



Medicines & Healthcare products  
Regulatory Agency



# Small area level data based on practice postcode

## Documentation and Data Dictionary

Version 2.6

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National Institute for  
Health Research



## Documentation Control Sheet

Over time, it may be necessary to issue amendments or clarifications to parts of this document. This form must be updated whenever changes are made.

Version	Affected Areas Summary of Change	Prepared By	Reviewed By
0.9	Initial Draft	Dan Dedman	
0.9.2	Modified	Dan Dedman	
0.9.3	Modified	Dan Dedman	Helen Strongman
1.0.0	Final version for release	Dan Dedman	
1.0.1	Modified	Dan Dedman	
1.0.2	Formatted	Grant Lee	Sophia Amjad
1.0.3	Modified	Shivani Padmanabhan	Daniel Dedman
2.0	Modified	Helen Strongman	Arlene Gallagher
2.1	Modified	Helen Strongman	Shivani Padmanabhan
2.2	Modified	Helen Strongman	
2.3	Modified	Rebecca Ghosh	Helen Strongman
2.4	Modified and formatted	Rebecca Ghosh	Arlene Gallagher
2.5	Reviewed	Arlene Gallagher	
2.6	Modified	Melissa Cabecinha	Rebecca Ghosh
2.7	Reviewed	Susan Hodgson	Elizabeth Crellin

## Summary of Changes

### Version 0.9.2

- Revised draft

### Version 0.9.3

- Revisions, January 2013

### Version 1.0.0

- Release version

### Version 1.0.1

- Added note on Patient Choice of GP Practices

### Version 1.0.2

- Formatted header and footer with new agency branding

### Version 1.0.3

- Removed reference to set version, and amended related links section and hyperlinks

### Version 2.0

- Updated versions of IMD scores



Version 2.1

- Updated postcode lookup file

Version 2.2

- Added builds from which changes to versions of IMD scores and the postcode lookup were implemented
- Changed reference to HSCIC to NHS Digital to reflect rebranding

Version 2.3

- Updated LSOA numbers and clarified some text

Version 2.4

- Updated versions of IMD scores

Version 2.5

- Updated to include individual IMD domains
- Updated to include Carstairs 2011 Index of Deprivation
- Updated to include Urban-Rural Classification
- Reviewed for set 16

Version 2.7

- Reviewed for set 17



## Background

Classifications based on the population characteristics of small areas or neighbourhoods (and the individuals who live there) have been in use for several decades. In health research they have many applications, including: as a proxy for individual level measures of socioeconomic status; for planning and targeting of health and social care services; for ecological studies of environmental effects on health; and for individual level studies where characteristics of place of residence are of particular interest. [1] There are a wide range on small area data available from many sources. CPRD has linked the GP practice postcode for both CPRD GOLD and CPRD Aurum to some of the most commonly requested area level data. This includes several measures of area level deprivation and a rural-urban classification.

### Census geography [2]:

The small area data provided is based on census geography which is the main geography directly associated with the UK Census in England, Wales and Northern Ireland. The base unit of this geography is the Output Areas (OA) which are built from clusters of adjacent postcode units [3]. Output areas usually contain around 110-140 households and are designed to be similar in population size and social characteristics based on tenure of household and dwelling type. Output Areas can be aggregated into Super Output Areas (SOA) which can be sub-divided into lower layer super output areas (LSOA) and middle layer super output areas (MSOA) in England and Wales [2].

The small area data provided by CPRD is at LSOA level which are typically built up from 4-6 OAs and have a notional minimum size of 1,000 residents and 300 households, and an average of 1,600 residents [4]. In Northern Ireland data Super Output Area (SOA) are used which have a population of 2,100 people [5]. In Scotland a similar geography known as data zones (DZ) are used which are slightly smaller than LSOAs, with the majority having a population of 500-1,000 residents.

### A note on Patient Choice of GP Practice

Since January 5 2015, GP practices in England are free to register new patients who live outside their practice boundary area [6]. This might mean that some patients will register at a practice near their place of work or children's schools, rather than a one near their home. Researchers should consider the implications of this change, for example if they are considering using the practice level deprivation score as a proxy for patient level deprivation or socioeconomic status. Linkage based on the patient postcode is available separately for patients registered with a subset of general practices in England, as detailed below.

