Inequalities in the disease burden in Scotland: an area level analysis using Scottish Index of Multiple Deprivation

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I Grant, E Fletcher G McCartney M Thrower G Wyper D Stockton

Public Health Scotland

Outline

- What is Scottish Index of Multiple Deprivation (SIMD)
- How is it constructed?
- Strengths/limitations of SIMD
- Applying SIMD in burden of disease analysis
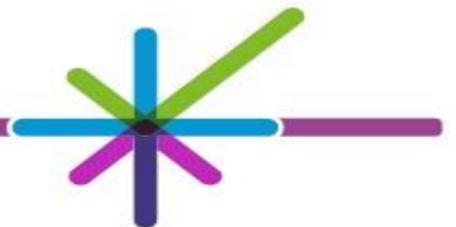
What is Scottish Index of Multiple Deprivation?

- The Scottish Index of Multiple Deprivation (SIMD) 2020 is the Scottish Government's official tool for identifying concentrations of material deprivation in Scotland.

- SIMD20 is the Scottish Government's sixth edition since 2004.

- Is a relative measure of deprivation across small areas in Scotland.

- Used to target programmes aimed at reducing socioeconomic inequalities in health

- Looks at multiple deprivation. 'Deprived' does not just mean 'poor' or 'low income'. It can also mean people have fewer resources and opportunities, for example in health and education

How is SIMD constructed?

- Scotland is split into 6,976 small areas, called **‘data zones’**, with roughly equal populations

- **Indicators** chosen to measure the different aspects of deprivation in each data zone, like pupil attainment, travel time to a GP, crime and unemployment

- Indicators are grouped into seven types, called '**domains**': *income; employment; health; education, skills and training; geographic access to services; crime; and housing*.

- The seven domains combined into one index, ranking each data zone in Scotland from 1 (most deprived) to 6,976 (least deprived).
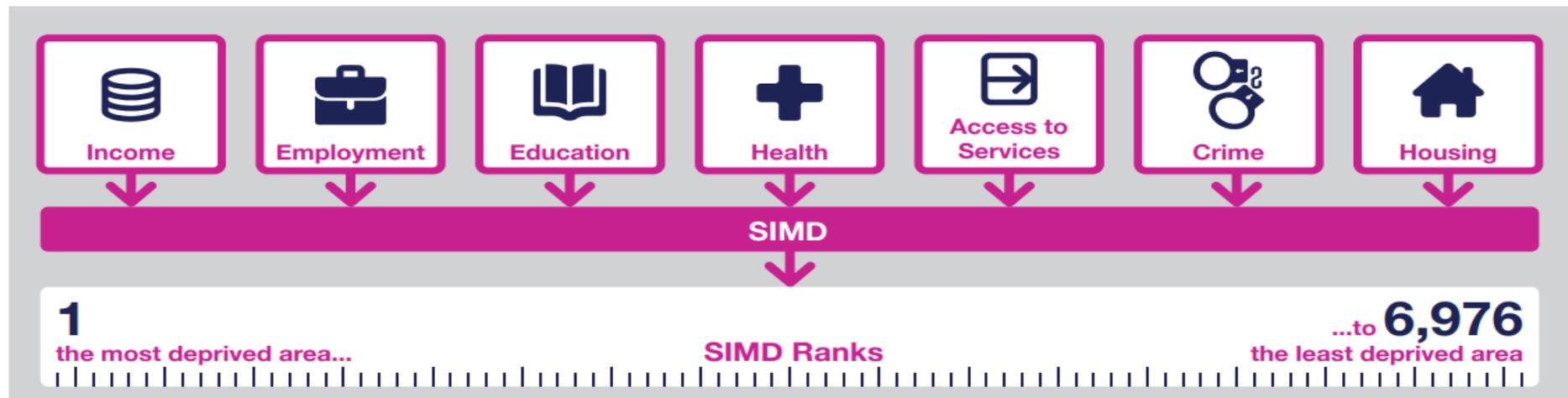
Data zones

