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Trajectories of deprivation in the UK, 1971-2021

Chris Lloyd

Queen's University Belfast

c.lloyd@qub.ac.uk



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Co-investigators:

Sara Ferguson (QUB)

Gemma Catney (QUB)

David McLennan (deprivation.org)

Michael Noble (deprivation.org)

Paul Norman (University of Leeds)

Rationale

- Deprivation measures crucial in development and implementation of policies to help disadvantaged communities
- Funding allocated based upon a single time point
- Likely success of interventions determined by the **deprivation history** and **trajectory** of an area
- Success of schemes should be assessed by measuring changes in deprivation over time



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Deprivation trajectories: Townsend index

Census years: 1971, 1981, 1991, 2001, 2011 & 2021(2)

Geography:

- England and Wales, Lower Layer Super Output Areas (LSOAs)
- Scotland, Data Zones (DZs)
- Northern Ireland, Super Data Zones (SDZs)

Variables: inputs to Townsend deprivation

1. Unemployment
2. Non-home ownership
3. No car access
4. Overcrowding (differences in raw data over time & by country)

Deprivation calculation: Comparable over time



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Consistent geographies

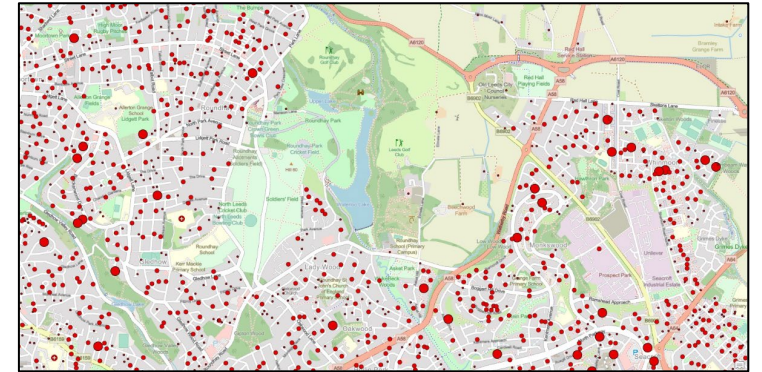
Boundary change

- Census years:
1971, 1981, 1991, 2001, 2011
- Convert variables from 'source'
geographies EDs / OAs / Grid
- 'Target' 2021 zones

Source zones
(e.g., 1991 EDs)



Source Postcodes
(e.g. 1991)



2021 target zones



Deprivation trajectories: Townsend index

- Four input variables standardised to z-scores relative to average percentages over all six time points
 - Allows absolute comparison & interpretable meaning
- Standardised values added together to produce the Townsend index
- For trajectories: Values for each indicator (4 * 6 census years) are inputs to a *k*-means classifier with five deprivation trajectory classes derived
- Original plan was for UK-wide from the outset
 - Plan didn't work!
- The above separately by E&W, Scotland & NI



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NI example Townsend index: 1971-2021

Period	Emp	Rent	Car	Ovr
1971-1981	8.84	-3.38	-3.35	0.11
1981-1991	-0.70	-12.59	-3.56	1.69
1991-2001	-11.84	-6.73	-8.30	-4.15
2001-2011	0.93	3.30	-2.43	-0.91
2011-2021	-2.27	1.78	-3.44	0.83

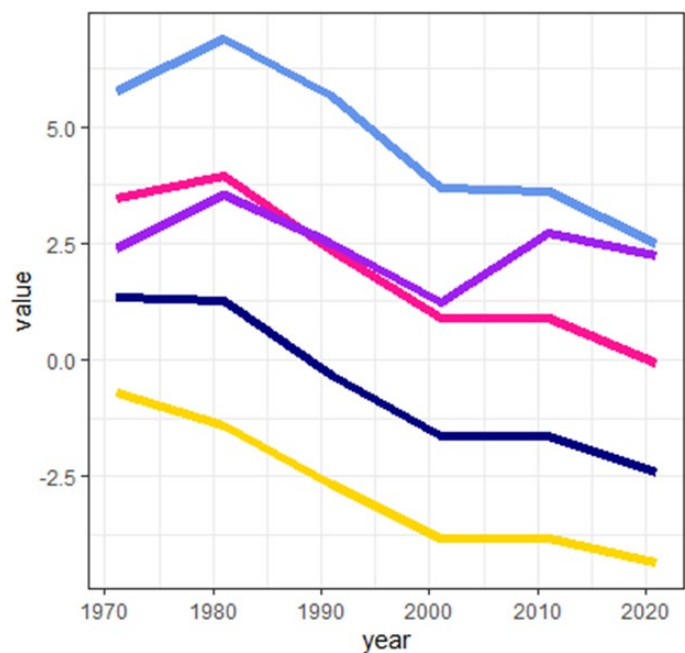
Mean changes in TI indicator z-scores for all SDZs



