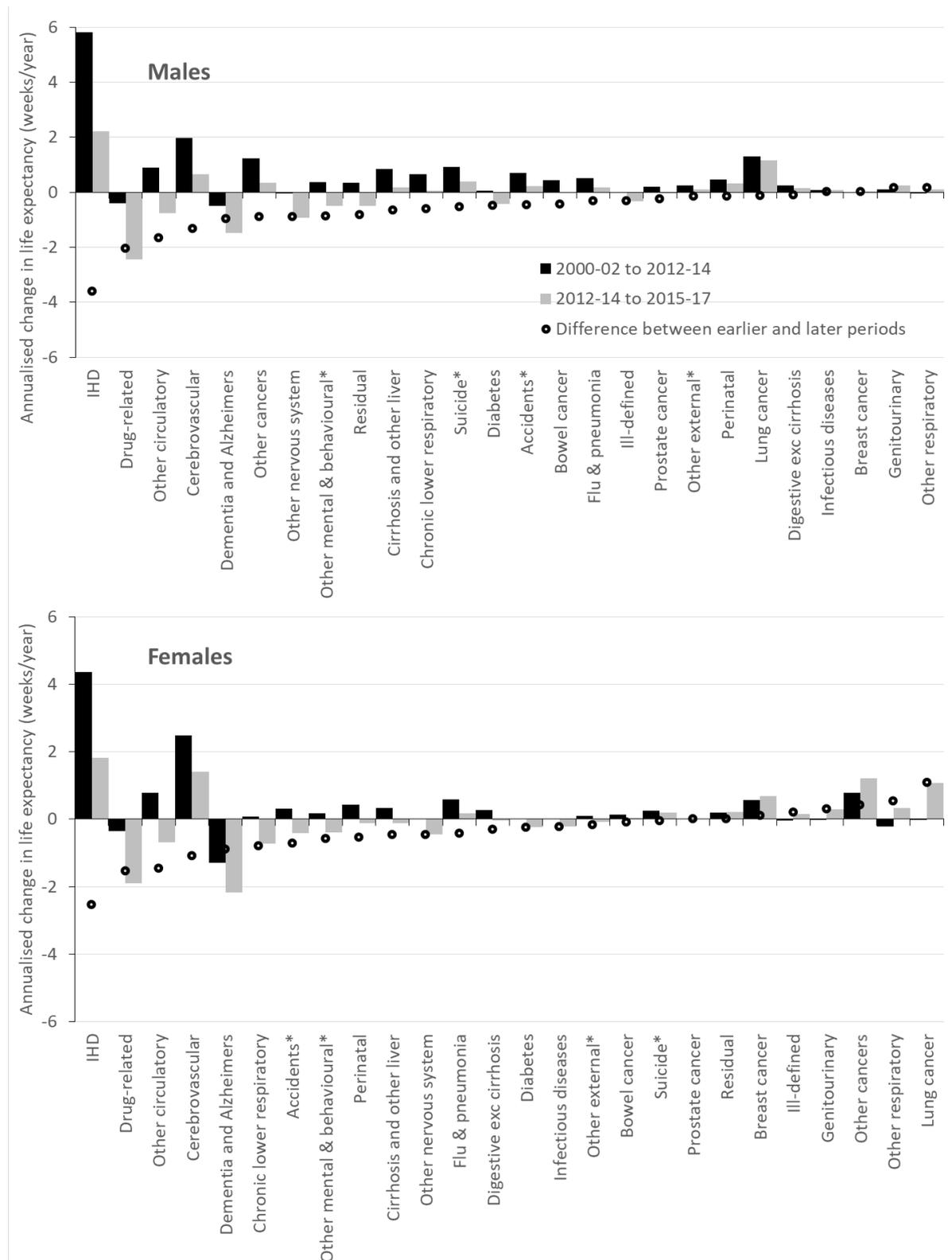


Figure 3.4: Contribution of changes in cause-specific mortality to the change in life expectancy trends, Scotland, males and females²⁵



Inequalities in the stalled trends

The stalled average trend in mortality masks a widening of inequalities. Although the rate of improvement in mortality has slowed across all socioeconomic groups, the trends have been worst for people living in the most deprived areas of Scotland,²⁸ England & Wales,^{12 29 30 31} and across UK cities,¹⁰ and on some measures in Northern Ireland.^{10 32} Figure 3.5 illustrates these trends using data for females in England, Northern Ireland and Scotland. The slowing in the average rate of improvement is evident after 2012 across all three nations, but the worsening mortality (particularly in England and Scotland) for the most deprived groups contrasts with the continuing improvement (albeit at a slower rate) in the least deprived areas.

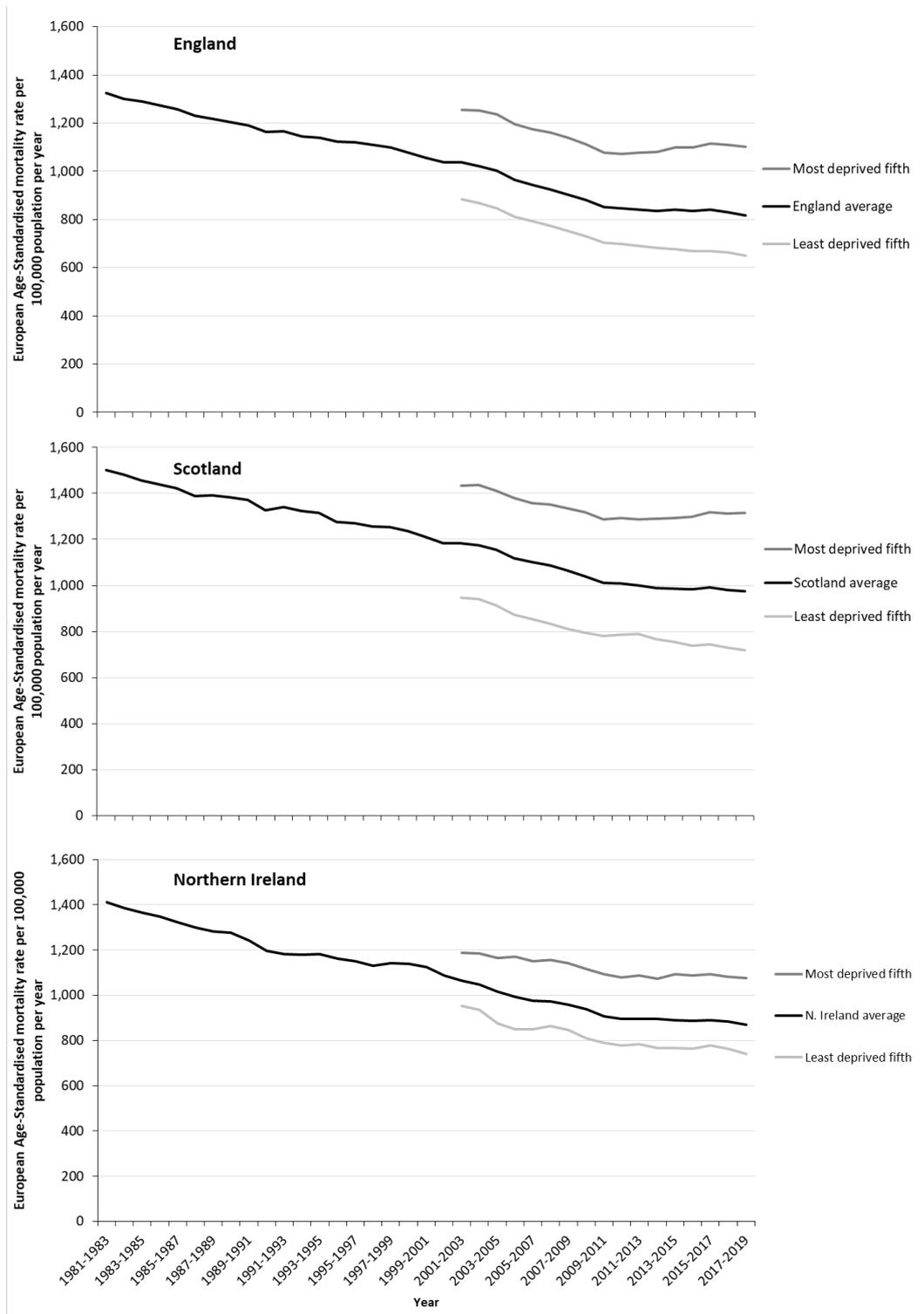
This report focuses on the pre-pandemic trends. Mortality inequalities were widening prior to the pandemic. However, these inequalities further worsened during the COVID-19 pandemic, with people living in the most deprived areas, working in less well rewarded jobs, and ethnic minorities all experiencing larger rises in mortality.^{33 34} Although COVID-19 has already compounded the stalled mortality trends with a further decline in life expectancy, the Years of Life Lost (YLL) to inequalities in mortality has been estimated to be substantially more than the initial worst-case scenarios for the pandemic in the UK.³⁵

Trends in other health outcomes

Mortality is a narrow and negative measure of health, but it is routinely available and important. Broader measures include self-rated health, mental health and wellbeing, and Healthy Life Expectancy (HLE, which combines self-rated health with mortality). Analyses of trends in HLE show that this has declined in Scotland since around 2011 as a combined result of the stalled trends in life expectancy and worsening trends for self-rated health.³⁶ Again, this is a trend mirrored for the UK overall, where there has been a marked decline in HLE at birth between 2013–15 and 2017–19.³⁷ The trends for mental health outcomes are less clear, but there is some evidence that trends

in mental health problems, particularly for younger adults, worsened between 2015 and 2019 in Scotland and England.^{38 39}

Figure 3.5: Inequalities in rolling three-year average European age-standardised mortality rates (by deprivation fifth), all ages and all causes, females



(Source: updated version of analysis published in Walsh et al, 2020).

No equivalent data for Wales was available.

4. Critical appraisal of causal evidence

This section of the report summarises and critically appraises the evidence for hypothesised causes of the stalled trends.

Decomposition approaches to analysing changes in life expectancy have facilitated identification of particular causes of death in which there have been changes contemporaneous with overall mortality stalling. The data available are drawn from death certificates, and the extraction from these of the disease process identified as the 'underlying' cause of death. It has been hypothesised that processes specific to some causes of death (cardiovascular disease, drug-related deaths, dementia and influenza) may have played an important role in the changed trends, and so these are considered first as separate categories. Information about certified causes of death, however, can only contribute to a partial understanding of trends. This is due to limitations of the data itself, as discussed in the sections below, but more importantly because they are limited in what they can tell us about the broader causes of death due to the social determinants of health. Any contribution from specific causes of death needs to be understood in terms of changes in incidence, fatality or age at death, and how these might have been altered by changes in exposure to other societal factors or broader causal processes (the so-called 'causes of the causes').⁴⁰

A number of population-level changes in determinants of health have been identified as being temporally associated with stalled mortality trends, and as such have been hypothesised as making a contribution. These include an increased prevalence of obesity, demographic changes, and austerity policies operating at national, sub-national and household level. Changes in weather and temperature have also been suggested as making a contribution.

These hypothesised causes are considered here in turn, recognising that there are likely to be substantial overlap and interaction between them. The potential interactions between identified plausible contributing causes are considered in Section 5.

4.1 Reduced improvements in cardiovascular disease mortality

Hypothesis

Analysis of cause-specific mortality trends and the certified causes of death contributing to changes in life expectancy has identified that there has been a slowing in improvement of cardiovascular disease deaths. Consequently, this change has been suggested as cause of the overall stalling in life expectancy gains. A number of hypotheses have, in turn, been proposed to explain these changes in cardiovascular deaths. These include reduced improvements in risk factors, such as smoking, and reduced gains from medical treatments. A worsening of other risk factors, such as obesity and diabetes, has also been suggested (the role of obesity is discussed in detail in Section 4.5 below).^{27 41}

Critical appraisal of the evidence

Ischaemic heart disease and stroke (both forms of cardiovascular disease) are among the most frequent causes of death in the UK. In 2018 ischaemic heart disease remained the most common cause of death for males in the UK, and the second most common cause for females.⁴² There were, however, substantial reductions in deaths due to these causes in the latter half of the twentieth, and early twenty-first centuries, across the UK.⁴³ In England age-standardised mortality rates due to these conditions reduced by around 60% between 2001 and 2018;⁴⁴ however, the rate of decline has not been continuous, slowing in the more recent period.²⁷

As shown in Section 3, decomposition analyses of life expectancy changes have identified reduced improvements in cardiovascular mortality as the single largest contributor to life expectancy changes in the periods before and after 2012. In Scotland, reductions in deaths due to ischaemic heart disease had a positive effect on the change in life expectancy between both 2000–02 to 2012–14 and 2012–14 to 2015–17, but the positive contribution in the latter

period was less than half that of the earlier period.²⁵ This is similar to the pattern and effect observed in England.²⁷ The average annual fall in age-standardised mortality due to both heart disease and stroke was substantially smaller in the period 2011–2016 than 2001–2006, for both males and females in England.^{25 27}

These analyses split the data for comparison before and after 2012, and show a stark difference between periods. However, there is some evidence that the beginning of stalled improvements in cardiovascular mortality predate these wider changes by around ten years. Stalled improvements in coronary artery disease mortality were found from the year 2000 in those aged under 55 years in England and Wales,⁴⁵ and in the same age groups in Scotland from 2003.⁴⁶ This means the sequence of events meets the criteria for a cause-and-effect temporal relationship. However, it may be argued that an ongoing background trend in stalled cardiovascular improvements is insufficient, alone, to explain the step-change in life expectancy trends around 2012.