- Key geography for dissemination of small area statistics in Scotland and are widely used across the public and private sector.
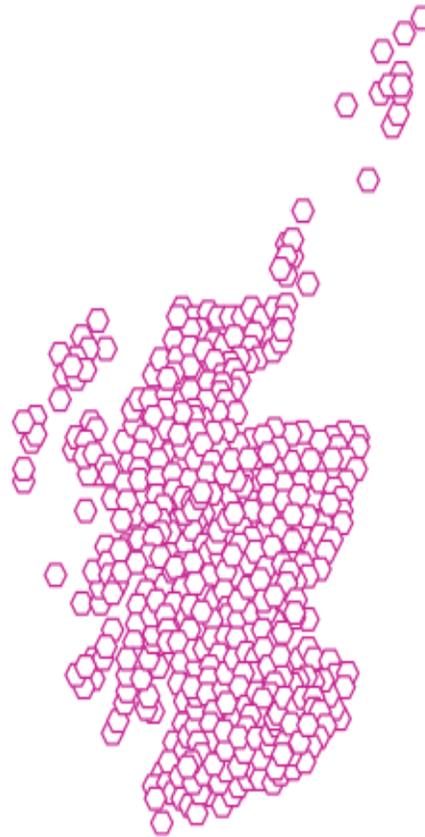
→ 5.4 million people

→ 6,976 data zones

→ 700-800 people per data zone

SIMD domains and indicators

Employment	Income	Education	Health	Access	Crime	Housing
Percentage of people who are employment deprived Number of people who are employment deprived	Percentage of people who are income deprived Number of people who are income deprived	School pupil attendance Attainment of school leavers Working age people with no qualifications: standardised ratio Proportion of people aged 16-19 not participating in education, employment or training Proportion of people aged 16-19 not participating in education, employment or training	Comparative Illness Factor: standardised ratio Hospital stays related to alcohol or drug use: standardised ratio Standardised mortality ratio Proportion of population being prescribed drugs for anxiety, depression or psychosis Proportion of live singleton births of low birth weight Emergency stays in hospital: standardised ratio	Average drive time to a petrol station, GP surgery, post office, primary school, retail centre or secondary school in minutes Average public transport time to GP surgery, post office of retail centre in minutes % of Premises without access to superfast broadband	Number of recorded crimes of violence, sexual offences, domestic housebreaking, vandalism, drugs offences, and common assault Recorded crimes of violence, sexual offences, domestic housebreaking, vandalism, drugs offences, and common assault per 10,000 people	Number of people in households that are overcrowded Number of people in households without central heating Percentage of people in households that are overcrowded Percentage of people in households without central heating

Describing SIMD

Quintile (20%)	Quintile % Groups	SIMD Ranking	
		From	To
1	1 – 20%	1	1,395
2	21 – 40%	1,396	2,790
3	41 – 60%	2,791	4,185
4	61 – 80%	4,186	5,580
5	81 -100%	5,581	6,976

Quintiles

Decile (10%)	Decile % Groups	SIMD Ranking	
		From	To
1	1 - 10%	1	697
2	11 – 20%	698	1,395
3	21 – 30%	139,6	2,092
4	31 – 40%	2,093	2,790
5	41 – 50%	2,791	3,488
6	51 – 60%	3,489	4,185
7	61 – 70%	4,186	4,883
8	71 – 80%	4,884	5,580
9	81 – 90%	5,581	6,278
10	91 – 100%	6,279	6,976

Deciles

Vigintile (5%)	Vigintile % Groups	SIMD Ranking	
		From	To
1	1 - 5%	1	348
2	6 - 10%	349	697
3	11 - 15%	698	1,046
4	15 - 20%	1,047	1,395
5	21 - 25%	1,396	1,744
6	26 – 30%	1,745	2,092
7	31 – 35%	2,093	2,441
8	36 – 40%	2,442	2,790
9	41 – 45%	2,791	3,139
10	46 – 50%	3,140	3,488
11	51 – 55%	3,489	3,836
12	56 – 60%	3,837	4,185
13	61 – 65%	4,186	4,534
14	66 – 70%	4,535	4,883
15	71 – 75%	4,884	5,232
16	76 – 80%	5,233	5,580
17	81 – 85%	5,581	5,929
18	86 – 90%	5,930	6,278
19	91 – 95%	6,279	6,627
20	96 – 100%	6,628	6,976