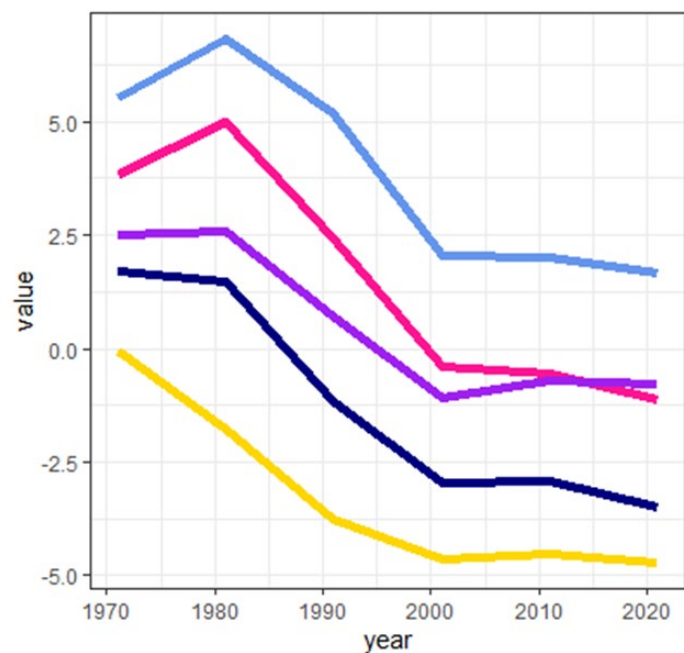
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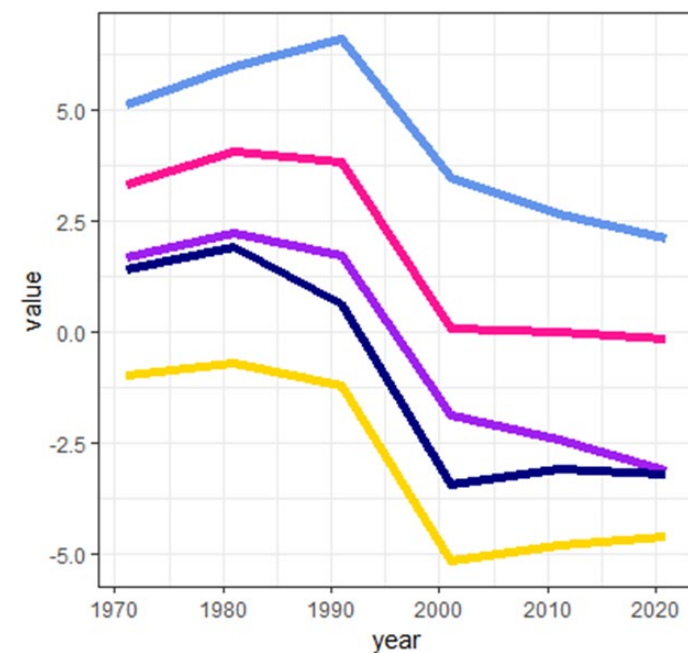
Townsend index: trajectory classes 1971-2021(2)



