

# Inequalities in Rural Communities: Adapting national deprivation indices for rural areas

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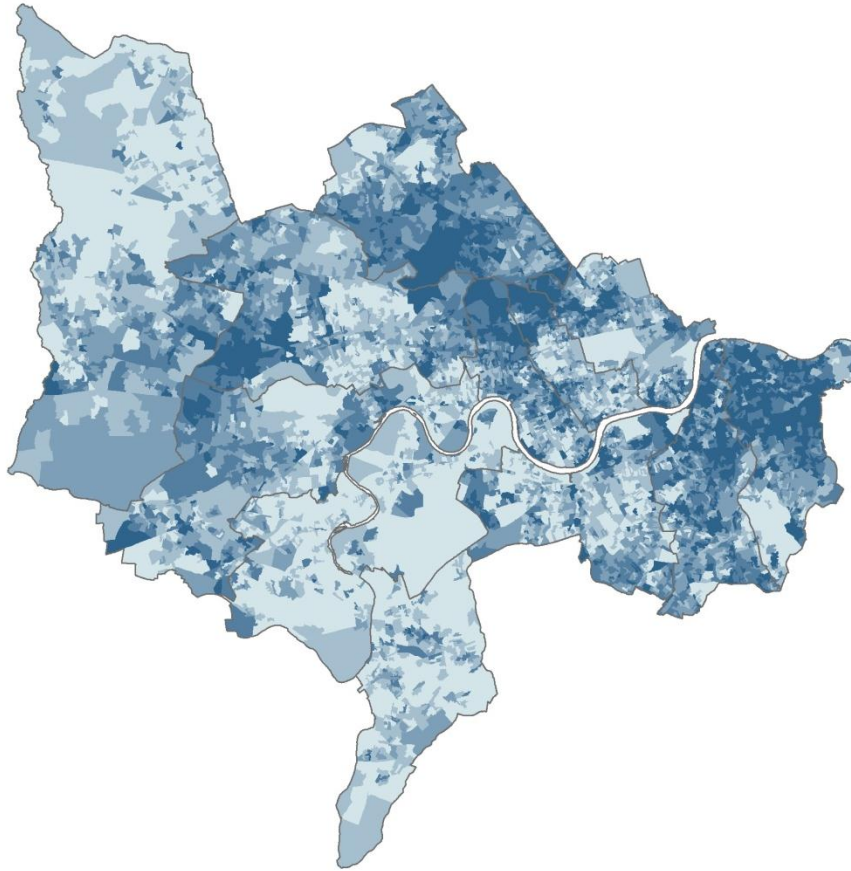


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# National area-level deprivation indices



## Carstairs - Equal counts

Affluent  Deprived

## Based on census data:

Measures of material deprivation:

- Carstairs Index
- Townsend Index

Need for primary care services

- Jarman Underprivileged Area score

## Based on other data sources:

- Index of Deprivation
- Department of the Environment index

# Census based indices: composite measures of deprivation

| Name                    | Carstairs Index   | Townsend Deprivation Index  | Jarman Underprivileged Area Score  |
|-------------------------|---|---|--|
| <b>Census variables</b> | <ul style="list-style-type: none"> <li>• No car ownership</li> <li>• Unemployed males over 16</li> <li>• Overcrowding: more than 1 person per room</li> <li>• Head of household in low social class</li> </ul> <p>... expressed as percent of households in an area with the relevant characteristics</p> | <ul style="list-style-type: none"> <li>• No car ownership</li> <li>• Unemployed males over 16</li> <li>• Overcrowding: more than 1 person per room</li> <li>• No home ownership</li> </ul> <p>... expressed as percent of households in an area with the relevant characteristics</p> | <ul style="list-style-type: none"> <li>• Unemployed males over 16</li> <li>• Overcrowding: more than 1 person per room</li> <li>• Head of household in low social class</li> <li>• Lone pensioners</li> <li>• Single parents</li> <li>• Borne in New Commonwealth</li> <li>• Children aged under 5</li> <li>• One year migrants</li> </ul> <p>... expressed as percent of residents in an area with the relevant characteristics</p> |
| <b>Weighted</b>         | no  | no  | yes  |

# Derivation of Carstairs score for an area

$$CAR = \sum_{i=1}^n \frac{X_i - m_i}{s_i} \qquad X_i = \frac{n_i}{d_i}$$

$n_i$  is the numerator of deprivation variable  $X_i$  (e.g. number of unemployed males)

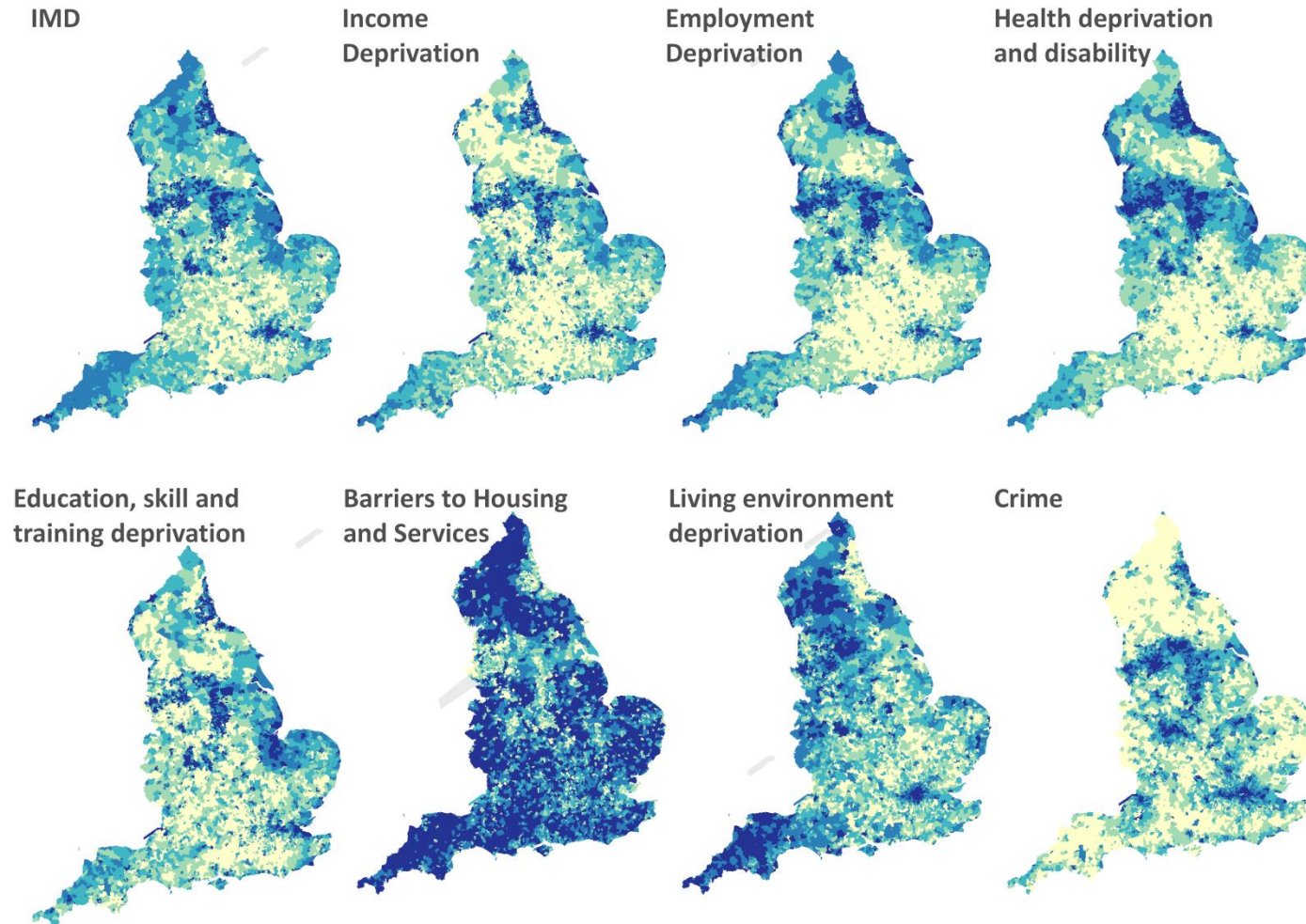
$d_i$  is the denominator of deprivation variable  $X_i$  (e.g. number of economic active males)

