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Understanding and Using the English Indices of Multiple Deprivation

Poverty, Deprivation and Dementia: Some Reflections

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Outline

- Poverty and Deprivation: Understanding Concepts
- Measures of Deprivation
- English Indices of Multiple Deprivation (IMD)
  - Concept
  - Limitations
- IMD and Dementia: Possible Association

Poverty and Deprivation

‘Poverty [is] the failure of basic capabilities to reach certain minimally acceptable levels’ (Sen, 1981).

‘Individuals’ families and groups in the population can be said to be in poverty when they lack the resources to obtain the types of diet, participate in the activities and have the living conditions and amenities which are customary, or at least widely encouraged or approved, in the societies to which they belong’ (Townsend, 1979).

‘In considering the minimum income needed by persons of working age for subsistence during interruption of earnings, it is sufficient to take into account food, clothing, fuel, light and household sundries, and rent, though some margin must be allowed for inefficiency in spending’ (Beveridge, 1942).

‘By necessaries, I understand not only the commodities which are indispensably necessary for the support of life but whatever the custom renders it indecent for creditable people, even of the lowest order, to be without…’ (Smith, 1776).

Source: Saunders, (2004), Noble, et. al, (2006)

Poverty and Deprivation

Concepts

- Poverty is complex; there have been differences on the conceptually explaining it and even more differences on the measurement methods.
- Poverty line or consumption norms could distinguish poor from non-poor, and also give proportion of poor to non-poor at a given point of time.
- "…the condition of poverty means not having enough financial resources to meet needs. Deprivation, on the other hand, refers to unmet need, which is caused by a lack of resources of all kinds, not just financial" (Noble, et. al., 2006).
- "Absence of entitlement is deprivation" (Sen, 1981).

Poverty and Deprivation

Concepts

- Entitlements are of five types:
  - Trade-based / exchange
  - Production-based
  - Own-labour
  - Inheritance / transfer
  - Entitlement through social security
- …and, disruption in either of these could cause deprivation (Sen, 1981).
- Deprivation could be for a short or a prolonged period of time.

Poverty and Deprivation

Measurements

The Head-Count Measure

- Based on income.
- Short-fall of income from poverty line does not affect the head count.
- Not sensitive to distribution of income, even within the ones below poverty line.

Minimum nutritional / food requirement

- This could vary across different groups and regions.
- This would differ based on the choice of commodities, and people's choices and habits vary significantly across regions and cultures.
- If linked with a proportion of income that would be used for food, then nutritional requirements would derive income requirements.

Relative Deprivation

- Poverty and deprivation are used interchangeably, invariably.
- Conditions versus feeling.
- Issue with the choice of reference group, and the group with which people associate themselves.

English Indices of Multiple Deprivation

Background

- This is a successor to the Index of Local Deprivation, .
- The research to develop Index of Multiple Deprivation (IMD) was commissioned in 1998, by the then Department of Environment, Transport and Regions and published in 2000.
- Since then, IMD are published in 2004, 2007, 2010, 2015 and the latest is 2019.

English Indices of Multiple Deprivation

Estimation and Aggregation

Indices are estimated for each LSOA.

LSOAs are small areas designed to be of a similar population size, with an average of approximately 1,500 residents or 650 households.

Indices are then aggregated and made available at higher administrative levels.

Source: Noble, (2019)

English Indices of Multiple Deprivation

Concept, Components and Weights

Income Deprivation (22.5%)	Employment Deprivation (22.5%)	Education, Skills and Training Deprivation (13.5%)
• 7 components • Sum / LSOA total Population • Apply shrinkage procedure to this rate	• 6 components • Sum / LSOA total Population (18-59 Age years group) • Apply shrinkage procedure to this rate	• 7 components • Apply shrinkage procedure to all data • Factor analysis to generate weights to combine weights in children sub-domain • Adult skills combined as non-overlapping count • Two sub-domains standardised, exponentially transformed and combined with equal weights

Source: McLennan, et. al., (2019); Noble, (2019)

English Indices of Multiple Deprivation

Concept, Components and Weights

Health Deprivation and Disability (13.5%)	Crime (9.3%)	Barriers to Housing and Services (9.3%)	Living Environment Deprivation (9.3%)
• 4 components • Apply shrinkage procedure to all data • Factor analysis used to generate weights to combine indicators	• 4 types of crime rates • Constrain numerators to CSP totals, create rates then apply shrinkage procedure to the four rates • Factor analysis used to generate weights to combine indicators	• 4 main components • Apply shrinkage procedure to the sub-component “overcrowding” • Standardise indicators in sub-domains and combine with equal weights • Weights; Two sub-domains standardised, exponentially transformed and combined with equal weights.	• 2 main components • Apply shrinkage procedure to the sub-components, except for “air quality” • Standardise indicators in sub-domains and combine with equal weights • Weights; Two sub-domains standardised, exponentially transformed and combined with weights: 0.67 for indoors, 0.33 for outdoors.

Source: McLennan, et. al., (2019); Noble, (2019)

English Indices of Multiple Deprivation

Measures

The average rank and average score summaries identify the average level of deprivation.