There is evidence that this stalling of improvements in cardiovascular mortality does not represent the result of reaching a threshold of ‘maximum achievable gain’ for cardiovascular disease prevention or treatment in Scotland or the rest of the UK. International data show that while improvements in cardiovascular mortality have stalled in many high-income countries, a number are seeing continued improvements in age-standardised mortality rates which are lower than those in the UK, indicating that such stalling is not inevitable.⁴⁷ In addition, the marked socioeconomic inequalities in cardiovascular disease incidence and mortality within the UK show that further improvements are possible.^{48 49 50}

The relative contributions of risk factor reduction and disease treatment to past gains in cardiovascular mortality are debated, and depend to some extent on the metrics selected.⁵¹ However, changes in the occurrence of risk factors such as hypertension, diabetes, obesity and smoking are consistently found to be important, with reductions in these estimated to contribute around half of mortality improvements.^{52 53 54} In the UK there is evidence to suggest that the age-sex standardised incidence of non-fatal cardiovascular disease

fell between 2000 and 2014, with falling incidence in ischaemic heart disease in particular.^{55 56} However, the reductions appear concentrated in the earlier part of this period, and another study did not find any change in age-sex standardised incidence of coronary artery disease between 2006 and 2015.⁵⁷ This supports the view that gains from primary prevention of ischaemic heart disease stalled in this period.

Increases in obesity and diabetes prevalence have been suggested as important factors that could explain a stalling of improvements in cardiovascular disease occurrence and outcomes. Estimations using the 'IMPACT' model (which estimates the causes of changing trends in cardiovascular disease) find that increases in diabetes and obesity reduce the potential improvements in cardiovascular mortality that would otherwise be realised through reductions in blood pressure, cholesterol and tobacco smoking, by around 10–14%.⁴⁷ However, although there is a biologically and temporally plausible relationship between population levels of diabetes and obesity and stalled cardiovascular disease improvements, the relationship between these factors, and others, in contributing to the trends is not fully understood. The role of obesity as a risk factor for cardiovascular disease is just one mechanism by which obesity prevalence may influence mortality trends; its potential contribution across all-cause mortality is considered in Section 4.5.

In addition to the role of risk factor changes, improvements in treatment of cardiovascular disease are recognised to have an effect on mortality. Two studies exploring 30-day case fatality after acute myocardial infarction in the UK found that these had fallen in the decade up to 2010, with both changes in pharmaceutical management and increases in percutaneous coronary intervention identified as relevant.⁵⁸ This review did not find case fatality estimates for relevant conditions covering the period after 2010. Such estimates would allow clarification of the contribution of available treatments to cardiovascular survival in this period. Given the importance of timely, quality care and secondary prevention in explaining the improvements up to 2010, it is possible that any changes in healthcare access and equity, due to

austerity policies or COVID-19 pressures, could impact on cardiovascular mortality trends. However, we are not aware of any evidence which addresses this question directly.

Finally, in common with some of the other specific causes of death, it is known that trends in deaths identified as due to cardiovascular conditions are affected by changes in the rules used to allocate ICD-10 diagnostic codes to death certificates in 2011 and 2014. These changes, and their potential impact, are considered more fully in the section on dementia. The coding changes implemented in 2014 were estimated by the ONS to reduce the number of deaths allocated to the 'circulatory' category by 0.7%.⁵⁹

Evidence summary

Improvements in cardiovascular mortality contributed substantially to reductions in life expectancy in the latter half of the twentieth century. There is evidence of a levelling-off in the falling incidence of cardiovascular disease in the UK around 2006, and stalling improvements in cardiovascular mortality are noted for younger age groups from the early 2000s, and as such these changes slightly predate those in all-cause mortality. Positive trends in risk factors are noted to have played a substantial role in past declines in cardiovascular mortality, and there are plausible recent adverse trends in relevant risk factors which may contribute to reduced improvements. From this evidence, it is likely that stalled improvements in cardiovascular deaths are contributing to stalled life expectancy trends, and there are a number of relationships with other hypotheses. However, alone this hypothesis is insufficient to explain the timing and extent of the change observed around 2012 (not least because changes have been observed in many other causes of death). Changes in cardiovascular mortality are likely to also be due to common underlying drivers that are also impacting on those other causes.

4.2 Increase in drug-related deaths

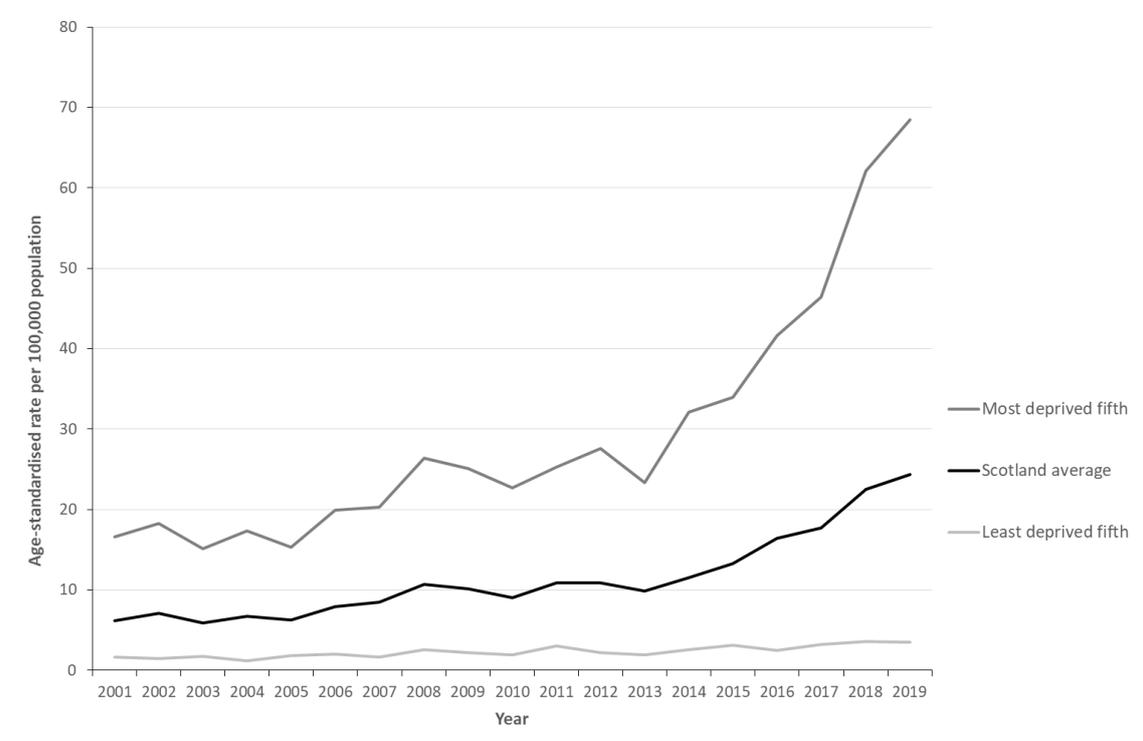
Hypothesis

In Scotland, the observed life expectancy/all-cause mortality changes have coincided with striking increases in the rate of drug-related deaths. It has therefore been hypothesised that changes in mortality associated with drugs misuse may have a causal role in the overall changed trends.⁶⁰

Critical appraisal of the evidence

There are a number of factors in support of this hypothesis. In the decomposition analyses discussed in Section 3, drug-related deaths were shown to have been the second-largest negative contributor to the change in life expectancy after 2012. There is clear evidence of an increase in drug-related deaths in Scotland over the relevant period, with death rates highest, and increasing to a greater degree, in the socioeconomically most deprived neighbourhoods (Figure 4.1).⁶¹ Although rates are considerably lower in other parts of the UK, they also increased over the same period in England & Wales and Northern Ireland for both males and females.^{10 62} Working-age adults are most affected, which impacts to a greater degree on overall measures such as life expectancy at birth than the same number of deaths at older ages. All-cause premature mortality rates (<65 years) have increased in Scotland (where drug deaths are highest), rather than stalled as they have in England & Wales. In Scotland, rates were increasing in the period prior to the observed mortality changes, and are therefore plausibly linked in terms of timing.

Figure 4.1: Drug-related deaths for Scotland overall, and for the most and least deprived fifths of the Scottish population: age-standardised rates, 2001 to 2019



(Source: National Records of Scotland, 2021)

However, there are a considerable number of arguments against this hypothesis as a sole or majority contributor to stalled mortality trends. First, although rates have increased elsewhere in the UK, death rates from this cause are more than 3.5 times higher in Scotland.⁶³ However, the magnitude of the changes to all-age, all-cause mortality and life expectancy in Scotland and in England & Wales has been similar (Figure 3.5).¹⁰

Second, although increases in drug-related deaths have clearly impacted on overall rates of premature all-cause mortality in Scotland, especially among males, changes in rates can be observed even when drug-related deaths are excluded. This is shown in Figures 4.2 and 4.3 which compare premature mortality trends (for Scotland and two selected cities), including and excluding

drug related deaths.^f ^g This confirms that other factors are also driving the increase in all-cause mortality rates at these ages.

Third, related to the above, decomposition analyses (referred to in the previous section of the report) have shown that the overall mortality/life expectancy changes have been observed for the majority of age groups (not just younger ages) and, importantly, for many different causes of deaths, not just drug-related.²⁵

Importantly, the existing evidence also suggests that the increase in drug-related deaths is likely to have been partly caused by the same underlying factors associated with the overall mortality changes. The drivers of the increase in deaths from this cause in Scotland are known to be multiple: alongside a ‘cohort effect’ (an ageing, particularly vulnerable, cohort of drug users), and increased affordability and availability of drugs, there is evidence of the effects of UK Government ‘austerity’ measures, which are discussed elsewhere in this part of the report.^{64 65 66 67} Their impact is seen as two-fold: reducing levels of important services such as addictions, housing, mental health, welfare rights and so on; and cutting individual incomes by reductions in social security payments, leading to further drug use as a ‘coping mechanism’. In terms of the latter, recent published research demonstrated an association between cuts to disability-related social security payments and increased drug-related deaths across all local authority areas in Great Britain.⁶⁸

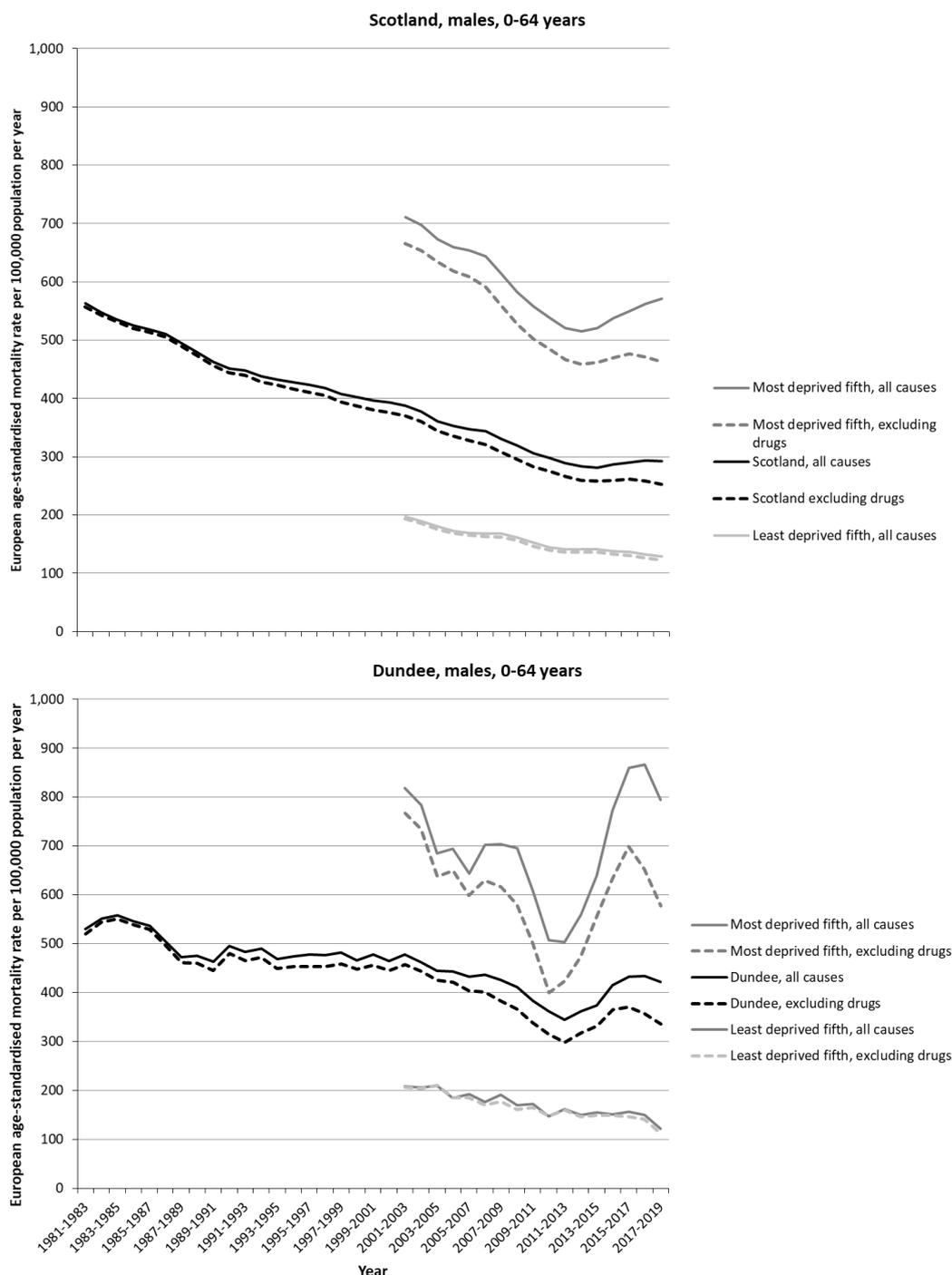
^f Note that Figure 4.3 employs a definition of drug-related deaths (‘drug-related poisonings’) which is different – and less accurate – to that used in official UK publications of drug-related mortality, including the NRS data shown in Figure 4.1.