### A note on GP practices with multiple locations

GP practices may have multiple locations. In these cases, the GP practice will have only one practice postcode based on the location of the main practice. Researchers should consider how this could affect the deprivation linkage and rural-urban classification, as the main practice might have branch practices in more rural or deprived areas.



### **Area level measures of deprivation:**

There are a number of well-known area-based measures of deprivation available at the LSOA level for linkage to CPRD primary care data through the practice postcode. These measures are:

#### **The Index of Multiple Deprivation (IMD):**

One of the most commonly used measures is the Index of Multiple Deprivation (IMD). This is a composite measure derived from a number of indicators covering different aspects ('domains') of material deprivation: housing, employment, income, access to services, education and skills, crime, and living environment. Each domain index can itself be a composite score derived from two or more sub-domain indicators. In addition, a composite index - often referred to as the Index of Multiple Deprivation (IMD) - is calculated as a weighted sum of the domain indices. As of Linkage set 16, individual IMD domains are available on request for the most recent IMD release for England, Wales, Scotland and Northern Ireland.

The first official 'Indices of Deprivation' for England [7] were produced by the UK Department for Communities and Local Government in 2000, replacing the 1998 Index of Local Deprivation. Updates were produced in 2004, 2007, 2010 and 2015. Similar indices are also available for Wales [8], Scotland [9] and Northern Ireland [5] [10]. It is important to note that differences in methodology and source data mean that the indices are not directly comparable between different countries. Note also that all the indices measure relative rather than absolute deprivation. As such it is the ranking of areas provided by the IMD score, rather than the actual score itself, which is of primary interest.

#### **Carstairs Index: [11]**

This indicator was devised in the 1980s by Carstairs and Morris as an index of material deprivation at the small area level. Originally developed for Scotland, and now covering England and Wales as well, it is based on four measures from the UK census:

- Male unemployment: proportion of the economically active population of males age 16-74 who are unemployed.
- Car ownership: proportion of households with no car
- Overcrowding: proportion of all persons living in private households with a density of more than one person per room.
- Social Class: proportion of persons in private households with an economically active head of household in a low social class. Social class score was originally created using the Registrar General's Social Class [12], but as of 2001, this measure is approximated from the operational categories of the National Statistics Socio-Economic Classification

The index is created from the sum of scores for each standardised measure. Carstairs scores have been recalculated using data from the 1991, 2001 and 2011 census. In England and Wales, Carstairs scores are calculated at LSOA level, while scores for Scotland are calculated using data zones. As with IMD scores, it is the ranking of areas provided by the Carstairs Index, rather than the actual score itself, that is of primary interest. However, unlike IMD, Carstairs 2011 scores are comparable between the different countries, as the scores are calculated based on the total distribution across



all LSOA/DZs with data available. The Carstairs index covering Scotland, England and Wales is available linked to CPRD practice postcode at the LSOA level for the 2011 census [13].

### **Rural Urban Classification:**

It may be important to distinguish between rural and urban areas when investigating differences in social and economic characteristics of small areas. Populations can vary in their composition between urban and rural areas, as can access to services, employment and educational opportunities, and quality of life.

The Rural Urban classifications (RUC) for England and Wales are produced by the Office for National Statistics, and are based on census population data [14]. The “Urban” or “Rural” designation is given based on resident population only, and do not reflect the land use, policy, or financial characteristics of an area. Similar classifications exist for Scotland [15] and Northern Ireland [16]. It is important to note that the methodologies and source data for England and Wales differ from those for Northern Ireland and Scotland. This means that the classifications for England and Wales are comparable, however the classifications for England and Wales, Scotland, and Northern Ireland are not comparable.

In England and Wales, the Urban/Rural classification is available at the LSOA level using the 2011 census [14]. In Scotland, the classification is available by data zone for 2016 [15]. For England and Wales and Scotland the classifications are available as binary (rural/urban) variables, the full classification has up to eight categories, four urban and four rural. In Northern Ireland, the classification is available at the SOA level for 2015 and is provided as a three-level variable (rural/urban/mixed) [16]. CPRD may be able to provide different groupings of the categories on request and with an approved Independent Scientific Advisory Committee (ISAC) protocol.