$m_i$  is the mean of  $X_i$

$s_i$  is the standard deviation of  $X_i$

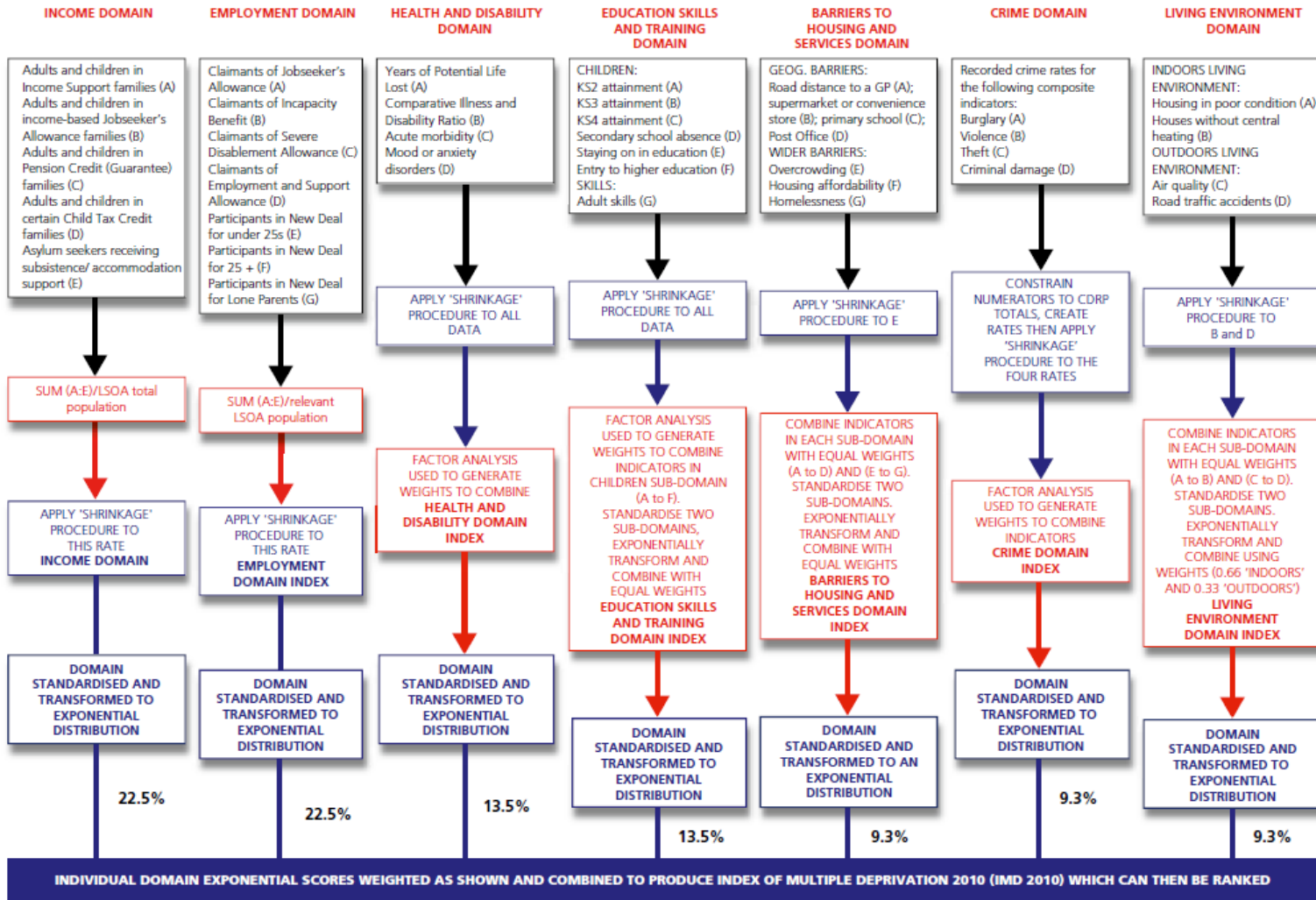
# Index of Multiple Deprivation (IMD)

- Originally developed by the **Office of the Deputy Prime Minister** (2000, 2004), now **Communities and Local Government** (2007, 2010, 2015 [to be released September 2015])



# IMD Derivation

## Annex B: Components of the Index of Multiple Deprivation 2010





# Methods: Define rural areas

Rural areas were defined using:

- *ONS Rural and Urban Area Classification 2004*  
for LSOAs 2001

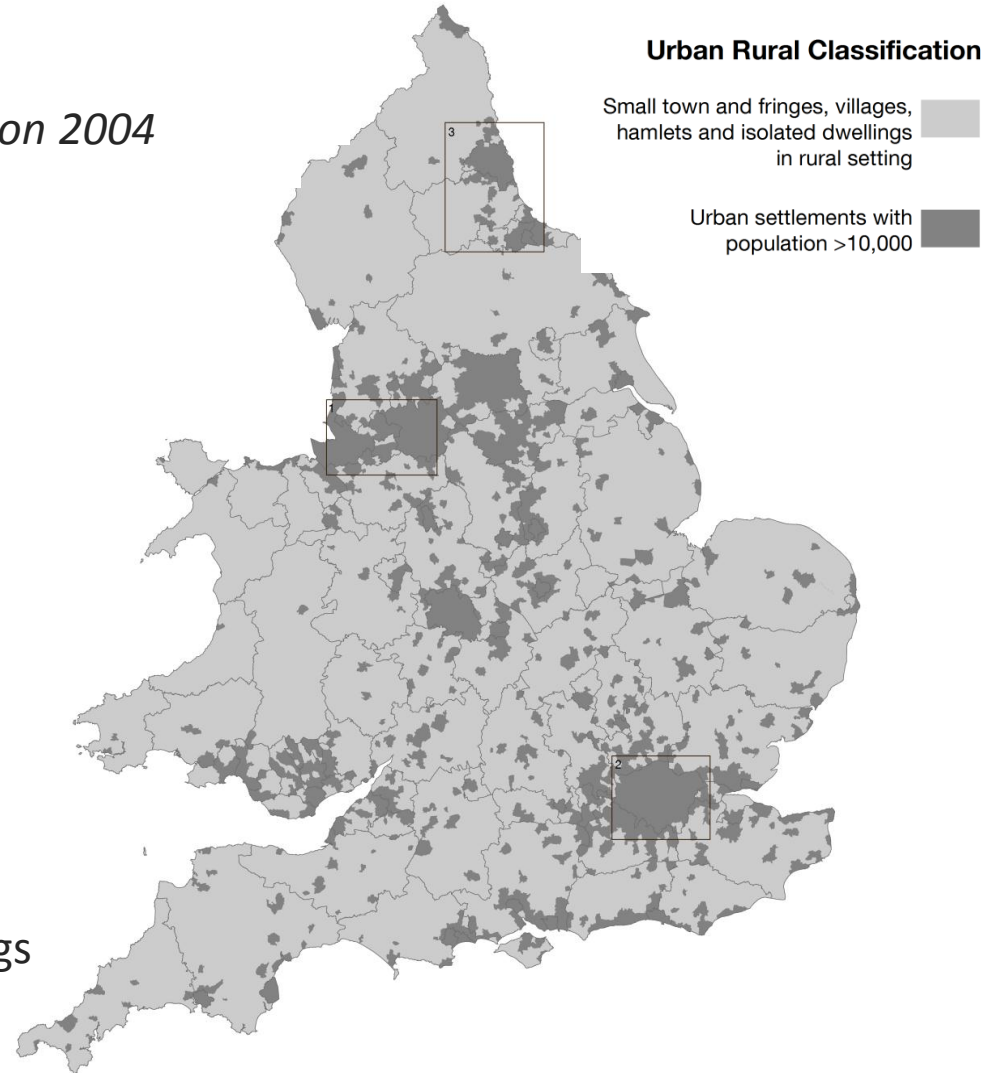
Rural areas include:

- small town and fringes
- villages
- hamlets and isolated dwellings

- *ONS Rural-urban Classification 2011*  
for COAs 2011

Rural areas include:

- rural town and fringe
- rural village
- rural hamlet and isolated dwellings



# Methods: Adapting to rural areas

- Areas (e.g. COAs, LSOAs) classified as urban were removed from the data
- Deprivation index was standardised to rural areas only where possible
- Deprivation index score was divided into quintiles

## *Carstairs Index 2011 for COAs 2011*

- Due to the relative simplicity of the methodology (see slide 4), this deprivation index can be re-standardised to rural areas.
- Records of urban COAs were removed from the input variables and scores were then re-standardised and summed (following the equation shown on slide 4) to create the Rural Carstairs Index (see slide 9).
- **Carstairs index includes car ownership, so although it can be standardised to rural areas, the components of the measure may not be ideal for rural areas**

## *Index of Deprivation 2010 for LSOAs 2001*

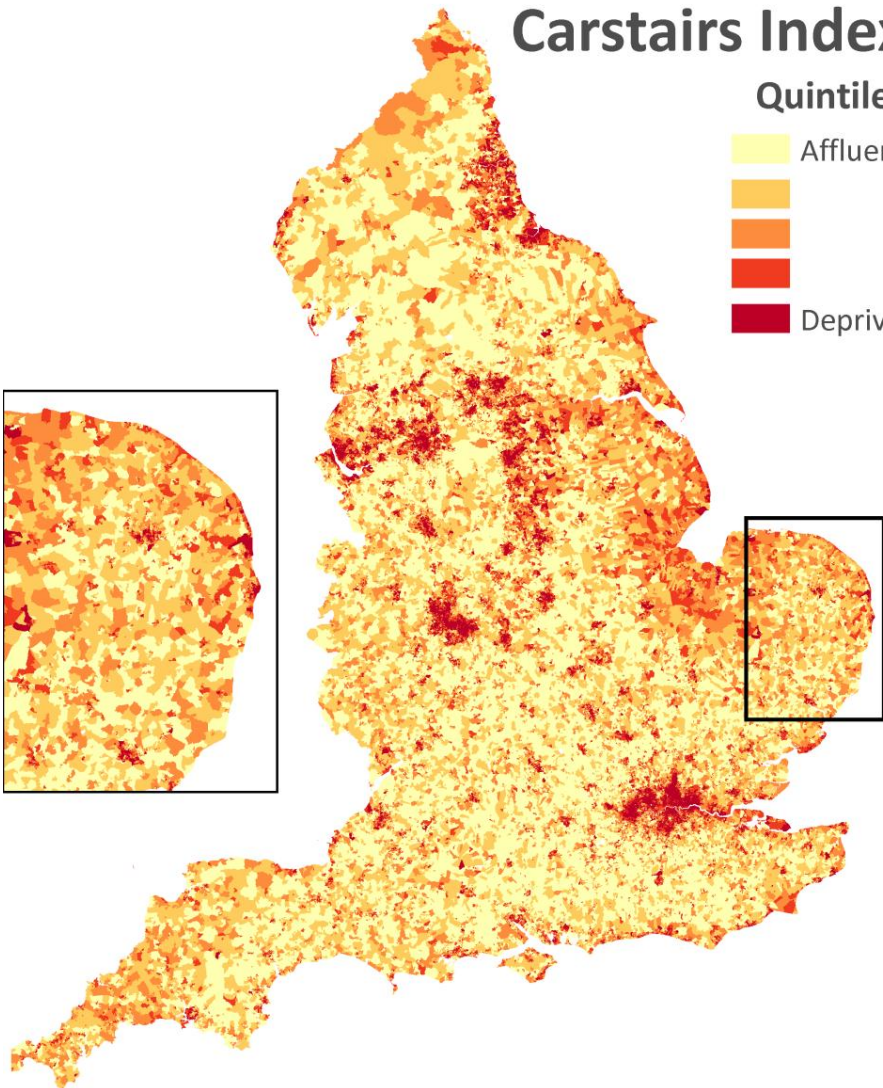
- Due to complexity of IMD calculation (see slide 6) the IMD cannot be re-standardised to rural areas without substantial methodological effort.
- To display the heterogeneity of the IMD in rural areas the IMD (and its domains) was instead mapped using quintiles specific to rural areas only (see slides 10 - 17).
- **In the IMD calculation shrinkage estimation is used to move LSOA scores of areas with small population counts (and large standard errors) towards the more robust Local Authority mean (see slide 6). This might potentially distort the rural IMD in areas close to urban centres.**