^g Based on authors’ own analyses of National Records of Scotland population and mortality data, 2020.

Evidence summary

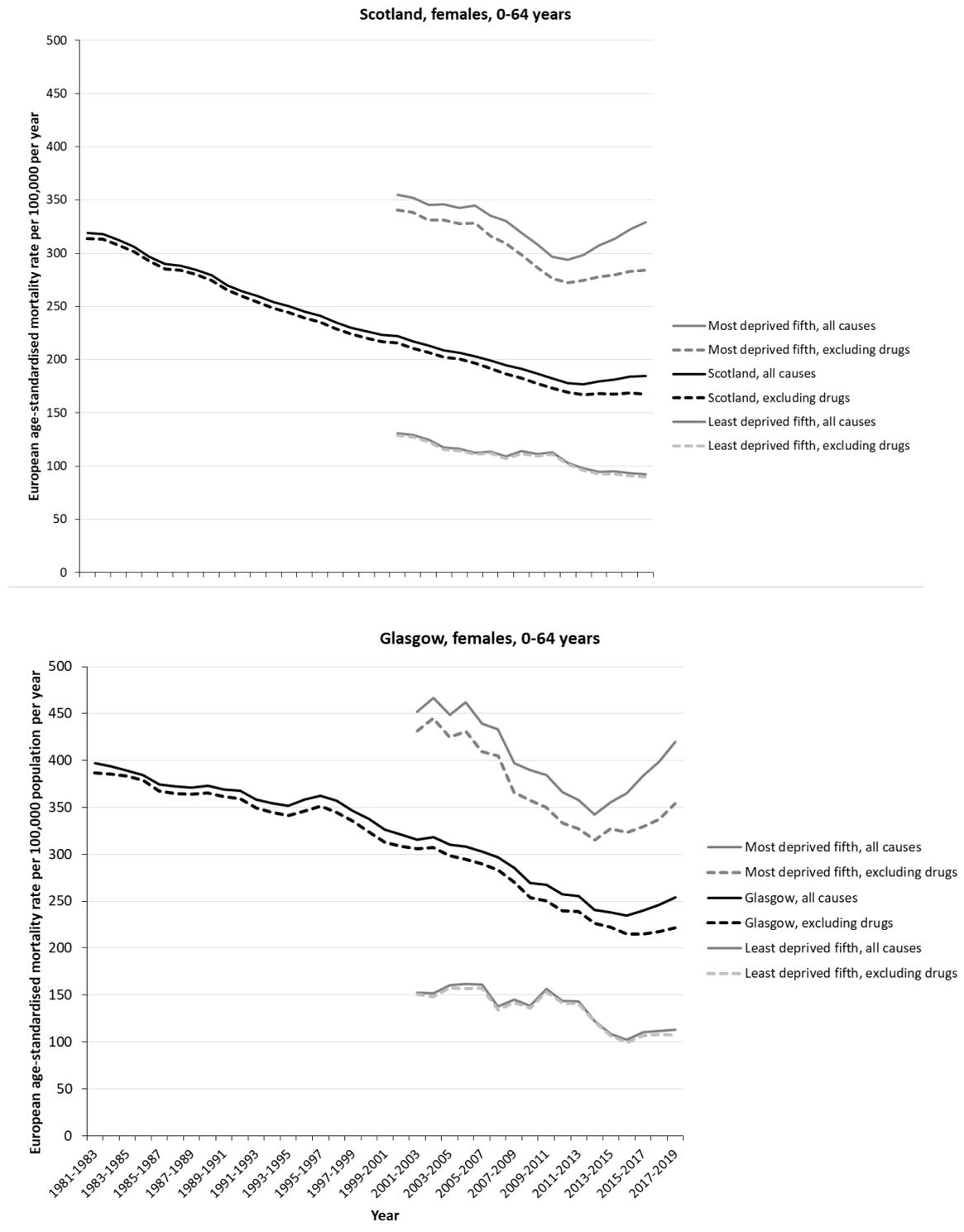
While increased rates of drug-related deaths are likely to have contributed to the overall stalled mortality trends, the evidence suggests that both are likely to share a common underlying cause, rather than the former causing the latter. Furthermore, the diverse age groups and causes of death associated with changes to overall (all age, all cause) mortality rates, alongside the fact that similar overall changes have been observed in England & Wales where drug-related death rates are notably lower, suggests that the overall contribution of drug-related deaths to the observed changes is in any case likely to be relatively small, with other factors more influential.

Figure 4.2: Age-standardised mortality rates, 0–64 years, males, Scotland and Dundee, overall and country/city-specific most and least deprived quintiles: all-causes (solid lines) and excluding drug-related poisonings (dotted lines)



Source: authors' analyses of National Records of Scotland (NRS) mortality and population data

Figure 4.3: Age-standardised mortality rates, 0–64 years, females, Scotland and Glasgow overall and country/city-specific most and least deprived quintiles: all-causes (solid lines) and excluding drug-related poisonings (dotted lines)



Source: authors' analyses of National Records of Scotland (NRS) mortality and population data

4.3 Increase in deaths due to dementia and Alzheimer's disease

Hypothesis

The number of deaths certificated as due to dementia and Alzheimer's disease (hereafter referred to as dementia) have increased substantially in recent years. The change in deaths attributed to dementia over the relevant period is large and so nearly all reviews of potential causes of stalled mortality improvements have considered their contribution. However, nearly all also conclude that the observed changes in dementia deaths are predominantly attributable to a range of reporting artefacts, rather than reflecting a substantial causal contributor.^{27 69 70 71 92 93} The appraisal below therefore sets out the various identified artefacts, as well as how any real increases in dementia deaths may fit with other causal explanations.

Critical appraisal of the evidence

In England & Wales the number of deaths due to dementia increased from 27,161 in 2002 to 66,424 in 2019, with two-thirds of the increase occurring after 2010. The changing age profile of the population has played a role, but the increase in the age-standardised rate from 65.3 to 115.1 per 100,000 population over the same period indicates that age alone is not responsible.⁷²

Life expectancy decomposition analyses quantified the scale of, and change in, the contribution of deaths due to dementia. In England, among both males and females, deaths due to dementia had a negative effect on the change in life expectancy between 2011 and 2016, and also in the preceding period of 2006 to 2011. In the latter period the negative contribution was by far the largest of any cause of death (-0.2 years for males, -0.3 years for females). However, as dementia deaths were already exerting a negative effect on life expectancy prior to 2011, their impact on the difference in life expectancy gain before and after this time was smaller than several other causes of death.²⁷

This is similar to the pattern and effect observed in Scotland (see Figure 3.4).²⁵

A number of factors are identified in the literature as playing a role in the apparent increase in dementia mortality. Several authors identify a role for national dementia strategies in increasing the diagnosis, and documentation of diagnosis, of dementia.⁹³ In England ‘Living well with dementia: A National Dementia Strategy’ was published in 2009 and ‘Scotland’s National Dementia Strategy’ followed in 2010, which both indicated a need for increased and earlier diagnosis.^{73 74} Whether driven by these strategies, particular incentives such as the GP Dementia Identification Scheme in England in 2014,⁷⁵ or other factors, there is clear evidence of an increase in recording of dementia diagnoses in primary care records in all UK countries between 2005 and 2015.^{76 77}

There is evidence that the increased primary care recording of dementia diagnoses has been temporally associated with increased inclusion of the diagnosis on the death certificates,⁷⁸ and also that those meeting standard criteria for a dementia diagnosis were nearly ten times more likely to have this included on their death certificate in 2013–16 than in 1989–92.⁷⁹ However, in contrast to these trends in certified deaths, evidence drawn from UK cohort studies indicates that age-specific incidence of dementia has actually been falling in recent years.^{80 81}

The other factor influencing diagnostic recording was the updates to the automated coding software used to apply International Classification of Disease 10 (ICD-10) diagnostic codes to the information recorded on death certificates. This took place in 2011 and 2014 in England, and in 2017 in Scotland.⁸² These changes affected both the allocation of codes to specific diagnoses (in particular for vascular dementia), and the sequences in which dementia or Alzheimer’s disease were accepted as ‘underlying causes’ of other conditions recorded on the certificate. The effect was to increase both the number of ‘dementia codes’ applied to certificates, and the proportion in which this was assigned as ‘underlying cause’. For dementia deaths (not including Alzheimer’s disease) these coding changes were estimated to

increase the mention of dementia on certificates by 1.58 times in 2011, and a further 1.07 times in 2014.⁸² The impact of these changes was considered in a 2018 review by Public Health England (PHE),²⁷ with the time series cause-specific data being adjusted for coding changes. On the basis of analyses of those adjusted data,^{83 84} coding changes accounted for around 40% of the increase in deaths due to dementia in England between 2001 and 2016.

The substantial changes in the recording of dementia mortality have been raised as a challenge for our ability to understand recent mortality data.^{41 69 70} If increased dementia deaths do not reflect increased incidence or mortality risk from these conditions, then it might be assumed that the same events would previously have been attributed to some other cause, such as cardiovascular disease or respiratory infection (thereby changing the contribution of those specific causes of death to the stalled trends). Of the reporting factors at play, those which are most closely temporally associated with the stalling of life expectancy improvements are the coding changes in 2011 and 2014 in England; however these occurred later in Scotland. These are also the most straightforward to adjust for, as has been done in some decomposition analyses.²⁷ The trend of increased diagnosis and documentation in general is longer standing, and predates stalled mortality trends by around ten years.

Changes in recording are not neutral – they have at least in part been driven by appropriately seeking to improve care for those with these important causes of morbidity and mortality. There is evidence that between 2001 and 2016 there has been an increase in prescribing of pharmaceutical treatments for dementia, and a reduction in prescribing of antipsychotic drugs for people with dementia, which are associated with worse outcomes.⁸⁵ It is therefore possible that the factors associated with increased ascertainment are also associated with changes in treatment, care and survival.

Evidence summary

Increases in age-standardised mortality rates for dementia over the past 20 years mean that deaths due to this cause have had a negative impact on life expectancy. This predates the stalling of mortality improvements under review here. There is good evidence that changes in diagnosis, documentation and coding of dementia in health records and death certificates are responsible for the substantial changes in mortality rates that have been observed. There is also evidence that age-specific incidence of dementia is not increasing.

Dementia and Alzheimer's disease are important causes of both morbidity and mortality, which are now more fully represented in recent mortality data than previously. Step-changes in incidence and mortality from dementia do not appear to explain recent mortality trends. However, as common conditions, deaths from these causes are likely to be affected by the same underlying drivers as the other causes of death.

4.4 Increased deaths due to influenza

Hypothesis

A rise in crude mortality was noted in the 2015 deaths data and the investigation of this rise led to the realisation that all-cause mortality rates had stopped improving around 2012. As a consequence of the temporal association between 2015 influenza mortality and early recognition of stalled all-cause mortality, a lot of the early hypothesis focused upon the role of influenza in explaining the stalled trends.^{27 86 87 88 89 90 91 92 93 94}

Critical appraisal of the evidence

Direct estimation of the contribution of influenza to mortality through decomposition approaches is not straightforward, due to it being clinically under-recognised or not documented as a precipitating cause of death. Certificated influenza deaths are likely to substantially underestimate the total contribution because influenza may be an unrecorded antecedent cause for a range of certified causes of death including pneumonia and heart disease.⁹⁵ In particular, some deaths certified as dementias may also have influenza as an unrecognised or undocumented precipitating cause. However, as described in Section 3, the stalled trends are due to changed trends in almost all causes of death and almost all age groups, which is not what would be expected if influenza was a sole or major cause.

To reduce the impact of this under-recording, a combined category of 'influenza and pneumonia' has been used to estimate the potential influenza contribution. As noted in Section 3 (Figure 3.4), the rate of improvement in mortality due to the combined category of 'influenza and pneumonia' slowed in Scotland²⁵ (and in England²⁷) after the stalling of the overall trends. However, this slowdown in the rate of improvement was similar to other causes of death. In Scotland this accounted for only 2% of the total slowdown for males, and 4% of the total slowdown for females.²⁵ In England the contributions were 6% and 7% of the total slowdown in England for males and

females respectively.²⁷ Although this may be an underestimate because it does not include any contribution of influenza to dementia or cardiovascular deaths, it could also be an overestimate as not all pneumonia deaths are related to influenza (indeed, the proportion could be quite small).

The EuroMOMO surveillance system seeks to detect and measure excess mortality, and the Flumomo model was developed to estimate the total attributable mortality fraction from influenza.⁹⁶ They use observed data on the prevalence of influenza-like illness within populations, alongside data on temperature and historical crude mortality data to adjust for other factors. They have suggested a substantial overall contribution of influenza in two of the winters in the past decade (for Scotland, the UK, and across Europe).^{97 98 99} However, these studies do not provide a means of understanding the contribution of influenza to long-term trends because the baseline changes over time.

For influenza to provide an explanation for the stalled mortality trends, it would require the contribution from influenza to age-standardised mortality to have increased over time, as there is no debate that influenza does contribute to mortality on a frequent basis. A study of deaths following hospital admission in England, using influenza codes at the point of admission rather than on death certification, shows that influenza had made little or no contribution to the changed mortality trends there.²⁷ A further analysis of English data considered whether the trends would have changed if winter deaths were excluded (as a crude proxy for influenza deaths). This found that the trends were largely unchanged, again reducing the likelihood that influenza has played an important role in explaining the trends.²⁷ Finally, an analysis of presentations to primary care for influenza-like illnesses did not increase after 2010, making increased influenza an unlikely cause of the changed trends.⁹²

Even if the contribution from influenza had increased over time, that would not preclude other factors being causes as well, as influenza could plausibly be a

mechanism (or effect modifier^h) linking these to mortality. For example, it could be that an increasing prevalence of obesity or the implementation of austerity policies (and the impact that might have on social care provision, for example) could exacerbate the mortality from influenza.