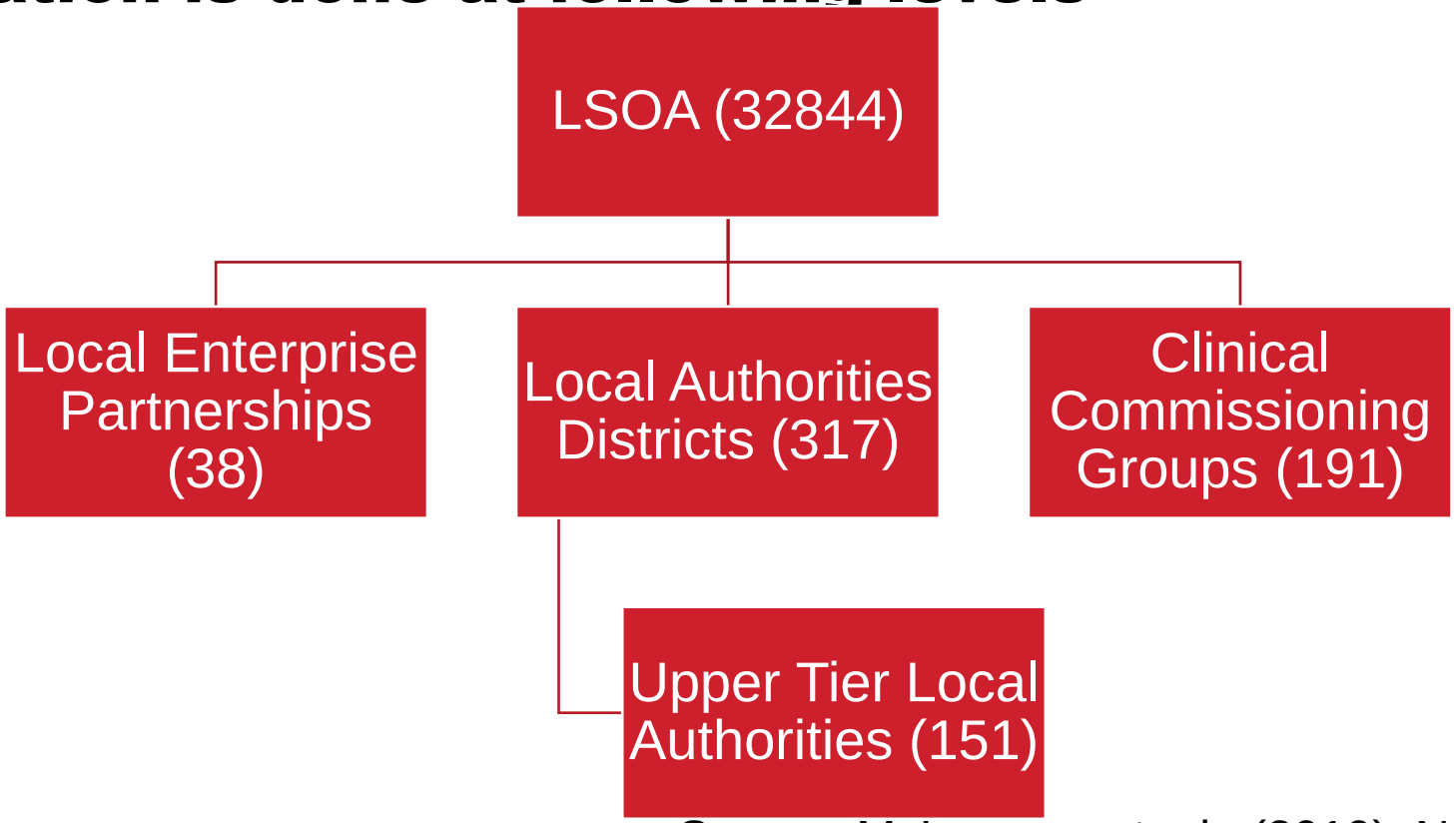
The proportion of LSOAs in the top most deprived decile is the degree to which the higher-level area is highly deprived.

The local concentration summary identifies those higher-level areas with extreme levels of deprivation.

Source: Noble, (2019)