Vigintiles

- In the 1st quintile - within the 20% most deprived in Scotland
- In the 1st decile - within the 10% most deprived in Scotland
- In the 1st vigintile - within the 5% most deprived in Scotland

SIMD strengths

- Useful index to identify areas with concentrations of need because of its small output areas, accessibility, consistent delivery, and statistical rigour.

- Methodology and indicators are re-evaluated by experts and users of the index upon the release of the next SIMD.

| SIMD allows user to: |
| --- |
| Compare overall deprivation of small areas |
| Compare the seven domains of deprivation |
| Compare the proportion of small areas in a council that are very deprived |
| Find areas where many people experience multiple deprivation |
| Find areas of greater need for support and intervention |

SIMD limitations

- Identifying all people who are deprived in Scotland – not everyone who is deprived lives in a deprived area

- Saying how much more deprived one area is from another

- Comparing ranks over time

- Comparing with other UK countries

- Reverse causality in health inequalities analysis?

SIMD identifies deprived areas - not people.
The box below shows why.

Non-deprived area

Deprived area

Not on low income
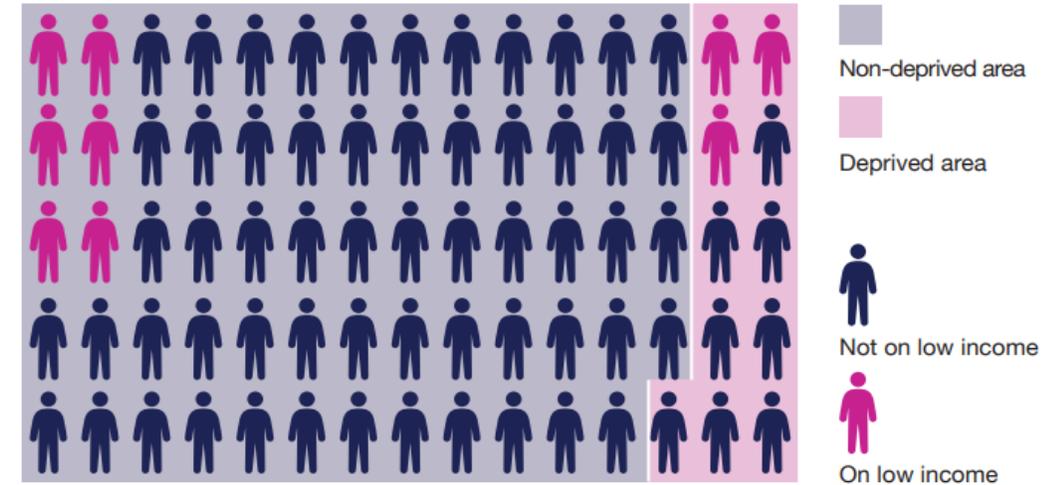
On low income

Not all people experiencing deprivation live in deprived areas. About two out of three people on low income do not live in deprived areas.

Not everyone in a deprived area is experiencing deprivation. About one in three people living in a deprived area are on low income.
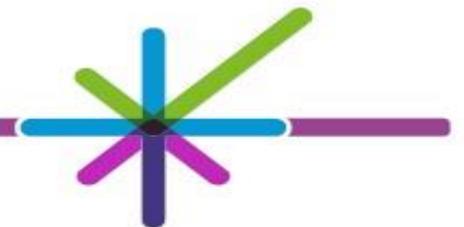
Issue of reverse causality?

- SIMD includes a basket of weighted health measures raising the theoretical possibility of reverse causality whereby people are ordered by the health outcome rather than socioeconomic deprivation.