England and Wales

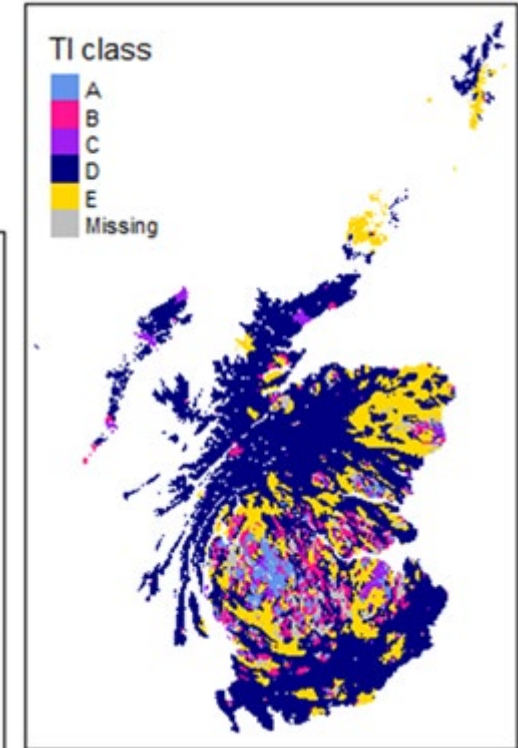
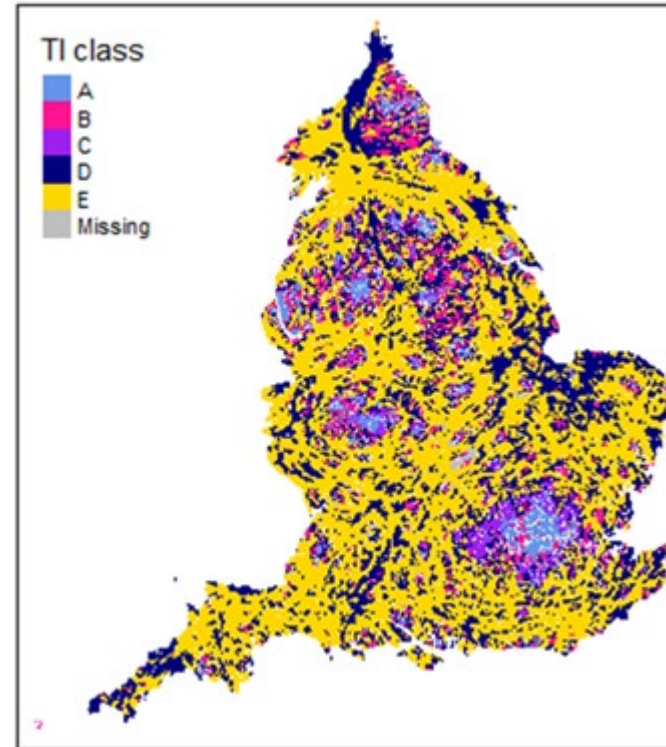
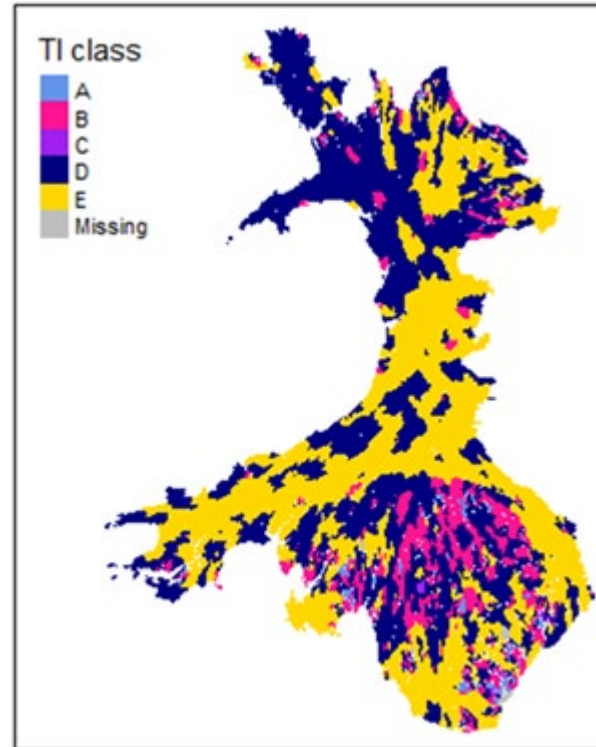
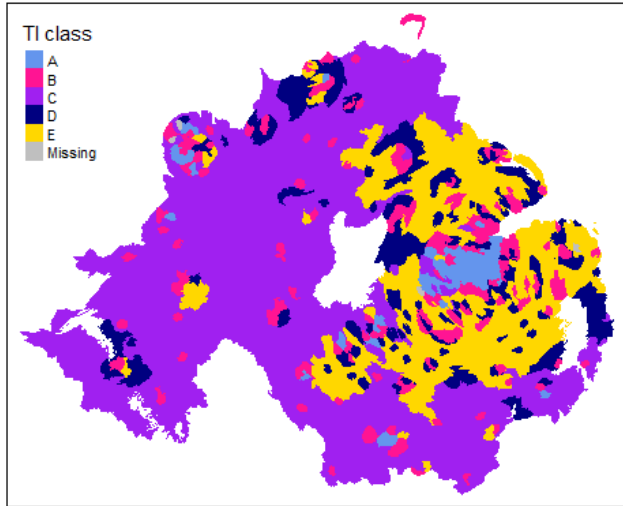


Scotland



Northern Ireland

Townsend index: trajectory classes 1971-2021(2)