## What data are available through this linkage?

All General Practices which contribute data to the CPRD GOLD and CPRD Aurum databases are eligible for inclusion in this linkage. The PRACTICE postcode is mapped to LSOA, SOA (Northern Ireland only) or datazone DZ (Scotland only) using a postcode lookup file. This then allows linkage to the following small-area level deprivation measures:

- English Index of Multiple Deprivation [7]
  - 2010
  - 2015 composite and individual domains (including the 'Indoor' and 'Outdoor' Living Environment subdomains\*), available from March 2016 CPRD GOLD build and June 2018 CPRD Aurum build
- Northern Ireland Multiple Deprivation Measure (MDM) [5]
  - 2010
  - 2017 composite and individual domains (including the 'Housing Quality' and 'Outdoor Physical Environment' Living Environment subdomains\*), available from November 2017 CPRD GOLD build and June 2018 CPRD Aurum build
- Scottish Index of Multiple Deprivation [9]
  - 2009
  - 2012 (available from March 2016 CPRD GOLD build)
  - 2016 composite and individual domains, available from November 2017 CPRD GOLD build and June 2018 CPRD Aurum build
- Welsh Index of Multiple Deprivation [8]
  - 2011
  - 2014 composite and individual domains, available from March 2016 CPRD GOLD build and June 2018 CPRD Aurum build
- Carstairs Index
  - 2011
- England and Wales Rural Urban Classification
  - 2011
- Northern Ireland Rural Urban Classification
  - 2015
- Scottish Rural Urban Classification
  - 2016

\* There is no 'Environment' IMD domain for Scotland, and no 'Housing' IMD domain for England and Northern Ireland. For studies which include practices in Scotland, England, Wales and/or Northern Ireland, and for which a measure of living environment/housing deprivation is required, the 'Housing' domain (Scotland and Wales) might be used with the 'Indoor' (England) and 'Housing quality' (Northern Ireland) sub-domains.

### Disclosure control

The Rural Urban Classification and deprivation scores and rankings are in the public domain and can be used to identify individual LSOAs. Therefore, for IMD and Carstairs, each LSOA, SOA or DZ is classified into quintiles and deciles of the deprivation score or (equivalently) rank. The score or





rank measures are not provided as these may identify the actual LSOA, SOA or DZ of an individual general practice. This ranking is not restricted to the CPRD population, no further processing is done on the data and the quantiles are not weighted.

*Technical note:* different approaches are available for assigning quantile membership (quintile, deciles) when the number of units to be grouped is not an exact multiple of the number of groups. The quintile and decile groupings were created with the `-xtile-` command in Stata version 13 [17], with the `-nquantile()` option to specify the number of equal sized groups to be created (quintiles=5 groups; deciles=10 groups).

By cross-tabulating two or more classifications it is possible to identify very small groups of lower super output areas (LSOA). In order to minimise the possibility of deductive disclosure of a patients' area of residence, CPRD will only supply one of the area-based measures for any one study. If you feel you have a compelling justification for using two or more classifications in the same study you should contact CPRD to discuss your requirements.

As standard, the most recent deprivation scores will be provided for ISAC-approved studies. Researchers may wish to request older versions if they coincide more closely with the study period. It is worth noting that the available measures are very highly correlated. The Spearman's rank correlation coefficient for deciles of the IMD classifications is 0.97 between English IMD 2010 and 2015, 0.98 between Scottish IMD 2009 and 2012, 0.93 between NI 2010 and 2017 and 0.97 between Welsh IMD 2011 and 2014. This means that for many applications, the choice of area-based deprivation measure is unlikely to have a significant impact on the results or interpretation.

Linkage based on the patient postcode is available separately for patients registered with a subset of general practices in England. This uses the patient postcode of residence which is linked via LSOA, to the different Indices of Deprivation (four versions of the English IMD released in 2004, 2007, 2010 and 2015, and domains of IMD for 2015), Townsend 2001 scores, Carstairs 2011 Index and Rural Urban Classification. These data are described in the documentation on small area data for patients.

