

Health Inequalities in Scotland

Trends in deaths, health and wellbeing, health behaviours, and health services since 2000



APPENDICES

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Health inequalities in Scotland:
An independent review

Version history

A correction was made to the original appendices document on the 17th January 2023. Figure D.1.1. was updated to include the correct percentage of the population in the least deprived decile of areas of different areas of Scotland. Table B1 was updated to include a summary of the availability of data on inequalities in social care outcomes in Scotland.

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Appendix A. Stakeholder engagement: summary of process and insights

To inform the focus and presentation of the report, and its integration with the companion report(s), a process of stakeholder engagement was undertaken. Seven one-to-one meetings were held with nine stakeholders, representing third sector organisations (health, community, poverty), local government, Scottish Government, public health and press/media. Insights were shared on the project scope, key content to include, presentation preferences, accessibility and language/framing. Alongside these specific insights, stakeholders offered interesting research questions, and directions for rigorous examination of the intersections between research, policy making, advocacy and public engagement around health inequalities. Unfortunately, due to the scope and timescale of this project we were unable to address some of the most innovative and ambitious suggestions, however, these warrant close consideration for future research and engagement. Below is a summary of the key themes.

Preconceptions and expectations

Several stakeholders conveyed some sense of health inequalities being “overdone” in terms of data/evidence describing the problem. Despite this, most acknowledged the value of the report, and highlighted potential contributions it could make by:

- Bringing things up-to-date, in the context of COVID-19 and the cost-of-living crisis
- Presenting complexity: fundamental causes, extent/gradient of inequalities as well as multiple/overlapping disadvantage
- Saying it differently, e.g. framed positively, addressing stigma, emphasising injustice/solidarity
- Making it accessible: less technical/academic and offering commentary/synthesis
- Including new voices, e.g. from qualitative research, direct lived experience, and under-served groups
- Confirming that “this is not inevitable” but the result of policy decisions

And in relation to the Scottish context, substantive focus on:

1. Early years – differences to rest of UK in childcare, Scottish child payment, education policy & child poverty action plan
2. Drug deaths – given the unfavourable comparison to other UK nations
3. Ethnicity – differences in Scotland compared to rest of UK in terms of diversity, and what this means for outcomes, services etc

Perceptions of the challenges associated with producing the report included: the enormity of the task; the crowded landscape in terms of evidence/voices; and the potential to enable lifestyle drift or shift focus from fundamental causes because the report brief is to describe inequalities in health outcomes and health-related behaviours (and not on the social determinants of health, which are the focus of a separate report being produced by the Fraser of Allander Institute). Despite these concerns, all stakeholders offered generous comments on what would be useful substantive issues to cover, and the best ways to present and frame content.

Limitations (of existing evidence/data, predominantly Long-term monitoring of health inequalities reports)

The Long-term monitoring of health inequalities reports, which are published annually by Scottish Government, were universally described as an important and credible source of data/evidence. However, limitations were mentioned in relation to how they are presented and used. Some stakeholders were keen to see more interpretation of data/findings and more narrative content. Some related this to the difficulty of interpreting differences in direction of trends in absolute and relative inequalities, and in interpreting the relative and slope indexes of inequality (these

measures are briefly explained in Appendix D). Others mentioned the importance of considering health outcomes in the wider context of the social determinants of health and policy landscape, and some suggested findings should be more integrated with lived experience data.

Outcomes for inclusion

Stakeholders were broadly supportive of including a range of health outcomes as trends over time. Particular emphasis was given to healthy life expectancy: as a key policy target; because it is a measure that is meaningful to citizens and because it shows stark inequalities. Many also advocated for inclusion of physical activity measures, given this is an area of current policy attention. Cancer was also mentioned by some stakeholders as an important outcome for inclusion.

Despite some interest in showing trends in physical activity, various stakeholders were ambivalent about the inclusion of health behaviour trends and others were keen these be excluded from the report. Several stakeholders mentioned potential for supporting a “judgy” narrative, placing blame on poorer communities for poorer health outcomes.

Spotlight topics

Across the interviews, stakeholders were positive about the proposed Spotlight topics - no comments suggested any were inappropriate. However, some hinted at potential tensions to be resolved in presenting/structuring and framing. Some stakeholders expressed a concern to balance any focus on the most marginalised groups with emphasis on the importance of gradients and the impact of inequalities across the population. Others discussed the importance of ensuring the underpinning/most important issues were not reduced to the same level as important (but less fundamental) issues. Some also mentioned a concern with discussing place-based approaches and focus on communities at the expense of a focus on fundamental causes.

Geography

Stakeholders were asked about any important geographic comparisons to consider in the report. Several stakeholders mentioned the relevance of exploring differences, in terms of health outcomes, health-related behaviours and social determinants between urban and rural areas, with an interest in the particular character of deprivation in some rural areas, including issues around transport, public services and housing being different in urban areas. More nuanced comparisons were also of interest - suburban areas were mentioned and a particular interest in large towns impacted by post-industrialisation. Several stakeholders also mentioned an interest in the particular issues faced by the largest city, and within the “intense pockets of deprivation” found in Glasgow and Dundee. There was generally less interest in, and a concern to avoid, comparing Glasgow and Edinburgh.

Two stakeholders described finding the [Local Government Benchmarking Framework](#), which compares clusters of similar areas, useful. This was of interest in relation to identifying policy successes, but also as a more useful and less stigmatising way to compare areas. Generally, maps were considered a useful, accessible and interesting way of presenting data/findings.

Presentation

Presentation of trends and Spotlights was discussed at length, based on the various examples shared. Stakeholders articulated the importance of considering the audience to establish the correct tone. Most suggested that the examples of trends and Spotlight charts could be simplified to improve accessibility - clear labelling, avoiding jargon and better use of boxes and explanations were all advised. Good design and infographics were generally seen as positive additions. However, some stakeholders expressed caveats to over-simplification, and use of metaphors which obscured relevant complexity.

Framing and language

Stakeholders were asked about language and framing of evidence in relation to health inequalities. The potential for evidence to contribute to stigmatising individuals and communities was highlighted as a key concern across almost all interviews. In particular, the characterisation of areas and communities as of high deprivation, and therefore doing worse in terms of life expectancy was deemed problematic. Repetition of the message that health inequalities exist and are particularly stark in Scotland was seen by some stakeholders as potentially disempowering to citizens - a further report to this end might suggest these differences are intractable, and a deeply embedded national problem. In addition, presentation of inequalities in health-related behaviours was described as particularly problematic, promoting, or aligning with, moralising discourses. Strategies mentioned for addressing these were: including lived experiences in the report that reflect the complexity/diversity within groups/outcomes, and/or developing alternative framing and language in collaboration with communities – that foreground injustice, establishes the current state is resultant from policy decisions, and calls for action.

Appendix B. Results from the data scoping exercise

The Table B1 overleaf details data coverage for different areas of health, according to different stages of the life course. Below, we briefly summarise the main data gaps that were identified. Please note, this scoping exercise (carried out in spring of 2022) was not intended to provide an exhaustive list of all possible data sources, but those most likely to be useful for examining trends in inequalities in health for this report. We provide these below, in case helpful as a source of reference.

Gaps in outcomes:

- Healthy and successful ageing
- Multimorbidity and co-occurrence of poor health and wellbeing
- Disaggregated mental health (e.g. anxiety, depression, eating disorders) – in comparison to specific respiratory diseases or cancers.
- Menstrual health and fertility (e.g. endometriosis)
- Relationships and social health outcomes (Including sexual health, intimate partner violence, loneliness)
- Violence
- Potential gaps/areas to monitor in the future:
 - Online risks
 - Anti-microbial resistance
 - Climate crisis indicators (vulnerability to extreme weather injuries, heat etc)

Inequalities

- Little data on individual socio-economic circumstances (SEC). Available SEC measures are usually income or housing tenure, and include fewer social elements (education, job class etc)
- Ethnicity - where data is available it is normally cross-sectional, meaning data are limited for examining trends
- Migration status
- There were few areas where intersectionality could be assessed using publicly available data. Intersections by geography (e.g. region) and the Scottish Index of Multiple Deprivation are available for some outcomes in administrative data. Surveys offer a greater range of SEC and demographic measures, but the sample sizes limit potential to examine intersectionality.

Missed populations in administrative records and survey data

- Those living in unstable housing or communal institutions
- Those with barriers to participate in surveys (limited internet/phone access; disabilities; limited time, for example due to caring responsibilities; those who are most unwell) – these groups are less likely to be excluded from routine data³

Table B1: summary of data availability for documenting trends in health inequalities in Scotland, ordered according to the life course

		SIMD	Individual SEC	Ethnicity	Sex	Disability	Regional	Other
Gestation	Birthweight	1996-20	2004/5 ¹ *	2001-8 grouped ^d *	*		2002-21	*
	Smoking/drinking in pregnancy	2003-20	2004/5, 2010/11 ¹ *	2001-8 grouped ^d *			2003-20	*
	Antenatal booking before 12 weeks	1997-21		2021			2020-21	Mother age 1997-21
	Preterm birth	2014-20		2001-8 grouped ^d			2002-21	
	Congenital abnormalities	2000-19			2000-19		2000-19	Mother age 2000-19
Early years	Ante-natal smoking	2000-19					2000-20	
	Child development milestones	2014-20	*	2014-20	2014-20		2013-20	English as main language, looked after child 2014-20
	Breastfeeding	2003-21	2004/5 & 2010/11 ¹	2016-21			2002-21	Care experienced children 2016-21, Mother age 2003-21
	Infant immunisations	2009-21	2009-13				1997-21	
	Infant mortality	2000-19	2000-19		2000-20		2002-20	
	Parent mental health	2005-8 grouped & 2010 ¹	2005-8 grouped ¹ ; 2007/8; 2013/14 ¹					Family structure, Urban/rural, social support, mother age 2005-8 grouped ¹
Mid-childhood to adolescence	Smoking or drug use	2015 and 2018 ⁴	*	*	2015 ⁴ *	2015 and 2018 ⁴		Family structure 2015 and 2018 ⁴ *
	Teenage pregnancy	2010-19			NA		2004-18	
	Drinking	2015 and 2018 ⁴	*	*	*	2015 and 2018 ⁴	2002-20	Family structure and urban/rural 2015 and 2018 ⁴ *
	Adverse Childhood Experiences	2019 retrospective ² ; 2004-12 grouped ¹	2019 retrospective ² ; 2004-12 grouped ¹		2004-12 grouped ¹	2019 retrospective ²		Mother age, urban/rural 2004-12 grouped ¹
	Unintentional injury	2009-18 grouped ^d ; 2021	2009-18 grouped ^d		2011-21		2005-20	Relationship status of parents at birth 2009-18 grouped ^d
	HPV vaccination	2014-20					2014-20	
	Dental	2009-19					2012-20	
	General self-rated health	2008-19 ²	2012-19 ²		2008-19 ²	2008-19 ²	2006-13	Sex and family affluence intersection 2017/18 ³
	Mental health	2008/9 ¹ , 2015 and 2018 ⁴	2008/9 ¹ *	*	2002-20 *	2015 and 2018 ⁴	2010-13 grouped	Caring responsibility 2015 and 2018 ⁴ *
Overweight and obesity	2001-20	*	*	*		2002-19	*	

Adulthood	COVID-19 hospital admissions	2020-21		2020-21			2020-21	
	Cardiovascular: CVD, CHD, heart attacks, stroke, angina	1997-20, 2002-21	2008-19 ² *	2008-11 grouped ²ⁱ	2008-19 ² *	2008-19 ²	2002-21	Religion and sexual orientation 2008-11 grouped ² *
	Gastrointestinal diseases			2001-10 grouped ⁱ				
	Cancer (incidence or deaths)	1997-19	*	2001-8 grouped ⁱ *	*		2002-18	*
	Respiratory disease e.g., Asthma	2008-19 ² and 2002-21	2012-19 ²	2001-10 grouped ⁱ *	2008-19 ²	2008-19 ²	2002-21	Intersection ethnicity & SEC at area, household and individual level 2001-10 grouped (8 measures of SEC) *
	Diabetes		*	2013-20	2002-20	2008-11 grouped ²	2005-20	Sexual orientation and religion 2008-11 grouped *
	Alcohol (consumption; hospitalisation; deaths)	1997-20	2012-19 ²	2001-10 ⁱ &	2008-19 ²	2008-19 ²	2002-20	Sexual orientation and religion 2008-11 grouped ² *
	Drug use	1996-21	*	*	2002-20		2002-20	*
	Smoking or e-cigarettes	2008-19 ²	2012-19 ²	2008-11 grouped ² *	2008-19 ²	2008-19 ²	2002-20	Sexual orientation and religion 2008-11 grouped ² *
	Breast screening uptake	2003-19					2010/11-2018/19	Urban/rural 2003-19
	Bowel screening uptake	2015-21			2015-21		2015-21	
	Cervical screening uptake	2006-9; 2020					1997/98 – 2020/21	Age 1997/98 – 2020/21
	Mental wellbeing	2002-21	2012-19 ²	2008-11 grouped ² *	2008-19 ²	2008-19 ²	2008-17	Sexual orientation and religion 2008-11 grouped ² *
	Limiting long-term illness	2008-19 ²	2012-19 ²		2008-19 ²	2008-19 ²	2012-19 ²	Ethnicity and SEC intersection 2011 ⁱ
	General self rated health	2008-19 ²	2012-19 ²	2008-11 grouped ²	2008-19 ²	2008-19 ²		Sexual orientation and religion 2008-11 grouped ²
	Overweight and obesity	2008-19 ²	2012-19 ²	2008-11 grouped ²	2008-19 ²	2008-19 ²	2012-19 ²	Sexual orientation & religion 2008-11 grouped ² , urban/rural 19-20
	Feeling safe	2013-19 ²	2013-19 ²	2013-19 ²	2013-19 ²		2013-19 ²	Urban/rural 2013-19 ²
	Unintentional injury	2011-21		2001-13 grouped ⁱ	2011-21		2011-21	
	Repeat emergency hospitalisation	2002-15					2002-15	
	Activity and diet	2008-19 ²	2008-19 ²	2008-11 grouped ²	2008-19 ²	2008-19 ²	2007-19	
	Sexual health	1998-15 grouped; 2016			2010-19		2010-19	
	Patients per GP	2002-14					2002-14	
	Registration and participation with an NHS dentist	2018-21					2018-21	Intersection between age, region and SIMD 2018-21
Dental health	2008-19 ²	2008-19 ²	2008-11 grouped ²	2008-19 ²	2008-19 ²		Sexual orientation and religion 2008-11 grouped ²	