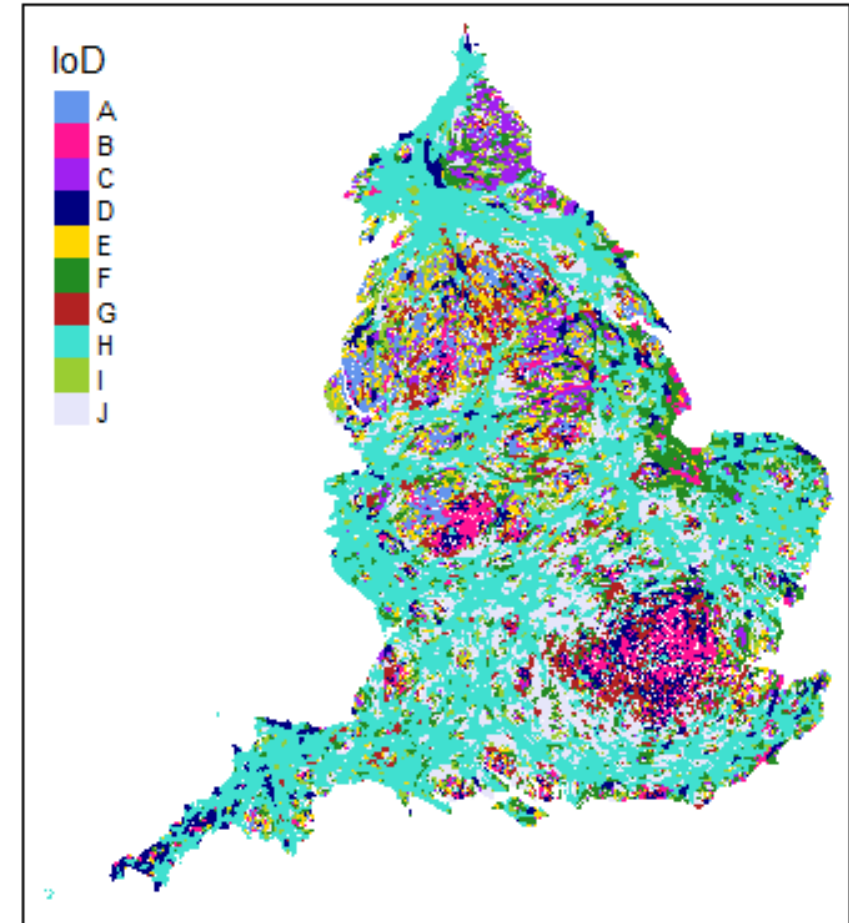
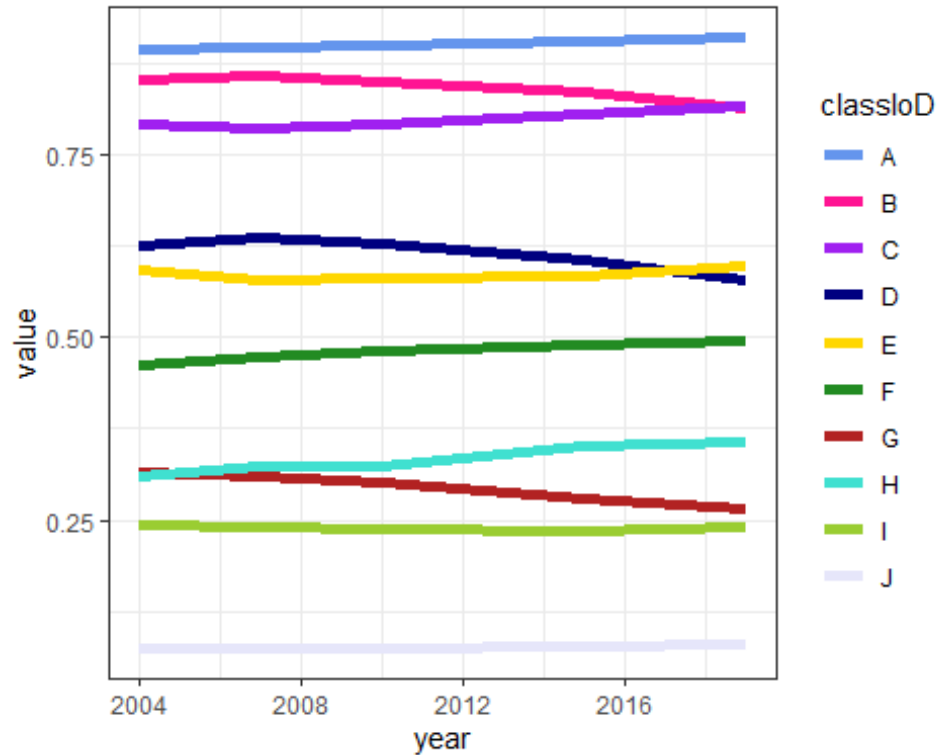
Indexes of Multiple Deprivation

- Official Measures in UK's constituent countries
 - Many (apparent) advantages over Townsend (or similar census-based), BUT ...
- Input data, domains, etc., in each country are different
- Time releases different (inc. years of inputs not aligned with outputs)

2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
E			E			E					E				E
				W			W			W					W
		Sc			Sc			Sc				Sc			Sc
	NI					NI							NI		