## Eligibility for inclusion in practice-level postcode linkage

Practices are eligible for inclusion if all the following criteria are satisfied:

- Practice full postcode is available and has a valid format.
- Practice postcode can be linked to a LSOA in England and Wales, SOA in Northern Ireland or data zone (DZ) in Scotland, using the current postcode lookup file.

## How often is this linkage updated?

The linkage requires updating when one of the following events occurs:

- A new practice is recruited and begins contributing to patient data to the CPRD GOLD or CPRD Aurum databases.
- An existing practice moves to new premises with a different postcode.





- An LSOA boundary change occurs such that an existing postcode is assigned to a different LSOA.
- An existing postcode designation is changed - for example it may be split into two postcodes as a result of a new residential development being built.
- A new area-based classification system is introduced (e.g. IMD 2015)

The practice level postcode linkage will be updated as part of the monthly database build.

## Related files

**NHS Postcode Directory (NHSPD) [18]:** The Office for National Statistics (ONS) supplies postcode-related data to the Organisation Data Service (ODS). The Organisation Data Service (ODS) is provided by NHS Digital and is responsible for the publication of all organisation and practitioner codes and NHS data standards. NHSPD is updated on a quarterly basis and is available as a downloadable zip file (gridall.csv) from: <https://digital.nhs.uk/organisation-data-service/data-downloads/national-statistics> . The current version used is the 2018 November postcode directory.

## Linkage summary results

*Coverage period for linkage:* undefined. The linkage is based on the practice postcode at the time of the last data collection for that practice, and which may change with each monthly database build. Researchers should bear in mind the time period to which the source data used in the IMD classification relate and consider the extent to which this is valid for their particular study period. Historic postcodes for practices are not maintained.



## Dataset specification

File name: *practice\_imd.txt*

<i>Column name</i>	<i>Description</i>	<i>Format</i>
pracid	Encrypted unique key given to a practice in CPRD GOLD or CPRD Aurum	integer: 5
country	1=England, 2=Northern Ireland, 3=Scotland, 4=Wales	integer: 4
e2015_imd_5	England: IMD2015: quintile (1=LEAST deprived)	integer: 1
e2015_imd_10	England: IMD2015: decile (1=LEAST deprived)	integer: 2
e2010_imd_5	England: IMD2010: quintile (1=LEAST deprived)	integer: 1
e2010_imd_10	England: IMD2010: decile (1=LEAST deprived)	integer: 2
ni2010_imd_5	Northern Ireland: MDM2010: quintile (1=LEAST deprived)	integer: 1
ni2010_imd_10	Northern Ireland: MDM2010: decile (1=LEAST deprived)	integer: 2
ni2017_imd_5	Northern Ireland: MDM2017: quintile (1=LEAST deprived)	integer: 1
ni2017_imd_10	Northern Ireland: MDM2017: decile (1=LEAST deprived)	integer: 2
s2009_imd_5	Scotland: IMD2009: quintile (1=LEAST deprived)	integer: 1
s2009_imd_10	Scotland: IMD2009: decile (1=LEAST deprived)	integer: 2
s2012_imd_5	Scotland: IMD2012: quintile (1=LEAST deprived)	integer: 1
s2012_imd_10	Scotland: IMD2012: decile (1=LEAST deprived)	integer: 2
s2016_imd_5	Scotland: IMD2016: quintile (1=LEAST deprived)	integer: 1
s2016_imd_10	Scotland: IMD2016: decile (1=LEAST deprived)	integer: 2
w2014_imd_5	Wales: IMD2014: quintile (1=LEAST deprived)	integer: 1
w2014_imd_10	Wales: IMD2014: decile (1=LEAST deprived)	integer: 2
w2011_imd_5	Wales: IMD2011: quintile (1=LEAST deprived)	integer: 1
w2011_imd_10	Wales: IMD2011: decile (1=LEAST deprived)	integer: 2