Older Age	Successful ageing score		2007/8 ⁵ⁱ					
	Dying in hospital	2002/3-2014/15					2002/3-2014/15	
	Mortality amenable to health care	2002-2014			2001-21		2019-20	
	Proportion last 6mths spent in hospital	2011-21			2011-21			Urban/rural 2011-21
Death	(Healthy) Life expectancy	2000-19⁶; 2013-20		2001-4 grouped	2000-19 ⁶ ; 2013-20		2002-18	Urban/rural 2015-20
	Premature mortality	1997-20	1991-2000 and 2000-10 grouped ⁷ⁱ	2001-13 grouped ⁱ	2006-17 ⁱ		2006-20	Social connection and sex 1991-2000 and 2000-10 grouped ⁷
	Suicide	2006-10 grouped & 2016-20; 2001-19 ⁶			2002-20		2002-20	
Social care	Criminal justice social work reports [`]		2016-21	2016-21				
	Community payback orders [`]		2016-21	2016-21				
	Fiscal work orders [`]		2016-21	2016-21				
	Diversion from prosecution cases [`]		2016-21	2016-21				
	Drug treatment and testing orders [`]		2016-21	2016-21				
	Receiving home care	2018/19						
	Home alarms and telecare	2018/19						

Key:

Green: Trend in inequality available over at least 5 years.

Yellow: Trend not available or only available for a limited geographic region.

Red: Data not available.

Superscript: Survey data source (see below), no superscript indicates routine data source.

Bold: Included in most recent Long-Term Monitoring of Health Inequalities Report.

* Potential to do novel analysis.

ⁱ Data from journal articles

⁷ No denominator present, so presents proportion of all cases from different groups. Comparability over time is not perfect.

Data sources:

Below are brief descriptions of the datasets referred to in Table B1.

Outcomes in the table without superscripts are documented in administrative data sources, which include:

- Census data, Hospital and NHS records; death registers; SCI-diabetes; Child Health Surveillance Programme School system; SHELS; Scottish cancer registry
- Often requires engagement with health-care services and residence in Scotland

¹ Growing Up in Scotland *birth* cohorts: <https://growingupinScotland.org.uk/about-gus/>

- 5217 children born 2004/5 and 6127 born 2010/11
- Sampled families at random from Child Benefit records, invitation by letter, interview face-to-face
- Population representative, but maybe missing children in care or unstable housing
- Provides limited picture of trends (comparisons only between two time points corresponding to the two birth cohorts)

² Scottish surveys:

- Annual publications of 3 cross-sectional household surveys: Scottish Household Survey; Scottish Health Survey and Scottish Crime and Justice Survey
- Systematic random sampling used to select the addresses from the Postcode Address File with the addresses ordered by urban-rural classification, SIMD rank and postcode (two-stage, clustered sampling)
- Often excludes prisons; hospitals; military bases; nursing homes; student halls of residence; communal establishments, mobile homes; sites for travelling people. May miss those recently or not stably settled in Scotland. During the COVID-19 pandemic misses those without telephone or internet access
- Addresses selected for any of the surveys (SHS, SHeS, SCJS) are removed from the sample frame for a minimum of 4 years so that they cannot be re-sampled for another survey
- Scottish Health Survey
 - 11,691 households sampled in 2019. Annual interview target of 4,006 adults for Scotland as a whole and a minimum of 125 for each Health Board
 - Representative of adults at Health Board level (over every four-year period)
 - Interviewing was in-person up to the COVID-19 pandemic, and by phone and online self-completion during the pandemic.

Year	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Sample	8215	10138	9038	9531	6602	6732	6327	6418	5884	5300	6790	6881	1920

- Scottish Household survey
 - 10,577 households sampled in 2019
 - Interviewing was in-person up to the COVID-19 pandemic, and by phone or video call during the pandemic.
 - Lower response rate during the COVID-19 pandemic (20% compared to 63% in 2019).

³ Health Behaviours School Age Children Survey

- Cross-national school-based survey using self-completion questionnaires across 51 countries, including Scotland
- Nationally representative
- <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2732766/>

⁴ Scottish Schools Adolescent Lifestyle and Substance Use Survey

- Samples children in S2 (age 13) and S4 (age 15) in local authority and independent schools (excludes special schools). In some cases, matched to administrative data from Health Boards, Local Authorities and Alcohol and Drug Partnership
- Survey in paper format up to 2015, followed by combination of paper and online formats. Includes children in attendance at school on survey days only
- Sampled using Scottish Govt school database. Primary Sampling Units were S2 and S4 classes, stratified by local authority, school type, year group
- In 2015 61% schools invited responded, meaning 1036 classes and 21650 pupils. Pupil response rate was 91%. <https://www.gov.scot/publications/scottish-schools-adolescent-lifestyle-substance-use-survey-salsus-technical-report-2018/pages/4/>
- Results are weighted for the following variables: local authority; sex; year group; sector; denomination; rural/urban to bring distribution in line with the pupil census

⁵ West of Scotland Twenty-07 study

- Following 4510 people from 1986 to 2007/8
- Respondents were aged 35, 55 or 75 years in 2007/8
- Regional sample representative of Central Clydeside Conurbation
- The Primary Sampling Unit is the postcode sector stratified by level of employment and socioeconomic group. Individuals within each sector are then chosen for each age cohort. Additional locality sample focuses on North West and South West Glasgow. Survey tries to interview even if people have since moved to other parts of the UK
- In person interviews at home
- Not nationally representative

⁶ Glasgow Centre for Population Health

- Uses administrative data for Glasgow only
<https://www.understandingglasgow.com/indicators/population/overview>

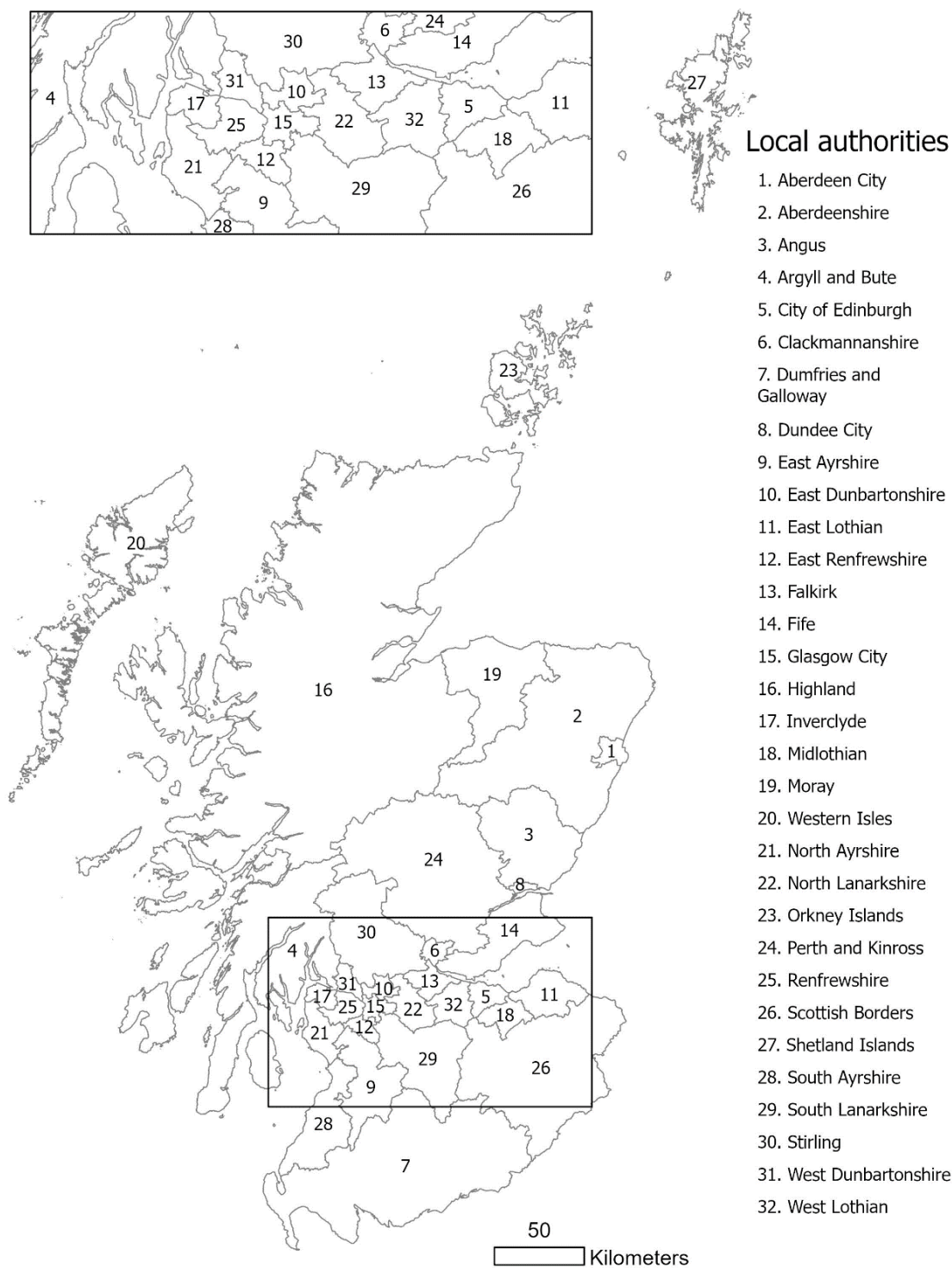
⁷ Scottish Longitudinal Study

- Links administrative data for 5.3% of the population (representative)
- Samples everyone born on one of 20 semi-random birth dates each calendar year. Must have been registered with the NHS for linkage (includes immigrants provided registered with NHS)

Appendix C. Technical information on some of the measures used

D.1. Local authorities across Scotland

Map D.1.1: Geographical location of local authorities



Author: L Macdonald, 2022. British National Grid, GCS OSGB 1936, Transverse Mercator. Local authority boundary data: Office for National Statistics licensed under the Open Government Licence v.3.0 Contains OS data © Crown copyright and database right [2022].

Table D.1.1 shows the variation in the population size of Scotland's local authorities over the past two decades. Glasgow City has consistently had the largest population share (around 11-12% of the total Scottish population), closely followed by City of Edinburgh (9-10%). Orkney and Shetland are the smallest, both home to just 0.4% of the population across the entire period.

Table D.1.1: Population size of local authorities: % share of the Scottish population in 2000, 2010 and 2020 (mid-year estimates)