IoD: 2004, 2007, 2010, 2015, 2019

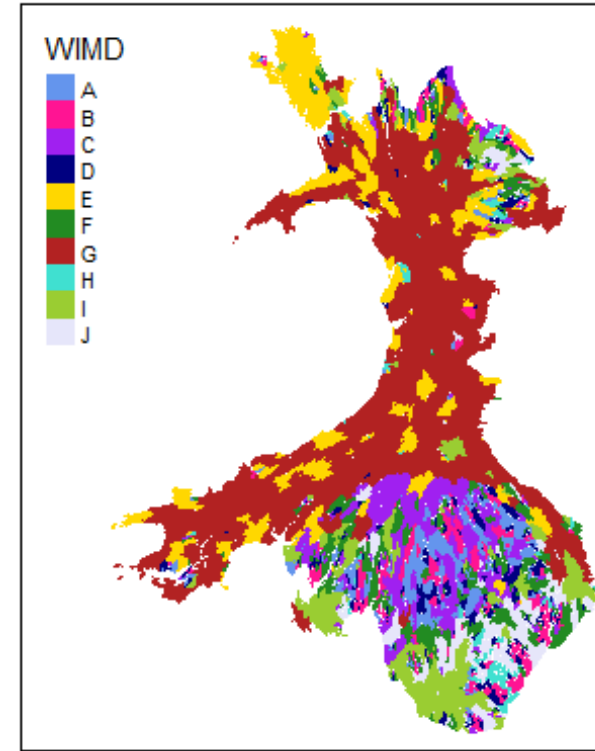
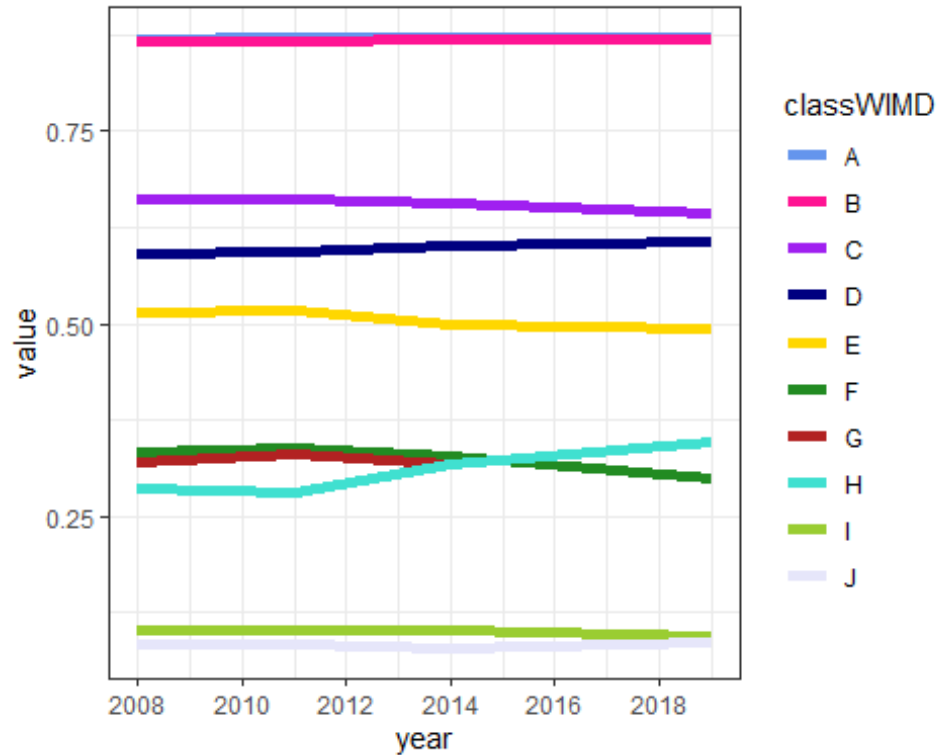
Seven domains