File name: imd\_domains.txt

<i>Column name</i>	<i>Description</i>	<i>Format</i>
pracid	Encrypted unique key given to a practice in CPRD GOLD or CPRD Aurum	integer: 5
country	1=England, 2=Northern Ireland, 3=Scotland, 4=Wales	integer: 4
e2015_income_5	England: IMD2015 income domain: quintile (1=LEAST deprived)	integer: 1
e2015_income_10	England: IMD2015 income domain: decile (1=LEAST deprived)	integer: 2
e2015_employment_5	England: IMD2015 employment domain: quintile (1=LEAST deprived)	integer: 1
e2015_employment_10	England: IMD2015 employment domain: decile (1=LEAST deprived)	integer: 2
e2015_education_5	England: IMD2015 education domain: quintile (1=LEAST deprived)	integer: 1
e2015_education_10	England: IMD2015 education domain: decile (1=LEAST deprived)	integer: 2
e2015_health_5	England: IMD2015 health domain: quintile (1=LEAST deprived)	integer: 1
e2015_health_10	England: IMD2015 health domain: decile (1=LEAST deprived)	integer: 2
e2015_crime_5	England: IMD2015 crime domain: quintile (1=LEAST deprived)	integer: 1
e2015_crime_10	England: IMD2015 crime domain: quintile (1=LEAST deprived)	integer: 2
e2015_access_5	England: IMD2015 access domain: decile (1=LEAST deprived)	integer: 1
e2015_access_10	England: IMD2015 access domain: quintile (1=LEAST deprived)	integer: 2
e2015_environment_5	England: IMD2015 environment domain: quintile (1=LEAST deprived)	integer: 1
e2015_environment_10	England: IMD2015 environment domain: decile (1=LEAST deprived)	integer: 2
e2015_housing_5	England: IMD2015 housing sub-domain: decile (1=LEAST deprived)	integer: 1
e2015_housing_10	England: IMD2015 housing sub-domain: quintile (1=LEAST deprived)	integer: 2
e2015_outdoor_environment_5	England: IMD2015 outdoor environment sub-domain: quintile (1=LEAST deprived)	integer: 1
e2015_outdoor_environment_10	England: IMD2015 outdoor environment sub-domain: decile (1=LEAST deprived)	integer: 2
ni2017_income_5	Northern Ireland: MDM2017 income domain: quintile (1=LEAST deprived)	integer: 1
ni2017_income_10	Northern Ireland: MDM2017 income domain: decile (1=LEAST deprived)	integer: 2



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ni2017_employment_5	Northern Ireland: MDM2017 employment domain: quintile (1=LEAST deprived)	integer: 1
ni2017_employment_10	Northern Ireland: MDM2017 employment domain: decile (1=LEAST deprived)	integer: 2
ni2017_education_5	Northern Ireland: MDM2017 education domain: quintile (1=LEAST deprived)	integer: 1
ni2017_education_10	Northern Ireland: MDM2017 education domain: decile (1=LEAST deprived)	integer: 2
ni2017_health_5	Northern Ireland: MDM2017 health domain: quintile (1=LEAST deprived)	integer: 1
ni2017_health_10	Northern Ireland: MDM2017 health domain: decile (1=LEAST deprived)	integer: 2
ni2017_crime_5	Northern Ireland: MDM2017 crime domain: quintile (1=LEAST deprived)	integer: 1
ni2017_crime_10	Northern Ireland: MDM2017 crime domain: decile (1=LEAST deprived)	integer: 2
ni2017_access_5	Northern Ireland: MDM2017 access domain: quintile (1=LEAST deprived)	integer: 1
ni2017_access_10	Northern Ireland: MDM2017 access domain: decile (1=LEAST deprived)	integer: 2
ni2015_environment_5	Northern Ireland: IMD2015 environment domain: quintile (1=LEAST deprived)	integer: 1
ni2015_environment_10	Northern Ireland: IMD2015 environment domain: decile (1=LEAST deprived)	integer: 2
ni2017_housing_5	Northern Ireland: MDM2017 housing sub-domain: quintile (1=LEAST deprived)	integer: 1
ni2017_housing_10	Northern Ireland: MDM2017 housing sub-domain: decile (1=LEAST deprived)	integer: 2
ni2017_outdoor_environment_5	Northern Ireland: MDM2017 outdoor environment sub-domain: quintile (1=LEAST deprived)	integer: 1
ni2017_outdoor_environment_10	Northern Ireland: MDM2017 outdoor environment sub-domain: decile (1=LEAST deprived)	integer: 2
s2016_income_5	Scotland: IMD2016 income domain: quintile (1=LEAST deprived)	integer: 1
s2016_income_10	Scotland: IMD2016 income domain: decile (1=LEAST deprived)	integer: 2
s2016_employment_5	Scotland: IMD2016 employment domain: quintile (1=LEAST deprived)	integer: 1
s2016_employment_10	Scotland: IMD2016 employment domain: decile (1=LEAST deprived)	integer: 2
s2016_education_5	Scotland: IMD2016 education domain: quintile (1=LEAST deprived)	integer: 1
s2016_education_10	Scotland: IMD2016 education domain: decile (1=LEAST deprived)	integer: 2
s2016_health_5	Scotland: IMD2016 health domain: quintile (1=LEAST deprived)	integer: 1
s2016_health_10	Scotland: IMD2016 health domain: decile (1=LEAST deprived)	integer: 2