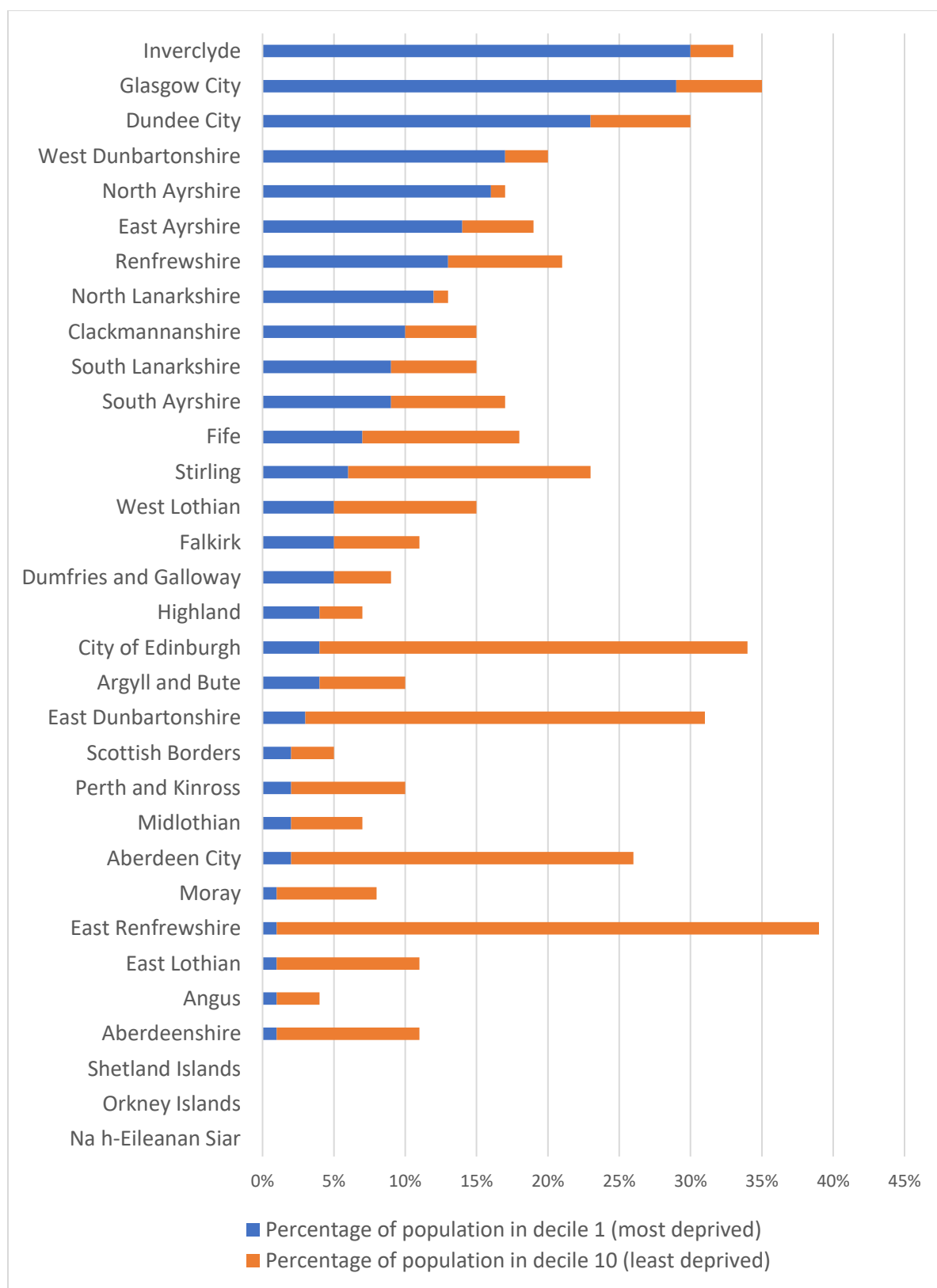
Local authority	% share 2000	% share 2010	% share 2020
Aberdeen City	4.2	4.2	4.2
Aberdeenshire	4.5	4.8	4.8
Angus	2.1	2.2	2.1
Argyll and Bute	1.8	1.7	1.6
City of Edinburgh	8.9	8.9	9.7
Clackmannanshire	1.0	1.0	0.9
Dumfries and Galloway	2.9	2.9	2.7
Dundee City	2.9	2.8	2.7
East Ayrshire	2.4	2.3	2.2
East Dunbartonshire	2.1	2.0	2.0
East Lothian	1.8	1.9	2.0
East Renfrewshire	1.8	1.7	1.8
Falkirk	2.9	2.9	2.9
Fife	6.9	6.9	6.8
Glasgow City	11.4	11.1	11.6
Highland	4.1	4.4	4.3
Inverclyde	1.7	1.5	1.4
Midlothian	1.6	1.6	1.7
Moray	1.7	1.8	1.8
Na h-Eileanan Siar	0.5	0.5	0.5
North Ayrshire	2.7	2.6	2.5
North Lanarkshire	6.3	6.4	6.2
Orkney Islands	0.4	0.4	0.4
Perth and Kinross	2.7	2.8	2.8
Renfrewshire	3.4	3.3	3.3
Scottish Borders	2.1	2.2	2.1
Shetland Islands	0.4	0.4	0.4
South Ayrshire	2.2	2.1	2.1
South Lanarkshire	6.0	6.0	5.9
Stirling	1.7	1.7	1.7
West Dunbartonshire	1.9	1.7	1.6
West Lothian	3.1	3.3	3.4
Total, number	5,062,940	5,262,200	5,466,000

Source: Mid-2021 Small Area Population Estimates Figures, Scotland¹

Figure D.1.1 overleaf shows how deprivation varies across local authorities in Scotland in 2021. The blue bars show the proportion of the population living in the most deprived tenth of areas, and the orange bars show the proportion living in the least deprived tenth of areas. It shows a picture of high variation. Inverclyde and Glasgow City have the highest deprivation levels, with almost one in three people living in Scotland's 10% most deprived areas. In contrast, West Lothian has very high proportions living in the least deprived areas, followed by Stirling, and West Dunbartonshire. West Dunbartonshire has the most varied population in terms of deprivation, with almost half of the population living either in the most or least deprived tenth of areas.

As discussed in the results chapters of this report, it is essential to bear in mind these variations in deprivation when considering geographical variations in health in Scotland – whether they be by local authority or degree of urbanicity - as any differences in health will be, to an extent, explained by deprivation.

Figure D.1.1: Proportion of population living in the most and least deprived tenths, by local authority, 2021*



Source: Mid-2021 Small Area Population Estimates Figures, Scotland¹

D.2: Scottish Government Urban Rural Classification

Table D.2.1: Description and size of settlements, according to the Scottish Government Urban/Rural Classification, 6-fold class

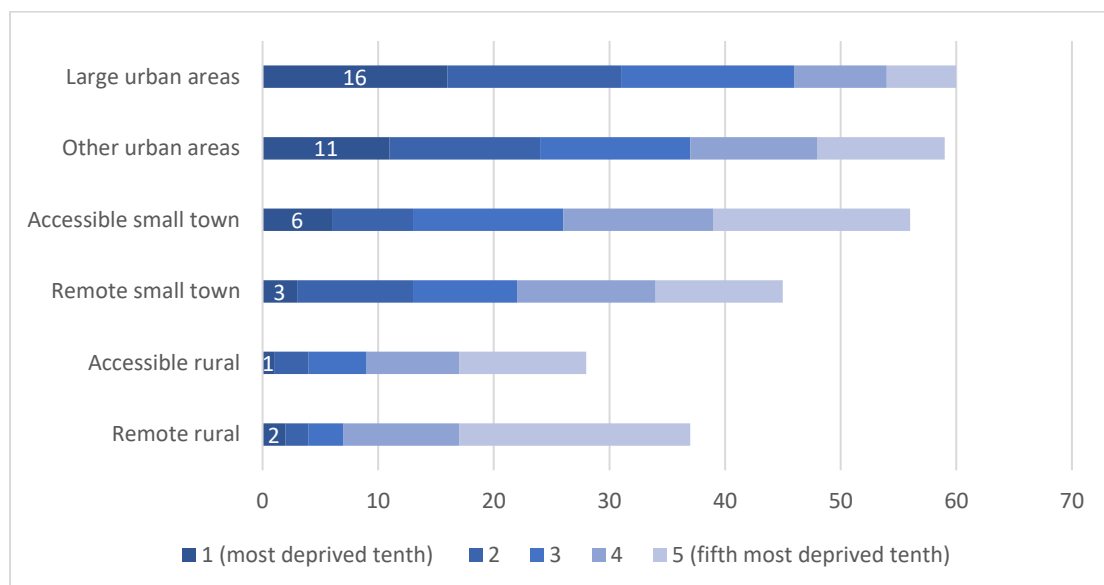
Class Name	Description of settlements *	% Scotland's population 2021^
<i>Large Urban Areas</i>	>=125,000 people	38%
<i>Other Urban Areas</i>	10,000 - 124,999 people	34%
<i>Accessible Small Towns</i>	3,000-9,999 people, within a 30-minute drive time of an urban area	8.6%
<i>Remote Small Towns</i>	3,000-9,999 people, more than a 30-minute drive to an urban area	2.6%
<i>Accessible Rural Areas</i>	<3,000 people, within a 30-minute drive time to an urban area	12%
<i>Remote Rural Areas</i>	<3,000 people, more than a 30-minute drive to an urban area	5.5%

Sources: *Poverty in rural Scotland: evidence review²; ^Population Estimates by Urban Rural Classification³

Table D.2.1 describes how settlements are characterised under the Scottish Government 6-fold urban/rural classification, alongside the proportion of the population resident in each class in 2021. The Rural Scotland Key Facts 2021 report also highlights the proportionate share of Scotland's landmass and the total population using 2019 population estimates according to a three-fold rural/urban classification which consists of remote rural areas, accessible rural areas, other areas). This shows that remote rural areas make up 70% of Scotland's land mass, although just 6% of the Scottish population live in these areas. Accessible rural areas make up 28% of landmass, with 11% population. Urban areas make up just 2% of Scotland's landmass but 83% of the population lives in them. There has been little change over the past ten years⁴.

Figure D.2.1 shows the proportion of the population living in the five most deprived tenths of areas in the most rural to the most urban settlements. As shown by the white labels, the proportion of people living in the most deprived tenth of areas in remote rural, accessible rural and small towns is just 1, 2, and 3% respectively. This is in contrast to 16% in large urban areas and 11% in other urban areas. The stacked bars show how 60% of people living in large urban settlements and 28% of people living in accessible rural settlements live in the 50% most deprived areas.

Figure D.2.1: proportion of population living in the five most deprived tenths of areas, across more rural and urban settlements



Source: Poverty in rural Scotland: evidence review

D.3. National Statistics Socio-Economic Classification (NS-SEC)

Figure 1.1 (Chapter 1, Timing and Causes of Deaths), describes inequalities in infant mortality from a paper by Harpur et al⁵. In this analysis, they used the modified five-class National Statistics Socio-Economic Classification (NS-SEC) to look at parental occupation, consisting of these groups:

1 Managerial and professional; 2 Intermediate; 3 Small employers and own account workers; 4 Supervisors/craft related; 5a. Semi-routine and routine occupations; 5b. Never worked, long-term unemployed and uncoded occupations.

Where parents were living together, the highest occupation of both parents was assigned. More detail on NS-SEC is available from National Records of Scotland⁶.

Appendix D. Guide to interpreting graphs and measures of health inequalities

Guide to reading trend graphs

Overleaf we provide a guide to reading the trend graphs which are used throughout the report to show how health has changed over time, according to area-level deprivation fifths (or sometimes tenths). Also included in these figures are text boxes and tables which quantify the degree of inequality between the most and least deprived areas.

Measures of disease frequency:

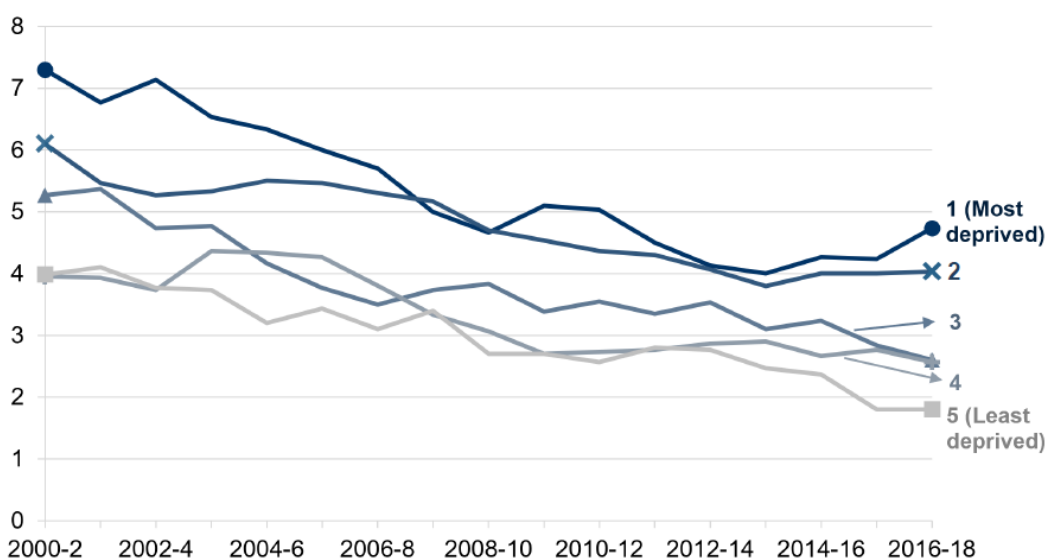
Three measures of disease frequency (the y-axis) are used in this report. These are:

1. Rates (as here) = the number of cases/deaths that occur for every 100,000 or in this case 1,000 members of the population in this year.
2. Prevalence = the proportion of the population with this disease/performing this behaviour in this year.
3. Life expectancy/Healthy life expectancy = how long a baby born in this year would live/live in good health if mortality and morbidity age-patterns remained the same across its life.

The measure used in each graph (the y-axis) is shown in the technical title directly above each graph

Figure 1.1. Children living in deprived areas are 2.6 times as likely to die before their first birthday as children in less deprived areas

Deaths in < 1-year-olds per 1,000 live births, according to fifths of area-level deprivation: 2000-2 to 2016-18.



Most deprived 1.8x as high as least. Gap of 3.3 deaths per 1000 births.

Most deprived 1.7x as high as least. Gap of 2.0 deaths per 1000 births.

Most deprived 2.6x as high as least. Gap of 2.9 deaths per 1000 births.

	2000-02	2004-06	2008-10	2012-14	2016-18
Population average (per 1,000)	5.5	4.9	4.0	3.5	3.3
Relative difference	1.8	2.0	1.7	1.5	2.6
Absolute gap (per 1,000)	3.3	3.1	2.0	1.4	2.9

Source: Harpur, A., et al., Trends in infant mortality and stillbirth rates in Scotland by socio-economic position, 2000–2018: a longitudinal ecological study. *BMC Public Health*, 2021. 21(1): p. 995.

Annotations highlight the size of inequalities at the start and end of the timeframe.

The ‘gap’ reports the size of the absolute difference in disease rate between the most and least deprived groups. For example, in 2000-2 the absolute difference is 7.3 – 4.0 = 3.3 deaths per 1,000. This number is strongly affected by the overall prevalence/rate of the disease across the entire population.

The relative difference shows how many times greater the rate/prevalence of the disease is in the more disadvantaged group. For example, in 2001 the relative difference is 7.3÷4.0 = 1.8.

Key:

The darkest blue line represents the most deprived fifth of areas (SIMD 1) and the palest grey line represents the least deprived fifth (SIMD 5).

What does it mean if the absolute and relative gaps show different trends?

The absolute gap is more affected by how common the disease/behaviour is in the population overall than the relative difference. This means that in cases where the overall frequency of the disease/behaviour is changing the absolute gap and relative difference may change in different ways. This can be seen in the example figure in the guide to trend graphs, where the absolute gap in infant mortality decreases (from 3.3 deaths per 1,000 births to 2.9 deaths per 1,000) between 2000-2 and 2016-18, but the relative difference increases (from 1.8 to 2.6). For rare diseases, absolute inequalities are likely to be small but relative differences can still be very large. Whilst the opposite can be true of absolute differences.