IoD trajectory classes

WIMD: 2008, 2011, 2014, 2019

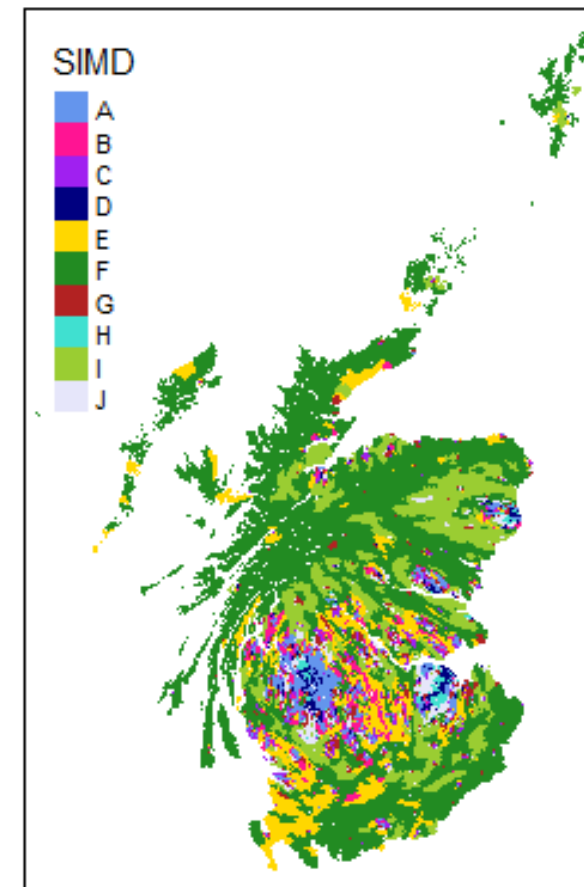
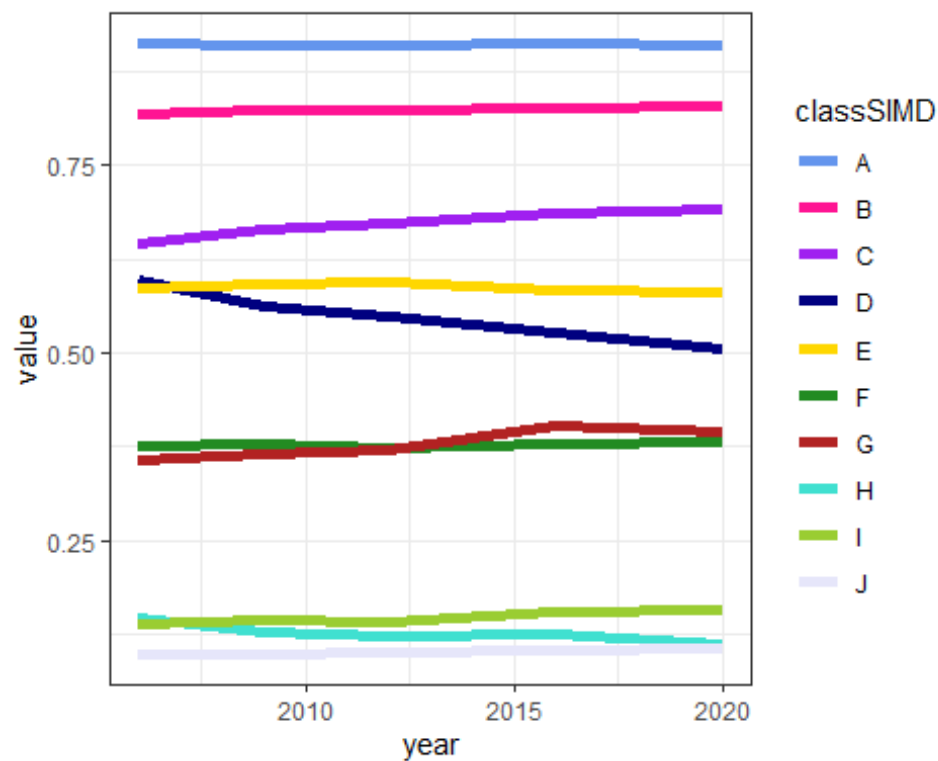
Eight domains



WIMD trajectory classes

SIMD: 2006, 2009, 2012, 2016, 2019

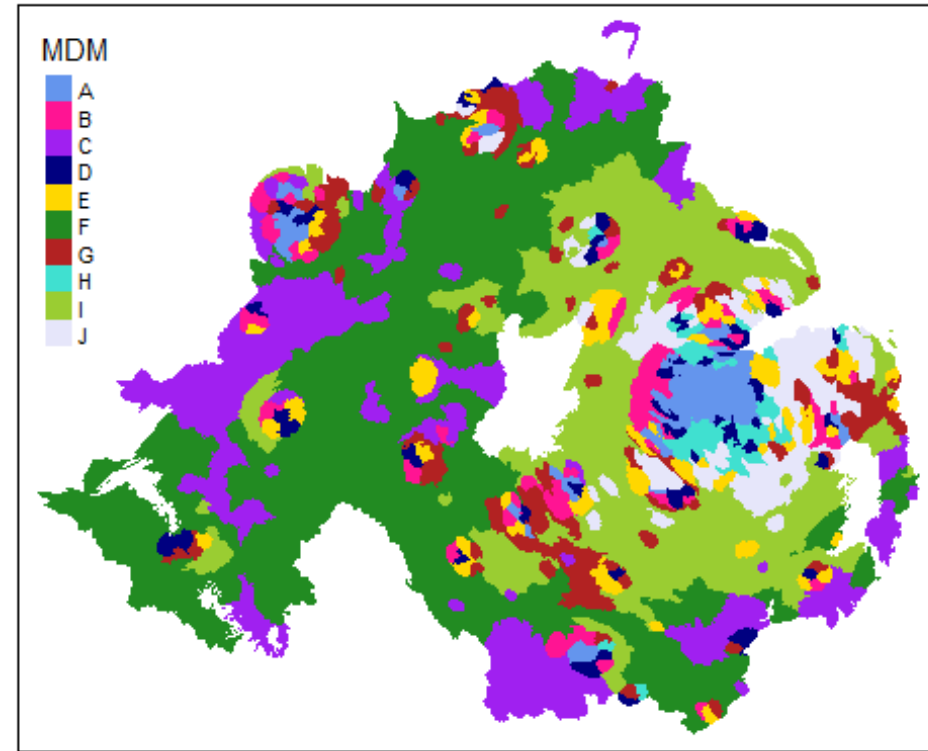
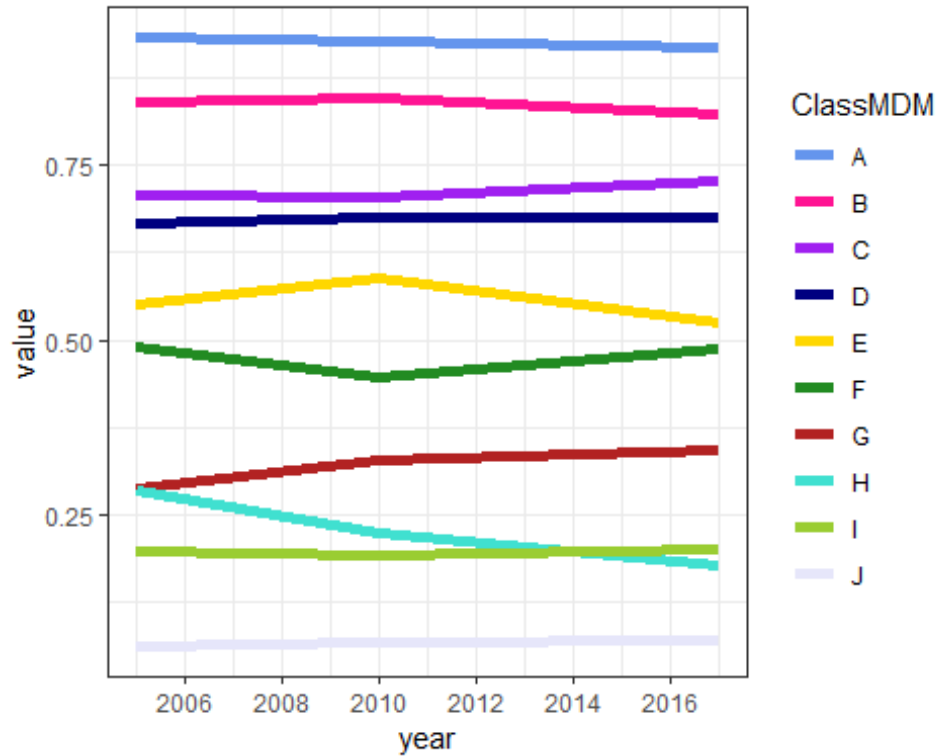
Seven domains



