

# A deprivation index for the UK: exploring spatial variations within and between nations

## UKDI Short Briefing issue 1

Christopher D. Lloyd<sup>1</sup>, Gemma Catney<sup>1</sup>, Sara Ferguson<sup>1</sup>, David McLennan<sup>2</sup> and Paul Norman<sup>3</sup>

<sup>1</sup> Geography, School of Natural and Built Environment, Queen's University Belfast

<sup>2</sup> Deprivation.org

<sup>3</sup> School of Geography, University of Leeds

Email: [c.lloyd@qub.ac.uk](mailto:c.lloyd@qub.ac.uk)

## Introduction

'Trajectories of Deprivation in the UK' is a research project funded by the Nuffield Foundation<sup>1</sup>. This project assesses how deprivation levels have changed in neighbourhoods across the UK, from 1971 through to the present day (see Lloyd et al. 2023; Norman et al., 2024). We aim to identify key factors which are linked to persistent or worsening levels of deprivation and have sought to identify examples of good practice in tackling deprivation at neighbourhood level. While the primary aim of the project has been to measure change over time in deprivation levels, this research note (UKDI Short Briefing issue 1) uses data for a single time point – 2021 for England and Wales and Northern Ireland and 2022 for Scotland. In this research note we introduce a new index – the **UK Deprivation Index (UKDI)** – which incorporates Census data on employment status, education, and self-reported health, which each relate to important dimensions of deprivation. This novel index shows marked inequalities both within and between the UK nations.

Measures of deprivation have been used widely to understand spatial inequalities across the UK and other nations and to target support to those in need. Many different indices have been created using data from the national censuses and drawing on an array of administrative data sources. In the UK, most indices have been produced for individual nations or, occasionally, for Britain as a whole. Only rarely have *whole UK* indices been created. For instance, the official Indices of Multiple Deprivation (IMDs) for each of the four UK nations differ in their deprivation domains, the variables included in their construction, and the weights used to combine the domains and sub-domains. In contrast, the research developed in this project is novel in creating a **new UK-wide index using data from the 2021 Censuses in England and Wales and Northern Ireland, and the 2022 Census in Scotland**. The index drills down into spatial inequalities at a very local level, and highlights how each locality compares to all other areas within the UK. The findings from the study will be of interest to the public, policy makers and third sector organisations, and anyone concerned with spatial inequalities in the UK.

In this research, deprivation is represented by three distinct domains – **employment** (people unemployed as a percentage of all people employed and unemployed – excluding full time students), **education** (people with no qualifications as a percentage of all people aged 16 and over), and **health** (a combination of information on general health status and limiting long term illness).

## Key points

- Northern Ireland has a much higher proportional share of the most deprived areas in the UK than Scotland, Wales, or any of the nine regions of England, at 25%.
- The North East of England has the second highest levels of deprived areas (21%), and the West Midlands the third (16.5%).

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<sup>1</sup> <https://www.nuffieldfoundation.org/>

- Employment deprivation is highest in the North East of England at 20%, followed by the West Midlands at 19%.
- Education deprivation is highest in Northern Ireland at 27%, with Yorkshire and the Humber ranked second at 19%.
- Health deprivation (using self-reported health) is particularly pronounced for Northern Ireland – nearly 28% of areas in Northern Ireland rank within the most deprived 10% by poor health across the UK. This compares to 23% in Scotland, 16% in the North East of England and – at the other extreme – just 1.5% of areas in London and 2.65% in the East of England.
- When results are summarized at local authority level, Derry and Strabane and Belfast (both within Northern Ireland) have larger shares of their areas within the most deprived 10% across the UK than do any of the other 374 UK local authorities.
- For employment deprivation, Birmingham has the largest proportion of areas in the most deprived 10%, with Wolverhampton ranked second and Middlesbrough (all England) ranked third.
- For education deprivation, Derry and Strabane (NI) has the largest proportion of areas in the most deprived 10%, with Sandwell (England) ranked second and Knowsley (England) ranked third.
- For health deprivation, Belfast (NI) has the largest proportion of areas in the most deprived 10%, with Glasgow (Scotland) ranked second and Derry and Strabane (NI) ranked third.