Evidence summary

There are several reasons why influenza is unlikely to be an important cause of the stalled trends. First, influenza would not be expected to have impacted on almost all ages and specific causes of death. Second, we would have expected deaths certified as 'influenza and pneumonia' to have made a much more substantial contribution to the stalling within decomposition analyses. Third, the study in England examining mortality trends following hospital admission with influenza as a cause does not suggest any increase in contribution. However, there is currently no simple means of ascertaining the contribution influenza may be making across specific causes of death such as dementia and cardiovascular disease.

Overall, therefore, it is highly unlikely that influenza has played an important role in driving the stalling of mortality trends in Scotland (or indeed in the rest of the UK or internationally).

^h An effect modifier is an exposure or factor which changes the size of effect of another exposure.

4.5 Increased prevalence of obesity

Hypothesis

It has been proposed that increases in obesity prevalence in recent decades have contributed to the overall stalling of improvement in mortality, including through a contribution to the stalling of improvements in cardiovascular mortality, as discussed earlier in this section. This has been suggested in relation to changing mortality rates in the UK,¹⁰⁰ the US,^{101 102} Australia, and other high-income countries.¹⁰³

Critical appraisal of the evidence

National survey data for Scotland and England show that obesity levels have increased notably in both countries since the mid-1990s (when the surveys began). Adult obesity prevalence in 1995 was approximately 16% in both countries; by 2019 it was between 28% (England) and 29% (Scotland), with slightly higher figures for females compared to males. The biggest increases were seen between the mid-1990s and the late 2000s/start of the 2010s; much smaller increases were observed in the later period (e.g. only 1–2 percentage point increases between 2011 and 2019 for males and females in Scotland, and males in England). These trends are shown by sex in Figure 4.4.

Obesity has been shown to be associated with both cardiovascular disease¹⁰⁴ (as discussed in section 4.1) and, importantly, all-cause mortality.¹⁰⁵ The modelled impact of obesity prevalence on cardiovascular disease is referenced in Section 4.1. For all-cause mortality, analyses of global data have highlighted associations based on an average c.14-year follow-up period, which is consistent with the time periods covering both the increase in obesity prevalence and the changing mortality trends in the UK. The hypothesis can be deemed plausible in terms of the strength of association between exposure (obesity) and outcome (mortality), the temporality of the association, and the consistency of evidence.¹⁴

Given this plausibility, new research has recently been undertaken in an attempt to better understand – and quantify – the potential contribution of obesity to the changing mortality and life-expectancy trends in Scotland and England. Explained in more detail elsewhere,¹⁰⁶ this was based on the calculation of Population Attributable Fractions (PAFs),¹⁰⁷ defined in a particular way in order to provide estimates of the proportion of deaths deemed attributable to the change in obesity prevalence between the mid-1990s and late 2000s. The application of these PAFs to recent mortality data (thereby taking into account the c.14-year time lag) allows us to estimate hypothetical, obesity-adjusted, mortality rates – i.e. the rates that might have been observed had the earlier increase in obesity not taken place. (Appendix 1 provides further details of the methods used.) These estimates can then be compared with both the actual observed mortality rates, and the projected mortality rates that were presented in Section 3, i.e. the rates that we would have expected to see if the changes to mortality in the last decade had not taken place. The analyses were undertaken for Scotland and England, for males and females aged 35–89 years.

The nature of such ‘hypothetical’ modelling and projections-based analyses means that we must be very cautious in our interpretation of the results. Nevertheless, the analyses suggest that a small proportion of the difference between the projected and observed mortality rates for Scotland could potentially be explained by the earlier changes to obesity prevalence rates. For example, in 2019, 9.8% of the gap for males, and 13.4% for females, was deemed potentially attributable to increased obesity prevalence (using 1991-based projections for 35–89 year olds). For England, these figures are higher: 18% for males and 34% for females.

However, there is considerable uncertainty around the accuracy of these currently estimates. Although validated methods were employed, obesity-related PAFs have been subject to some criticism regarding the extent to which they accurately measure causality.^{108 109 110 111 112 113} Furthermore, the analyses were subject to a large number of caveats regarding some of the data used in their calculations.

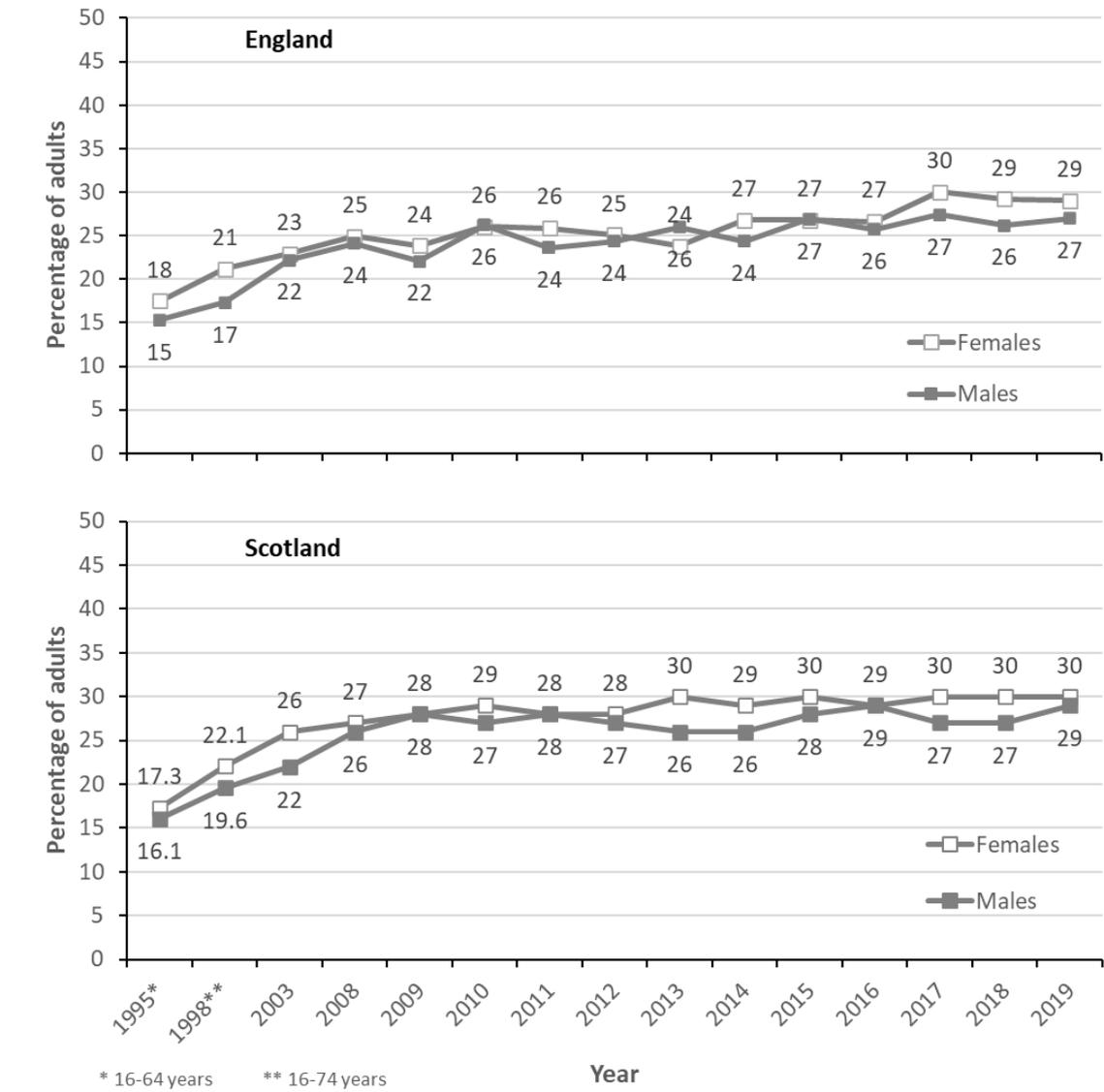
Evidence summary

While the hypothesis discussed here is plausible, it requires contextualisation. At the population level, obesity is the result of a ‘complex multifaceted system of determinants’, including an ‘obesogenic environment’ⁱ, with clear socioeconomic influences.¹¹⁴ Thus, the increases in obesity prevalence that have been observed in recent decades in the UK are likely to be the consequence of many different factors, some of which are related to the underlying economic inequalities that have increased across the UK in the last 40 years.¹¹⁴

Our analyses suggest that a small amount of the change in mortality rates in Scotland may be attributable to earlier changes in obesity prevalence; the equivalent proportions for England are bigger. However, there are many uncertainties associated with these estimates. If accurate, they suggest most of the changes in mortality that have been observed in both Scotland and England since the early 2010s have been caused by factors other than obesity. This is supported by the evidence presented in Section 3 of the report which shows changes in trends for many different causes of death, not just those associated with obesity.

ⁱ The obesogenic environment describes the context in which people live that makes increased obesity more likely through the marketing and provision of cheap and calorific food in combination with home, work, education, and broader environments that make physical activity more difficult and less commonplace.

Figure 4.4: Percentage of male and female adults classed as obese (BMI of 30+) in (a) Scotland and (b) England, 1995–2019. Adults are defined as aged 16 years and above apart from data for Scotland in 1995 (16–64 years) and 1998 (16–74 years)



Sources: Health Survey for England and Scottish Health Survey

4.6 Demographic factors

Hypothesis

There is a group of possible explanations for the stalled mortality trends that can be categorised as ‘demographic’ or ‘artefactual’, and which have been examined to varying degrees in other relevant reports.^{27 69} These are ageing of the population; issues relating to age-standardisation; issues relating to population estimates and migration; tempo effects and mortality shifts over time; natural limits to life expectancy; and cohort effects.

Critical appraisal of the evidence

Population ageing

The hypothesis that the ageing of the population might be a contributory factor was based on early mortality data (for 2015), published as crude counts.^{86 89 90}^{97 98} At that point age-standardised mortality rates, and life-expectancy calculations based on age-specific mortality rates, were not available. Subsequent analyses using these statistical techniques to keep the age structure of the population constant, and thereby excluding population ageing as a cause, confirmed that population ageing is not a contributing factor to the stalled trends.^{24 25 27}

Age-standardisation

One of the techniques used to avoid changes in the age structure of the population being conflated with other causes of changes in mortality trends is to use a ‘standard population’. This is a fixed age structure (i.e. proportion of people in each age and sex group) to which the actual age and sex specific mortality rates are applied. This allows comparisons to be made between populations and over time which take account of differences in the age and sex structure of those populations (e.g. to account for population ageing, as

noted above). The 'standard population', if it is to reflect actual mortality rates, should be close to the actual age structure of the population. In 2013 a new 'standard population' was introduced to better reflect the age structure of populations as the previously used standard dated from 1976 and was therefore much younger than the actual, current, populations of most European countries. However, this change would only impact on the trends if the same standard population was not used throughout the trend, or if a very inappropriate standard population was used which created an artefact by amplifying the mortality rates for a particular age or sex group which was not reflected in the actual population. This explanation can be discounted, however, as the analyses confirming the stalled trends avoid these problems.^{24 25 27}

Population estimates and migration

Calculation of mortality rates or life expectancy depends both on the accurate counting of the number of deaths in each age-sex category and accurate estimates of the population denominator (i.e. the number of people at risk of death in each group). Population estimates are derived from the decennial census, and then adjusted between censuses using the Annual Population Survey and data on births, deaths, migration, and so on. For inaccurate population estimates to be responsible for the observed trends, the population across sexes and age groups would need to have been underestimated across the board. Linked to this is the potential for migration to have either changed the number of people at risk (by underestimating the number of people at risk in each population), or to have changed the risk profile of the country through healthy migrant effects¹¹⁵ (which would have had to have worked in reverse with a substantial exodus of healthy individuals leaving).

The likelihood of denominator underestimation in the UK^j being an explanatory factor is very low for two principal reasons. First, the phenomenon is not restricted to a single country which might have experienced particular problems with population estimation – instead, the stalling is seen across many countries at approximately the same time. Second, analyses of cohort data (which follows up the same population over time) has shown the same stalling effect, and this is not prone to denominator problems.²⁷

Inward migration to the UK has continued to be higher than outwards migration since 1993. Net migration (the difference between the two figures) dropped slightly in 2012 before recording the highest figures since at least 1991 in 2014 and 2015 before subsequently dropping slightly. The EU exit referendum ('Brexit') in 2016 saw a decline in net immigration, but there were still around 200,000 more immigrants than emigrants to the UK, each year, between 2016 and 2019.¹¹⁶ As such, the healthy migrant effect is likely to have been contributing to an improving rather than deteriorating health profile for the UK up until at least 2019, thereby, if anything, masking the extent of the mortality trend problem. The possibility of less healthy UK nationals returning to the UK after the Brexit referendum could feasibly be contributing to a higher mortality risk,⁶⁹ but this postdates the turning point in the mortality trends and so is very unlikely to be a substantial cause. The total number of deaths in England among migrants from EU accession countries was only 0.8% of the total deaths in 2017 and the scale of any effect of changes in mortality due to migration effects is very small.²⁷

Tempo effects and mortality shifts over time

Tempo effects can be described as an artefactual inflation or deflation of life expectancy or mortality rates due to a mismatch between the numerator and denominator when changes occur between years.⁶⁹ The effect is temporary

^j It has been suggested that this may have been a more important factor in Iceland although we are not aware of any work to test this hypothesis.

and can impact on estimates following years of particularly high or low mortality. Given that the changed mortality trends have persisted for many years, and are evident even with three-year rolling average data, this is very unlikely to be a substantial contributing factor to the stalled trends.