English Indices of Multiple Deprivation

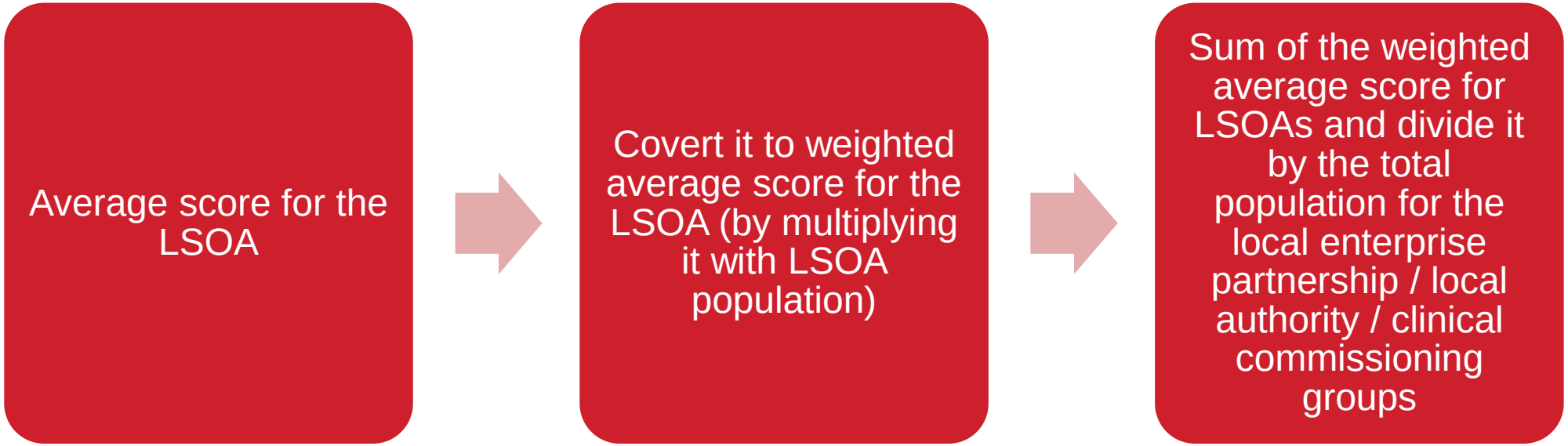
Aggregation is done at following levels



Source: McLennan, et. al., (2019); Noble, (2019)

English Indices of Multiple Deprivation

Aggregation for average score for higher administrative levels



Source: McLennan, et. al., (2019); Noble, (2019)

English Indices of Multiple Deprivation

Characteristics

- Shrinkage enhances the reliability of measurement (IMD score).
- Factor analysis is undertaken to identify one single common factor against the possibility of a more meaningful factor.
- The exponential transformation procedure gives control over the extent to which a lack of deprivation in one domain cancels or compensates for deprivation in another domain.
- The transformation is scale-independent, and therefore, it is not affected by the size of the Lower-layer Super Output Area’s population.

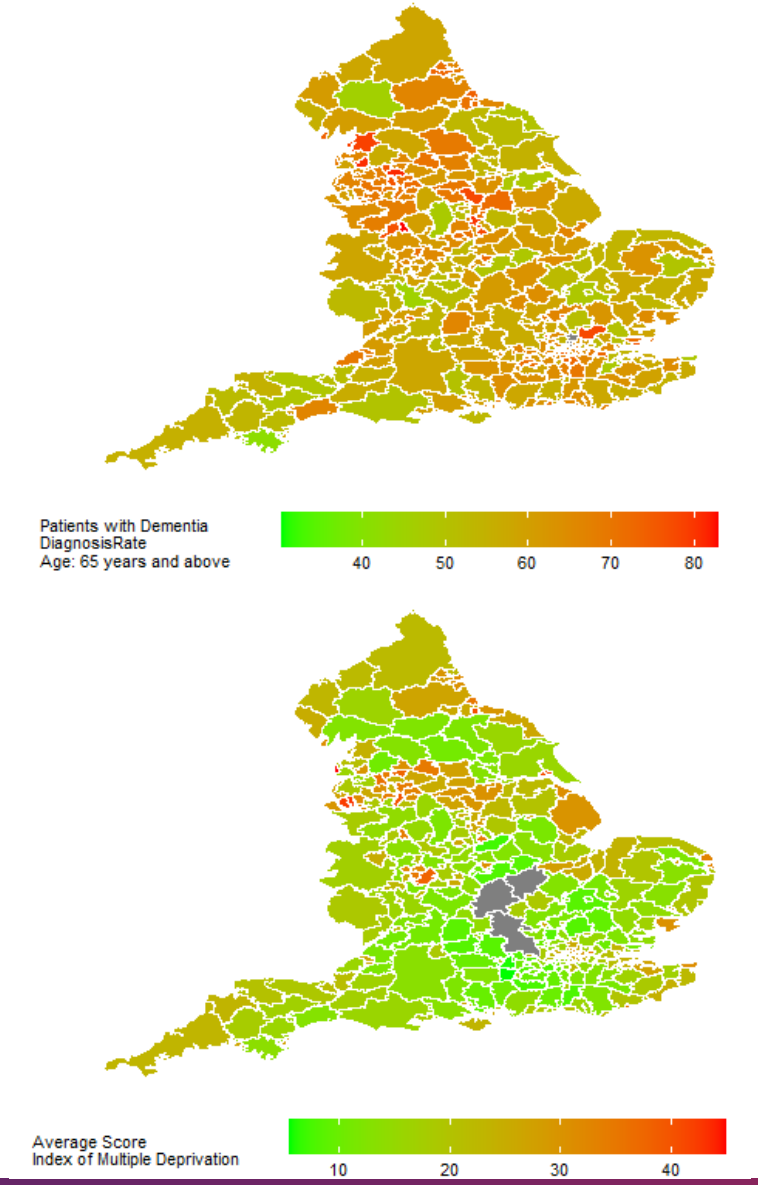
Source: Noble, (2019)

English Indices of Multiple Deprivation

Limitations

- The limitation of factor analysis is replicability, since correlations change over time.
- There is no robust method to validate deprivation measure for small areas.
- The reasons for weight allocations are not clearly explained.
- There could be issues of double counting. For example, universal credit claimants in the “no work requirements” is included both in income and employment domains.