## Measuring deprivation

For health, age standardised indices are computed which account for the fact that places with older populations tend to have poorer health. For the general health measure, people with very bad and bad general health are compared to all people. For limiting long term illness (LLTI), people with a LLTI which impacts them a little or a lot are compared to all people. The index is constructed following a similar methodological approach as used for the official English Index of Multiple Deprivation (McLennan et al., 2019). First, the domain values for employment and education are adjusted by a process called shrinkage – this accounts for uncertainty in the values where population numbers are low. The values for all domains are then ranked from least deprived to most deprived, and the ranked values are exponentially transformed before they are added together (with equal domain weights) to obtain an overall UKDI value for each area<sup>2</sup>.

All of the analyses presented in this report are for the **smallest** geographical areas available in each of the UK nations. In England and Wales and in Scotland these are Output Areas while in Northern Ireland they are Data Zones. In this research briefing these are collectively referred to as zones. The sets of zones have different average population sizes ranging from 117 people in Scotland to 503 people in Northern Ireland<sup>3</sup>. The smallest available zones are used as there is extensive evidence that deprivation is concentrated within very small areas and using larger zones would risk missing pockets of deprivation (see Lloyd, 2016).

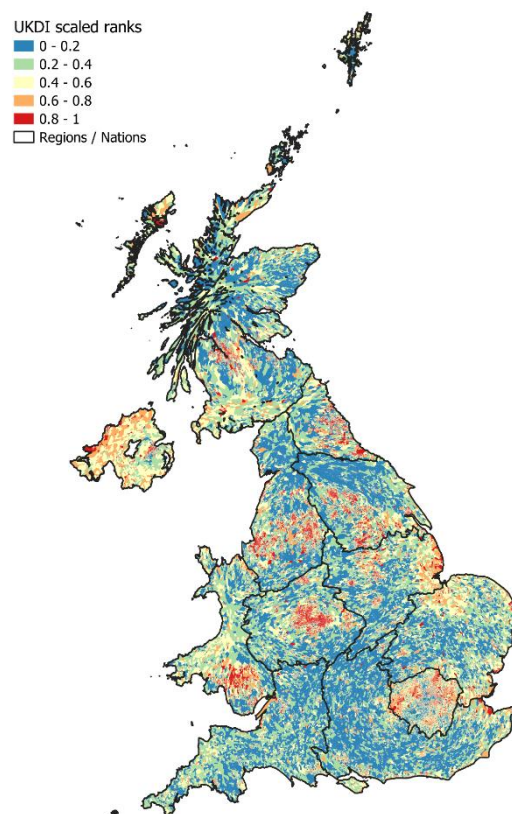
Deprivation measures are frequently used to identify the most deprived 10% of areas with many policy interventions targeting support at areas in this top decile. Given that most existing indices (including the official Indices of Multiple Deprivation) are not directly comparable across the UK nations, it has so far been very difficult to assess how areas with the highest levels of deprivation are distributed between the four nations. In this briefing, UKDI deciles are used to compare areas across the UK.

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<sup>2</sup> Shrinkage is not applied for the health domain as this measure is not based on local rates.

<sup>3</sup> We acknowledge that systematic size differences between the geographies of the four nations may have an effect on the final rankings.

## Deprivation trends in the UK



**Figure 1.** UKDI scaled ranks – 0 is least deprived, 1 is most deprived.

Using a cartogram (see Dorling, 1996) which allows us to see in more detail densely populated urban areas, Figure 1 shows UKDI scaled ranks for the UK. This emphasizes areas which would be difficult to discern in a map using normal cartographic space. Along with each nation, the boundaries of the nine regions of England are included on the map.

The scaled ranks range from zero (blue) where deprivation is very low relative to the rest of the UK, through to a value of one (red) where deprivation is very high relative to the rest of the UK.

Our analyses show that deprivation values are typically highest in urban areas, including parts of London, Birmingham, Liverpool, Manchester, Newcastle and Glasgow – and also part of south east Wales (the former coalfields), the north of East Anglia, and the west of Northern Ireland. These findings are shown visually in Figure 1.

These broad patterns are well-known for individual UK nations, but this analysis enables a direct comparison *between* nations.

There are differences in deprivation by the three domains, but the broad trends are similar. One notable difference is relatively higher levels of deprivation in Northern Ireland for education and health than for employment which is comparatively low.