# Rural standardisation: Carstairs Index 2011 for COAs 2011

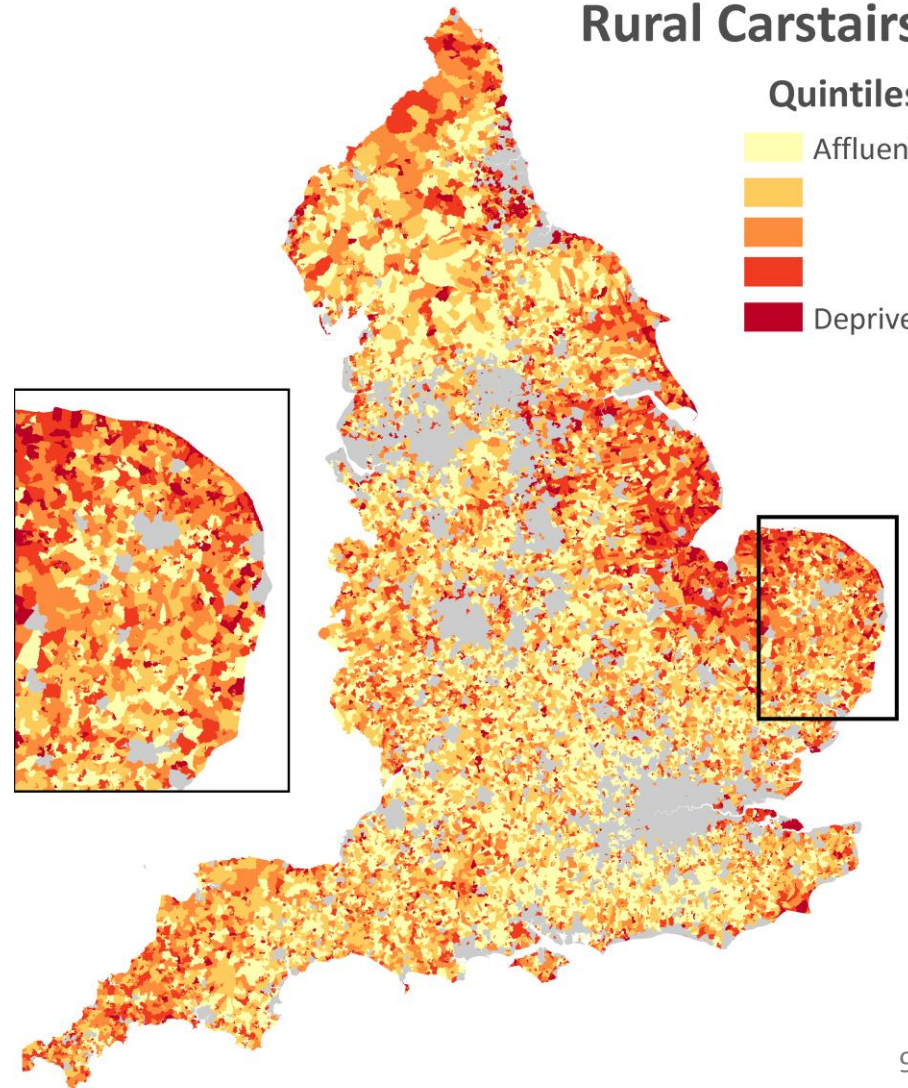
## Carstairs Index

Quintiles



## Rural Carstairs

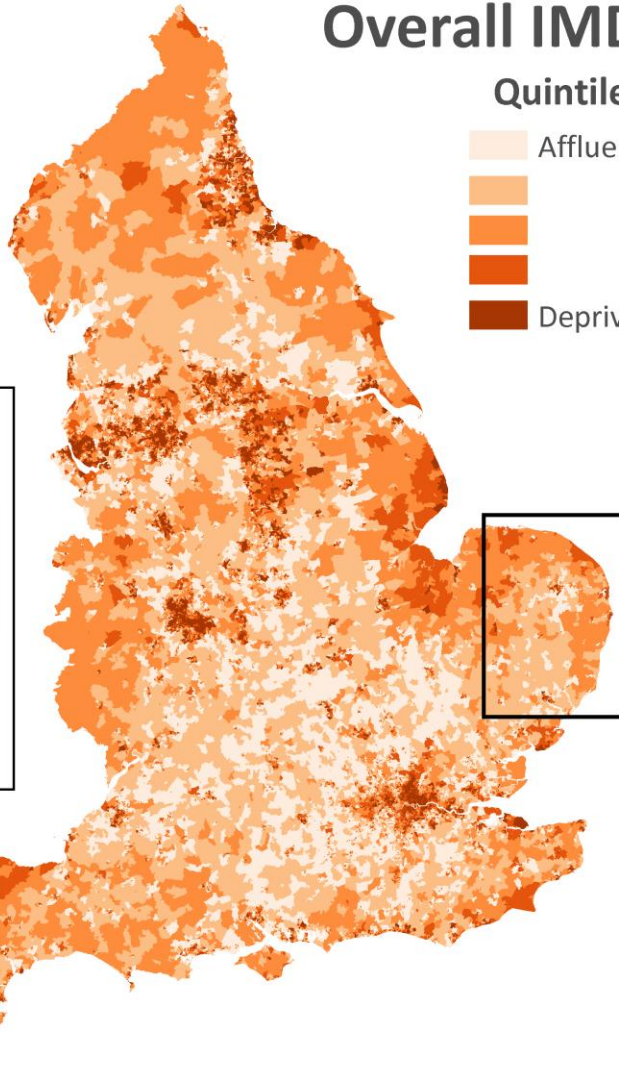
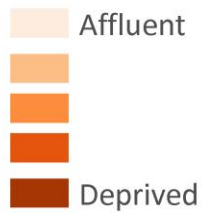
Quintiles



# Rural standardisation: Index of Multiple Deprivation (IMD) 2010

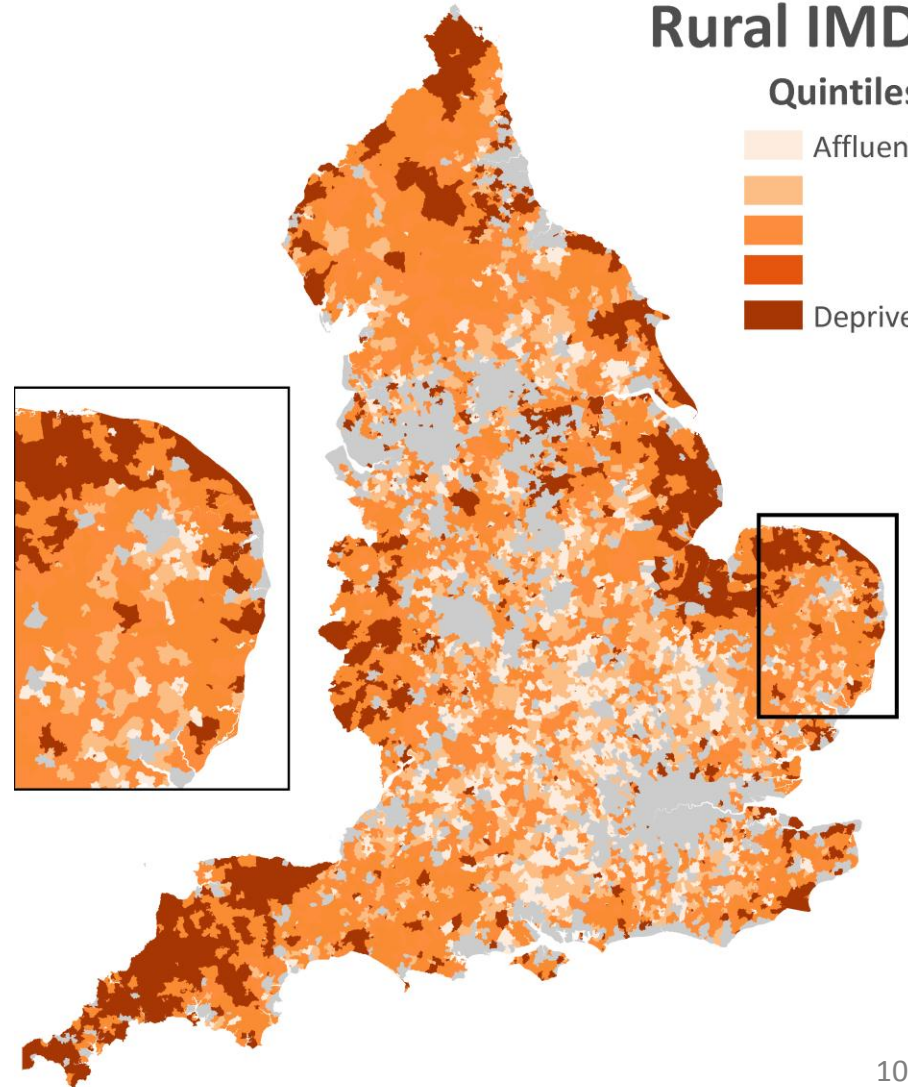
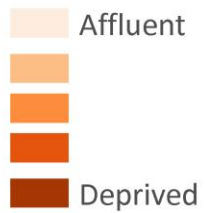
## Overall IMD