- However, health domain weighted to account for a relatively small part of the overall SIMD

- Analyses of health inequalities were found to give similar results whether the health domain was included or excluded (Source: Public Health Scotland 2020)

- Similar findings reported for England Index of Multiple Deprivation (Source: Adams and White 2006)

SIMD domain weights

Domain	Percentage of overall SIMD 2020
Income	28%
Employment	28%
Health	14%
Education, skills and training	14%
Geographic access to services	9%
Crime	5%
Housing	2%

Applying SIMD to burden of disease estimates

- Use SIMD to group DALYs based on deprivation deciles (from 1 (those living in the 10% most deprived areas) to 10 (those living in the 10% least deprived areas).

- Estimated inequalities using several measures:
  - absolute and relative range differences between the most and least deprived deciles.
  - Additionally, inequalities were measured using the Slope Index of Inequality (SII) and Relative Index of Inequality (RII)
   - SII and RII describe the *inequality across the full population*
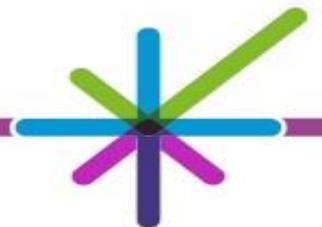
# Number of DALYs by SIMD decile, Scotland, 2016
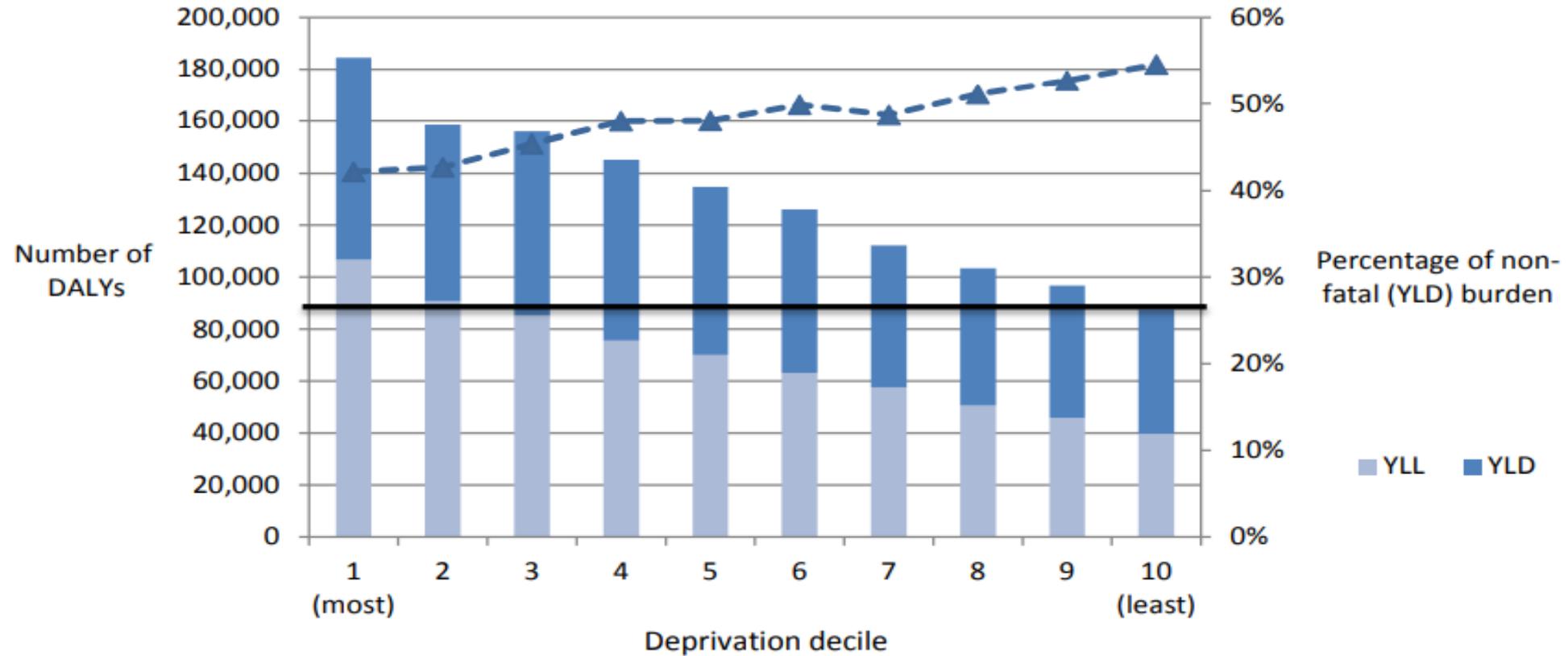
# Absolute and relative outcomes between poorer and wealthier areas Scotland, 2016