The absolute difference conveys the overall excess burden of disease in disadvantaged communities, whereas the relative difference is helpful for assessing whether inequalities are changing in a way which is less dependent on changes in the overall frequency of the disease in the population.

Alternative ways of quantifying inequalities: the indices of inequality

Some health inequalities publications and routine reports use the slope and relative indices of inequality (known as the SII and the RII). These provide single estimates of absolute and relative inequality, across the social gradient, which can allow for change in the size of social groups over time (e.g. numbers educated to degree level have increased).

After discussions with our stakeholders, we opted to take the simpler approach of showing data across all levels of deprivation (to show the shape of the social gradient) and using measures of inequality comparing the two extreme groups. This was considered easier to interpret and more grounded in what people wanted to know about health inequalities. For example, it allows us to consider whether the health of the most deprived groups is disproportionately worse than the others.

In order to minimise the impacts of changes in the size some socio-economic groups (e.g. the number of people with degrees has increased), we report trends in the Scottish Index of Multiple Deprivation and household income, which can easily be divided equally sized groups.

Alternative measures to the Scottish Index of Multiple Deprivation

As noted in the main report, the SIMD is made up of several domains, including a health domain. The health domain (which captures mortality rates, hospital stays related to alcohol and drug misuse, welfare claims linked to disability and ill health, emergency stays in hospital, proportion of population being prescribed drugs for anxiety, depression or psychosis, and low birthweight) has a weighted contribution of 14% to the overall SIMD score used in our main analyses. The inclusion of the health component in the SIMD potentially creates some circularity when looking at health inequalities. However, research examining the impact of removing the health domain from the SIMD score when analysing health inequalities has found it made no practical difference (Danny Bradford, Denise Brown (MRC/CSO Social and Public Health Sciences Unit), verbal communication).

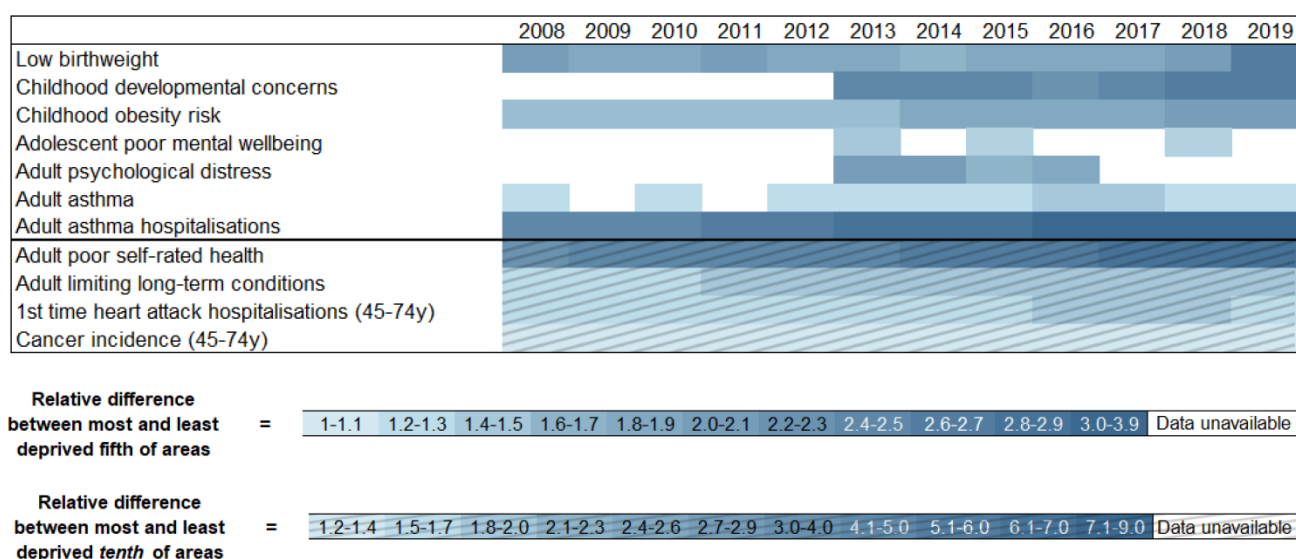
Guide to reading the synthesis heat maps

In chapters 2 and 4, heat maps are used to present a synthesis of trends in *relative* inequalities in all outcomes described in that chapter, with time running from left to right and each row representing a different outcome. The darker the shade of blue, the greater the inequality.

The unhatched rows of the heat map (towards the top) show relative inequalities between the most and least deprived *fifth* of areas for the main outcomes considered (and shown in the Figures).

Figure 2.13: Relative inequalities in health have largely been maintained

Relative inequalities between the most and least deprived fifth/ tenth of areas, 2006 to 2019, outcomes ordered by the life course.



The hatched rows beneath present inequalities in outcomes that are summarised in text form only throughout the report, because they are presented in detail in the Long-term Monitoring of Health Inequalities reports⁷. For these outcomes, relative inequalities between the most and least deprived *tenth* of areas are shown. This is an important distinction as the inequalities presented in the hatched rows are comparing more extreme groups. For this reason, the hatched area and unhatched area have their own shading schemes, shown in the two different keys.

This heat map only shows the inequality between the extremes of the socio-economic spectrum, so it is important to keep in mind that there may also be large inequalities between intermediate groups on the spectrum. The diagram shows inequalities by area deprivation because this is the most consistently available measure of socio-economic circumstances.

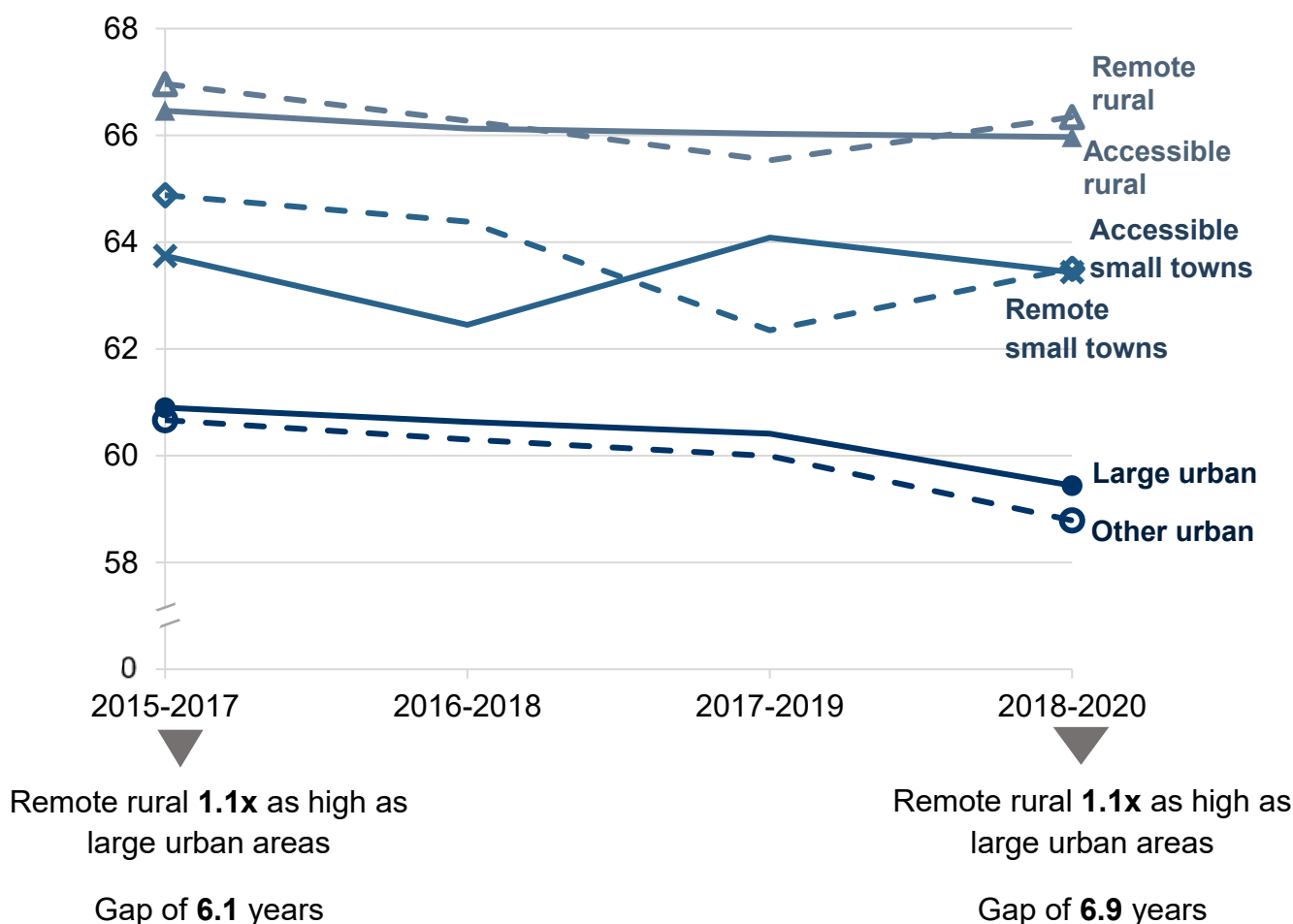
Appendix E. Additional results

Chapter 2: Health and wellbeing

E.2.1 Healthy Life Expectancy by Urban/Rural Classification

As shown in Chapter 2 of the main report, differences in healthy life expectancy between the most and least deprived tenth of areas are large, at 24 years for both men and women in 2018-20. Inequalities in healthy life expectancy are narrower between urban and rural areas, as shown below, but are still seen for both males and females. Healthy life expectancy in remote rural areas compared to large urban areas is approximately 7 years longer among men, and 4 years longer among women. Among males there is a fairly clear social gradient, with decreasing healthy life expectancy running from rural areas, to small towns, to urban areas. Among females the pattern is less clear, with remote small towns in particular showing rapid changes in healthy life expectancy across the time period. However, it is important to note that the confidence intervals around the estimates for some groups were wide, making it harder to be certain that these differences are representative of what is occurring in the Scottish population.

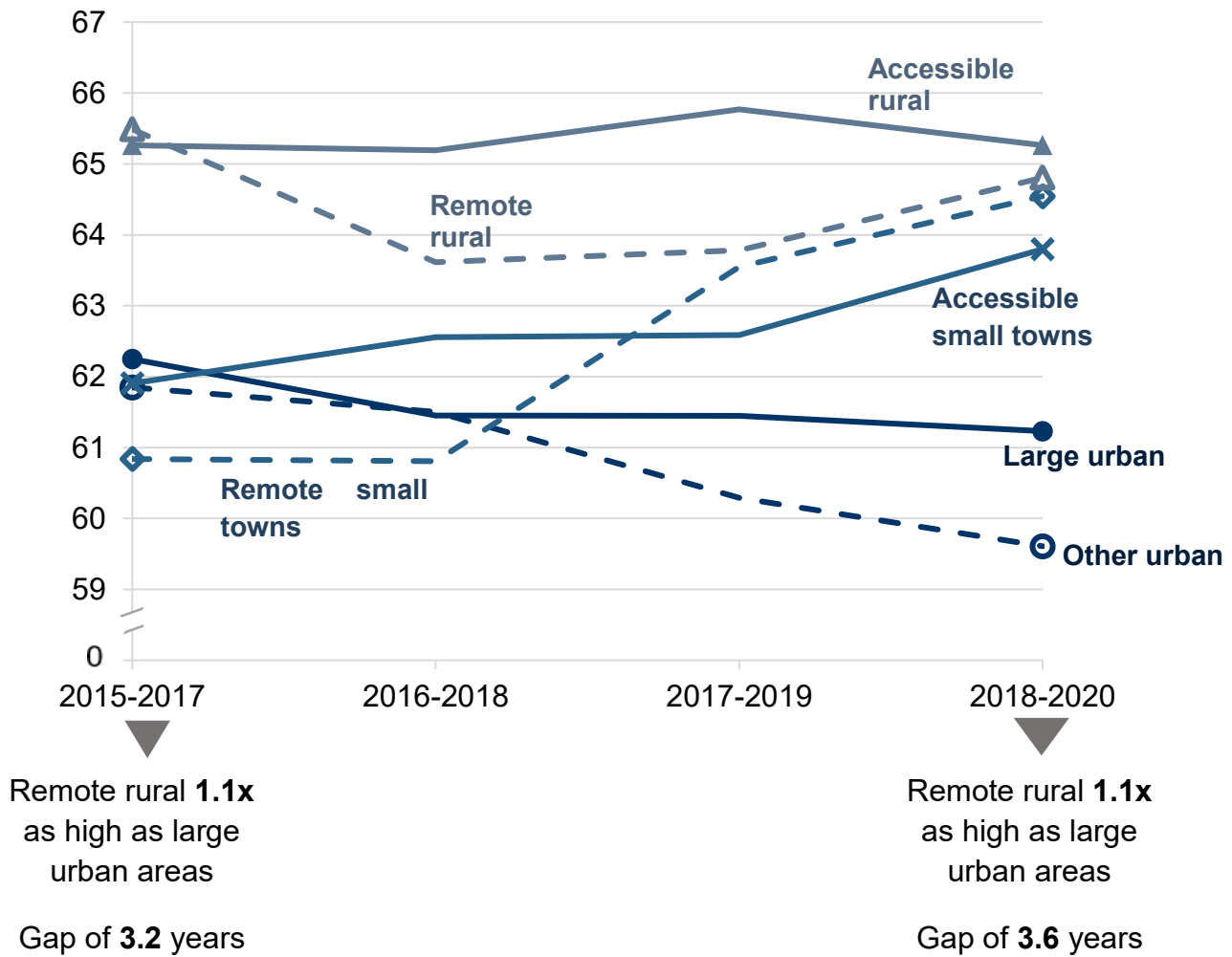
Figure E.2.1.a: Male healthy life expectancy is 6.9 years longer in remote rural areas than large urban areas.
Healthy life expectancy (years), according to the urban-rural classification of areas: 2015-2017 to 2018-2020



	2015-2017	2016-2018	2017-2019	2018-2020
Population average (years)	62.3	61.9	61.7	60.9
Relative difference*	1.1	1.1	1.1	1.1
Absolute gap (years)*	6.1	5.6	5.1	6.9

*Comparing remote rural areas compared to large urban areas. Source: National Records of Scotland.