A similar issue to tempo effects is that of mortality displacement over time, whereby a period of low mortality can create a population who are otherwise at high risk, or vice versa. An example of this might be where there is a prolonged period without expected mortality challenges (such as might be the case with a sequence of years with low influenza circulation or a more benign than expected climate) which leaves a larger population with pre-existing health conditions than the age-sex structure of the population might otherwise suggest. When an event then occurs, such as a heatwave or more virulent influenza strain, this might lead to a year of higher than expected mortality due to the presence of a large 'vulnerable population'. Again, the sustained stalling of the mortality trends over time, and the change in trend predating the peak influenza year in 2015, make this a highly unlikely explanation for the stalling.

Natural limits to life expectancy

In the early discussions of the causes of the stalled mortality trends it was suggested that life expectancy could have reached its 'natural' ceiling; consequently the stalled trends were not necessarily a matter of concern or a policy issue. However, this is clearly not the case given that life expectancy has continued to improve in countries who already enjoy the highest life expectancy (e.g. Japan), and the stalling (or reversal) in the trends is greater in the most deprived groups who likewise already have the lowest life expectancy. As such the stalling cannot be explained by the attainment of a natural limit to life expectancy.

Cohort effects

Cohort effects occur when a particular generation of people are at higher or lower risk than those born before or after. For example, people born around the time of the influenza pandemic c.1919 have been found to have a higher risk of mortality throughout their lives, while those born around 1930 (the so-called 'Golden Cohort') have had a lower risk.^{117 118} It has been suggested that the passage of this 'Golden Cohort' to now being over 80 years old may mean that the mortality advantage that they have previously enjoyed is now lost, and that consequently this has contributed to the stalling.⁶⁹ It has also been proposed that there are cohort effects in smoking prevalence that may be contributing.^{27 69} Although there is evidence of cohort effects for some (but not all) specific causes of death in Scotland,^{10 119 120 121} it is very unlikely that cohort effects are a substantial cause of the stalling because all age groups have seen a simultaneous decline in the rate of improvement (or even reversing). Furthermore, the slowdown in the rate of improvement (or reversal) across almost all causes of death (including those which are highly unlikely to be caused by smoking, such as drug-related deaths), make this a very unlikely explanation.

Evidence summary

It is unlikely that any of the factors considered here (ageing of the population; issues relating to age-standardisation; issues relating to population estimates and migration; tempo effects and mortality shifts over time; natural limits to life expectancy; and cohort effects) are making a substantial contribution to the stalled mortality trends.

4.7 Austerity policies

The evidence in relation to austerity can be divided into three inter-related categories. The first is the evidence at international level of macroeconomic policies and the extent to which austerity implemented at country level is linked to mortality trends. The second is the evidence relating to the specific manifestations of austerity within the UK context, in particular the cuts to local government funding. The third is the evidence of the impact of changes to household incomes on health, much of which in the UK relates to austerity-related social security 'reforms'. Each of these are inter-related, but operate at different levels: countries; sub-national (local authorities, health boards/authorities, etc.); and households.

4.7.1 Austerity at international level

Hypothesis

The 'Great Recession' after 2008 was followed by changes in economic policy in many countries. In the UK the 2010 election led to a change in policy towards 'austerity', with the stated aim of reducing government debt (and through that increase economic growth), by reducing discretionary spending (particularly on social security and local government, but impacting across government departments).¹²² Austerity was also implemented, to varying degrees, across many other countries at the same time.¹²³ Notwithstanding the economic effectiveness or otherwise of that policy approach, the implementation of austerity shortly before the change in the mortality trends alongside the existing evidence linking economic policy to health outcomes¹²⁴ led several authors to articulate austerity as a key cause of the stalling.^{92 93 94}

Critical appraisal of the evidence

In this section (4.7.1) the evidence considers austerity defined in terms of the fiscal balance of governments (i.e. whether they are paying off government debt, as is the intention of austerity policy; or implementing fiscal stimulus

where government borrowing is used to fund investments or services^k) at country level.

A forthcoming systematic review of the relationship between austerity and mortality at international level identified five relevant studies, all of which only included data up to 2013.^{125 126 127 128 129} These demonstrated a consistent harmful impact of greater austerity on mortality trends across countries and time although the certainty of these estimates was low. There have also been studies that focused on specific outcomes in the immediate period after the Great Recession across Europe which also found negative health impacts, but these did not measure overall mortality or austerity as comprehensively, and were therefore not included in the systematic review.^{130 131 132}

A subsequent analysis^l of austerity and mortality using four different measures of austerity, a series of sensitivity analyses (for time lag, exclusion of oil-dependent economies, and restriction to years of economic downturns), and data up to 2019, found that austerity measured by government expenditure, public social spending and the Cyclically Adjusted Primary Balance (CAPB) had harmful impacts on mortality, but when measured with the

^k Note that more sophisticated measures of austerity also account for the ‘automatic stabilisers’ in the economy. These are the additional spending on social security benefits that occurs during economic downturns when unemployment increases, and tax revenues reduce due to lower earnings and profits, both of which increase fiscal deficits during recessions and reduce fiscal deficits during periods of economic growth. By accounting for these automatic stabilisers they focus on the impact of policy decisions and discretionary tax and spending rather than changes due to economic fluctuations. This is further complicated, however, by the fact that some austerity measures might intend to reduce those automatic stabilisers (e.g. by reducing taxes or reducing the value of unemployment benefits).

^l This analysis has been submitted as a PhD thesis and awaits examination and publication.

Ardagna-Alesina Fiscal Index (AAFI) had little or no impact.^m These impacts were seen immediately with the size of effect tailing off by five years.¹³³ The effects were robust to restriction of the data to years of economic downturn and non-oil-dominated economies.

Evidence summary

There is now a series of studies which show that austerity implemented at national level, defined broadly as economic policies which aim to produce a government surplus to pay off debt, leads to slower improvements in mortality.

4.7.2 Austerity at sub-national level

Hypothesis

The increased mortality among the oldest age groups in 2015 led to an initial focus on the extent to which social care funding might have been important to explaining the stalled trends. Subsequently, analyses of funding for local authorities overall (which includes social care), and funding of health services have been examined as possible causes. Within the UK, cuts to funding (for local authorities), or a slower rate of increase in funding (for healthcare), form part of the overall austerity approach to economic policy.

Critical appraisal of the evidence

As part of the austerity policies implemented across the UK, funding for many public services reduced in real terms after 2010.¹³⁴ The grant to local government from the UK and devolved governments (who in turn are also

^m The CAPB and AAFI measures seek to assess the fiscal balance of government accounts (i.e. whether government debt is increasing or decreasing) after accounting for changes in spending or revenues due to changes in economic activity (and, in the case of AAFI, changes in asset prices).

dependent to a large degree on UK Government funding) have been among the largest single area of budget reduction resulting from the broader imposition of economic austerity (which is covered in more detail in the next section). This reduction has been particularly acute in England (where the cut in service spending between 2009–10 and 2016–17 was 23.7% on average, compared to cuts of 12.1% in Wales and 11.5% in Scotland).^{134 135 136} Local authorities do raise some of their own budgets through Council Tax, business rates and other charges, and in England this has become a much greater proportion of their overall budget.¹³⁵ However, because the local authorities which are more dependent on central government funding are systematically more deprived, this has meant that the cuts to services have impacted most in more deprived areas.^{135 137} The patterning of the reduction in local government service spending by deprivation in Scotland is not quite as clear cut as in England, although Glasgow City Council is among the Scottish councils with the largest reduction.¹³⁴

The other large area of public service provision outside of local government is healthcare spending. Similar to the picture for local authorities in England, the trends in NHS funding changed after 2010, with a slower rate of increase (as opposed to the decrease seen for local government),¹³⁸ with the rate slower again in more deprived areas after 2012.¹³⁹

There is evidence that changes in overall or specific aspects of local government spending in England are associated with changes in health outcomes, although the complicated relationship between deprivation, funding decisions and mortality trends make it difficult to disentangle the causes. Local government funding in England has declined most in the more deprived areas, and so the observed association between changes in spending and mortality in some analyses¹⁴³ could be due to other factors such as changes

in deprivation. However, more advanced statistical techniquesⁿ used in another study found that each £100 decline in annual per-person local government funding in England was associated with a decrease in life expectancy at birth of 1.3 months.¹⁴⁰ Similar results were found in another study using a different approach, again finding that the slower increase in healthcare funding, and reduction in social care funding, after 2010, have been detrimental to mortality trends, with social care having particularly adverse impacts.¹⁴¹

An as-yet unpublished study in Scotland, considering changes in health and social care spending and changes in mortality trends at local authority and Health Board level, does not show any substantial relationship.¹⁴² ^o

Reductions in health and social care spending in England were associated with an additional c.45,000 deaths using a fixed effects regression analysis.¹⁴³ ¹⁴⁴ Finally, the cuts in local government spending across England were also associated with increased homelessness¹⁴⁵ and higher mortality at older ages.¹⁴⁶

Evidence summary

There is mixed quality, but consistent, evidence of a negative impact on mortality, and other health outcomes, of reduced funding of a range of services. There is a particularly well-conducted study which shows that declining local government spending in England is likely to have contributed substantially to the stalled mortality rates.¹⁴⁰

ⁿ This involved panel regression analysis which removes time-invariant confounding (i.e. the impacts of factors that do not change over time, but which are different between areas, can be discounted as a cause).

^o This may be partially related to the reductions in local government budgets in Scotland being approximately half the reduction in England.

4.7.3 Austerity at household level

Hypothesis

The hypothesis here is that the changes to household incomes resulting from austerity, in particular due to the reduced real-terms value and increased conditionality of social security benefits, has led to the stalled mortality trends. Household incomes may also have been impacted by broader changes in the economy,^p in particular the labour market (e.g. changes to minimum wages, precarious or zero-hours employment contracts, unemployment rates, and so on), inflation (which is differentially experienced across income groups and includes aspects such as changes to housing rents and transport costs), and changes to taxation.

Critical appraisal of the evidence

Within the UK, austerity policies have led to substantial cuts to, and changes in the eligibility for, social security benefits.¹⁴⁷ This has meant that the incomes of the poorest groups have at best been static since 2010 (even after accounting for changes in wages and taxes).^{148 163} Given the importance of income (and stability of income) for health, through a number of material and psychosocial pathways,⁴⁰ this is a very plausible explanation for the stalled trends, and especially the worsening trends in the most deprived areas.

Using assumptions surrounding the relationship between changes in income and subsequent mortality, the impact of changes in incomes in Scotland due to tax and benefit changes was modelled. This estimated that the reduction in incomes could explain a decline of 0.38 and 0.44 years in life expectancy for

^p Austerity is normally defined in terms of the fiscal balance (i.e. spending and tax policy) of governments after accounting for automatic stabilisers in the economy. Changes to the labour market and inflation are not strictly speaking austerity policies, but can form part of the broader approach to economic policy.

females and males respectively, as well as increased inequalities, thereby accounting for a substantial proportion of the difference between the actual trends and those that would have occurred if the pre-2012 trends had continued.¹⁴⁹

The impact of the introduction of Universal Credit (which, as part of the broader austerity policy, involved increased conditionality and decreased real value compared to the previous benefits) was estimated to have resulted in c.64,000 more people experiencing psychological distress.¹⁵⁰ Furthermore, for lone parents, reducing the length of time after their children are born before they must move into work, resulted in worsening of mental health.¹⁵¹ Although mental health is only one indicator of morbidity, it gives an indication of the likely health and mortality impacts of these changes.

Finally, the increase in poverty associated with austerity policies was ecologically associated with adverse trends in infant mortality across England.¹⁴⁴

Evidence summary

There are no empirical evaluations of the mortality impacts of changed incomes after 2010 in the UK.^q However, it is clear that the austerity-related changes to social security in the UK have led to decreased incomes for the poorest groups, and studies using panel data have shown that these changes in incomes (and the increased conditions put on the receipt of the benefits) have led to worsening mental health outcomes. A modelling study estimates a large adverse mortality impact, and rising mortality inequalities, from the policies.

^q The Department for Work and Pensions has not yet approved applications for data linkage that would allow such evaluations to take place.

4.7.4 Overall evidence summary for austerity policies

Overall, there is good evidence that austerity has contributed to the stalled mortality trends when implemented at international level, and when implemented as local authority cuts in England. There is also good evidence that the cuts in the real value of social security benefits and the increased conditionality have been damaging for a broader range of health outcomes. Other studies also show consistently negative health and mortality impacts of austerity, but are of mixed quality. Taken together, this represents a strong and triangulated¹⁵² body of evidence demonstrating the negative impacts of austerity.

4.8 Increased deaths due to weather and temperature extremes

Hypothesis

Periods of high or low temperature can increase mortality, especially when combined with other factors in societies which make populations more vulnerable to adverse impacts (including underlying levels of deprivation and poverty, housing quality, energy affordability, urban planning, social support, and so on).^{153 154 155 156 157} One hypothesis generated from workshops and discussion has been that periods of particularly high or low temperature, perhaps associated with climate change, might be an explanation for the stalled trends.

Critical appraisal of the evidence

For climate to explain the stalled mortality trends, a change in exposure for a series of years would be required rather than one particularly adverse summer or winter. With climate change, such a systematic shift in exposure might be expected and plausible. Direct estimation of the contribution of heat and cold to mortality through decomposition approaches is not straightforward. Certified deaths due to these causes are small in number in the UK, but are likely to substantially underestimate the total contribution of climate to mortality, as they may operate through increasing the risk of other causes of death.¹⁵⁶ Attributing mortality to heatwaves and cold spells is analogous to the approach for influenza (Section 4.4), and is likely to be similarly related to the broader social determinants of health which create vulnerabilities (e.g. poverty-related ill-health) or resilience to such events (e.g. through affordable and effective home heating systems). The rapid rises in energy prices in early 2022, and the projected future increases, may create a situation in the future where mortality due to cold weather will have a larger impact than we have seen over the period from 2010.