Leading causes of ill health or early death in our **wealthiest areas***

1	Neck and lower back pain	6.4%
2	Sense organ diseases	5.6%
3	Heart disease	5.5%
4	Migraine	5.0%
5	Depression	4.7%

*Percentages of early deaths and illnesses
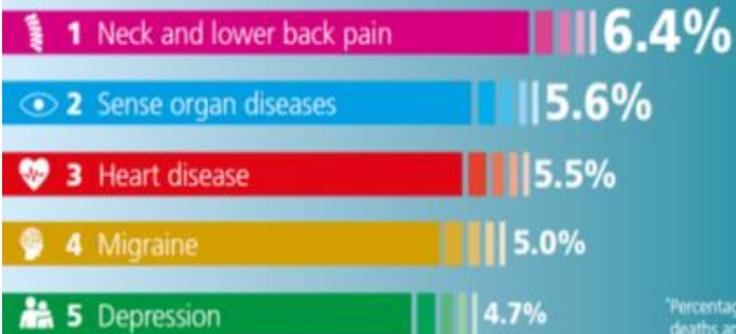
Leading causes of ill health or early death in our **poorest areas***

1	Drug use disorders	8.1%
2	Heart disease	7.9%
3	Depression	5.6%
4	Lung cancer	5.3%
5	COPD	4.7%

*Percentages of early deaths and illnesses

Early death and illnesses associated with the things that harm our health the most are more common in poorer areas than in wealthier areas. The rate of:

drug use is **17.0** times higher

alcohol dependence is **8.4** times higher

chronic liver disease is **7.2** times higher

COPD is **6.2** times higher

lung cancer is **4.3** times higher

Slope index of inequality, age-standardised DALY per 100,000, population, Scotland, 2014-16
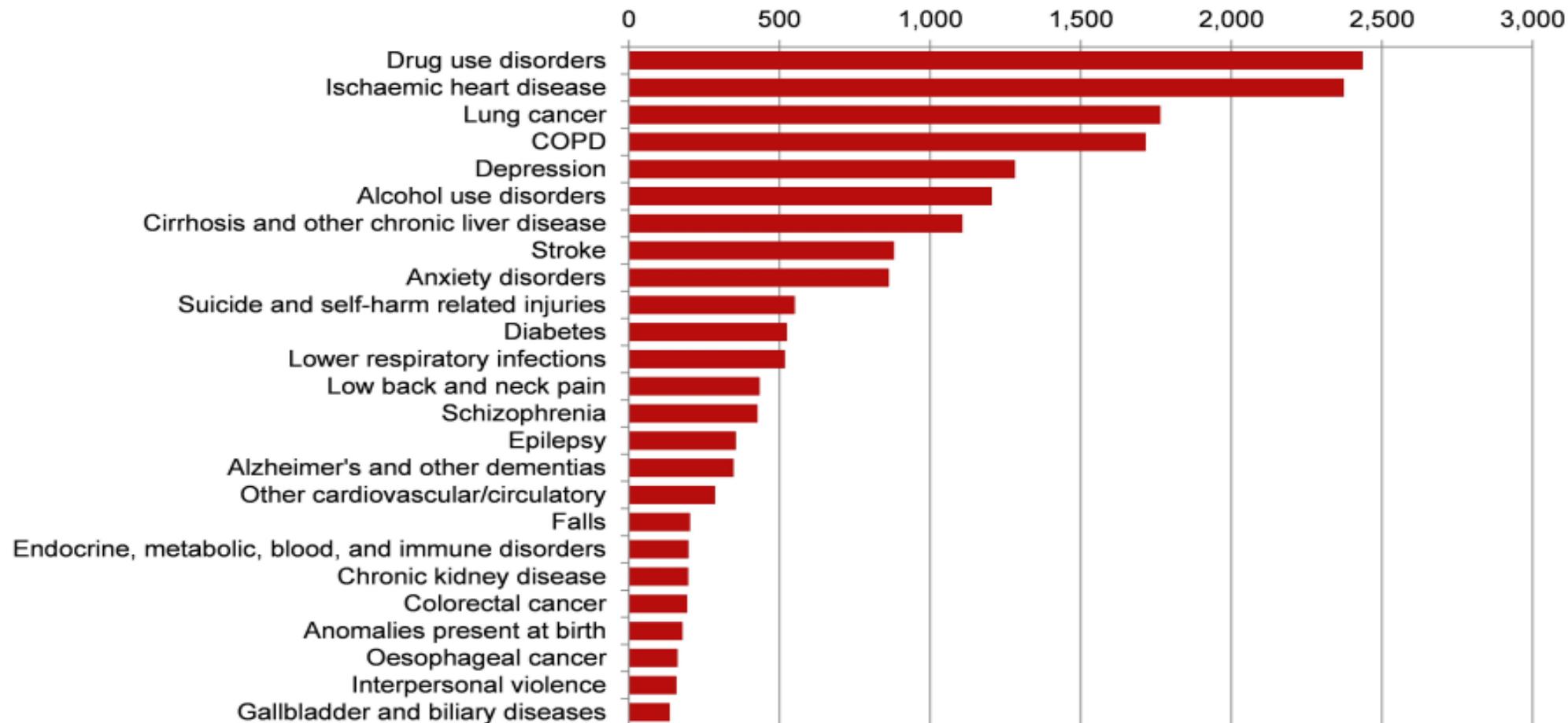
Relative Index of Inequality for the twenty largest contributors to DALY burden in Scotland, 2014-16