Figure E.2.1.b: Female healthy life expectancy is 3.6 years longer in remote rural areas than large urban areas.
 Healthy life expectancy (years), according to the urban-rural classification of areas: 2015-2017 to 2018-2020



	2015-2017	2016-2018	2017-2019	2018-2020
Population average (years)	62.6	62.2	61.9	61.8
Relative difference*	1.1	1.0	1.0	1.1
Absolute gap (years)*	3.2	2.2	2.3	3.6

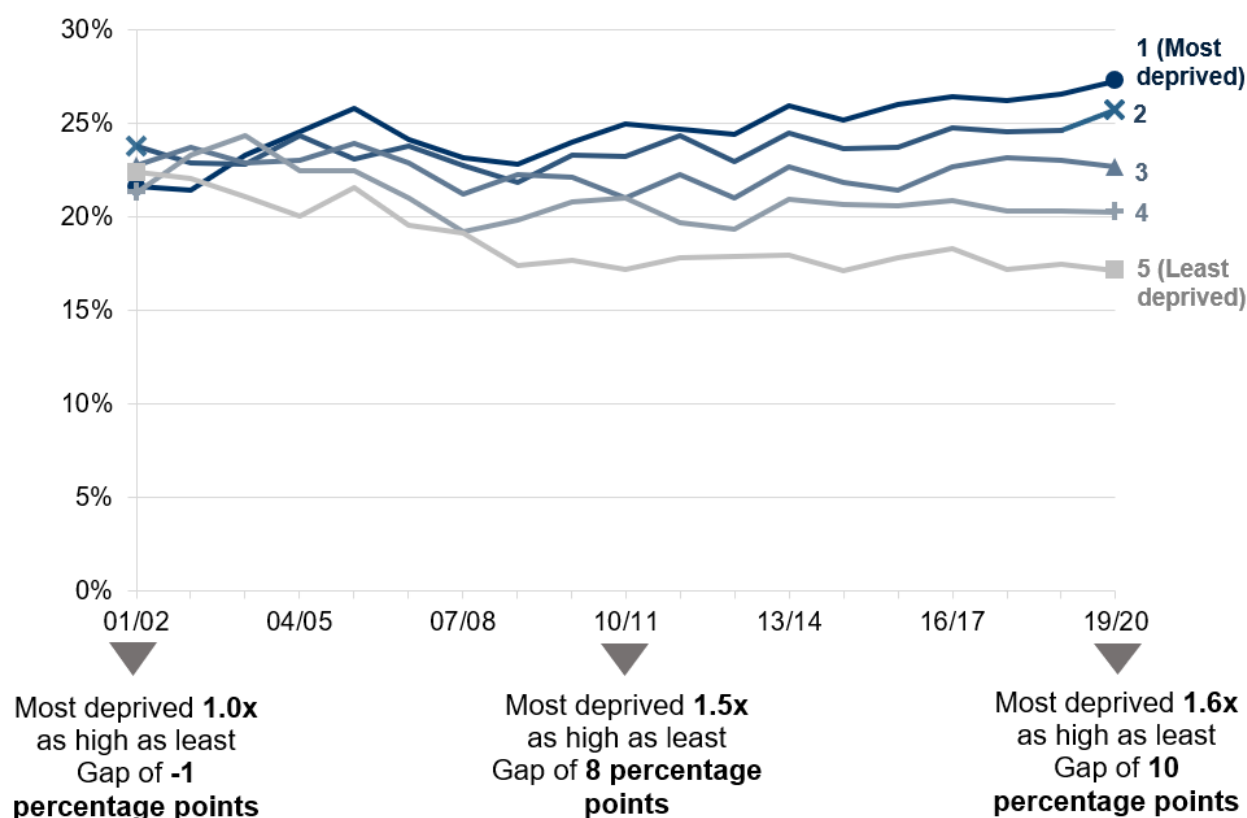
*Comparing remote rural areas compared to large urban areas. Source: National Records of Scotland.

E.2.2 Childhood overweight and obesity

Compared to inequalities in risk of obesity at P1 (which was 7 percentage points in 2019/20, Chapter 2 of main report), the proportion of children at risk of overweight (including children at risk of obesity - in other words BMI in or above the 85th centile) shows wider absolute gaps between the most and least deprived areas (e.g. 10 percentage points in 2019/20). This may in part be related to the higher population average risk of overweight compared to obesity. In contrast the relative difference is smaller when considering inequalities in overweight and obesity risk (1.6) rather than just obesity risk (2.1), suggesting that the social gradient is larger for the more severe forms of this outcome. As noted in the main report, coverage of the Primary 1 checks was relatively low throughout the 2000s but the widening of inequality since 2010 is likely to reflect trends at the population level.

Figure E.2.2: Inequalities in risk of childhood overweight and obesity have widened

Proportion of children in Primary 1 at risk of overweight or obesity (%), according to fifths of area-level deprivation: 2001/02- to 2019/20



Source: Public Health Scotland. Primary 1 Body Mass Index (BMI) statistics Scotland report. (2021).

As seen in the main report for risk of obesity, the risk of overweight (including obesity) increased during the pandemic (in 2020/21) to 29.5%. Inequalities also widened, with an absolute gap of 14.8 percentage points and a relative

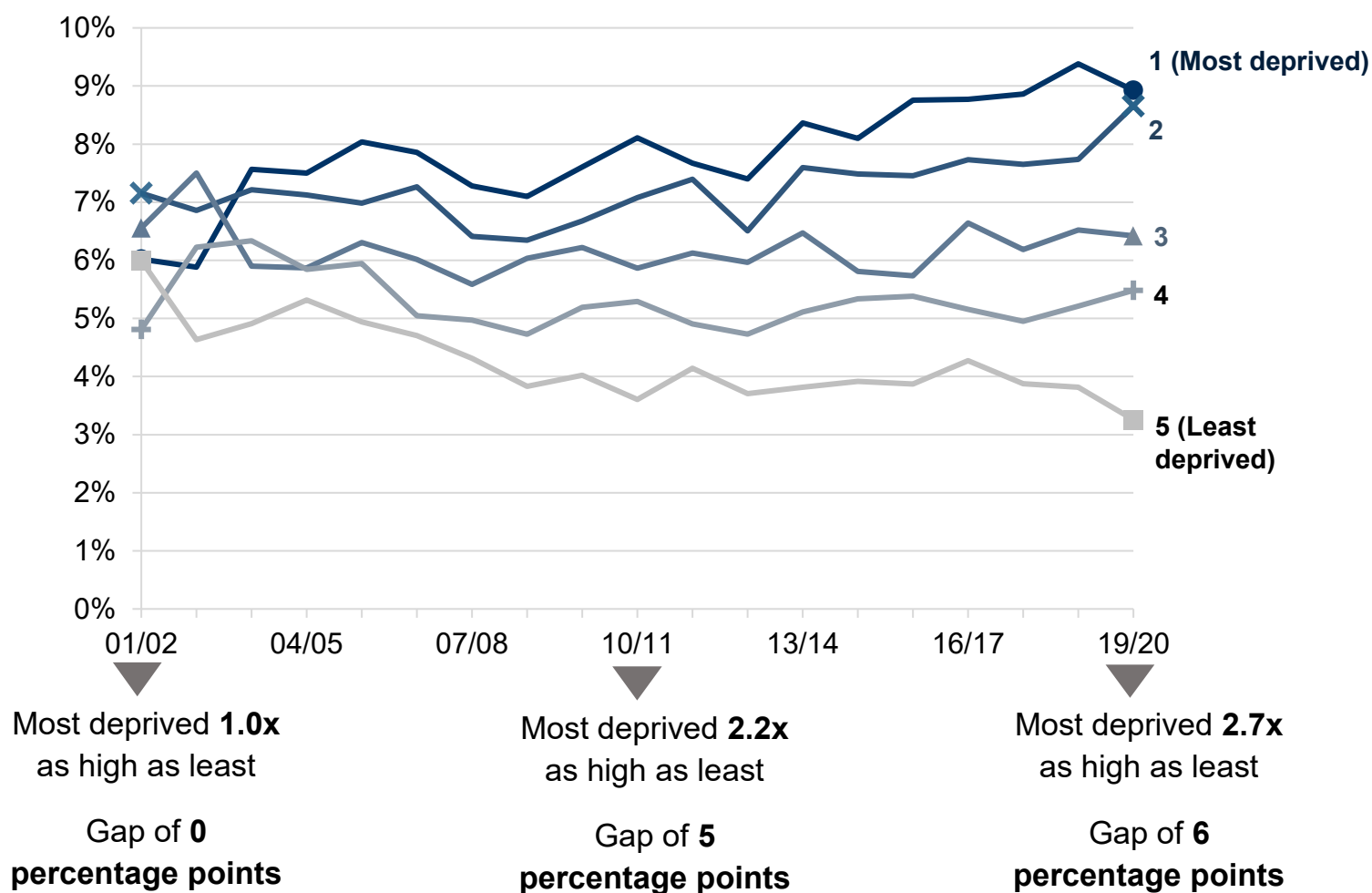
difference of 1.7. Analysis from Public Health Scotland concluded that the increase in prevalence was unlikely to be fully explained by the lower proportions of children measured during the pandemic⁸.

E.2.3 Childhood obesity using clinical definitions

Measuring childhood obesity using clinical definitions (BMI in or above the 98th centile) rather than the epidemiological cut-offs used in the main report leads to very similar trends in social inequalities in childhood obesity. The proportion of children identified as obese using clinical definitions also increased in 2020/21 to 15.1%, with an absolute gap of 10 percentage points and a relative difference of 3.

Figure E.2.3: Inequalities in childhood obesity measured using clinical definitions have widened

Prevalence of obesity among children in Primary 1 (%), according to fifths of area-level deprivation 2001/02 to 2019/20



	01/02	04/05	07/08	10/11	13/14	16/17	19/20
Population average (%)	6.2%	6.3%	5.8%	6.0%	6.4%	6.7%	6.6%
Relative difference	1.0	1.4	1.7	2.2	2.2	2.1	2.7
Absolute gap (%)	0%	2%	3%	5%	5%	5%	6%

Source: Public Health Scotland. Primary 1 Body Mass Index (BMI) statistics Scotland report. (2021).

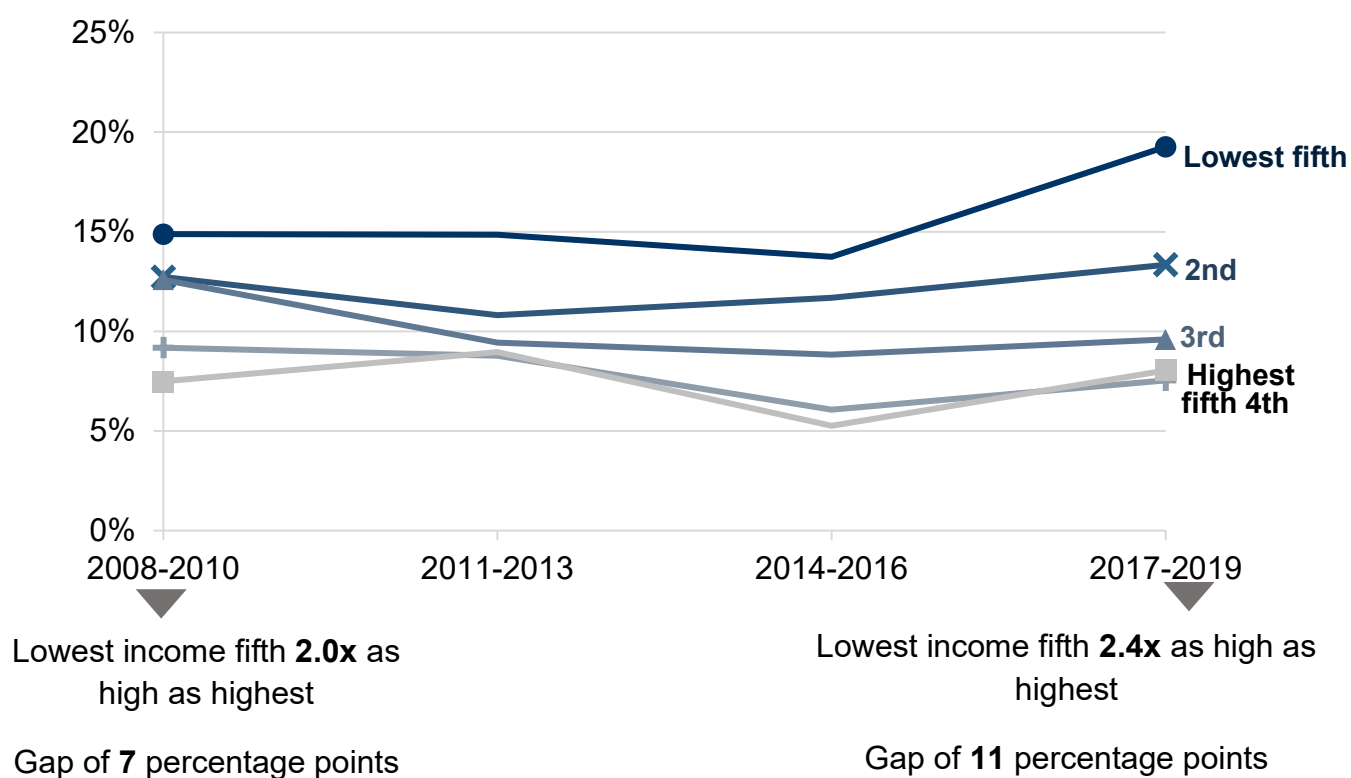
Chapter 3: Health-related behaviours

E.3.1 Children's formal physical activities by income fifths

A modest gradient in formal physical activities is seen by income, with the proportion of children with very low levels of formal physical activity being 11 percentage points higher in the lowest income fifth than the highest (a ratio of 2.4x) in 2017-2019. This compares to an absolute gap of 13 percentage points and a relative difference of 2.8 according to area deprivation (main report, Chapter 3). As described in Chapter 3, this self-reported measure of children's physical activity may be misleading as informal activities such as active travel to school are missed, and these may be a more common form of physical activity among less affluent families. Objective data using accelerometers show little inequality, or even a possible reverse social gradient in total physical activity in children⁹⁻¹¹.