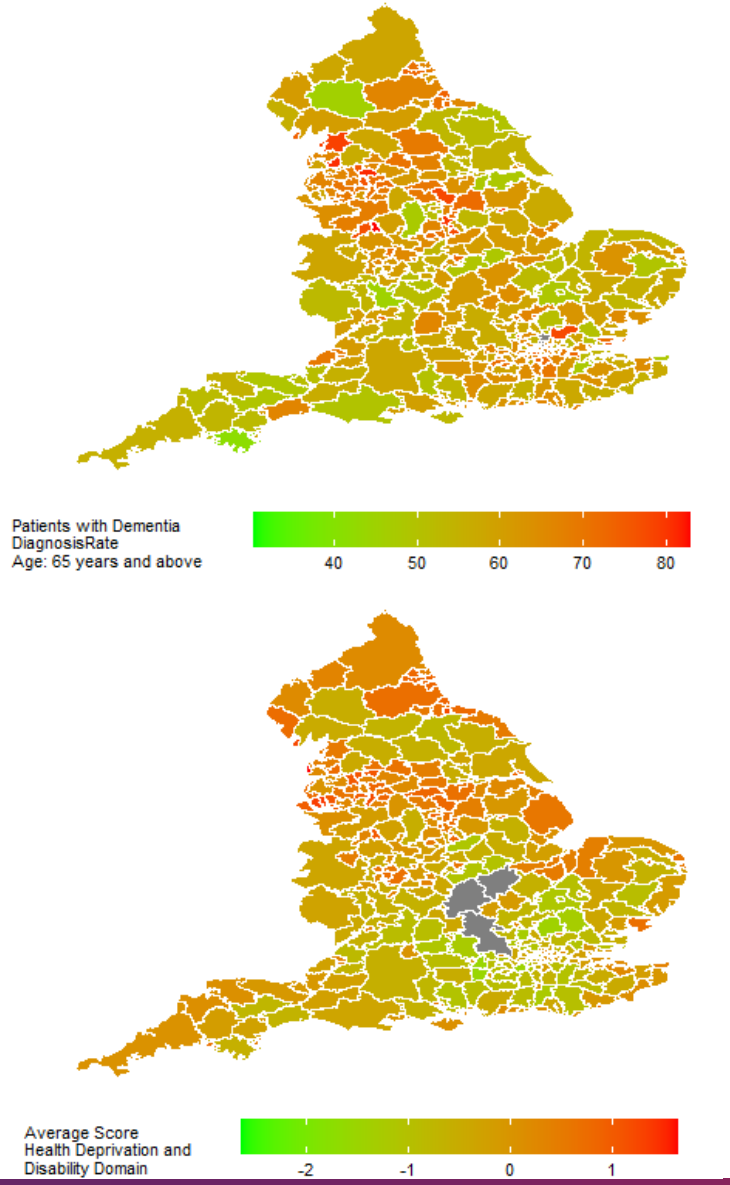
Source: Deas, et. al., (2003); Allik, et. al., (2020)



Dementia and Deprivation

- The diagnosis rate of dementia ranges from close to 20, to slightly above 80.
- Average Score for IMD ranges from slightly less than 10 to slightly more than 40.
- Diagnosis rate is a percentage and therefore it has a fixed range from 0 to 100.
- Average score for IMD is a weighted average of composite scores of sub-components of deprivation and therefore, has no fixed range.
- The grey region in the map shows unavailability of data for those regions.