Modelled estimates have been made of the excess deaths from extreme temperatures that have been observed up to now,¹⁵⁸ and that are forecast to result from future climate change.¹⁵⁹ Although the impacts are substantially more severe outside Europe and North America (where the evidence of stalled trends has largely arisen), numbers of excess deaths have also been estimated in the latter areas. The best estimates of the contribution of excess deaths from heatwaves over time show an exponential increase since 2010. However, the contribution from excess deaths due to cold remains much larger than that due to heatwaves, amounting to around 86,000 excess deaths per year across Northern Europe (which includes the UK, Republic of Ireland, Nordic and Baltic countries).¹⁶⁰ There is a sparsity of synthesised evidence of the contribution of other climate-related pathways (e.g. flooding), but it is likely to be small in the UK at present. This means that heatwaves are not a cause of the stalled trends because they are not contributing to excess deaths in the UK in recent years. Cold weather has been a longstanding cause of excess deaths in the UK, but this has not increased in recent years.

If temperature was a substantial contributor to the trend it would have been expected that extreme temperatures would impact particularly on the very old and very young (rather than across all age groups as is the case from the UK data); be confined to the summer and/or winter months (which is again not the case from the UK data²⁷); and be concentrated on specific causes of death. There is strong evidence now that climate change is contributing to excess deaths through summer heatwaves, including in Europe and North America, and that this acceleration in excess deaths coincides with the stalled trends. However, the actual number of deaths attributable to excess cold and heat for the UK has changed little since 2000 (less than 0.5% for either cold or heat) and so the contribution to the stalled trends is very small.¹⁵⁸

Evidence summary

Extreme weather/temperatures are not contributing to the stalled trends in life expectancy. Although excess deaths due to heat are increasing across Northern Europe, they remain very small. There has been a longstanding excess mortality due to cold, but this has not changed and therefore also cannot explain the stalled trends.

5. Synthesis of the evidence

The evidence for each of the hypotheses has been summarised above. On the basis of that evidence, this section of the report assesses the likelihood of each hypothesis making a causal contribution to the stalled trends. As described in Section 2, the causal contributions are assessed through application of the Gordis major criteria (temporal relationship, biologic[al] plausibility, consistency, and alternative explanations (confounding)) and other considerations (dose-response relationship, strength of association, and cessation effects). Table 5.1 summarises the evidence for a causal contribution for each hypothesis. It shows that, of the original hypotheses, several factors are likely to be making a causal contribution on the basis of the evidence currently available. In terms of specific causes of death, cardiovascular disease (ischaemic heart disease and cerebrovascular disease) and drug-related deaths are assessed as contributing causes. However, each of these have to be considered in the context of their own causal mechanisms and not in isolation. Importantly, however, having discounted a range of 'artefactual' explanations, it is possible to conclude that stalled mortality trends do represent a real and important population health concern.

For exposures, austerity is supported by the evidence as making an important and substantial causal contribution, operating at international, sub-national and household level. Obesity is also evidenced as likely to be making some contribution. However, any obesity contribution needs to be considered within the societal and economic context which has led to such a marked change in body mass across the population, particularly between the 1990s and around 2010.

In contrast, the suggested demographic and measurement factors (population ageing, age-standardisation issues, population estimates and migration, tempo effects and mortality shifts over time, limits to life expectancy, and cohort effects) are unlikely to be making any causal contribution to the stalled trends of consequence. Likewise, the measured contribution of dementia to

stalled life expectancy appears to be largely attributable to certification and coding changes, rather than changes in incidence or mortality of these conditions. These factors, however, are important to recognise and consider for in the methodology and interpretation of work on stalled mortality.

The hypotheses that are evidenced as making a causal contribution are not in tension (in that one hypothesis cannot be true if the other is true).

Furthermore, there are clear causal links between many of the hypotheses such that they fit together into consistent and coherent causal chains. As noted in Section 2, the stalled trends are due to changes across specific causes of death and age group. However, of the specific causes, cardiovascular disease and drug-related deaths are more likely to be important for the stalled trends, but are themselves related to other factors (including austerity, obesity, and for drug-related deaths cohort effects). The rise in obesity during the 1990s and 2000s is likely to have made some contribution to some deaths (e.g. cardiovascular disease). Austerity, operating at multiple levels, is likely to have impacted across causes of death and made a substantial contribution to the overall stalled trends.

Figure 5.1 provides a diagrammatic representation of how the evidenced causal forces of the stalled mortality trends fit together. It shows that austerity operating at multiple levels is likely to be an important cause of the stalled trends. The direct link between austerity and stalled mortality is evidenced by the international evidence of austerity and mortality trends, and within a UK context is evidenced to operate through changes to local government funding, social security and household incomes. Obesity is also a likely contributing factor, but the extent of this is smaller and less certain.

Figure 5.1: A diagrammatic representation of how the evidenced causal forces for the stalled mortality trends fit together, with obesity in grey italicised font as it is making a smaller and less certain contribution

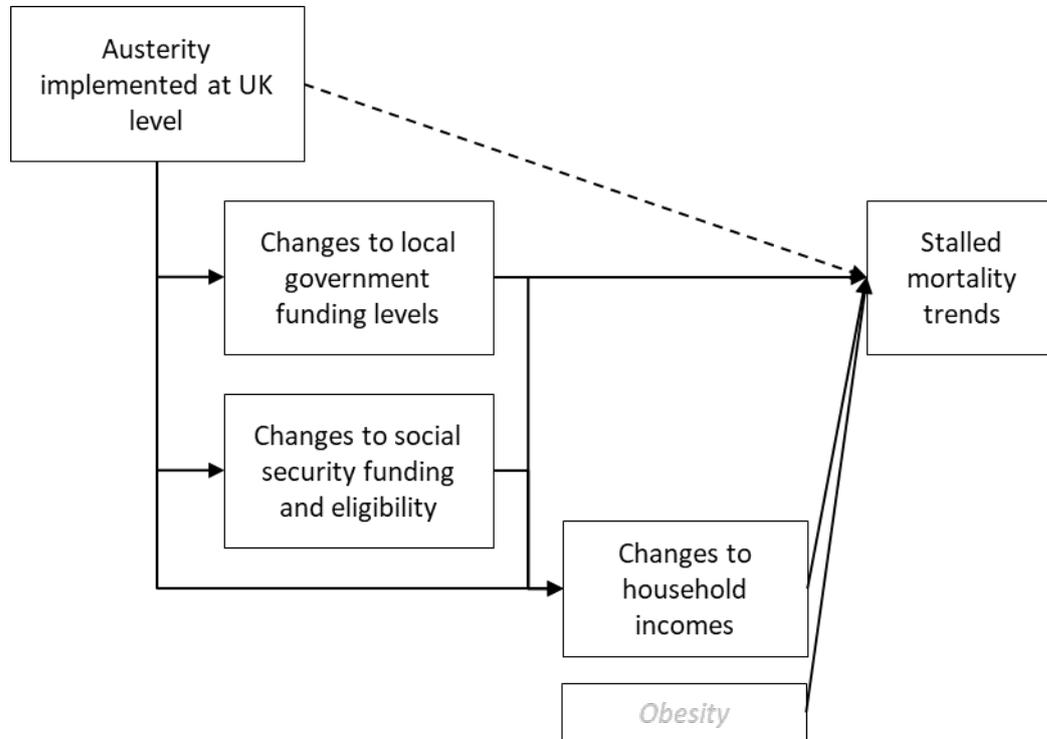


Table 5.1: Assessment of the quality of evidence for different hypothesised causes of the stalled mortality trends in the UK

5.1a: Specific causes of death

Hypothesis	Temporal relationship	Biologic plausibility	Consistency	Alternative explanations (confounding)	Dose-response relationship	Strength of association	Cessation effects	Summary of insight
Influenza	No	No	n/a	n/a	n/a	n/a	No	Increased influenza is not a substantive contributor to the stalled trends.
Cardiovascular disease (CVD)	Yes	Yes	Yes	n/a	Yes	Yes	n/a	CVD is one of the specific causes of death which contribute to the changed trends There is some evidence increased obesity may

Hypothesis	Temporal relationship	Biologic plausibility	Consistency	Alternative explanations (confounding)	Dose-response relationship	Strength of association	Cessation effects	Summary of insight
								have contributed.
Drug-related deaths	Yes	Yes	Yes	n/a	Yes	Yes	n/a	Drug-related deaths is one of the specific causes of death which contribute to the changed trends driven by drug specific causes (cohort effects and availability) and austerity mechanisms.
Dementia	Yes	Yes	Yes	Yes	Yes	Yes	n/a	Artefactual changes in how dementia is recorded accounts for

Hypothesis	Temporal relationship	Biologic plausibility	Consistency	Alternative explanations (confounding)	Dose-response relationship	Strength of association	Cessation effects	Summary of insight
								much of the changed trends in England but the remaining real changes in the trends are similar in scale to other specific causes of death, and may be related to austerity. .

5.1b: Exposures and overall explanations

Hypothesis	Temporal relationship	Biologic plausibility	Consistency	Alternative explanations (confounding)	Dose-response relationship	Strength of association	Cessation effects	Summary of insight
Austerity	Yes	Yes	Yes	Low risk	Yes	Yes	Yes	Austerity is a cause of the stalled trends.
Demography: ageing of the population	Yes	No	No	n/a	No	No	n/a	Population ageing is not a cause of the stalled trends.
Demography: age-standardisation issues	No	No	No	n/a	No	No	n/a	Age-standardisation issues are not a cause of the stalled trends.
Demography: issues relating to population estimates and migration	No	No	No	n/a	No	No	No	Issues relating to population estimates and migration are not a cause of the stalled trends.

Hypothesis	Temporal relationship	Biologic plausibility	Consistency	Alternative explanations (confounding)	Dose-response relationship	Strength of association	Cessation effects	Summary of insight
Demography: tempo effects and mortality shifts over time	n/a	No	No	n/a	n/a	n/a	n/a	Tempo effects are not a cause of the stalled trends.
Demography: limit to life expectancy	Yes	No	No	n/a	No	No	n/a	'Natural' limits to life expectancy are not responsible for the stalled trends.
Demography: cohort effects	No	No	Missing	n/a	No	No	No	Cohort effects are not responsible for the stalled trends.
Obesity	Yes	Yes	Yes	High risk	Missing	Missing	Missing	There is some evidence that obesity may be part of the cause of the stalled trends.

Hypothesis	Temporal relationship	Biologic plausibility	Consistency	Alternative explanations (confounding)	Dose-response relationship	Strength of association	Cessation effects	Summary of insight
Weather and temperature	Yes	Yes for some causes	Missing	n/a	Yes	Yes	n/a	The contribution of weather and temperature is too small to be an important explanation of the stalled trends.

n/a = not applicable

6. Conclusions and recommendations

Conclusions

Austerity is highly likely to be the most substantial causal contributor to the stalled mortality trends seen in Scotland and across the UK (and more tentatively across other high-income countries). There is likely to be a smaller contribution to the changed trends through the mechanism of obesity.

Recommendations

Given the conclusion that austerity, and its impact on funding for services and household incomes, is likely to be the largest and best evidenced causal force for the stalled mortality trends, the recommendations below detail what a sufficient policy response would look like given the public health importance of this phenomenon. These recommendations build upon existing recommendations around the alleviation of poverty and in responding to the related public health challenges of excess mortality in Scotland and Glasgow, and rising health inequalities. The methods (Section 2) briefly described how these recommendations were developed.

Section 1: Macroeconomic policy

Work has recently been published which describes the importance of addressing economic relationships between social groups (i.e. the numerous ways in which economic resources flow from poorer groups to richer groups through the design of the economy) if economic inequalities (and, as a result, health inequalities) are to be reduced.¹⁶¹ It highlights the important of the ownership of economic capital, rents, capital gains, profit extraction, monopoly and speculation. This understanding is reflected below. This report has also highlighted the central importance of macroeconomic fiscal policy, and

particularly austerity, as a causal factor in driving the stalled mortality trends (both in the UK and internationally). The recommendations in this section seek to address these causes, and are arranged by level of governance (UK Government, Scottish Government, and local government/health boards).

At UK level

1. Design fiscal policy to avoid austerity approaches which limit public spending, especially during periods of economic downturn.

At all levels

2. Seek opportunities to change the economic structures that lead to large wealth and income inequalities by introducing appropriate policies to reverse or mitigate the processes of rent extraction (e.g. rent controls and public/community ownership), capital gains (e.g. land value taxation), profit (e.g. plural ownership of industry), monopoly (e.g. anti-trust regulations) and speculation (e.g. through financial regulation), and to diversify economic ownership (e.g. public ownership and co-operatives) as with Community Wealth Building.