## Where are the most deprived places across the UK?

A key means of summarising deprivation trends across the UK is to compute what proportion of zones within Wales, Scotland and Northern Ireland, and within each region of England, fall within the most deprived 10% of areas across the UK as a whole. Table 1 shows, for the UKDI and for each of the three deprivation domains, the corresponding percentages of zones in the most deprived 10%. The largest shares for the UKDI, and each domain, are highlighted in red. Northern Ireland has the highest deprivation levels, with some 25% of its zones being in the most deprived 10% across the UK. Ranked second is the North East of England, at 21%. For employment, the highest value is for the North East of England – at 20%. For both education and health, Northern Ireland has the largest share of zones in the most deprived 10% at, respectively, 27% and 28%. Yorkshire and the Humber is ranked second for education, while Scotland is ranked second for health deprivation.

UKDI domain	East Midlands	East of England	London	North East	North West	South East	South West	West Midlands	Yorkshire and The Humber	Northern Ireland	Scotland	Wales
UKDI	7.86	3.96	3.84	20.97	15.07	2.90	2.83	16.49	15.88	25.19	12.45	13.51
Emp	6.75	4.90	17.99	20.14	13.31	4.02	2.98	18.81	14.11	7.41	6.85	9.11
Edu	11.17	6.99	2.90	15.70	13.23	3.35	3.12	16.42	18.58	27.06	10.93	13.88
Hea	5.83	2.65	1.53	16.33	12.66	2.83	3.96	6.67	9.14	27.78	22.94	14.09

**Table 1.** Percentage of zones in the most deprived 10% across the UK by the UKDI and the domains.

The same approach can be taken to summarise zones according to the local authorities in which they are located. Tables 2, 3, 4 and 5 indicate the 20 local authorities with the largest proportions of their zones in the most deprived 10% across the UK for, respectively, the UKDI, the employment domain, the education domain and the health domain. High levels of deprivation for Northern Ireland are again emphasized – Table 2 (UKDI) shows that Derry City and Strabane is ranked first, with some 45% of its zones in the most deprived 10%, with Belfast ranked second place at 40%, followed by Middlesbrough ranked third at 39%. The highest ranked local authority in Scotland is Glasgow City – ranked 11<sup>th</sup> with 32% while for Wales it is Blaenau Gwent – ranked 12<sup>th</sup> with 30%.

For the employment domain (Table 3), Birmingham is ranked first at 47%, followed by Wolverhampton at 42% and Middlesbrough at 38%. For Northern Ireland, Derry City and Strabane at 13<sup>th</sup> is ranked highest, with 29%. For Scotland, there are no local authorities in the top 20 and Glasgow City is highest at 61<sup>st</sup>, with 16%. Similarly, for Wales there are no local authorities in the top 20 and Newport at 66<sup>th</sup> is ranked highest, with 14%.

For the education domain (Table 4), Derry City and Strabane is ranked first at 45%, with Sandwell ranked second at 42%, and Knowsley ranked third at 40%. For Wales, the local authority ranked highest for education deprivation is Blaenau Gwent – ranked 5<sup>th</sup> with 39%. For Scotland, there are no local authorities in the top 20 and Glasgow City is highest at 27<sup>th</sup>, with 26%.

For the health domain (Table 5), Belfast is ranked first at 50%, with Glasgow ranked second at 46%, and Derry City and Strabane ranked third at 44%. For England, the local authority ranked highest for health deprivation is Knowsley – ranked 9<sup>th</sup> with 31%. For Wales, Merthyr Tydfil at 10<sup>th</sup> with 30%, is ranked highest. One distinguishing feature of Tables 2 (UKDI) and 5 (health), as examples, is that Table 2 is dominated by local authorities in England while Table 5 includes more local authorities in Scotland.