Relative index of inequality
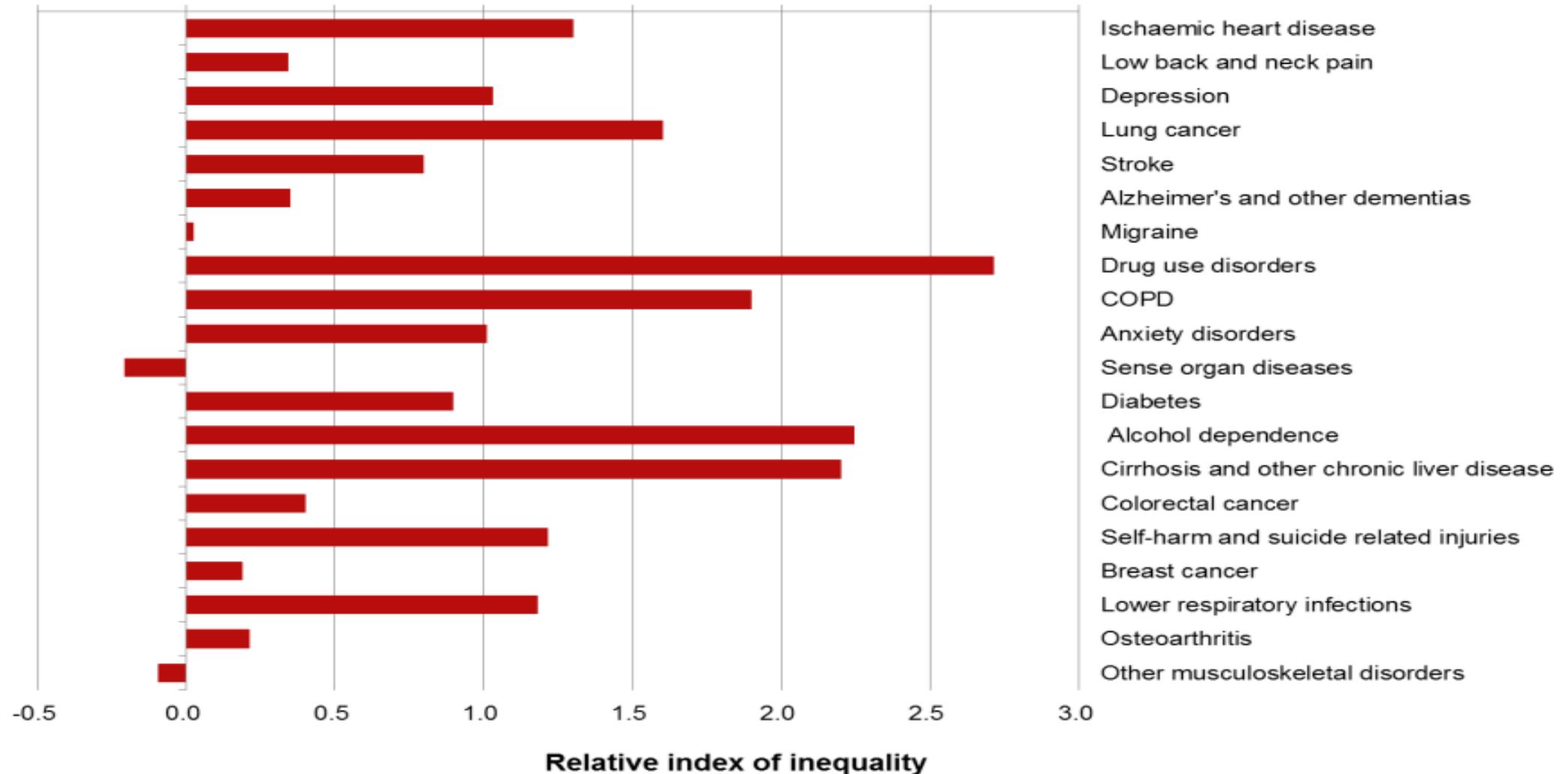
The leading 10 causes of population health loss and inequalities in Scotland

Leading causes overall	Absolute inequalities (SII)	Relative inequalities (RII)
Heart disease	Drug use disorders	Drug use disorders
Dementia	Heart disease	Alcohol use disorders
Drug use disorders	Lung cancer	COPD
Lung cancer	COPD	Chronic liver diseases
Stroke	Alcohol use disorders	Schizophrenia
COPD	Depression	Suicide and self-harm
Low back and neck pain	Suicide and self harm	Lung cancer
Depression	Chronic liver diseases	Epilepsy
Headache disorders	Stroke	Heart disease
Other cancers	Other cancers	Other digestive diseases

Inequalities in the age-standardised COVID-19 YLL rate in Scotland, by SIMD quintile, 2020 and 2021