Section 2: Social security

Aim: Households can meet their material needs

The recent reductions in real household incomes for some groups and resulting increase in poverty have been detrimental to health. Since 2010 there have been changes to the social security system which have resulted in decreased incomes and increased conditionality^r for low-income and vulnerable groups.¹⁶² The Equality and Human Rights Commission has

^r Conditionality is when access to certain social security benefits is dependent on an individual agreeing to particular behaviours.

reported that changes to UK social security systems (including freezes to working age benefits and tax credits and the introduction of Universal Credit) have negatively impacted low-income families, and will have a disproportionately negative impact on several protected groups, including disabled people, certain ethnic minorities, and women, lone parents in particular.¹⁶³

By comparison, the UK is less generous in its social security support than most other countries in Western Europe. In the UK, social security to support those out of work amounts to less as a percentage of median wage than other countries in Europe. The estimated European Union average replacement rate in 2018 was 69% compared with 48% of median earnings in the UK.¹⁶⁴

The evidence suggests that policy changes since 2010 have been accompanied by increases in child poverty; an increase in prevalence of overweight/obesity among the poorest; higher than anticipated working-age mortality from ischaemic heart disease and alcohol-related causes among men from deprived areas; increased drug-related deaths across the UK;⁶⁸ and some evidence of a higher number of working-age deaths than anticipated from respiratory disease and all-cause mortality.¹⁶²

The principles of a good social security system have been well articulated by the Child Poverty Action Group: a social security system should (i) prevent and reduce poverty by assisting with costs across the life course, including childcare and the costs associated with having a disability; (ii) provide income security by providing contingencies for adverse circumstances and at all times, in or out of work – no one should be unprotected as a result of sanctions and delays, and (iii) promote social solidarity and be non-stigmatising.¹⁶⁵ The feasibility of piloting a Universal Basic Income or Citizens' Basic Income has been discussed elsewhere.¹⁶⁶ A universal pilot was not found to be feasible in Scotland, but a specific pilot in care-experienced young people is to be trialled in Wales, which is likely to provide useful learning in this area.

At UK level

3. Increase all benefits and tax credits in line with inflation every year, and put in place a one-off increase in benefits and tax credits now to compensate for the loss of real income incurred since 2010. The reinstatement of the £20 per week uplift in Universal Credit that was in place during the early part of the COVID-19 pandemic would be a contribution towards this.
4. Reduce welfare conditionality, starting with the increases in conditionality introduced since 2010.

This uprating of the value of benefits is required in order to reverse the real terms reductions since 2010. The issues with Universal Credit which have been shown to cause unnecessary harm, including a five-week wait for benefits, poor administration, and sanctions, need to be addressed.

The increases in conditionality in the social security system introduced since 2010 need to be reversed, as an initial step towards further reductions in conditionality over time. It should be noted that this has been shown to be feasible in the devolved nations: the benefits cap is offset in Northern Ireland and the spare-room subsidy is offset in Scotland. Conditions on social security payments have increased since the 1980s, with sanctions being extended to previously exempt groups such as lone parents and people with disabilities.¹⁶⁷ Social security conditionality in the form of benefit sanctions is not effective in assisting entry into the paid labour market over time.¹⁶⁸ In evidence to the Commons Work & Pensions Committee inquiry into benefit sanctions, Professor Peter Dwyer stated that benefit sanctions are not appropriate for disabled people or Universal Credit recipients who are in work.¹⁶⁹ Written evidence from Dr Ben Geiger noted the ineffectiveness of sanctions for people with health problems or disabilities.¹⁷⁰ Written evidence from NHS Health Scotland recommended that sanctions be abolished for pregnant women and parents with children.¹⁷¹

5. Ensure that access to the social security system across the UK is seen as a right, and that people using the system are treated with dignity and respect.

Access to the social security system is a right (as is the case currently with the NHS, and how Social Security Scotland has been developed), and citizens must be treated with dignity and respect by clarifying this in the purpose and aims of the Department of Work and Pensions, and by embedding these values into the ways of working and organisational culture. An ideal social security system should be widely understood and supported by the public as mutual societal co-operation, not as charity.¹⁷² In a 2018 report by the United Nations 'Special Rapporteur on extreme poverty and human rights',¹⁷³ it was explicitly recommended that DWP staff be trained to use 'more constructive and less punitive approaches to encouraging compliance'. All opportunities should be taken to ensure the culture of the system is one that is focussed on the needs of claimants.^s

We welcome that the Social Security Scotland charter takes an explicit human-rights based approach.¹⁷⁴

At Scottish level

6. Use fiscal powers to top up reserved benefits and reverse UK cuts.
7. Create new benefits and increase existing benefits to support those in low-income households. Specifically, increase the Scottish Child Payment to £40 per week to meet child poverty reduction targets.

The Scottish Government could use their fiscal powers to top up UK benefits, reverse UK cuts and reforms and potentially create new benefits to support those in low-income households.¹⁷⁵ Revenue could be generated from

^s Note that monitoring of claimant experience of the reserved system in Scotland could be conducted using existing data sources.

increases to personal taxation. We welcome the introduction of the Best Start Grant, Carers Allowance and new Scottish Child Payment, but believe all should be monitored to ensure maximum impact for low-income families. While it has been stated that UK Government policy has driven much of the story of poverty over the last two decades,¹⁹ it is also true that Scottish Government has gained fiscal powers steadily since devolution. Some social security powers were transferred with the Scotland Act 2016; a set of benefits related to disability and caring and some payments for low-income households have also been transferred.¹⁹ As has been recommended previously, positive actions include reversing the effects of UK Government cuts and reforms (e.g. to tax credits, incapacity benefits, housing benefit and child benefits) to provide more efficient safeguards and protection for the most vulnerable in our society.^{7 8} A 50% increase to means-tested benefits rates could improve health and narrow health inequalities with an estimated 4.7% fewer premature deaths and 8% reduction in relative inequalities.¹⁷⁶ It has also been noted that increasing the Scottish Child Payment is an effective means of meeting the Child Poverty reduction targets.^{177 178}

At local level

8. Provide high-quality money advice and welfare rights services to ensure people receive all the benefits and other entitlements for which they are eligible.

All eligible people should receive the benefits they are entitled to through funding of high-quality money/welfare rights services. Up to half a million families in the UK are not claiming the means-tested benefits to which they are entitled.¹⁷⁹ Local authorities and NHS Boards are major employers across Scotland and should provide their employees with access to money/welfare rights advice. Formal referral pathways from health and other universal services to money/welfare advice could be developed; asking about money worries can be part of the routine assessment of needs of universal service users. Health Boards have been asked by Scottish Government to create pathways for service users where they do not exist and ensure they are

effective where they do exist.¹⁸⁰ Further income maximisation opportunities could be taken by embedding money advice in frequently used services or introducing an outreach service.¹⁸¹ ¹⁸² Money/welfare rights advice in such an embedded model would be provided via the setting the person is referred from, such as school, nursery, GP practice or community hub.

Section 2: Work

Aim: Improve quality and flexibility of working conditions

Various policies affecting working conditions have had important implications for health outcomes. These include those relating to wages, the availability of work, and the security and quality of employment.¹⁶² It is important to note that 65% of children in poverty in Scotland live in families where at least one adult is in work.¹⁸³

At UK level (and other levels where appropriate)

9. Improve the availability of 'good work' by increasing in-work benefits, improving employee control at work and minimising health and safety risks in the work environment.

As has been previously recommended,⁷ ⁸ the UK Government should support the vision set out in the Fair Work Framework¹⁸⁴ to attempt to ensure that all work in the UK offers security, fulfilment and respect. Forms of flexible working where the burden of risk falls disproportionately on workers (including most zero-hours contracts) are not fair work.¹⁸⁴ Flexible vacancies that allow people to reach a minimum income standard could help improve living standards overall.¹⁸⁵

10. Increase the statutory living wage to the Real Living Wage.

Since low pay is a major contributor to in-work poverty, it is crucial that all employees receive at least the Real Living Wage as set out by the Living Wage Foundation.¹⁸⁶ This would narrow income inequalities and focus

investment on those in the worst health. For example, care work can be seen as insecure, low-wage, low-skilled, gendered employment.¹⁸⁷ In reality, these workers are performing crucial work that should be valued by society and this should be demonstrated by substantial increases in their salaries. UK Government can ensure that public sector care workers are paid at least the Real Living Wage, thereby supporting early years' education and social care services.

11. Provide 30 hours per week of funded, good-quality and flexible education and childcare for all children from age one to five.

High-quality early years education is good for children. Good-quality universal childcare benefits all children and those from disadvantaged circumstances the most; targeted interventions benefit disadvantaged children still further.^{20 188} Supporting low-income families with free or affordable early years childcare helps parents to obtain employment^{189 190} and therefore increases household income with consequent benefits for health.

12. Eradicate the restrictions on trade unions.

New balloting rules and restrictions on campaigning create a greater imbalance of power between workers and employers which can be detrimental to health. Researchers have proposed that industrial relations and workplace regulation are crucial to public health and that weakening unions will contribute to health inequalities in the future.¹⁹¹ In addition, the Trade Unions Congress has reported that trade union involvement helps reduce injuries at work and leads to reductions in the levels of ill-health caused by work.¹⁹²

At Scottish level

13. Measure economic and social progress through health and wellbeing measures, instead of Gross Domestic Product.

When economic and social progress is measured through health and wellbeing parameters, it is clear that improvement of the health of a

population is a key priority of their government. Recognising that health and wellbeing outcomes are the ultimate goal of government policy, and that economic policy and activity is in support of such outcomes, would help prioritise policies and practice which support an inclusive economy. We welcome the First Minister's prioritisation of the Beyond GDP agenda¹⁹³ which aims to develop indicators that measure economic and social progress but are more inclusive of environmental and social aspects of progress. This is essential to Scotland's long-term sustainability and productivity.

At local level

14. Use public spend to advance progressive employment practices, including good/fair work, and to create healthier working environments.

Building on the Community Wealth Building agenda, suggestions for action have been outlined in the NHS Health Scotland briefing 'Maximising the role of NHS Scotland in reducing health inequalities'.¹⁹⁴ These include (i) providing high-quality services with allocation of resources proportionate to need; (ii) training the workforce to understand their role in reducing inequalities; (iii) forming effective partnerships with different sectors to help reduce health inequalities; (iv) mitigating inequalities through employment and procurement processes; and (v) advocating to reduce health inequalities. Local authorities should ensure public sector employers have enough knowledge and awareness of the challenges with Universal Credit to address them for their employees. They should also ensure that local childcare providers are well informed and supported to deal with Universal Credit's approach to childcare costs. The NHS can be considered an 'anchor institution' in that it usually remains in one geographical place, has significant assets and influences the health of communities just by being there. Importantly, by choosing to work with communities and invest responsibly, the NHS can have a very large impact on the wider determinants of health.¹⁹⁵

15. Maximise the potential of City and Regional Growth Deals to reduce inequality and improve health.

Building on the 'Economies for Healthier Lives' programme of work, consideration should be given as to how to maximise the potential of City and Regional Growth 'Deal' investments to help mitigate against the effects of vulnerability in the population^{7 8} and shape the economy to be more inclusive. For example, this could be done through capital investment in social housing or the creation of sustainable high-quality employment where surpluses are retained locally and by the workforce.

16. Implement the principles of inclusive economies to ensure that the economy is redesigned to achieve economic, social and health equity.

Inclusive economies are those which are designed to reduce inequalities across the population.¹⁹⁶ This is one of the main overall priorities set out in the Scottish Government's economic strategy, with a focus on actions relating to employment and access to this employment.¹⁹⁷ It is key that the principles of inclusive economies are implemented in practice in Scotland.

Section 3: Taxation

Aim: The inequality of extreme wealth concentration which leads to health inequalities is reduced

As outlined above, the poorest people in society suffer the highest levels of illness^{198 199} and income inequality across a society affects public health and wellbeing overall.²⁰⁰ On a population level, lifting the poorest people out of poverty can benefit the health of the whole population, as well as reduce health inequalities.²⁰¹ Fairer individual and corporate taxation could generate revenue to increase funding for public services.

At UK level

17. Address tax evasion and avoidance among individuals and corporations as a means of achieving fairer taxation across the UK.

18. Increase taxation of wealth, assets and corporate profits, reverse the concentration of asset ownership and reregulate the financial industry.

We know that inequalities in wealth are detrimental to population health.²⁰¹ Wealth inequality allows richer groups to receive substantial unearned income (e.g. from rents, profits, capital gains) which exacerbates income inequalities. The UK currently has an extreme level of wealth concentration. This has resulted from the deregulation, privatisation and reduced taxation in relation to the ownership of housing, land, companies and financial transactions. As Oxfam recommends, “governments must ensure corporations pay...fair taxes and take responsibility for their impact on the planet”.²¹ The income generated from these approaches could provide greater resources for public services, including NHS treatment services, public health services and social care services.

At UK and Scottish level

19. Introduce more progressive, and therefore fairer, income tax bands and rates to narrow income inequalities across society.

At Scotland level

20. Use fiscal powers to narrow inequalities by replacing council tax with a fairer alternative.

Population health can be improved by any policy that increases average household income, but to reduce health inequalities a policy must be progressive, disproportionately increasing incomes for the most deprived people over the least deprived people. Analysis has shown that council tax is only weakly linked to property valuation (being based on property values which are between 15 and 27 years out of date). It is also a regressive tax which takes a higher proportion of the incomes of poorer groups, and could be replaced with fairer alternatives.²⁰² The money generated could be used to invest in public services, which would in turn support population health.

Section 4: Public services

Aim: Public services are able to contribute significantly to preventing ill-health and premature mortality and can provide timely, high-quality services

After the introduction of the range of policies aimed at reducing the deficit in the UK (austerity), real terms reductions in some aspects of public spending led to pressures on NHS and local authority service provision. There have been greater reductions in England than in Scotland or Wales.^{134 203} These cuts impact on a wide range of services, including education, culture and leisure, housing and some support services for those with particular needs (e.g. disabilities or substance misuse issues).

Public funding for social care for adults has fallen considerably; it was reduced by 21% between 2009/10 and 2015/16.²⁰⁴ Adult social care comprises a support system which aims to encourage independence, and support the wellbeing, of those in our communities who have a disability or frailty from increasing age or a long-term condition. This support can range from providing meals and help with medication at home, to the running of care homes. In England, Scotland and Wales, local authorities are charged with purchasing and delivering adult social care. Pressures on such services can increase or become obvious when additional external challenges are present, for example a particularly severe winter or a bad influenza season.