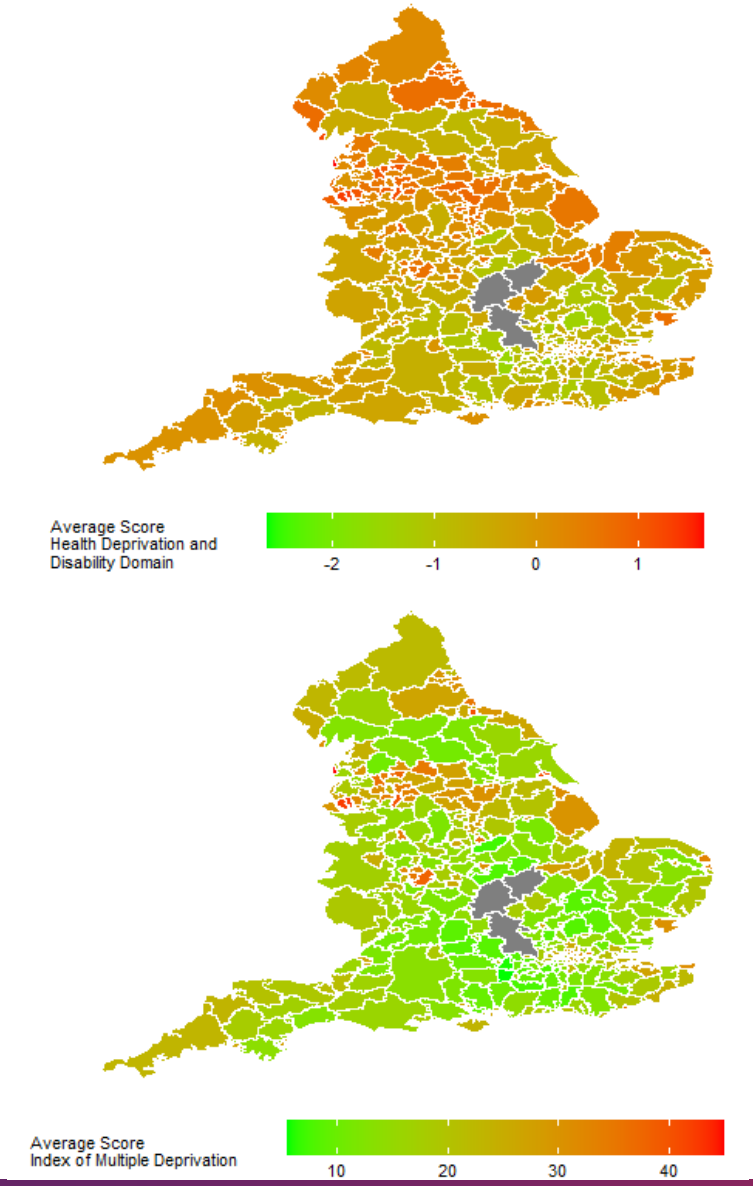
Source: Open Data Communities



Dementia and Health Deprivation

- The diagnosis rate of dementia ranges from close to 20, to slightly above 80.
- Average Score for Health Deprivation and Disability ranges from slightly less than -2 to slightly more than 1.
- The dimension of score for Health Deprivation and Disability varies drastically from the overall IMD score.