COVID-19 YLL rate, by SIMD quintile, Scotland, 2020 and 2021,
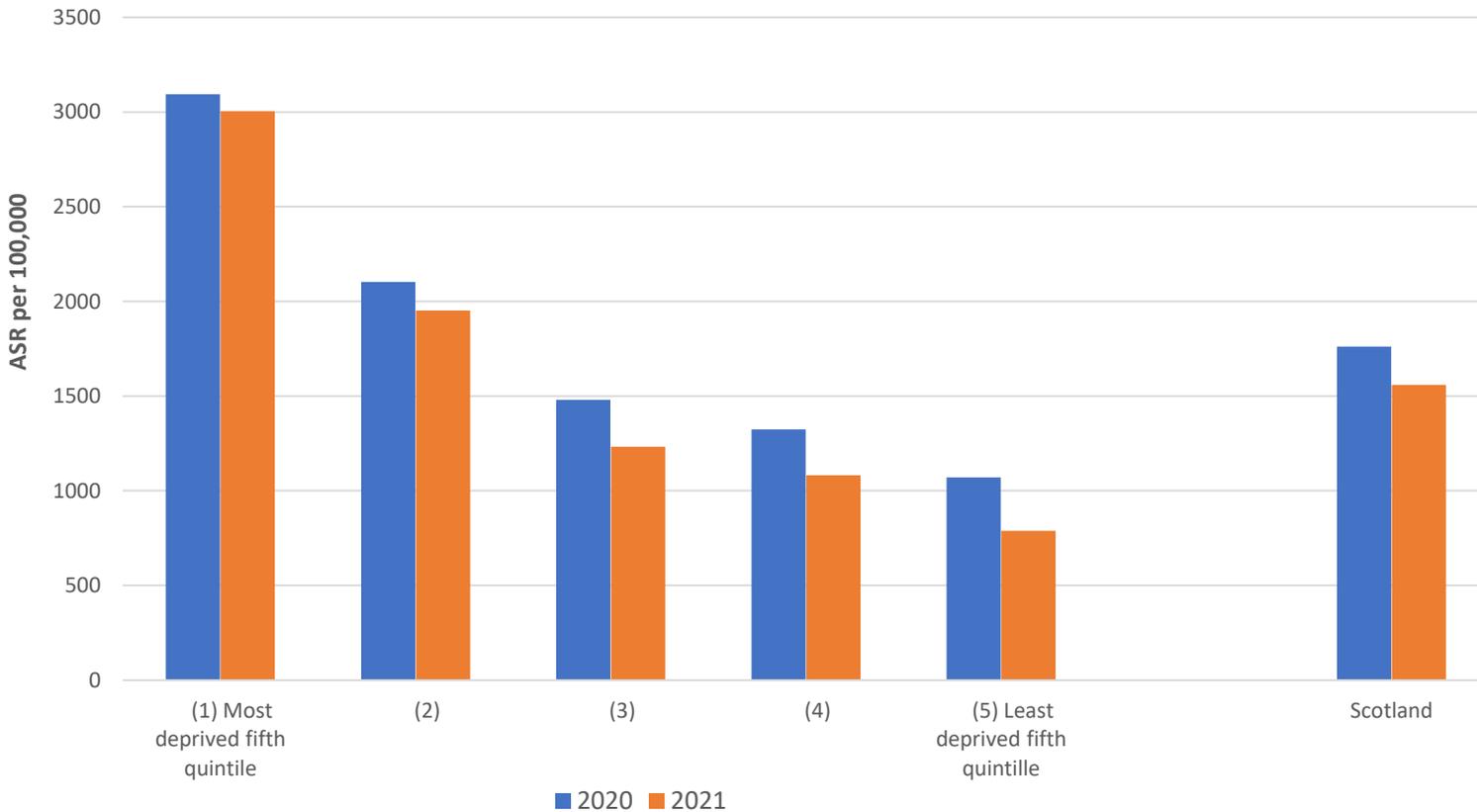
COVID 19 YLL	2020	2021
Absolute difference between most and least deprived fifth (ASR per 100 000)	2024	2217
Relative difference between most and least deprived fifth	2.89	3.81
Slope Index of Inequality (ASR per 100 000)	2414	2652
Relative Index of Inequality	1.37	1.70

Wyper GMA, Fletcher E, Grant I, *et al,* Widening of inequalities in COVID-19 years of life lost from 2020 to 2021: a Scottish Burden of Disease Study, *J Epidemiol Community Health* 2022;**76:**746-749.

Further information

- Scottish Government Scottish Index of Multiple Deprivation:

https://www.gov.scot/collections/scottish-index-of-multiple-deprivation-2020/#:~:text=It%20can%20help%20improve%20understanding,area%20concentrations%20of%20multiple%20deprivation.

Scottish Burden of Disease study: https://www.scotpho.org.uk/comparative-health/burden-of-disease/overview/

#ScottishBurdenOfDisease
#BurdenEU