Figure E.3.1: Inequalities in formal physical inactivity among children are similar between income fifths to between area deprivation fifths

Proportion of children (2-15 years) who did not participate in 30 minutes of sport or active play on any day in the previous week (%), according to fifths of household income: 2008-20 to 2017-19



	2008-10	2011-13	2014-16	2017-19
Population average (%)	13%	11%	10%	14%
Relative difference	2.0	1.7	2.6	2.4
Absolute gap (%)	7.4%	5.9%	8.5%	11.2%

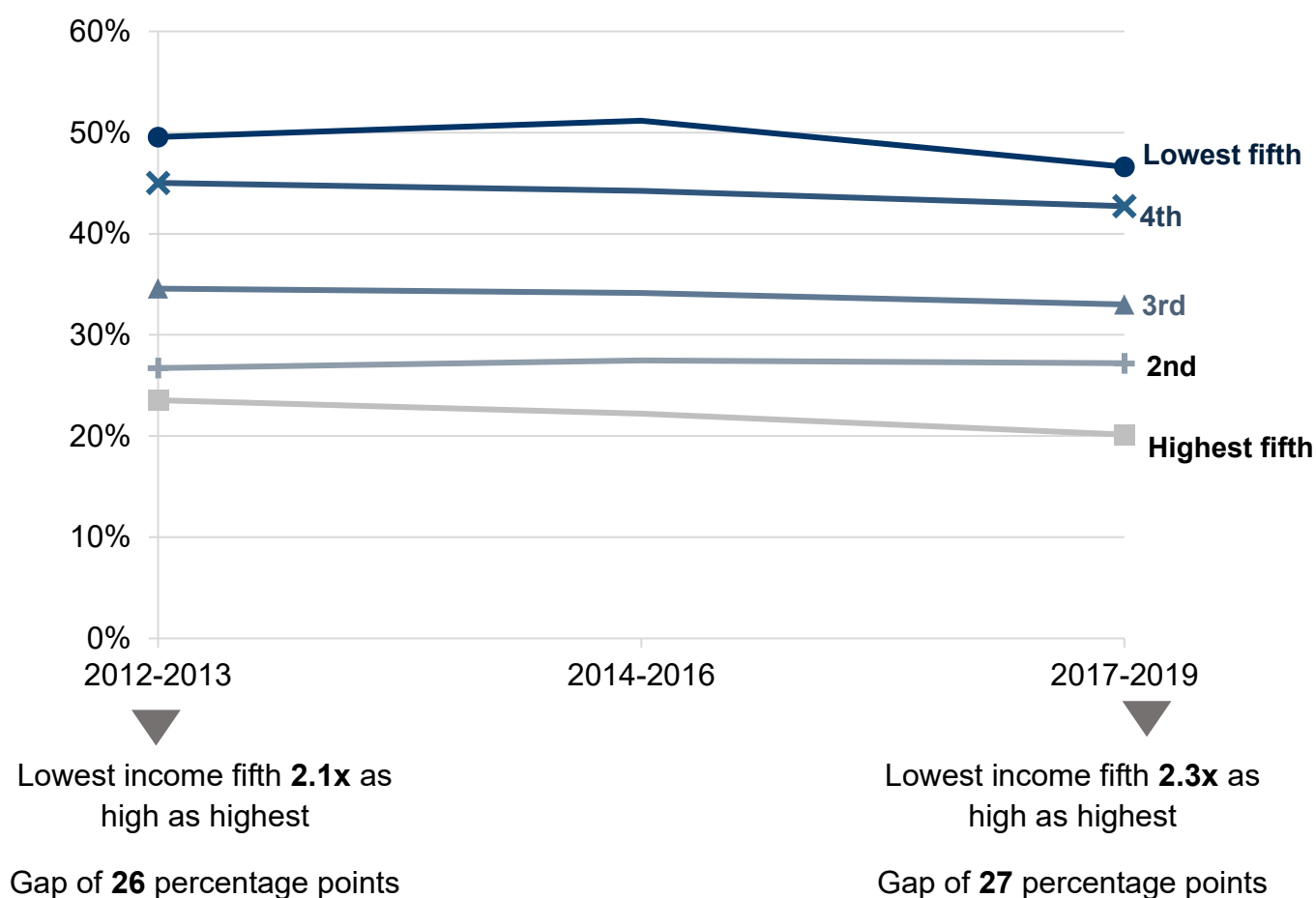
Source: New analysis of the Scottish Health Survey.

E.3.2 Adult physical activity by income fifths

The difference between the proportion of adults not meeting the CMO guidelines for physical activity in the lowest income fifth and highest income fifth has been large since 2012-13 (with a 27 percentage point gap and 2.3x relative difference in 2017-19). These inequalities are larger than those seen between the most and least deprived fifths of areas (which were 19 percentage points and 1.7 in 2017-19, as shown in Chapter 3 the main report).

Figure E.3.2: Inequalities in physical inactivity among adults are greater by income fifth than by area deprivation

Proportion adults not meeting CMO daily activity guidelines (%), according to fifths of household income: 2012-13 to 2017-19



	2012-13	2014-16	2017-19
Population average (%)	36.8%	36.7%	34.6%
Relative difference	2.1	2.3	2.3
Absolute gap (%)	26.0%	28.9%	26.5%

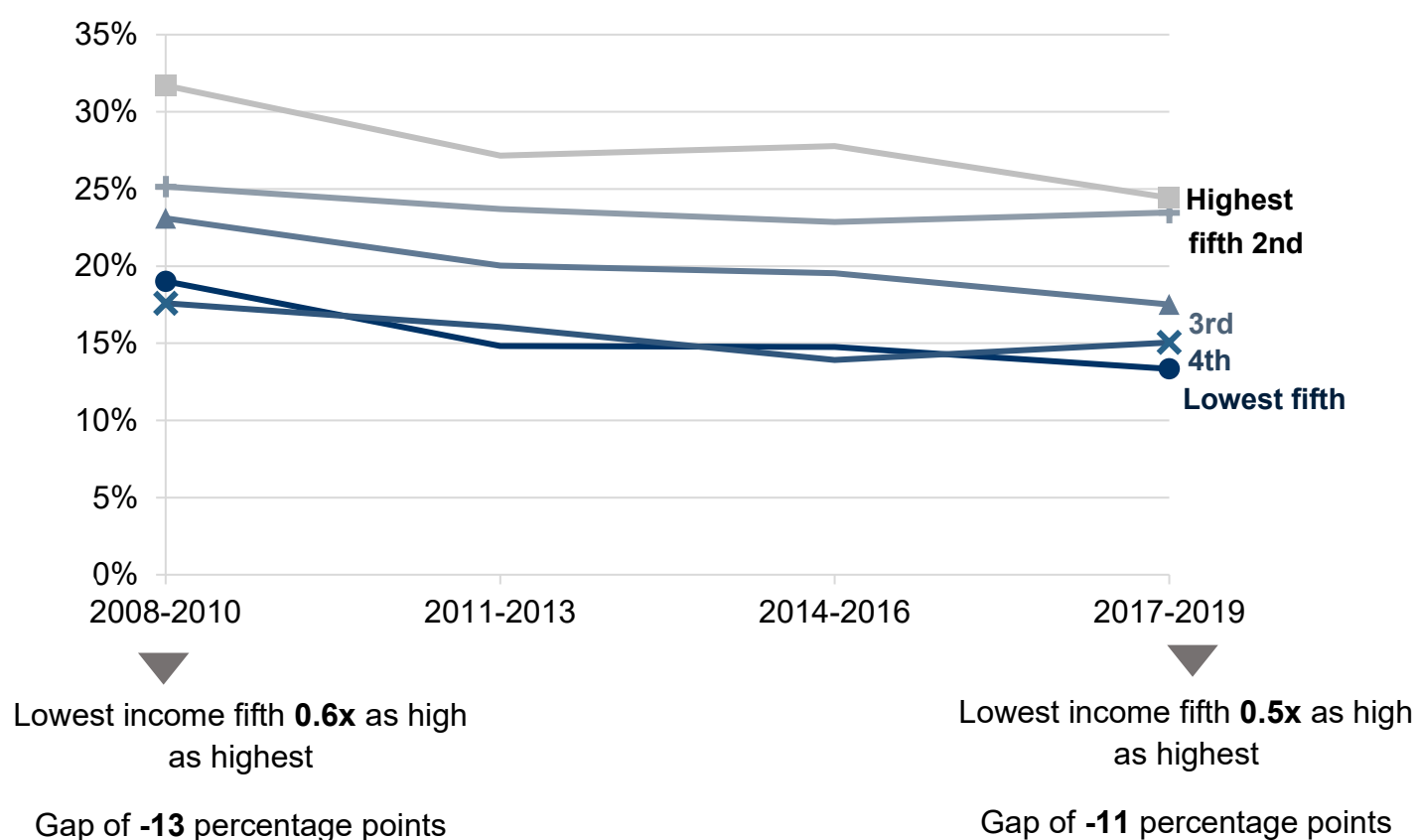
Source: New analysis of the Scottish Health Survey.

E.3.3 Hazardous and harmful alcohol consumption by income fifths.

A reverse social gradient in hazardous and harmful alcohol consumption is seen when consumption is stratified by household income, with the highest income fifths showing the highest prevalence of hazardous/harmful drinking (Figure E.3.3 below). This reverse social gradient is also seen for area deprivation (Chapter 3, main report). Inequalities are slightly larger between the highest and lowest income fifth than the most and least deprived fifths of areas (for example a -11 percentage point absolute gap by income in 2017-19, compared to a -9 percentage point absolute gap by area deprivation).

Figure E.3.3: A reverse social gradient in hazardous and harmful alcohol consumption is seen for household income as well as area deprivation

Prevalence of hazardous or harmful alcohol consumption (%), according to fifths of household income: 2008-10 to 2017-19



	2008-10	2011-13	2014-16	2017-19
Population average (%)	23.2%	20.5%	19.7%	18.5%
Relative difference	0.6	0.5	0.5	0.5
Absolute gap (%)	-12.7%	-12.3%	-13.0%	-11.1%

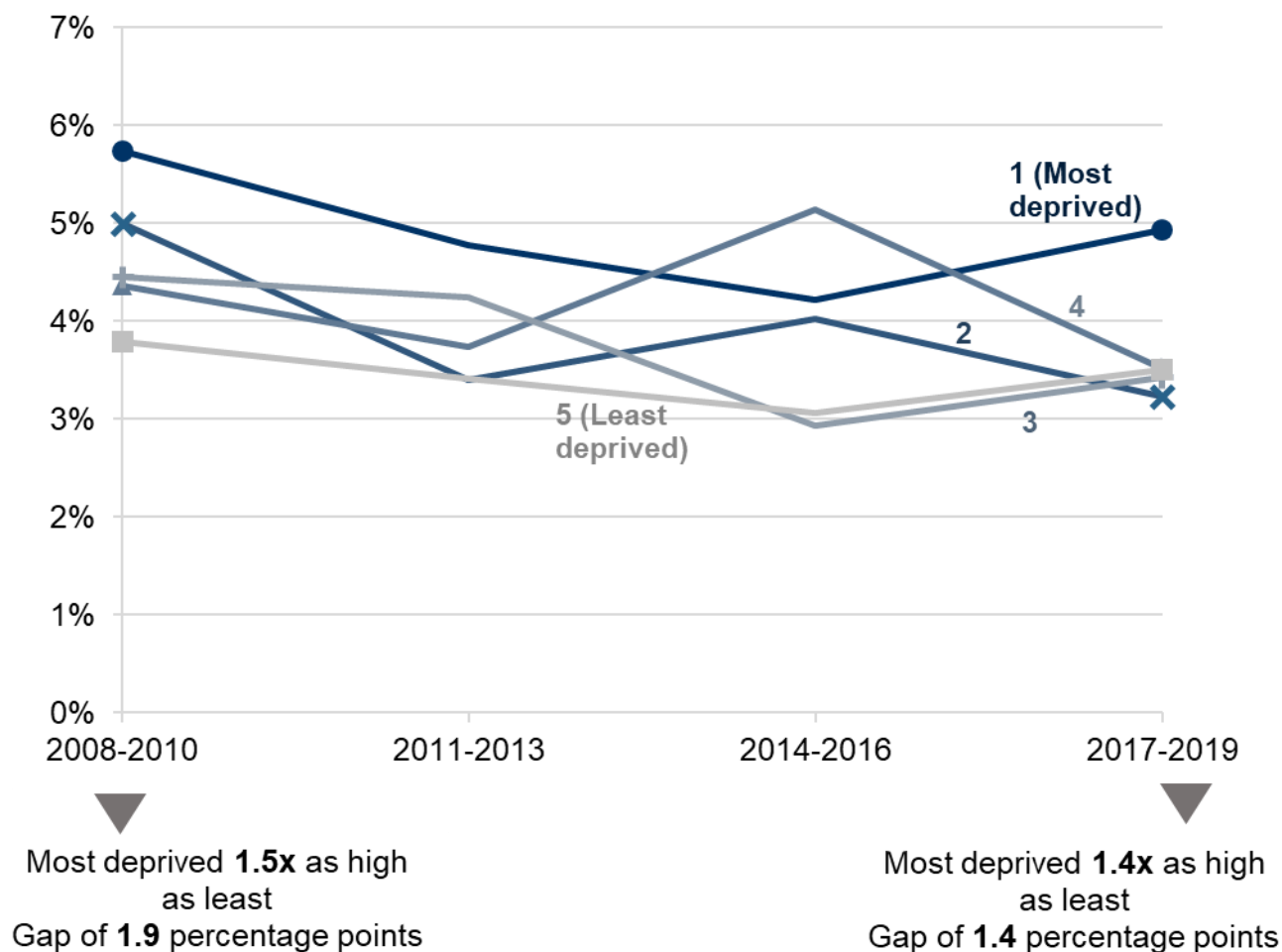
Source: New analysis of the Scottish Health Survey.