Source: Open Data Communities

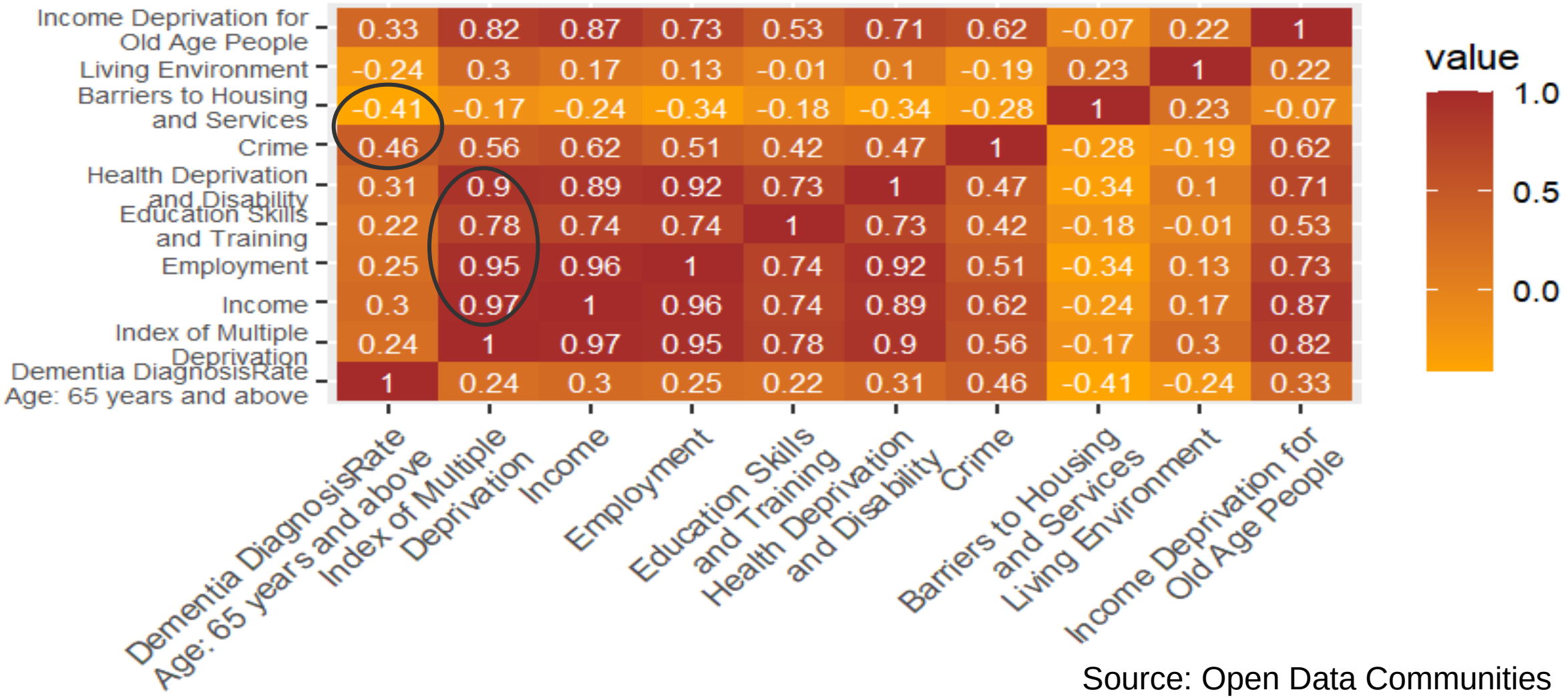


IMD and Health Deprivation

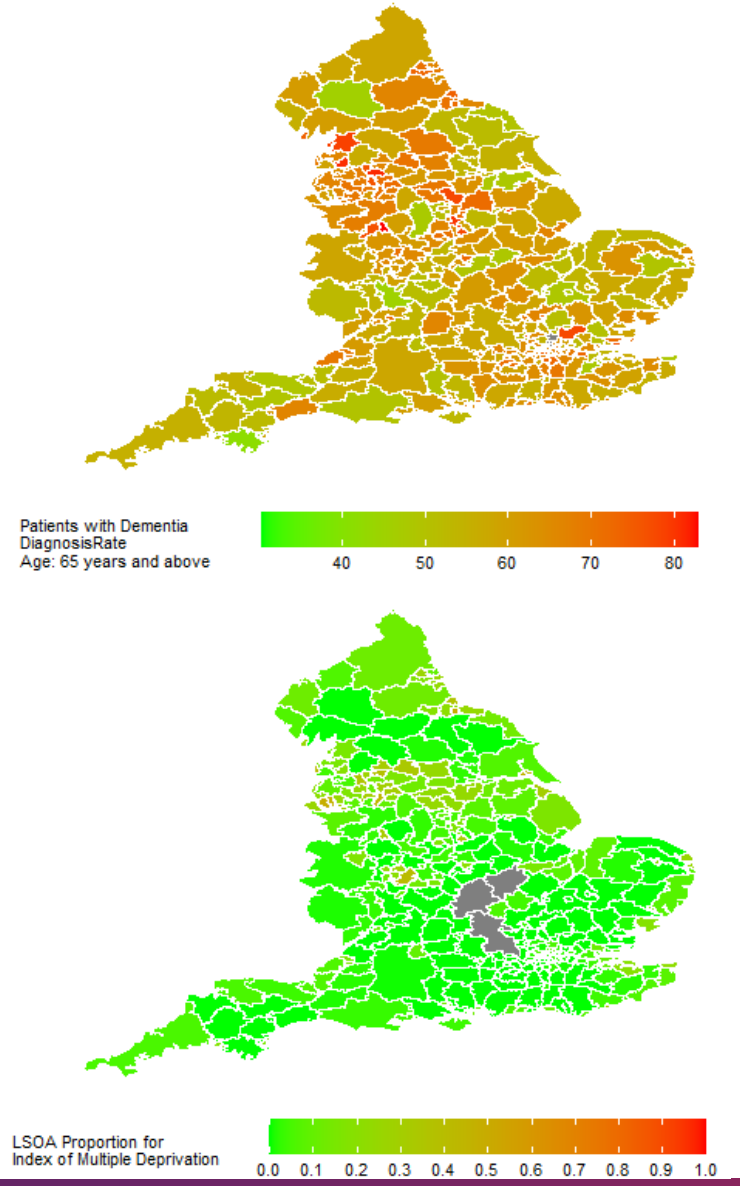
- Average Score for Health Deprivation and Disability ranges from slightly less than -2 to slightly more than 1.
- Average score for IMD ranges from slightly less than 10 to sightly more than 40.
- Despite, overall deprivation across the lower-tier local authorities across England is low, whereas health deprivation and disability is quite high.
- This contrast in overall deprivation versus health domain deprivation supports the concerns raised by Deas, et. al., (2003).

Source: Open Data Communities

Correlation Matrix Heatmap for Averge scores of Domains of Deprivation and Dementia Diagnosis Rate