### Quintiles



## Rural IMD

### Quintiles





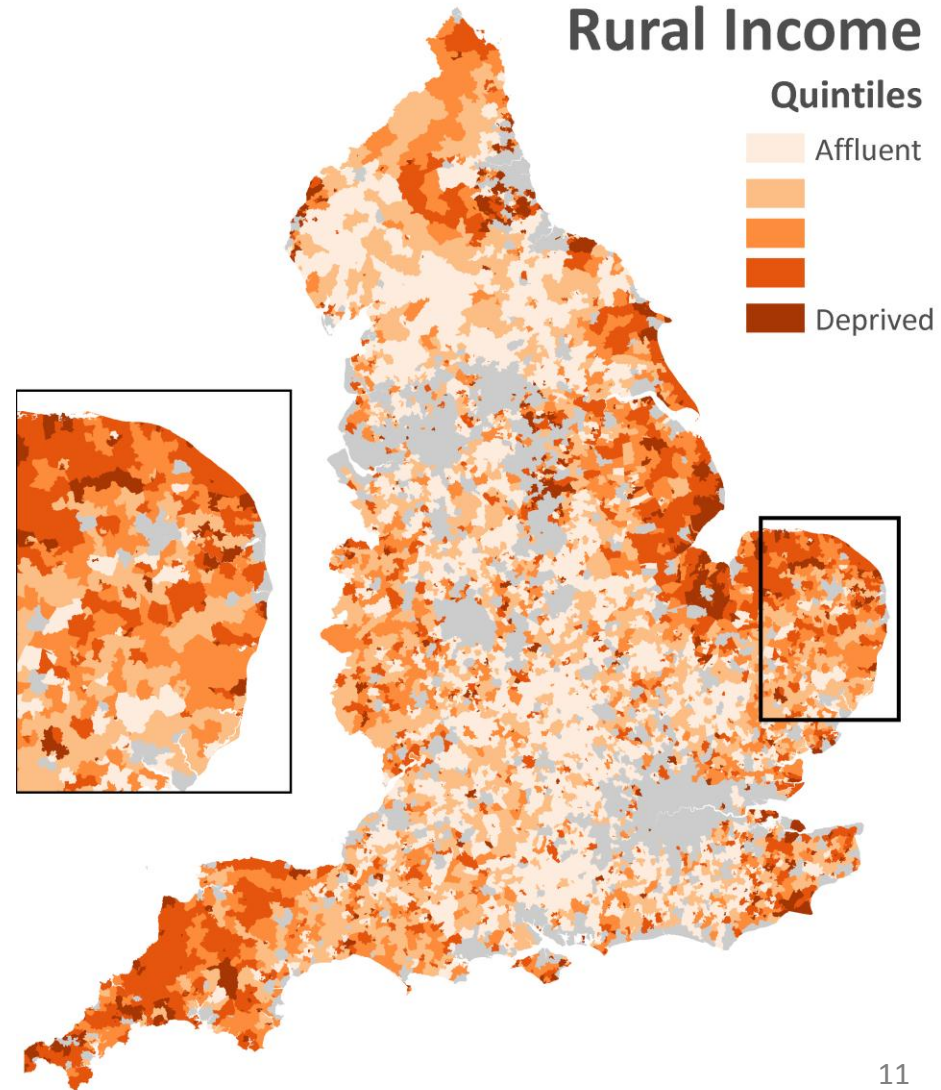
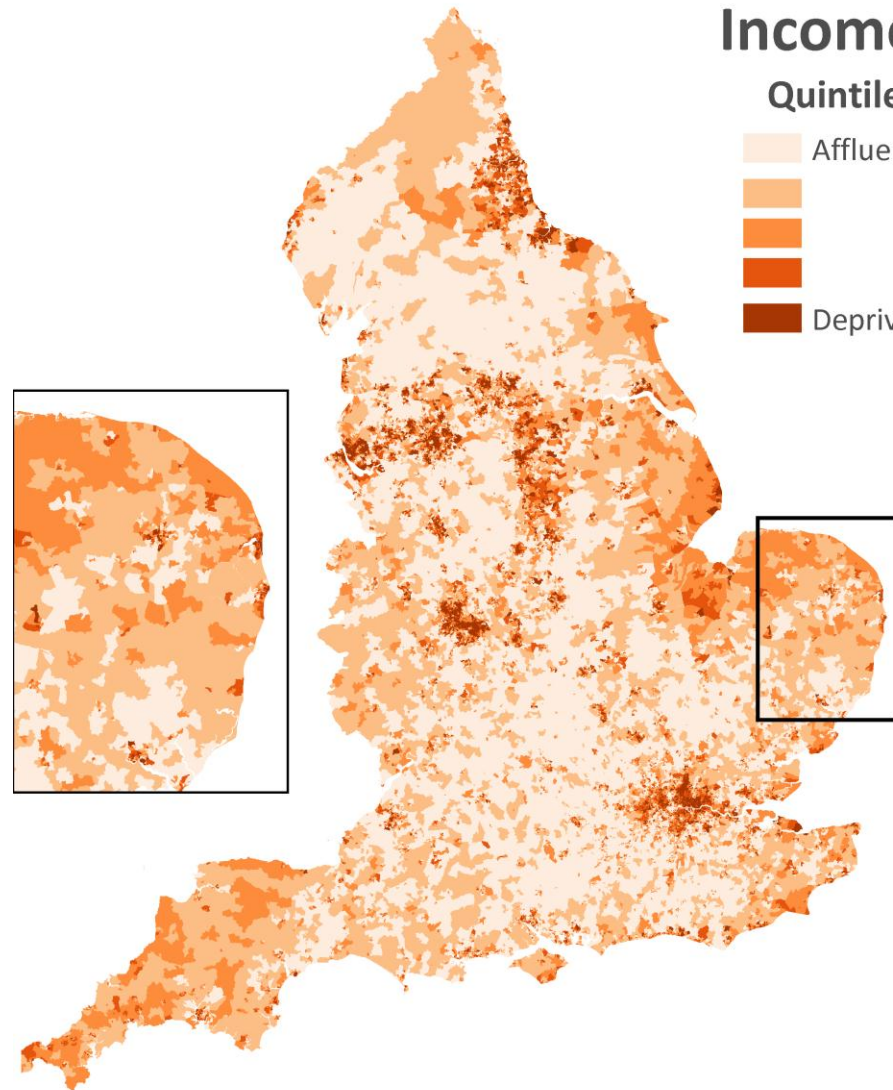
# Rural standardisation: Index of Deprivation 2010 – Income Domain