SIMD trajectory classes

NI MDM: 2005, 2010 2017

Seven domains



MDM trajectory classes

Deprivation trajectories: LGD profiles

One profile for each of the UK's local authorities

Townsend index 1971-2021

IMDs – releases vary by UK nation

- Deciles by year
- Indicators / domains which change most
- Maps
- Trajectory classes



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Belfast Deprivation Trajectories Profile

Christopher D. Lloyd, Gemma Catney, Sara Ferguson (Queen's University Belfast),
David McLennan (deprivation.org) and Paul Norman (University of Leeds)

Last updated: October 14, 2024

1. Introduction

This report provides statistical summaries of deprivation and deprivation trajectories in Belfast. Trajectories refer to the direction of change in deprivation. For example, one neighbourhood may have seen a consistent increase in deprivation while in another levels may have fluctuated or consistently decreased.

Areas with similar levels of deprivation as measured at the present time may have had very different deprivation histories. One area may have been subject to persistently high deprivation levels over many years while another may have only recently seen an increase in deprivation levels. Considering deprivation trajectories is, therefore, crucial in the design of effective policies and interventions aimed at reducing deprivation.

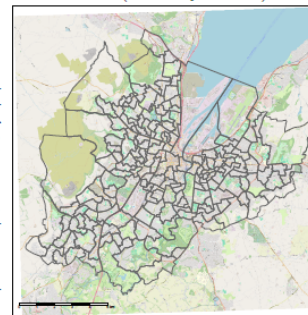


Figure 1: SDZ boundaries.

The report uses data which come from two sources: Census data for the period 1971 to 2021 and the NI Multiple Deprivation Measure (MDM) for 2005, 2010, and 2017. The report is divided into three main sections. The first uses Census data for the period 1971 to 2021 to compute the Townsend deprivation index (TI), the second makes use of the MDM, the third considers area deprivation trajectories using both measures. The report is intended to provide an overview of deprivation in Belfast compared to the rest of Northern Ireland, and to allow readers to assess how deprivation has changed in the area since 1971.

2. Geographies

The maps and data included in this report provide information on population and housing for areas called Super Data Zones (SDZs). There are 850 SDZs in NI with an average population of 2239 (figures for 2021). The SDZs which cover Belfast are shown in Figure 1, superimposed on a map of roads and other features (source: OpenStreetMap; <https://www.openstreetmap.org/>). This map is provided simply for the purpose of demonstrating the detailed geographical granularity of SDZs. There are 175 SDZs in Belfast. It is important to make a distinction in the use of the word 'Census' between 'Census data' that underpins the TI and 'Census geography' (that is, SDZs) which underpins the TI and the MDMs.

All of the data used in the profile are constructed for SDZs as used in the 2021 Census. The Census data from 1971, 1981, 1991, 2001 and 2011, upon which the Townsend Indices have been based, and all the MDM releases, were based on different sets of geographical units to 2021 SDZs. Therefore a GIS overlay procedure was used to convert these earlier datasets to the 2021 SDZs.