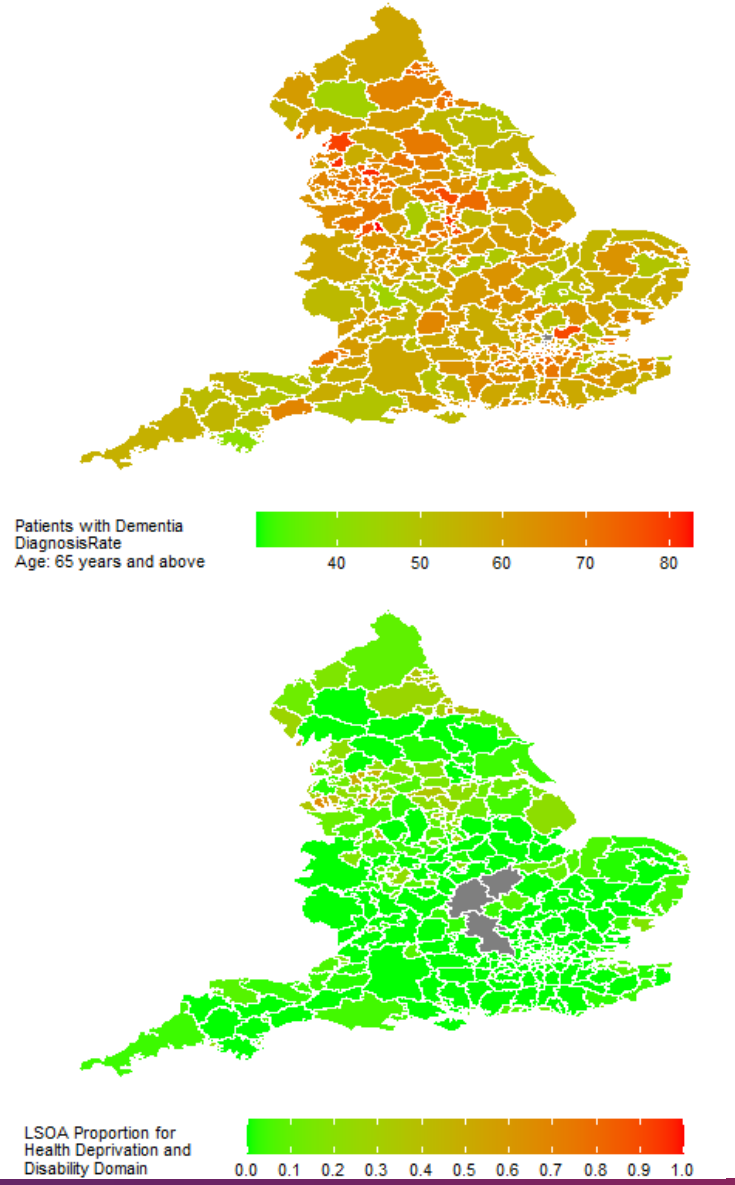
Source: Open Data Communities



Dementia and IMD

- The map in lower panel shows the proportion of LSOAs in the top decile of deprivation for a given local authority region.
- Most of the local authority regions have less than 10 per cent of LSOAs in the top decile of deprivation.
- This raises concern about which measure of IMD should be used for the study – average score or proportion of LSOAs.

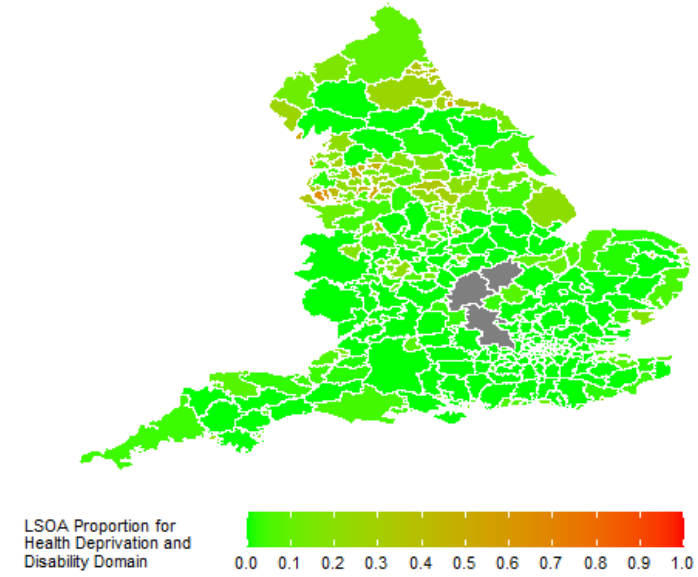
Source: Open Data Communities

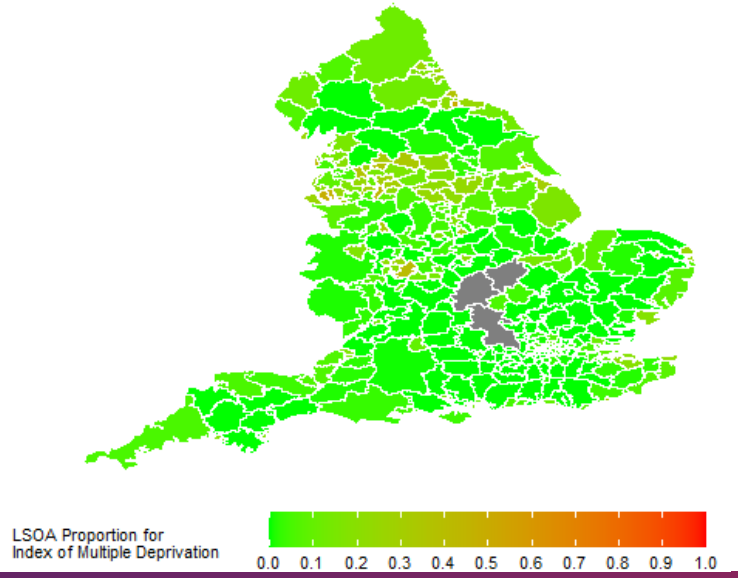


Dementia and Health Deprivation

- The lower panel shows LSOAs in top decile for the Health Deprivation and Disability domain of the IMD.
- Unlike the average score (as shown in the earlier slide), which was quite high, here the proportion of LSOAs in the top decile is very low.
- This could have an effect on the nature of relationship between dementia diagnosis rate and Health Deprivation and Disability.
- However, there is hardly any difference in the correlation coefficients, as can be seen from the correlation heatmaps.