**Income**  
Quintiles

- Affluent
- 
- 
- 
- Deprived

**Rural Income**  
Quintiles

- Affluent
- 
- 
- 
- Deprived



# Rural standardisation: Index of Deprivation 2010 – Employment Domain

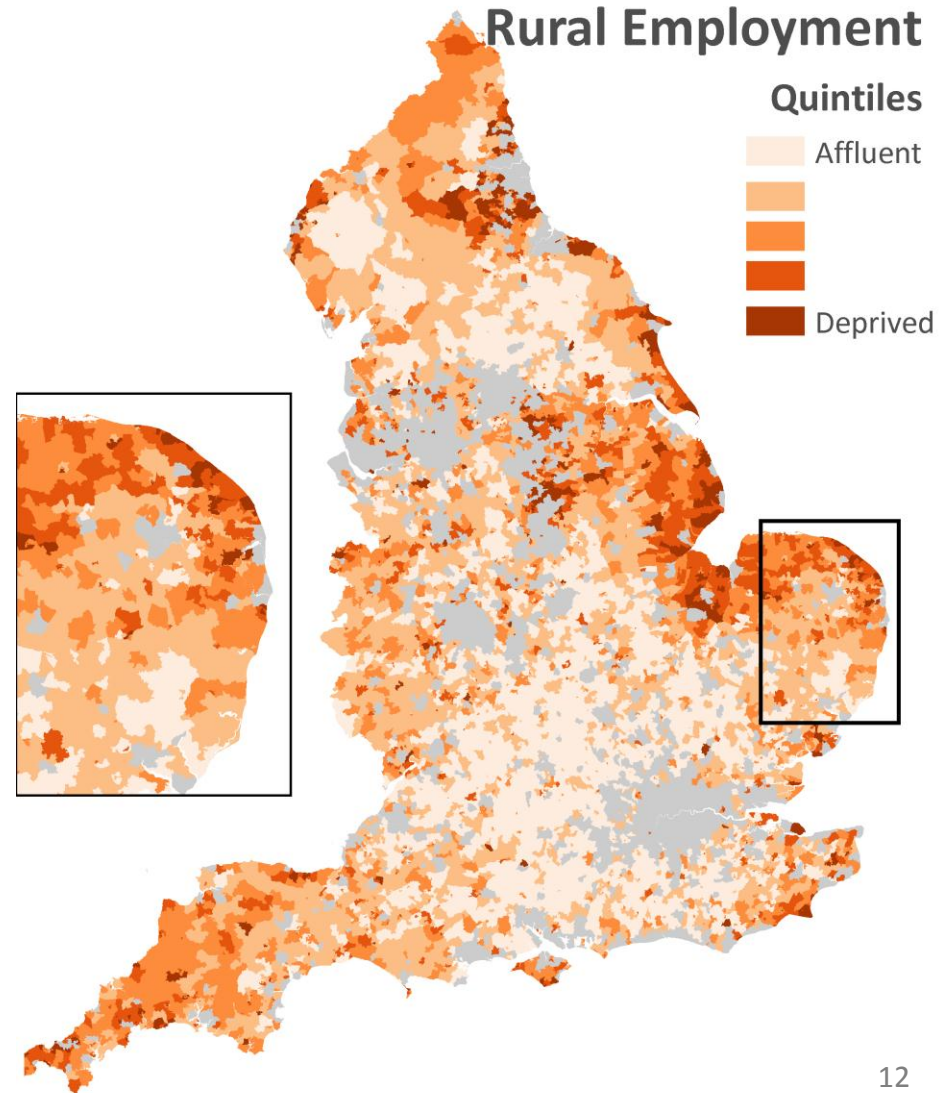
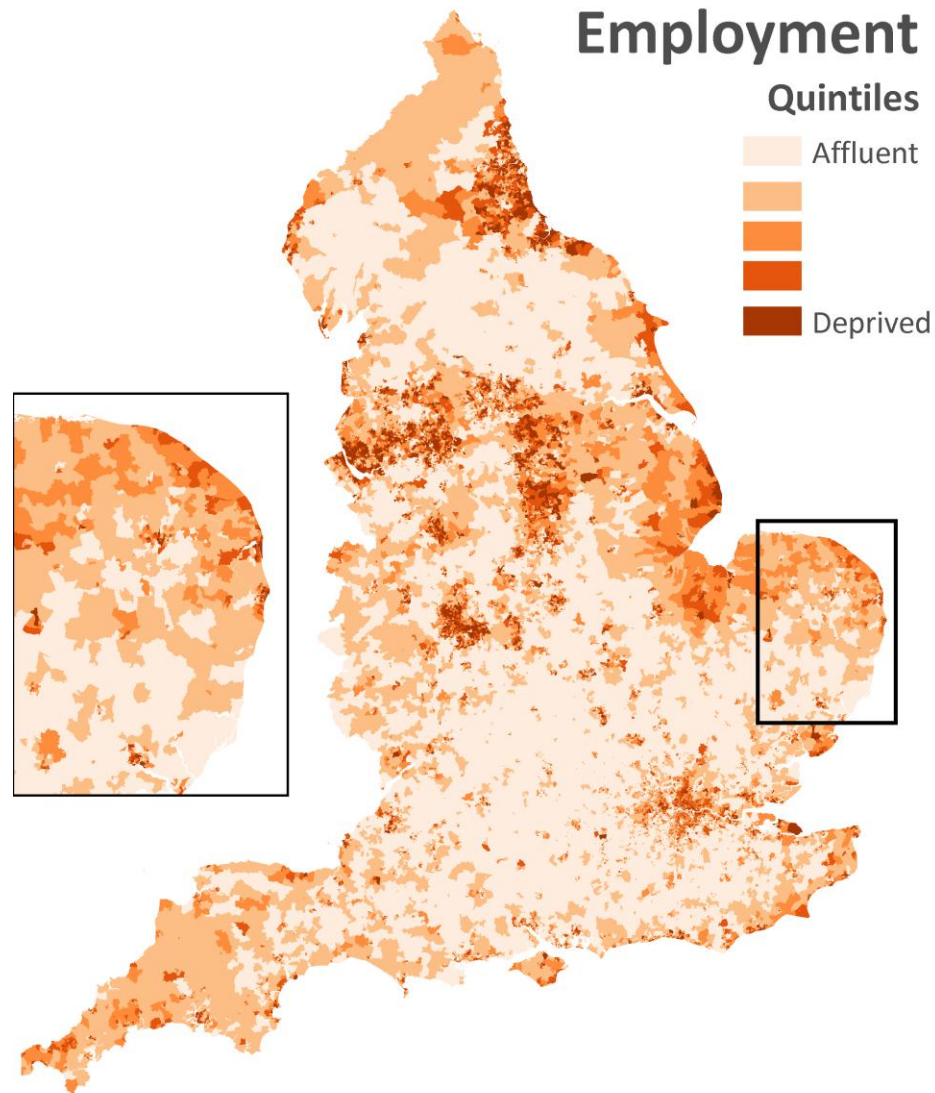
## Employment

### Quintiles



## Rural Employment

### Quintiles





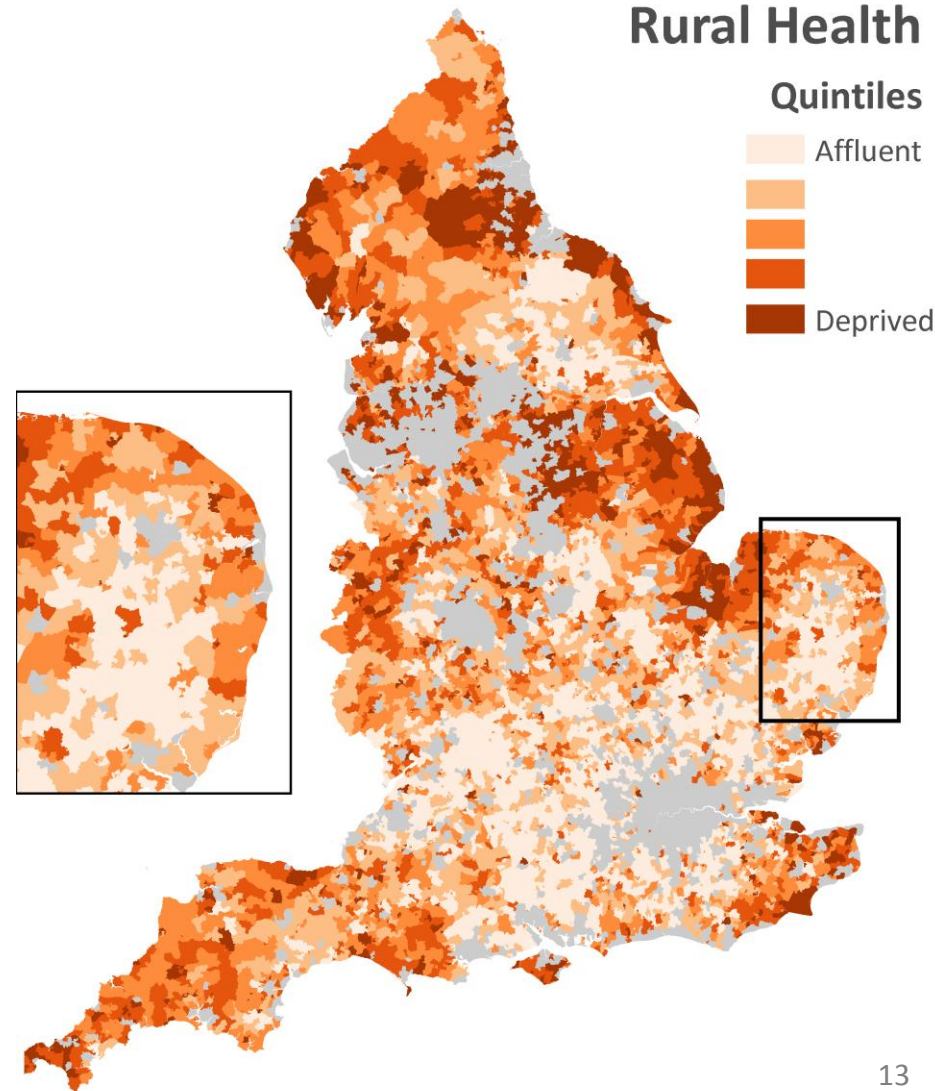
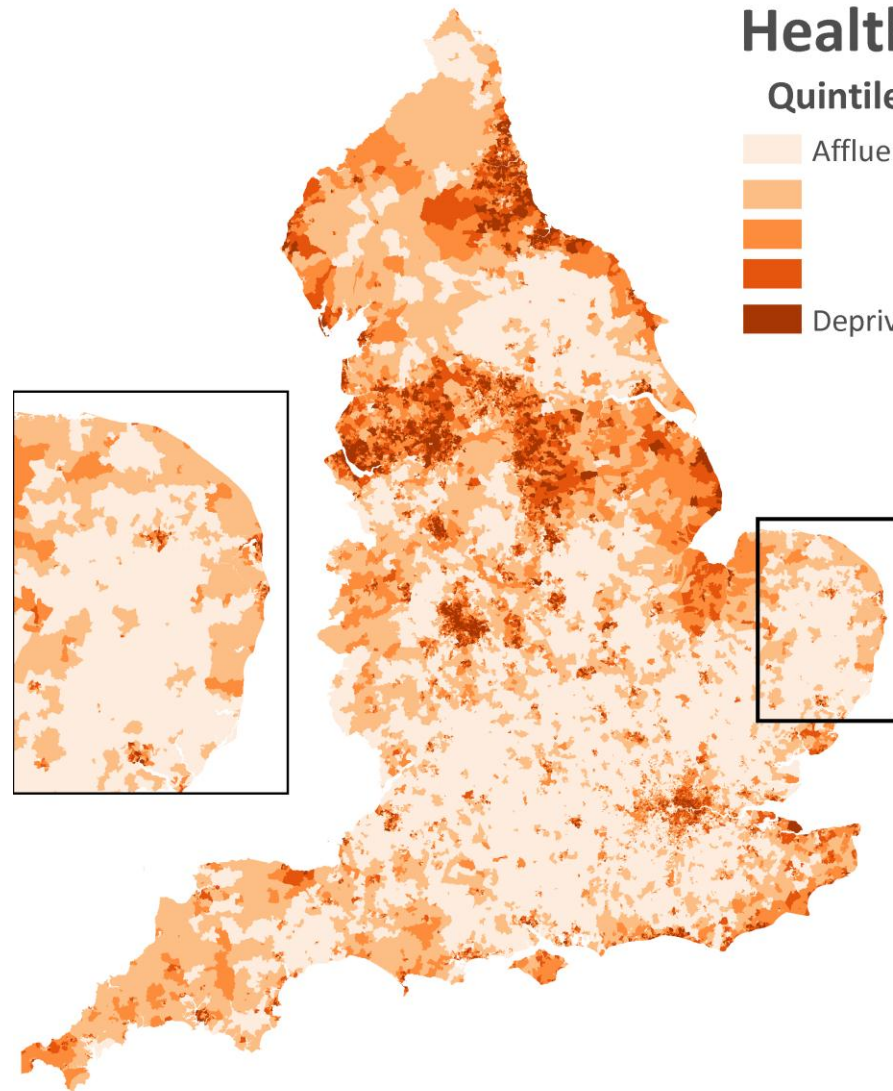
# Rural standardisation: Index of Deprivation 2010 – Health Domain