E.3.4 Harmful alcohol consumption only, according to area-level deprivation and income fifths

The reverse social gradient seen in hazardous alcohol consumption (see in Chapter 3 and previous section of this appendix) is less clear when separating out alcohol consumption which causes harm from hazardous alcohol consumption. The prevalence of harmful drinking is relatively rare across all groups although it is highest in the most deprived fifth of areas in most of the years studied. There is no consistent gradient across the other fifths.

Figure E.3.4.a: A gradient in harmful alcohol consumption by area deprivation is less clear than for hazardous and harmful consumption combined.

Prevalence of harmful alcohol consumption (%), according to fifths of area-level deprivation: 2008-10 to 2017-19



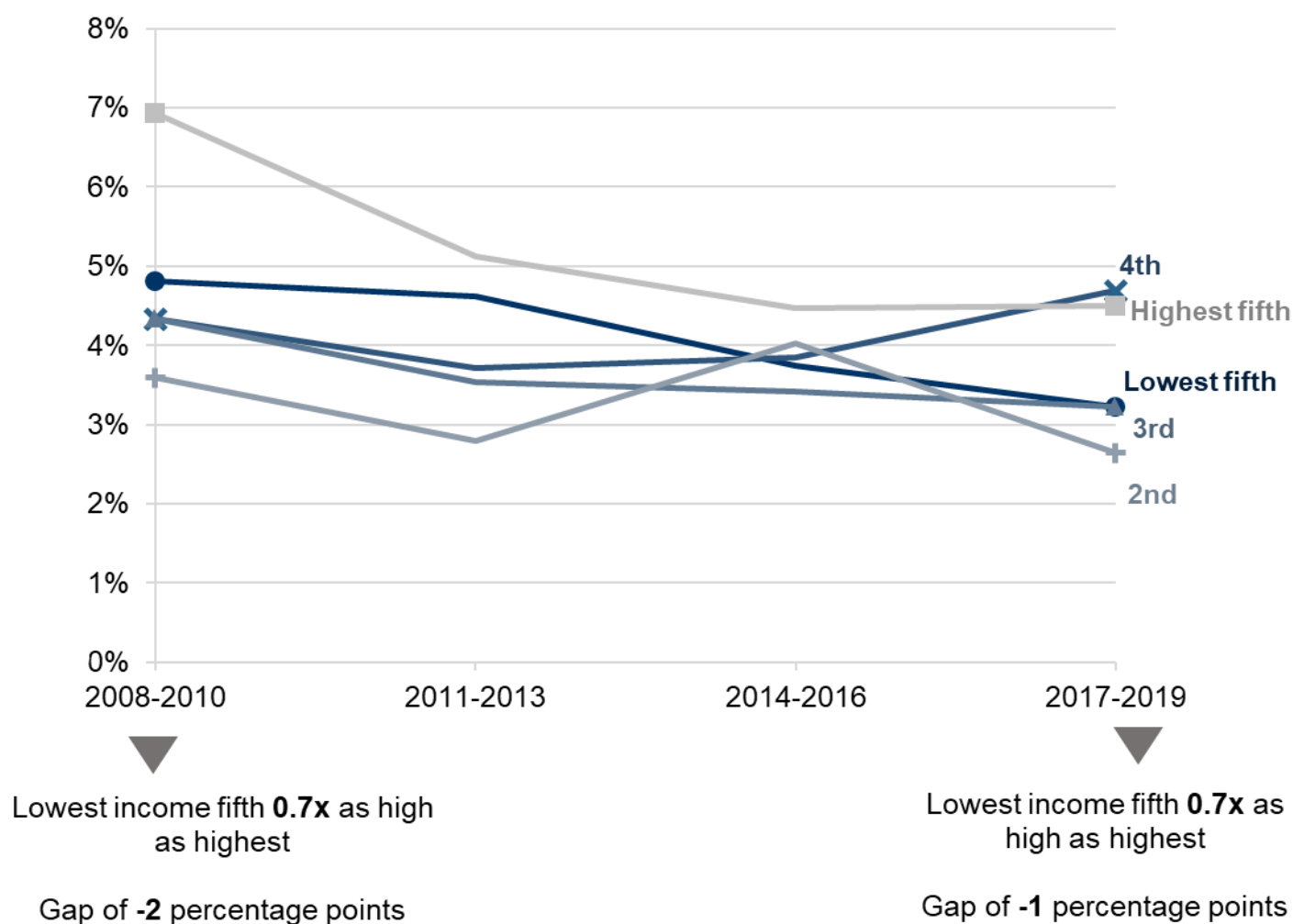
	2008-10	2011-13	2014-16	2017-19
Population average (%)	4.7%	3.9%	3.9%	3.7%
Relative difference	1.5	1.4	1.4	1.4
Absolute gap (%)	1.9%	1.4%	1.2%	1.4%

Source: New analysis of the Scottish Health Survey.

When considered by income fifth, the reverse gradient is again less clear when looking at harmful alcohol consumption only than when looking at hazardous and harmful consumption together. Both the highest and lowest income fifths tend to have high levels of harmful alcohol consumption across the time period.

Figure E.3.4.b: Both the highest and lowest income fifths have high prevalence of harmful alcohol consumption.

Prevalence of harmful alcohol consumption (%), according to fifths of household income: 2008-10 to 2017-19



	2008-10	2011-13	2014-16	2017-19
Population average (%)	4.7%	3.9%	3.9%	3.7%
Relative difference	0.7	0.9	0.8	0.7
Absolute gap (%)	-2.1%	-0.5%	-0.7%	-1.3%

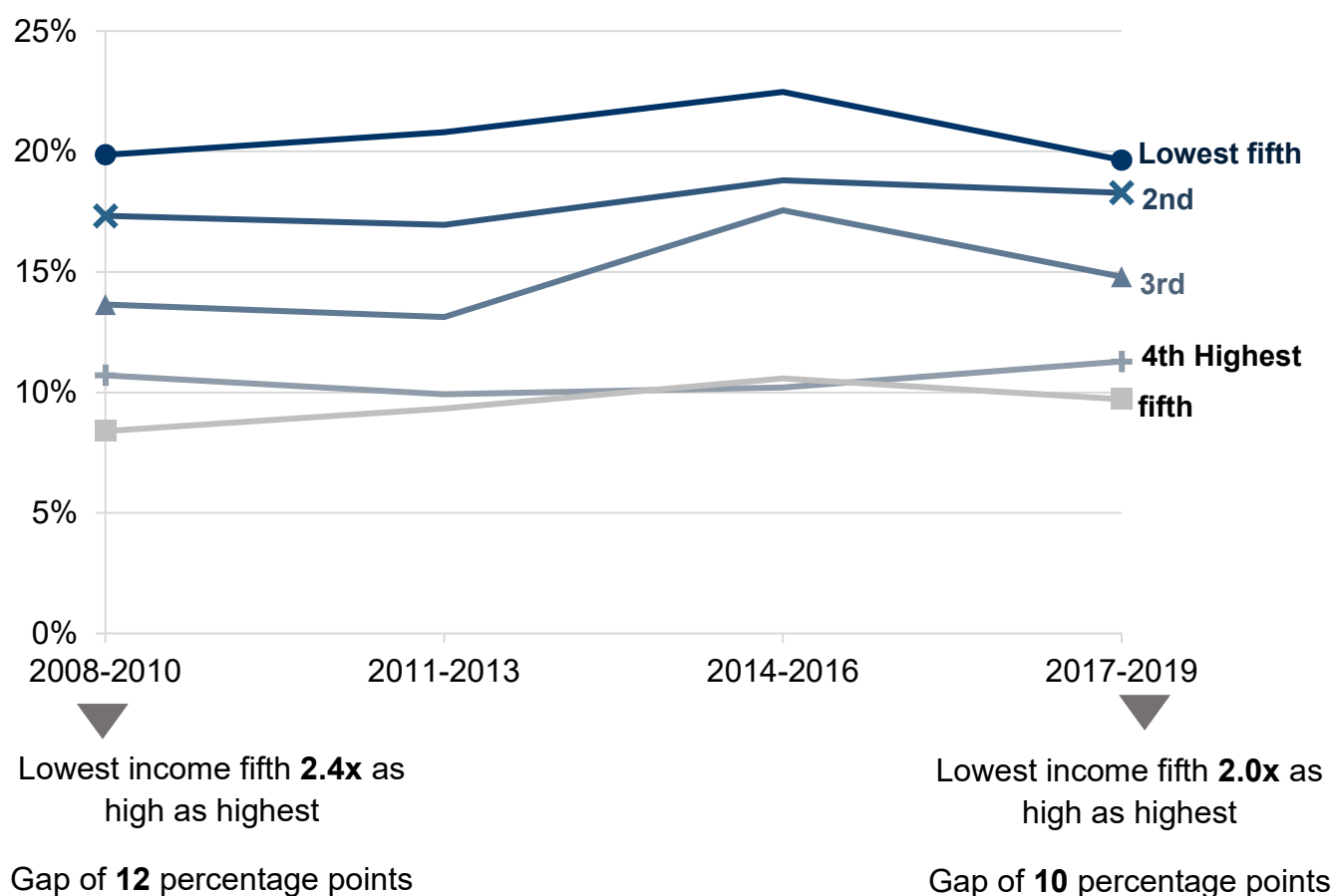
Source: New analysis of the Scottish Health Survey.

E.3.5 Diet by income fifths

A social gradient in very low fruit and vegetable consumption is seen by income fifth, although the gap between the highest and lowest income fifth is slightly narrower than the gap between the most and least deprived fifth of areas, particularly in more recent years as the gap by income has narrowed slightly. For example, in 2017-2019 the proportion of adults who reported not eating a whole portion of fruit/vegetables in the previous day was 10 percentage points higher in the lowest income fifth than the highest (a relative gap of 2.0), but 14 percentage points higher in the most deprived fifth of areas than the least deprived fifth (with a relative gap of 2.5x relative) – as shown in Chapter 3 of the main report.

Figure E.3.5: Differences in fruit and vegetable consumption by income fifth appear to be slightly more modest than by area deprivation fifth.

Proportion of adults who ate less than 1 portion of fruit and vegetables in the previous day (%), according to fifths of household income: 2008-10 to 2017-19



	2008-10	2011-13	2014-16	2017-19
Population average (%)	13.7%	13.3%	15.9%	14.6%
Relative difference	2.4	2.2	2.1	2.0
Absolute gap (%)	11.5%	11.5%	11.9%	9.9%

Source: New analysis of the Scottish Health Survey.