Source: Open Data Communities

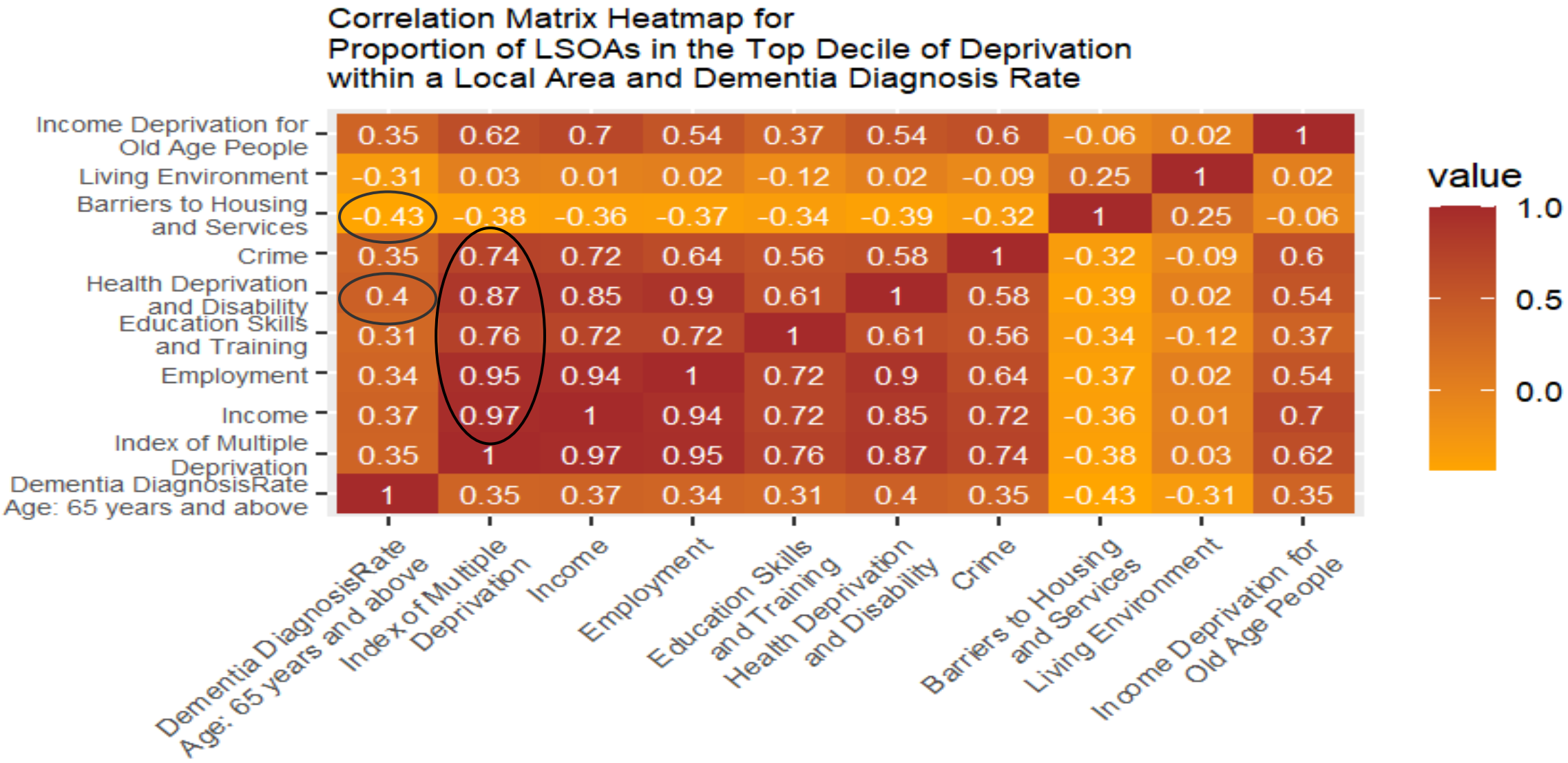




IMD and Health Deprivation

- Unlike the average scores, where the score of IMD was quite high with a high range, here, the proportion as well as the range of the proportion is quite low.
- Same is the case for the Health Deprivation and Disability.

Source: Open Data Communities



Source: Open Data Communities

Major Takeaway

- There are many methods of measuring poverty. However, the most recent method of estimating IMD has the least limitations, and covers a wide range of domains of deprivation.
- Factor analysis used in estimation of the index suffers from the limitation of replicability.
- While Shrinkage ensures reliability, validity of the Index is difficult to ascertain.
- There are issues of double-counting.
- The average scores are estimated for LSOAs and and made available at higher administrative levels.

Major Takeaway

- This study examines the patterns and associations in dementia and deprivation at local authority (district) level.
- The results reveal very weak association, including the individual domains of deprivation an dementia diagnosis rate.
- There is a negative correlation of dementia diagnosis rate with deprivation of housing and services, and living environment.
- One may see a very high correlation among the domains of deprivation.

The Way Forward

- This is an ongoing research. We plan to:
- Examine the pattern in correlation over time.
- Examine the impact of deprivation on dementia, while holding for demographic characteristics.

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Any questions?

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