**Health**  
Quintiles

- Affluent
- 
- 
- 
- Deprived

**Rural Health**  
Quintiles

- Affluent
- 
- 
- 
- Deprived



# Rural standardisation: Index of Deprivation 2010 – Education Domain

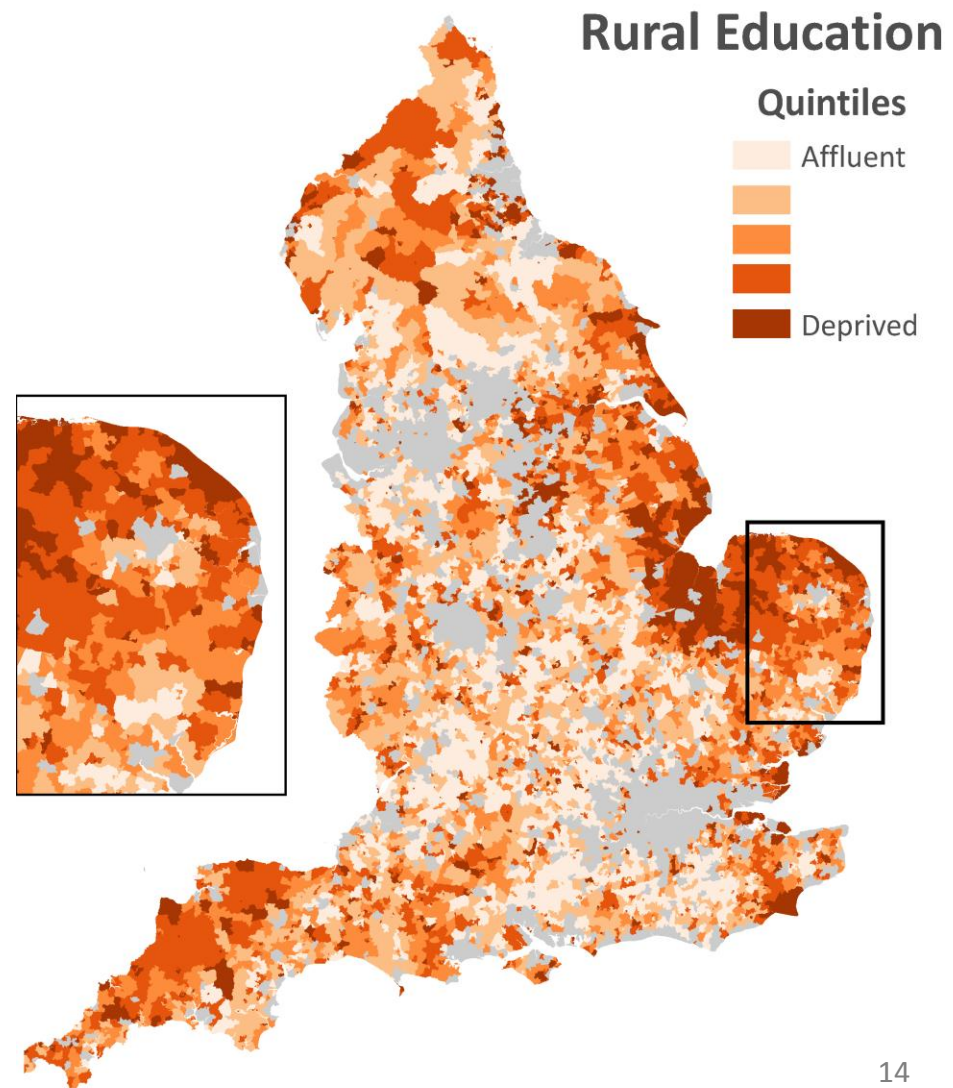
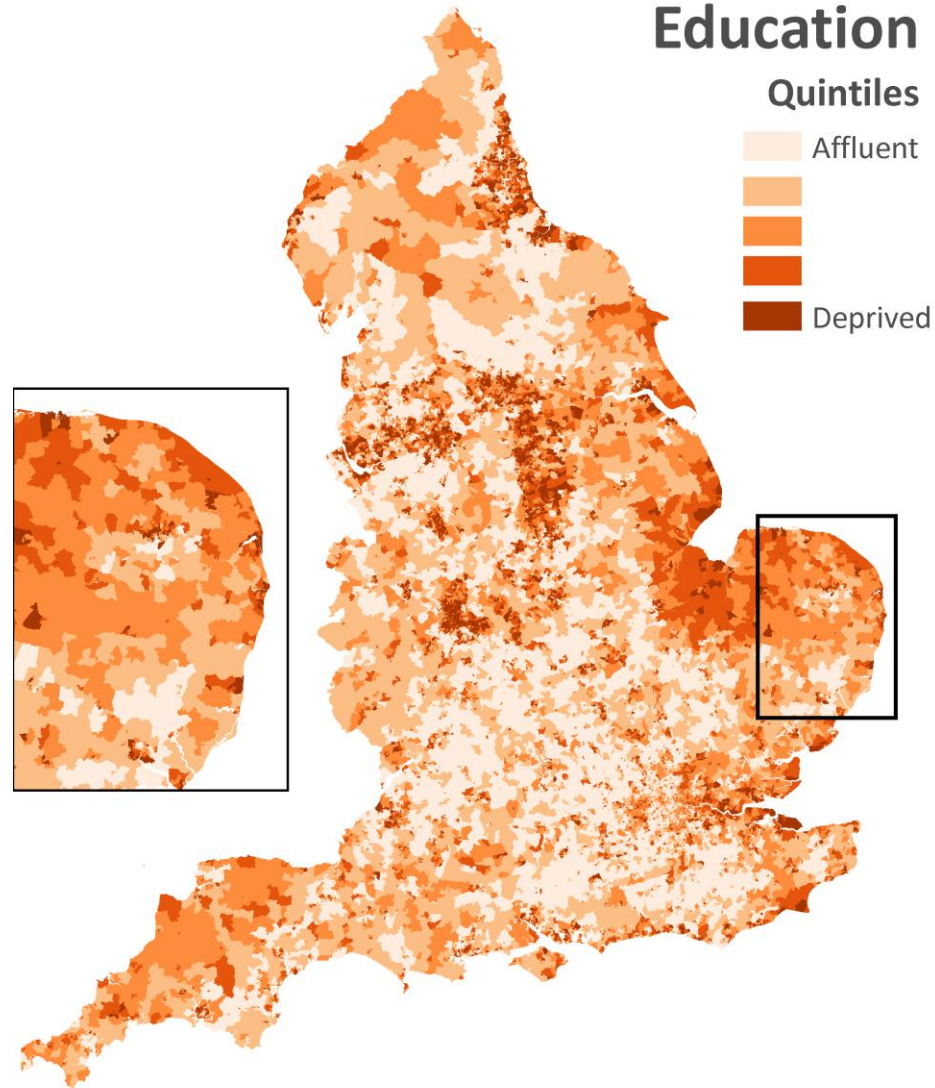
## Education