3. Townsend Deprivation Index

The Townsend deprivation index (TI) has been computed using Census data for multiple time points and it is used here to assess very long term (here, 1971 to 2021) deprivation trends. The TI is constructed using four sets of percentages which are each standardised (by calculating z-scores) and then combined with equal weights to form the overall composite index:

1. Unemployed persons (% of employed plus unemployed) (Emp)
2. Non owner-occupied households (% total households) (Rnt)
3. Households without access to a car or van (% total households) (Car)
4. Households with more than one person per room (% total households) (Ovr)

Positive values of the TI indicate deprivation levels which are greater than the average deprivation levels

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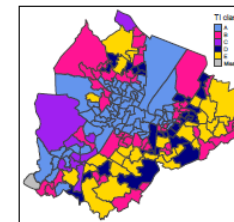


Figure 5: TI trajectory clusters.

Table 4: Number of SDZs in each TI trajectory cluster and TI 2021 decile.

Dec	A	B	C	D	E
1	0	0	0	0	16
2	0	0	0	0	6
3	0	0	0	0	6
4	0	0	0	3	3
5	0	1	1	7	0
6	0	1	4	3	0
7	0	11	3	8	0
8	4	16	0	3	0
9	9	14	1	0	0
10	51	5	0	0	0

3. Multiple Deprivation Measure

The MDMs are based mainly on administrative data and so are not restricted to Census years. The indices can also draw upon a wider range of deprivation measures than are available in the Census. The MDM comprises seven domains, each based on a set of indicators. These seven domains are combined together into an overall composite MDM using explicitly defined domain weights. The weights applied in creating the overall MDM 2017 measure are as follows:

1. Income Deprivation (Inc) 25%
2. Employment Deprivation (Emp) 25%
3. Health Deprivation and Disability (Hea) 15%
4. Education, Skills and Training Deprivation (Edu) 15%
5. Access to Services 10%
6. Crime Domain (Cri) 5%
7. Living Environment Deprivation Domain (Liv) 5%

Each domain is composed of multiple indicators, with there being ** indicators in the 2017 iteration of the MDM.

In the MDM framework, the terminology 'domain' is used instead of indicator (as used for the TI). This reflects the basis of the MDM as comprising several

distinct facets of deprivation, each of which may be assessed in their own right.

As noted previously, the MDM and TI are very different in nature, although they both have similar purposes in attempting to measure the multidimensional nature of socio-economic deprivation at neighbourhood level. One notable difference is in the relative contribution of overcrowding (households with more than one person per room) to the two measures. Overcrowding is a major component of the TI (accounting for one quarter of the overall score), whereas overcrowding is just one element within one domain (the Living Environment Domain - which is itself assigned a domain weight of 5%) of the MDM. Therefore, SDZs with high levels of overcrowding are likely to have relatively high levels of overall deprivation according to the Townsend score but not necessarily as measured using the MDM where its contribution to overall deprivation is much smaller.

The breakdown by national MDM deciles (where decile 1 is the 10% of SDZs with the lowest deprivation, and decile 10 is the 10% of SDZs with the highest deprivation) is shown in Table 5 for each MDM release from 2005 to 2017. In this table, the larger the percentage values in the bottom rows (deciles 9 and 10), the more highly deprived neighbourhoods there are.

Table 5: MDM score by decile, 2005 to 2017.

Decile	MDM05	MDM10	MDM17
1	5.1	9.1	14.3
2	9.1	8.0	6.3
3	6.3	5.1	6.9
4	3.4	6.9	5.1
5	8.0	5.1	8.0
6	6.3	5.1	3.4
7	5.7	3.4	7.4
8	5.1	9.7	6.9
9	15.4	11.4	12.6
10	35.4	36.0	29.1
Total	100.0	100.0	100.0

The MDM not only allows for assessment of change in the overall MDM (as shown above), but also each of the seven constituent domains that make up the MDM. A key interest in this profile is in SDZs which have seen large changes in deprivation rank on particular domains - either a relative increase in deprivation, or a relative decrease. Like the overall MDM score, the MDM domain scores are relative, and thus a reduction in MDM domain ranks in a specific area would indicate that deprivation has declined in that area relative to other areas across the country.

Table 6 shows mean average changes in MDM domain rank percentiles (defined below) for proximate time points; the averages are for all SDZs in Belfast. As

4

Summary

- Distinct geographies of deprivation change – most recent measures alone are not sufficient
- Provide resources to help assess what has worked, and where additional bespoke interventions are necessary
- Unpicks what facets of deprivation have changed most – or remained at similar levels
- Data and LGD profiles are available to help understand and tackle long-term spatial inequalities



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Publications

Lloyd CD, Norman PD & McLennan D (2023) Deprivation in England, 1971–2020. Applied Spatial Analysis & Policy <https://doi.org/10.1007/s12061-022-09486-8>

Norman P, Lloyd C, McLennan D, Ferguson S & Catney G (2024) 50-year Deprivation Trajectories: Local Area Change in England and Wales, 1971–2021. Applied Spatial Analysis & Policy <https://doi.org/10.1007/s12061-024-09583-w>



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