Chapter 4: Health and social care services

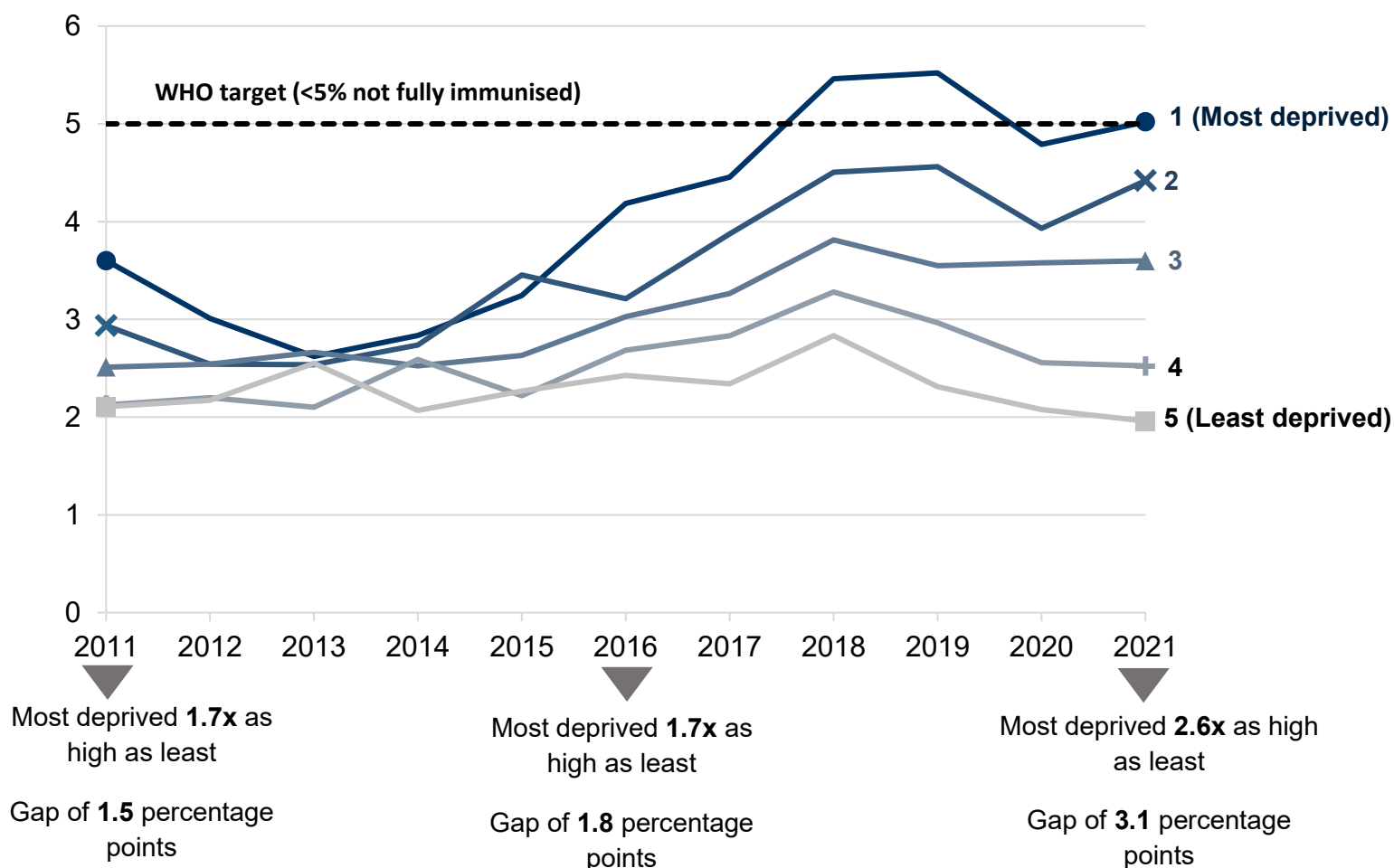
E.4.1. Primary immunisations

As shown in Figure E.4.1 below, the proportion of infants not fully immunised with the primary immunisations by age 12 months (due at 2, 3 and 4 months) has fluctuated, but importantly was below 5% across the entire period (therefore meeting WHO targets to achieve 95% coverage). However, the proportions of infants not fully immunised has been increasing in more deprived areas since 2013, albeit with some fluctuation during the pandemic. This has led to a widening of inequality between the most and least deprived areas: the absolute gap increased from 1.5 percentage points to 3.1 percentage points across the period, with the relative difference increased from 1.7 to 2.6.

So, while the picture in terms of overall uptake is more positive for primary immunisations than for the first vaccine of the MMR (5.6% were unimmunised in 2021), primary immunisation uptake is following similar trends.

Figure E.4.1: Inequalities in primary immunisations have widened since ~2013

Proportion of 12-month-olds not fully immunised with all three doses of the primary vaccines (due at 2, 3, 4 months) by area-level deprivation fifths: 2011-2021



	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Population average	2.7	2.5	2.5	2.6	2.8	3.2	3.4	4.1	3.9	3.5	3.6
Relative difference	1.7	1.4	1.0	1.4	1.4	1.7	1.9	1.9	2.4	2.3	2.6
Absolute gap (%)	1.5	0.8	0.1	0.8	1.0	1.8	2.1	2.6	3.2	2.7	3.1

Source: Public Health Scotland. Childhood immunisation statistics Scotland reports.

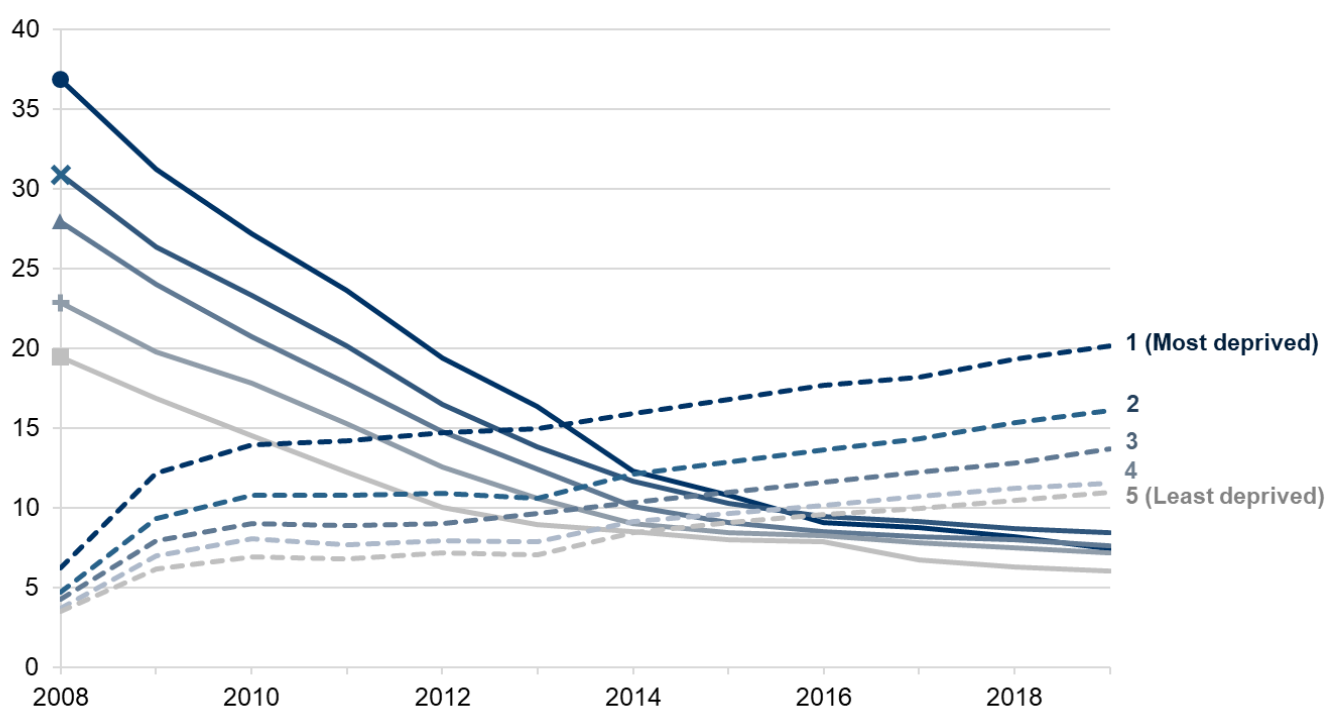
E.4.2. Proportions of children and adults registered and attending NHS dentists

As discussed in Chapter 4, the proportion of children not registered with an NHS dentist (shown in the solid lines in figures E.4.2 and E.4.3) decreased dramatically from 26% to 6% between 2008 and 2019 with a narrowing of inequalities by area-level deprivation. This decrease occurred after the introduction of 'lifetime registration'.

However, this has been accompanied by increases in proportions not attending among those who are registered (shown in the dotted lines), from 7% to 16% and a widening of inequalities. This is likely an underestimation of inequalities, because those living in less deprived areas are more likely to use private dental care, which is not captured.

Figure E.4.2: while inequalities in the proportion of children not registered with a dentist have narrowed, but inequalities in those not attending have increased

Percentage of children not registered with (solid line) and not attending in the past 2 years (dotted line) an NHS dentist, according to fifths of deprivation, 2008-2019 (September)



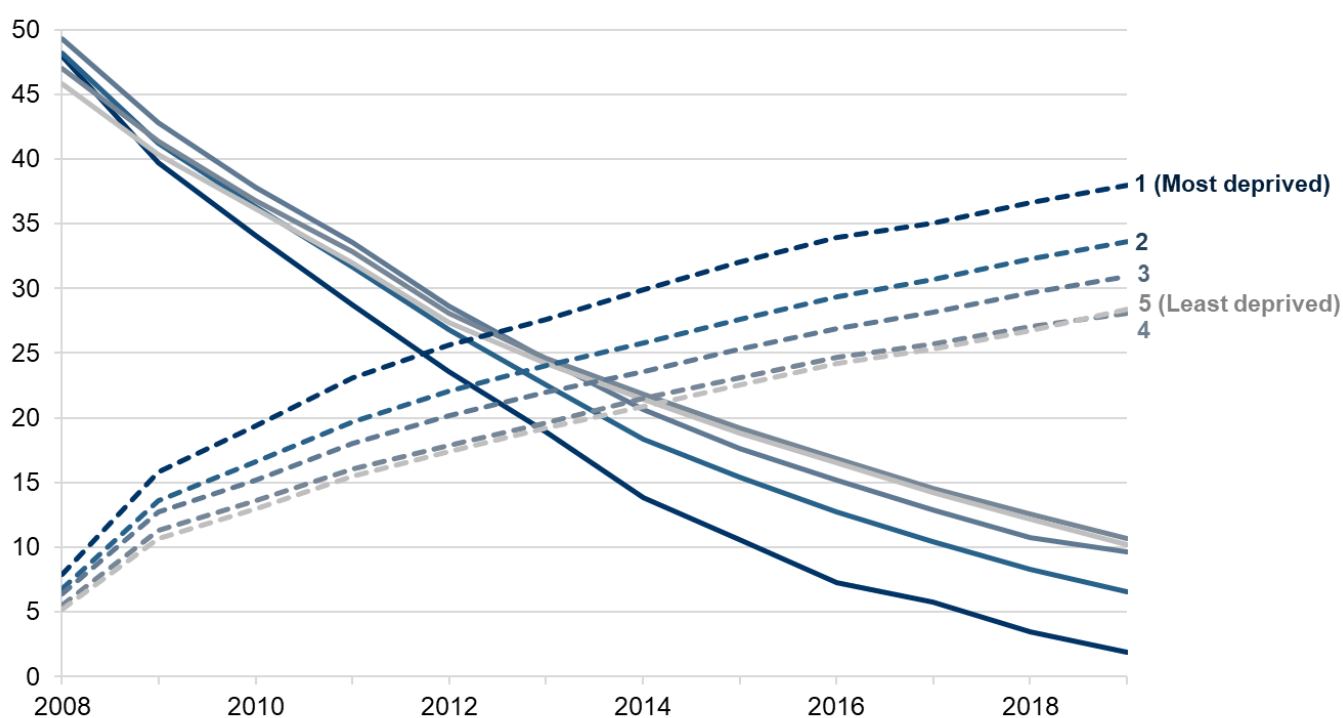
Source: Public Health Scotland. Dental statistics - NHS registration and participation. January 2022.

		2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Not registered	Population avg	25.5	21.2	18.6	15.5	12.3	10.1	8.1	7.2	6.7	6.4	6.2	6.0
	Relative difference	1.9	1.9	1.9	1.9	1.9	1.8	1.4	1.3	1.2	1.3	1.3	1.2
	Absolute gap (%)	17.4	14.4	12.7	11.4	9.4	7.4	3.8	2.8	1.3	2.0	1.9	1.4
Not attending	Population avg	6.6	10.7	11.9	11.4	11.7	12.3	13.0	13.6	14.2	14.6	15.2	15.8
	Relative difference	5.6	2.7	2.1	1.8	1.4	1.3	1.0	0.9	0.8	0.7	0.6	0.6
	Absolute gap (%)	16.0	10.7	7.6	5.5	2.9	1.9	0.0	-1.0	-1.8	-3.2	-4.2	-4.9

Similar patterns have been seen in adults (Figure E.4.3). The prevalence of adults not registered (solid lines) decreased from 46% to 5% and declines were greatest in the most deprived areas meaning that there is now a reverse social gradient in registration – those living in the least deprived areas are more likely to *not* be registered with an NHS dentist (although note this may be due to higher rates of private dentist use among the more advantaged). Proportions of those registered who had not attended within the past two years, though, increased from 7% to 34% and inequalities became larger.

Figure E.4.3: the proportion of adults registered with a dentist has increased and inequalities have fallen, but attendance has decreased, with a widening of inequalities

Percentage of adults registered with (solid line) and attending in the past 2 years (dotted line) an NHS dentist, according to fifths of deprivation, 2008-2019 (September)



		2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Not registered	Population avg	45.9	39.0	34.2	29.5	24.5	20.4	16.6	13.6	10.9	8.8	6.7	5.0
	Relative difference	1.0	1.0	0.9	0.9	0.9	0.8	0.6	0.6	0.4	0.4	0.3	0.2
	Absolute gap (%)	2.1	-0.6	-2.1	-3.2	-3.8	-5.4	-7.6	-8.2	-9.2	-9.2	-8.5	-8.6
Not attending	Population avg	7.1	14.2	17.1	20.1	22.6	24.6	26.4	28.2	29.9	31.1	32.5	33.8
	Relative difference	1.5	1.5	1.5	1.5	1.5	1.4	1.4	1.4	1.4	1.4	1.4	1.3
	Absolute gap (%)	2.7	5.2	6.4	7.6	8.2	8.4	9.0	9.5	9.7	9.7	9.9	9.5

Source: Public Health Scotland. Dental statistics - NHS registration and participation. January 2022.

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Citing these appendices

Miall, N; Fergie, G; Pearce, A. Health Inequalities in Scotland: trends in deaths, health and wellbeing, health behaviours, and health services since 2000. Appendices. University of Glasgow. November 2022. doi: 10.36399/gla.pubs.282637

This report was produced as part of the Health Foundation's "Health Inequalities in Scotland: An independent review".

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Health inequalities in Scotland:
An independent review