### Quintiles



## Rural Education

### Quintiles



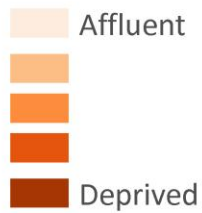


# Rural standardisation:

## Index of Deprivation 2010 – Barriers to Housing & Services Domain

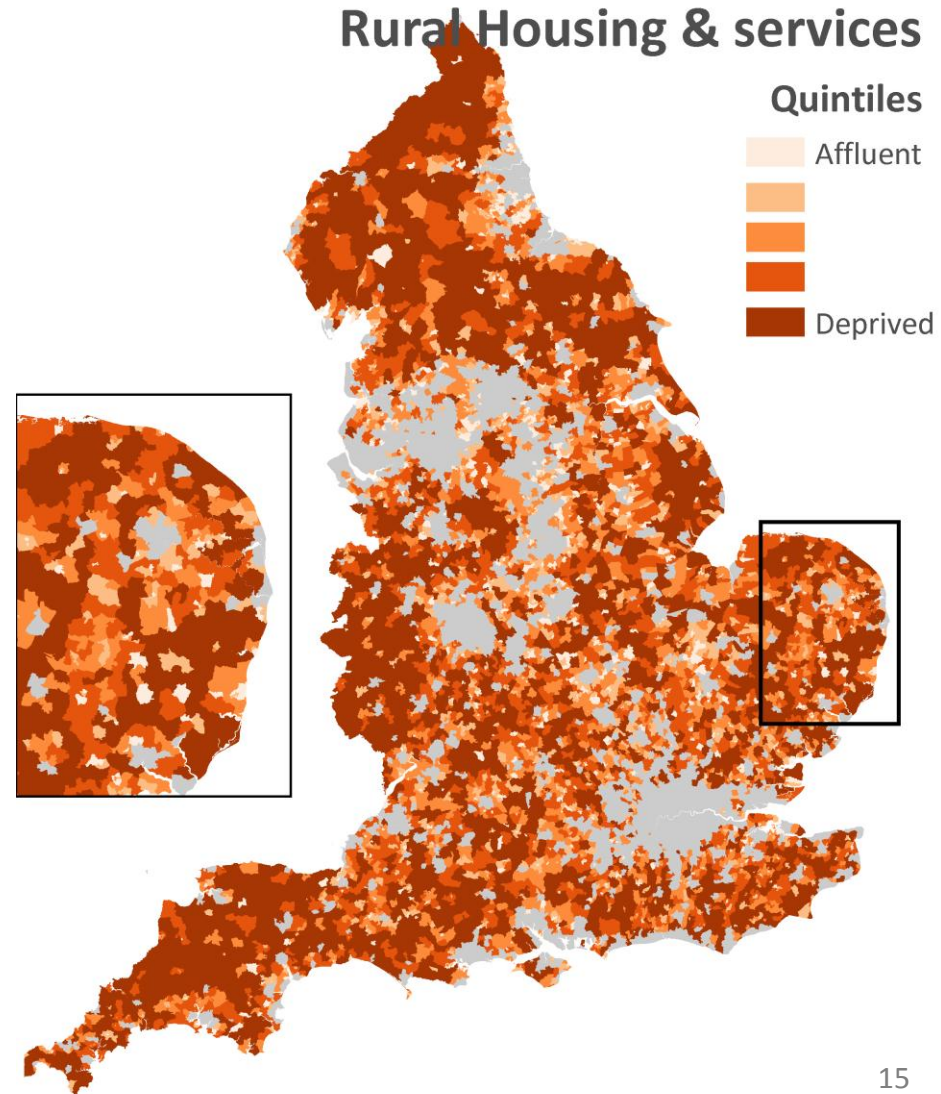
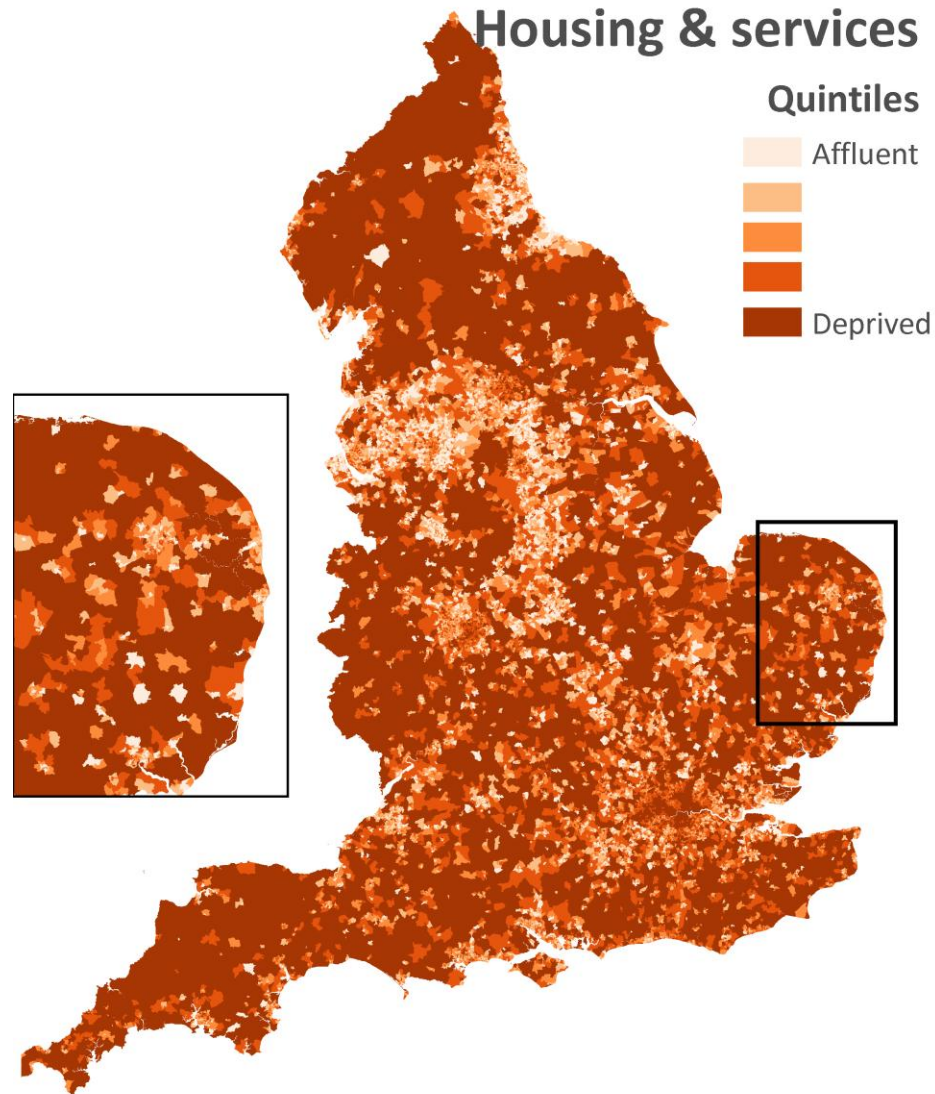
Housing & services

Quintiles



Rural Housing & services

Quintiles





# Rural standardisation: Index of Deprivation 2010 – Crime Domain

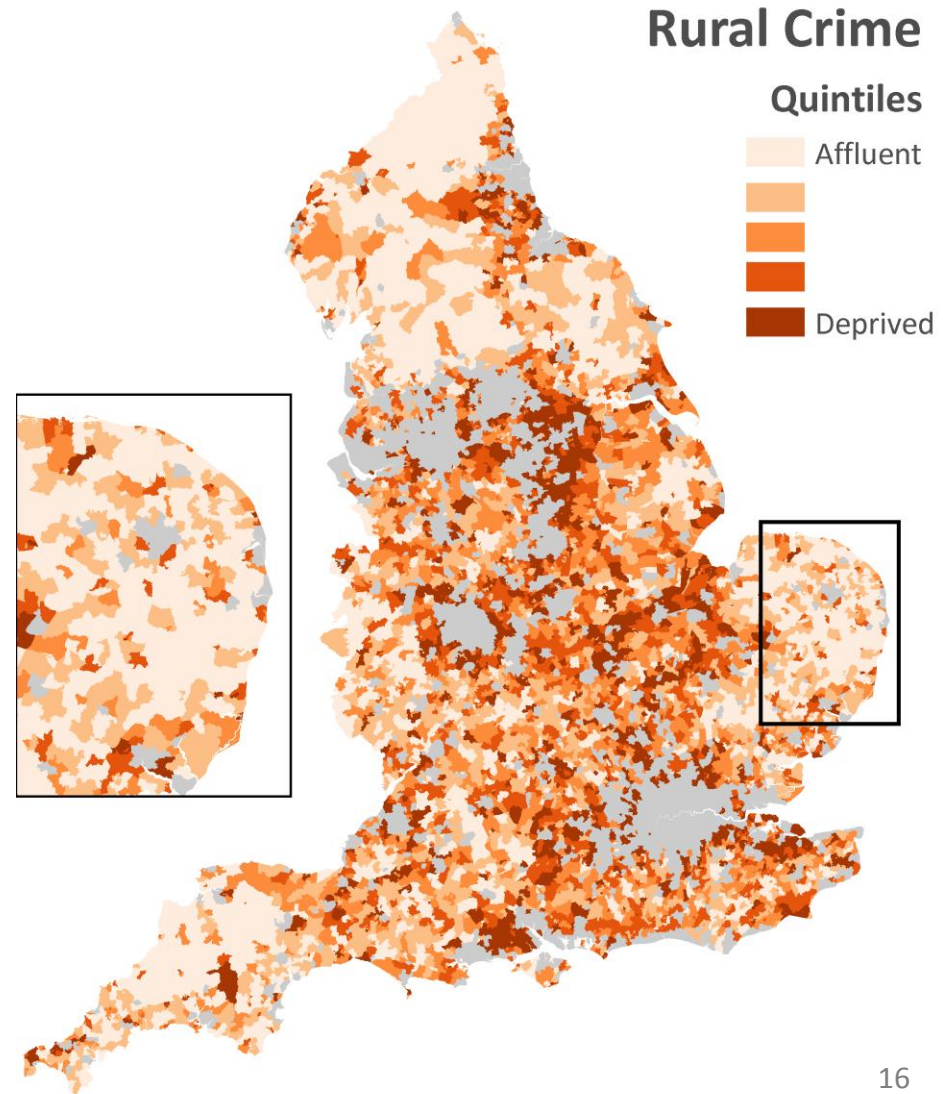
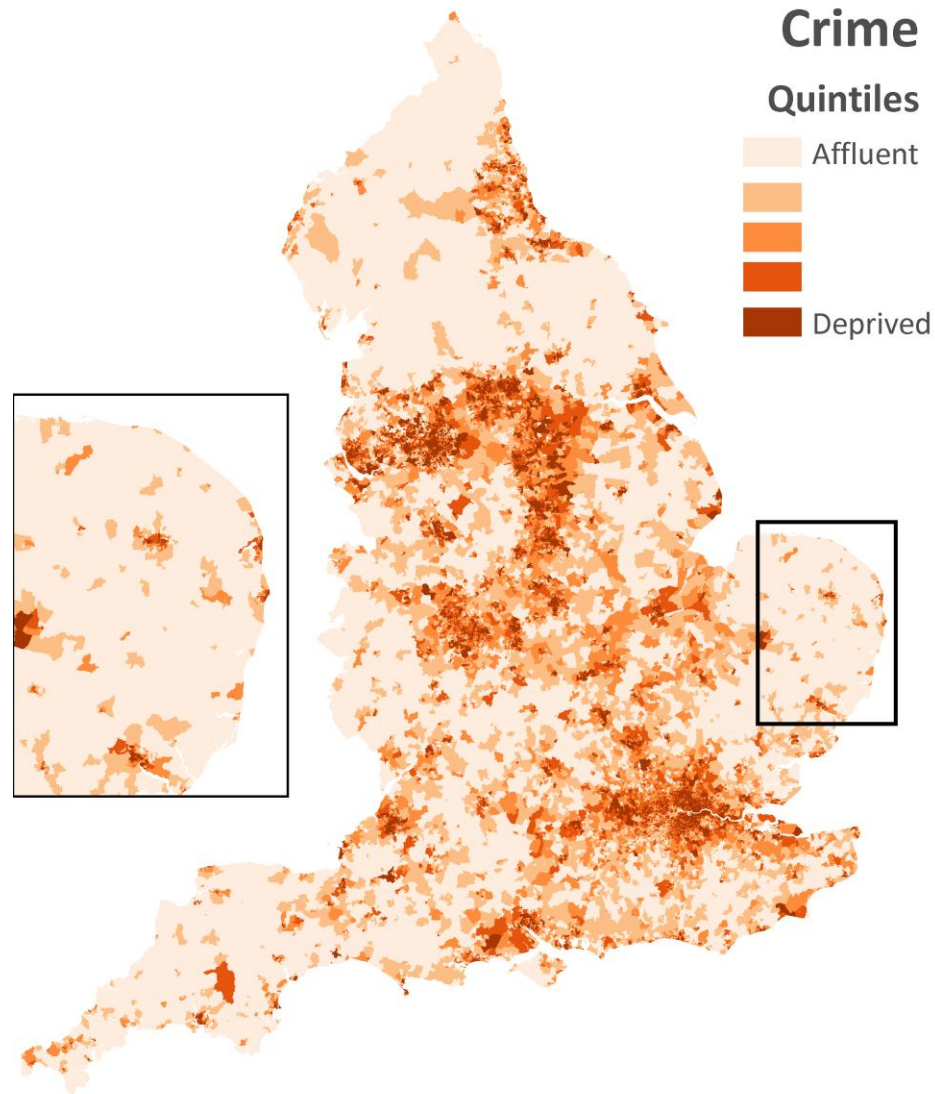
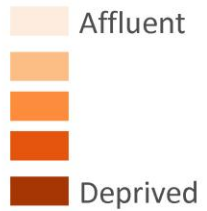
## Crime