At UK and Scottish level

21. Increase public sector funding for preventative services, resist privatisation of clinical care and ensure proportionate universalism of service provision.

Privatisation of health and social care services in the UK increased after the introduction of the Health and Social Care Act 2012. This appears to have increased costs without commensurate improvements in services, and with increased inequalities by age and socioeconomic position.^{205 206 207 208 209} As

described by Julian Tudor Hart, we know that where there are market incentives within the health service, the availability of good healthcare tends to vary inversely with the need of the population served (the 'inverse care law').²⁰⁶ Enhancing provision of health services in areas of greater need (e.g. through longer appointment times and greater support in the most deprived communities/with groups who have higher needs) is likely to help mitigate against inequality (i.e. 'proportionate universalism').²¹⁰

22. Reverse the reductions to social care funding and put in place an increase now to compensate for the loss of real income incurred since 2010.

There is evidence that cuts to health and social care spending, along with increased service demands and unmet need, may partly explain the recent mortality trends in England.²¹¹ When financial pressures are coupled with an ageing population and associated increased demands, even an uplift in social care spending to pre-2010 levels may not be enough; the social care system will still be underfunded in real terms if that increase does not match the increase in service demand.

23. Change drugs legislation to reduce drug harms as part of accepting the recommendations of the cross-party Westminster committee on drugs harms in Scotland.

Make the necessary changes to the Misuse of Drugs Act 1971 to enable the Scottish Government to pursue their public-health approach to drugs policy (including the piloting of harm reduction interventions such as safer consumption facilities and drug checking services), or devolve the powers in this area. Change legislation to decriminalise possession of drugs for personal use. Review the potential for the legalisation of drugs in order to reduce associated harms. Accept all of the recommendations of the cross-party Westminster committee on drugs harms in Scotland.²¹²

At Scottish level

24. Increase funding for public services back to 2010 levels as a minimum, particularly for local government.

Increasing available funding will increase the capabilities and resilience of NHS treatment services, public health services, addiction services, housing services and health and social care, all of which support the health of the population.

25. Implement a public-health approach to drugs services.

A public-health approach to drugs services would mean improving accessibility and acceptability of services by ensuring easy access to same-day prescribing and choice of treatment to effectively meet individual needs. Develop effective person-centred multi-agency addiction service delivery models that engage service users as partners in the management of their own health needs in order that an effective whole-system response can be made to problematic drug use in Scotland, and result in lives saved. We note that Scottish Government's pre-COVID-19 Programme for Government stated they would 'consult on drug law reform, setting out the changes we would want to make to the 1971 Act in the event that UK Government agrees to devolve the powers in the Act'.²¹³ We recommended any drug law reform takes a public-health approach. For a timely and proportionate response we recommend that Police Scotland, under the authority of the Lord Advocate, is enabled to implement Recorded Police Warnings for all controlled drugs (not just cannabis) as an alternative for personal possession offences. By providing police officers with an alternative to arrest in appropriate cases with immediate effect this can reduce barriers to services by tackling stigma and preventing disruption in people's lives. The recent increases in the availability of naloxone, including by Police Scotland, are welcome.

At local level

26. Design local services for the populations they serve, involving citizens in the design of services wherever possible.

Local services should be designed in line with the best available evidence in proportion to need through the use of public health needs assessment and service redesign processes. In the medium term, Scottish NHS Health Boards should work together to determine the true needs of the population and design services in accordance to those needs, such that they will address the longstanding inequalities and improve outcomes. This should include non-price barriers; a 'did not attend' event could be used as a signal that extra help is needed (not as a signal that someone needs to be punished by denying them healthcare). Such an approach should be aligned with the Scottish Government's Realistic Medicine work,²¹⁴ moving away from high-cost, low-value medical interventions towards more effective, efficient and culturally appropriate care.

Section 5: Material needs

Aim: Address the prohibitively high cost of living well

The next subset of recommendations focuses on policy approaches to help mitigate the negative impacts of poverty on health including those related to poor housing and poor nutrition. The recommendations in this section build upon those described under social security. These recommendations have become even more urgent as costs have increased rapidly in early 2022, particularly for the lowest income groups.

At UK and Scottish level

27. Eliminate fuel poverty.

Target cold and damp housing, and people who struggle to afford fuel, by implementing affordable heating, ventilation and quality energy efficiency

measures. This should ensure that housing across all sectors achieves this standard quickly without barriers being put in place that lead to differential access across the population. Lack of protection from the cold indoors has been identified as a factor in excess winter mortality.²¹⁵ This is particularly crucial given the recent increases in fuel costs in the UK.

28. Help prevent poverty by growing a social rented housing sector that is accessible, affordable and provides secure tenancies.

29. Extend the housing quality standard to the private rented and tied housing sectors, avoiding associated rental increases or reduced housing availability.

The role of social housing is becoming more prominent in an insecure labour market and supporting the growth of affordable and secure housing prevents poverty. In addition, the implementation of the Joseph Rowntree Foundation's proposal for a 'living rent', whereby social housing rental costs would be directly linked to local earnings, would make housing costs across the country fairer.²¹⁶

An extension of the Scottish Housing Quality Standards to the private rented sector and tied housing sectors in Scotland, alongside measures to control rents, would help to ensure that the whole population has access to affordable high-quality housing.

30. Eliminate food poverty.

To increase understanding of their prevalence, nature, causes and consequences, food poverty levels should be appropriately monitored. It should be publicly recognised by government that emergency food provision should not replace, or form an integral part of, an adequate social security net; a human rights-based approach means a move away from the benevolence model of food aid and food banks towards enabling environments that support people in feeding themselves. Poverty influences what people can afford to buy, cook and consume, partly because 'healthy' diets are around a third more expensive than 'unhealthy' diets.²¹⁷ In addition, precarious employment

can influence eating patterns both via stress eating due to a low-control job and lack of regular mealtimes due to work patterns. This can influence obesity, diabetes and cardiovascular disease patterns in people experiencing both poverty and precarious employment. It is therefore important to ensure that effective actions on both food poverty and the obesogenic environment are quickly implemented.

31. Develop and commit to targets to reduce child poverty across the UK.

These could be at least as ambitious as those detailed in the Child Poverty (Scotland) Act 2017. By 2030, Scotland aims to have:

- fewer than 10% of children living in families in relative poverty
- fewer than 5% of children living in families in absolute poverty
- fewer than 5% of children living in families living in combined low income and material deprivation
- fewer than 5% of children living in families in persistent poverty.

The plans to deliver on these commitments in Scotland are detailed in Every Child, Every Chance: The Tackling Child Poverty Delivery Plan 2018–22.^{218 219} It has been estimated that eliminating child poverty in the UK would save the lives of 1,400 children under 15 years of age annually.^{220 221}

At Scottish level

32. Increase the provision of social housing in Scotland.

As the Joseph Rowntree Foundation has stated, Scotland has an advantage in both the cost of housing and type of housing available and, because of this, poverty rates measured after housing costs in Scotland are markedly lower than in the rest of the UK. However, there are still long social housing waiting lists across Scotland and housing remains unaffordable in many local authority areas to young adults.^{19 222 223}

At a local level

33.Reduce the cost of public transport for those most in need.

The cost of public transport is significant for those living in poverty; particularly for those living in peripheral estates and rural areas. Transport services may be better managed locally, and free or subsidised transport for those on low incomes could significantly improve accessibility to education, employment and services. Lack of access to transport restricts access to activities and opportunities that improve people's life chances, such as education, work, food shopping and healthcare, and thereby contributes to social exclusion.²²⁴ This should be implemented alongside the Scottish Government's Scotland-wide free bus travel for those aged under 22 years of age.

Section 6: Obesity

At all levels

34.Implement and evaluate an evidence-based whole-system obesity strategy which prioritises actions that address the commercial determinants of obesity, and takes a structural approach.

The prevalence of obesity increased rapidly between the 1990s and around 2010. The Foresight Report¹¹⁴ detailed how this was due to the creation of an obesogenic environment in which multiple systems interacted to make an average gain in weight more likely across the population. It is clear that an effective strategy would take a population-wide, structural approach, which addresses the commercial determinants of obesity, and which would be more likely to reduce inequalities.²²⁵

Section 7: Improved understanding

Aim: Ensure both the public and policymakers are aware of structural drivers of health and wellbeing, the recent negative impacts of changes and are ready to act

This section is included to recognise the importance of, and prioritise the need to work to further understand, deprivation and the mechanisms which are leading to the unprecedented stalling and decline of life expectancy in the UK.

These two recommendations reflect the importance of the public understanding of the nature of the evidence base around the recent mortality trends and the implications of what we have seen.

UK level

Despite numerous approaches, the Department for Work and Pensions (DWP) and Her Majesty's Revenue and Customs (HMRC) have blocked requests by researchers to link NHS and mortality data to DWP or HMRC records which would allow better quality evaluations to take place, and facilitate the mortality impacts of policy changes to be estimated. The current situation reduces collective understanding of the impacts of policy and restricts the implementation of evidence-informed policy and reduces public policy accountability.

35. Facilitate linkage between DWP, HMRC, NHS and mortality records to allow for the health and mortality impact of policy changes to be accurately evaluated.

At all levels

36. Commit to taking the necessary action to respond to the changes in life expectancy trends.

The causes and implications of stalling life expectancy are important to the UK and all devolved governments; collaborative discussion about the reasons and opportunities for action through policy will remain important until life expectancy trends return to their pre-2012 trajectory.

37. Public health leaders should advocate for action to reduce the health inequity that leads to stark inequalities in premature mortality.

Public health advocates, including local public health professionals and national bodies, should take action to support the public, and wider public health community's understanding of recent adverse mortality trends. Explicit teaching on the impact of health inequity should be incorporated into training of multi-disciplinary professionals in all relevant areas of health and care training.

38. Commit to a programme of ongoing monitoring and research to deepen understanding of the causes of the stalling (including for groups where there are limited data, such as ethnic minorities), and to broaden understanding of the trends beyond high-income countries.

Ongoing monitoring of mortality trends within Scotland, across the UK, and internationally, are all required to assess whether the responses to the trends have been sufficient. Deepening the understanding of the causes of the trends through further high-quality and peer-reviewed research is necessary if policy is to be informed by evidence. This should extend to analyses beyond high-income countries as the extent to which there is evidence of stalling elsewhere has not been assessed in detail.

39. Improve and modernise the measurement of poverty.

This could follow the recommendations of the Social Metrics Commission.²²⁶ This measurement framework captures unavoidable costs people face in childcare and disability costs, and considers the wider financial resources available to people. It also assesses the depth and persistence of poverty and includes data on 'lived experience indicators' to give a broader picture of the nature of poverty as it is experienced in the UK today.

Section 8: Social recovery from COVID-19

Aim: Ensure the prioritisation of the actions in this document within the social recovery from the pandemic

This section has been added in response to the COVID-19 pandemic. The pandemic has exacerbated the issues of stalling and worsening life expectancy as a result of both the health, social and economic impacts of COVID-19 infection, and of the measures put in place to control the virus.²²⁷ These impacts have been felt most acutely by those on lower incomes, more deprived areas, and by those in ethnic minorities.

At all levels

40. Incorporate and prioritise the actions in this document within the plans for social recovery from the COVID-19 pandemic.

Incorporation of actions in this document into local, Scottish and UK level plans for social recovery from the pandemic would provide important opportunities to effect change. Work towards these actions should continue to be prioritised alongside the other key areas requiring the attention of public health professionals at this critical time.

Appendix 1: Summary of obesity contribution methods

This appendix briefly summarises the work to estimate how much of the recent stalling of improvement in mortality in Scotland and England is attributable to increased obesity prevalence.

Methods

We calculated Population Attributable Fractions (PAFs) for the increase in obesity prevalence between the mid-1990s and late 2000s in relation to all-cause mortality for 35–89 year olds in Scotland and England. We used obesity prevalence data from the Scottish Health Survey and the Health Survey for England, and previously published hazard ratios (HRs) from a meta-analysis of 89 European studies (based on c.14 years follow-up). PAFs were applied to mortality data for 2017–19, enabling calculation – and comparison – of observed rates, obesity-adjusted rates (i.e. excluding deaths attributable to the obesity increase) and 1991-based projected rates (i.e. predicted rates had the stalling in improvement not occurred). All rates were European age-standardised (EASRs) and stratified by sex. Sensitivity analyses included the use of different HRs, age groups, and base years for projections. DAGs and other tools were used to assess likely bias.

Results

The observed EASR for 35–89-year-old males in Scotland averaged across 2017–19 was 1750.7 (95% CIs 1728.6, 1772.8). This reduced marginally to 1718.8 (1696.9, 1740.7) after exclusion of obesity-related deaths, but was still notably higher than the projected EASR of 1447.1 (1426.9, 1467.3). The values for the individual years are used in Section 4.5. The change in obesity therefore potentially ‘explained’ 10.5% of the difference between the observed and projected rates. For females, 13.6% of the difference could be attributed in this manner. However, the figures for England were notably higher: 20.1%

for males; 35.1% for females. Sensitivity analyses and bias assessment suggested the potential for overestimation of effect size; however, the degree is difficult to quantify.

Conclusions

A number of uncertainties are associated with PAF-based methodologies: thus cautious interpretation of results is required. A proportion of recent mortality changes may be associated with earlier changes in obesity prevalence. However, much larger proportions are not explained by obesity, and are therefore likely attributable to previously articulated causes such as austerity. Policies are therefore required to both reverse the damaging effects of austerity, as well as to address the negative consequences of the well understood obesogenic environment in the UK.

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