Rank	Local authority	Decile 1 %
1	Derry City and Strabane	45.45
2	Belfast	39.86
3	Middlesbrough	38.88
4	Birmingham	36.72
5	Knowsley	34.71
6	Kingston upon Hull, City of	34.17
7	Sandwell	33.33
8	Liverpool	33.19
9	Hartlepool	33.13
10	Blackpool	32.68
11	Glasgow City	32.44
12	Blaenau Gwent	30.29
13	Wolverhampton	29.88
14	Walsall	28.99
15	Merthyr Tydfil	28.72
16	Oldham	27.95
17	Sunderland	27.24
18	Bradford	27.05
19	Manchester	25.55
20	South Tyneside	25.41

**Table 2.** UKDI: 20 LAs with the largest proportions of the zones in the most deprived 10% across the UK.

Rank	Local authority	Decile 1 %
1	Birmingham	47.40
2	Wolverhampton	42.22
3	Middlesbrough	38.44
4	Newham	35.96
5	Manchester	34.90
6	Sandwell	34.76
7	Kingston upon Hull, City of	33.37
8	Tower Hamlets	33.19
9	Blackpool	31.90
10	Hartlepool	31.89
11	South Tyneside	30.57
12	Walsall	30.05
13	Derry City and Strabane	28.62
14	Bradford	28.51
15	Haringey	27.05
16	Liverpool	26.85
17	Oldham	26.46
18	Barking and Dagenham	26.16
19	Camden	26.10
20	Nottingham	26.04

**Table 3.** Employment deprivation: 20 LAs with the largest proportions of zones in the most deprived 10% across the UK.

Rank	Local authority	Decile 1 %
1	Derry City and Strabane	44.78
2	Sandwell	42.43
3	Knowsley	40.04
4	Boston	39.15
5	Blaenau Gwent	39.00
6	Leicester	36.73
7	Belfast	34.83
8	Kingston upon Hull, City of	34.62
9	Merthyr Tydfil	33.85
10	Great Yarmouth	33.24
11	Walsall	31.92
12	Mid Ulster	31.82
13	Tendring	31.76
14	Wakefield	31.48
15	Stoke-on-Trent	30.59
16	Armagh City, Banbridge and Craigavon	30.05
17	Barnsley	29.89
18	Middlesbrough	29.81
19	Oldham	29.72
20	Bradford	28.89

**Table 4.** Education deprivation: 20 LAs with the largest proportions of zones in the most deprived 10% across the UK.

Rank	Local authority	Decile 1 %
1	Belfast	49.93
2	Glasgow City	45.97
3	Derry City and Strabane	44.11
4	Inverclyde	38.04
5	North Lanarkshire	37.40
6	North Ayrshire	36.88
7	West Dunbartonshire	36.40
8	Dundee City	32.60
9	Knowsley	30.77
10	Merthyr Tydfil	29.74
11	East Ayrshire	29.51
12	Blackpool	29.35
13	Clackmannanshire	28.96
14	Hartlepool	28.48
15	Renfrewshire	28.30
16	Liverpool	27.96
17	Blaenau Gwent	26.97
18	South Lanarkshire	26.17
19	West Lothian	25.32
20	Halton	24.88

**Table 5.** Health deprivation: 20 LAs with the largest proportions of zones in the most deprived 10% across the UK.

## Reflections on the findings

The findings are important in showing pronounced spatial inequalities between the nations of the UK (and between the regions of England). This information could play an important role in situating nation-specific deprivation in a UK context and in assessing, for example, how far the block grants from Westminster to the devolved nations reflect the challenges faces by people living in different parts of the UK.

While the variables used and the relevant definitions are consistent across the Censuses, the difference in timing between the England and Wales and Northern Ireland Censuses (2021) and that for Scotland (2022) should be borne in mind. It is important to acknowledge that both of the Censuses used in this analysis will have been affected by Covid-19, especially the employment domain. Scotland's overall unemployment rate in 2022 was lower than that for any region of England, and for Wales and Northern Ireland. This may reflect, in part, job losses following the UK national Covid-19 lockdowns in 2021 with some subsequent recovery by the time of the Scotland Census. This could therefore effectively suppress unemployment levels in Scotland compared to the rest of the UK.

The index produced in this research comprises only three domains. It does not have the breadth offered by the official Indices of Multiple Deprivation, nor can it be updated frequently as it depends on decadal Census data. However, the geographical zones used here are smaller than those utilised in the Indices of Multiple Deprivation collectively, thus enabling a more geographically granular approach. Providing a UK-wide perspective is the main contribution of this research.

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## Acknowledgements

We are grateful to the Nuffield Foundation for funding this programme of research, through grant reference: WEL/FR-000023253. The Office for National Statistics, National Records of Scotland, and the Northern Ireland Statistics and Research Agency are thanked for the provision of data on which the research is based.