### Quintiles



## Rural Crime

### Quintiles

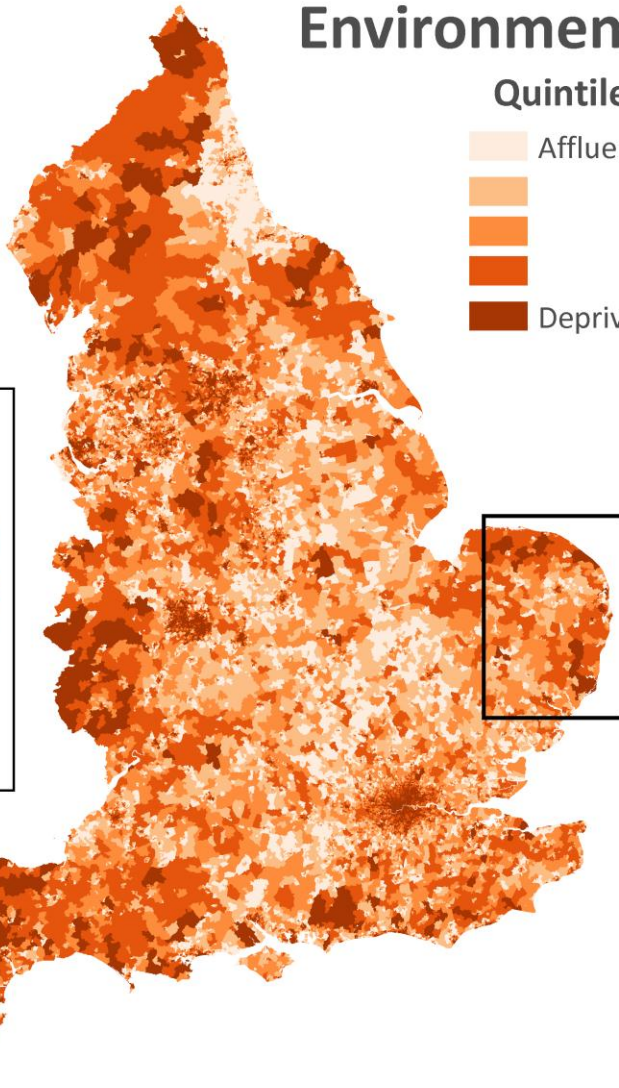


# Rural standardisation:

## Index of Deprivation 2010 - Living Environment Domain

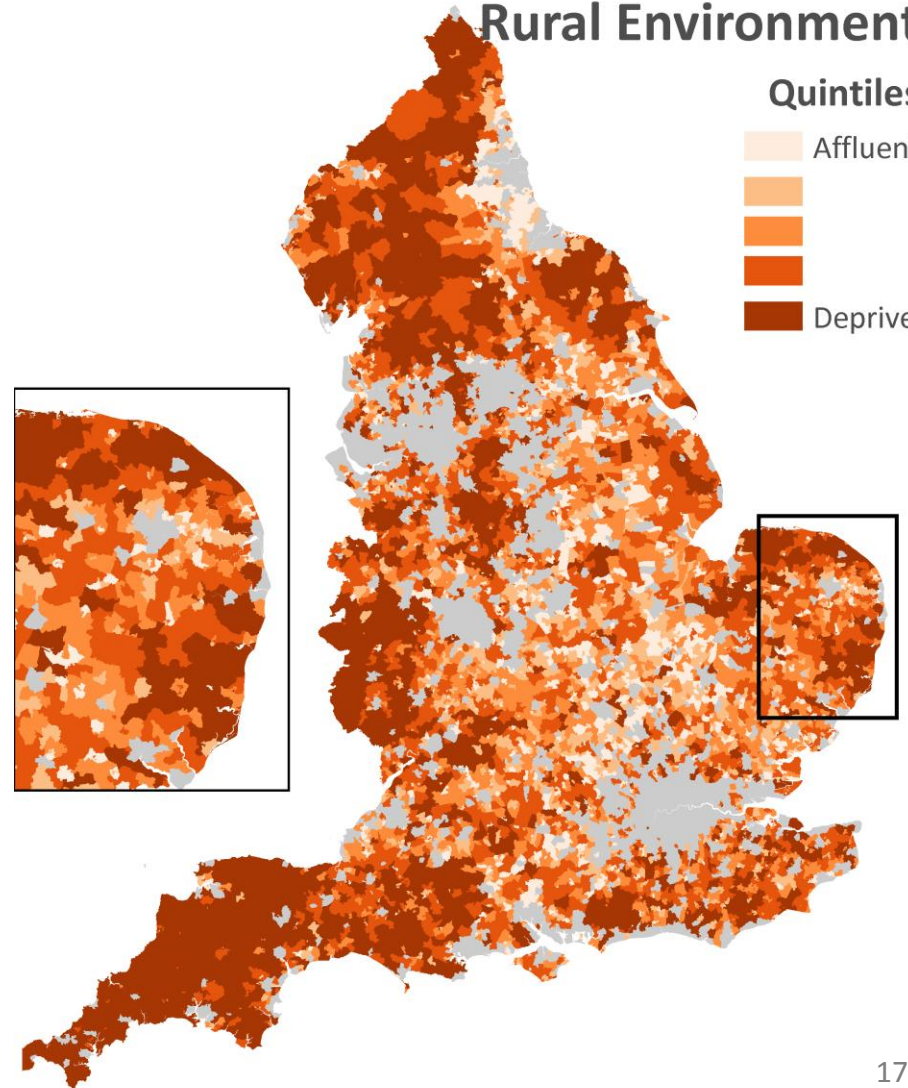
### Environment

#### Quintiles



### Rural Environment

#### Quintiles



# Correlations between IMD and its domains: overall IMD and rural IMD (light grey)

|             | IMD   | Income | Employment | Health | Education | Housing | Crime  | Environment |
|-------------|-------|--------|------------|--------|-----------|---------|--------|-------------|
| IMD         |       | 0.958  | 0.936      | 0.854  | 0.817     | 0.069   | 0.661  | 0.566       |
| Income      | 0.893 |        | 0.899      | 0.787  | 0.786     | 0.040   | 0.592  | 0.478       |
| Employment  | 0.896 | 0.893  |            | 0.856  | 0.781     | -0.109  | 0.539  | 0.391       |
| Health      | 0.764 | 0.736  | 0.820      |        | 0.685     | -0.125  | 0.554  | 0.430       |
| Education   | 0.815 | 0.844  | 0.793      | 0.653  |           | -0.168  | 0.490  | 0.262       |
| Housing     | 0.066 | -0.239 | -0.260     | -0.257 | -0.264    |         | -0.050 | 0.202       |
| Crime       | 0.377 | 0.374  | 0.359      | 0.298  | 0.365     | -0.258  |        | 0.468       |
| Environment | 0.383 | 0.169  | 0.118      | 0.132  | 0.056     | 0.413   | -0.018 |             |



# Conclusions

- Adaptation of national deprivation indices for rural areas highlights differences between rural areas that can be masked by using national indices
- More work would be needed to investigate and construct rural-specific indices, drawing on previous work (e.g. by OCSI for Norfolk in 2008 [http://ocsi.co.uk/spotlights/rural\\_exclusion/](http://ocsi.co.uk/spotlights/rural_exclusion/))