s2016_crime_5	Scotland: IMD2016 crime domain: quintile (1=LEAST deprived)	integer: 1
s2016_crime_10	Scotland: IMD2016 crime domain: decile (1=LEAST deprived)	integer: 2
s2016_access_5	Scotland: IMD2016 access domain: quintile (1=LEAST deprived)	integer: 1
s2016_access_10	Scotland: IMD2016 access domain: decile (1=LEAST deprived)	integer: 2
s2016_housing_5	Scotland: IMD2016 housing domain: quintile (1=LEAST deprived)	integer: 1
s2016_housing_10	Scotland: IMD2016 housing domain: decile (1=LEAST deprived)	integer: 2
w2014_income_5	Wales: IMD2014 income domain: quintile (1=LEAST deprived)	integer: 1
w2014_income_10	Wales: IMD2014 income domain: decile (1=LEAST deprived)	integer: 2
w2014_employment_5	Wales: IMD2014 employment domain: quintile (1=LEAST deprived)	integer: 1
w2014_employment_10	Wales: IMD2014 employment domain: decile (1=LEAST deprived)	integer: 2
w2014_education_5	Wales: IMD2014 education domain: quintile (1=LEAST deprived)	integer: 1
w2014_education_10	Wales: IMD2014 education domain: decile (1=LEAST deprived)	integer: 2
w2014_health_5	Wales: IMD2014 health domain: quintile (1=LEAST deprived)	integer: 1
w2014_health_10	Wales: IMD2014 health domain: decile (1=LEAST deprived)	integer: 2
w2014_crime_5	Wales: IMD2014 crime domain: quintile (1=LEAST deprived)	integer: 1
w2014_crime_10	Wales: IMD2014 crime domain: decile (1=LEAST deprived)	integer: 2
w2014_access_5	Wales: IMD2014 access domain: quintile (1=LEAST deprived)	integer: 1
w2014_access_10	Wales: IMD2014 access domain: decile (1=LEAST deprived)	integer: 2
w2014_housing_5	Wales: IMD2014 housing domain: quintile (1=LEAST deprived)	integer: 1
w2014_housing_10	Wales: IMD2014 housing domain: decile (1=LEAST deprived)	integer: 2
w2014_outdoor_environment_5	Wales: IMD2014 outdoor environment domain: quintile (1=LEAST deprived)	integer: 1
w2014_outdoor_environment_10	Wales: IMD2014 outdoor environment domain: decile (1=LEAST deprived)	integer: 2



File name: practice\_carstairs\_2011.txt

<i>Column name</i>	<i>Description</i>	<i>Format</i>
pracid	Encrypted unique key given to a practice in CPRD GOLD or CPRD Aurum	integer: 5
country	1=England, 2=Northern Ireland, 3=Scotland, 4=Wales	integer: 4
carstairs2011_5	Carstairs Index 2011: quintile (1=LEAST deprived)	integer: 1
carstairs2011_10	Carstairs Index 2011: decile (1=LEAST deprived)	integer: 2

File name: practice\_rural\_urban.txt

<i>Column name</i>	<i>Description</i>	<i>Format</i>
pracid	Encrypted unique key given to a practice in CPRD GOLD or CPRD Aurum	integer: 5
country	1=England, 2=Northern Ireland, 3=Scotland, 4=Wales	integer: 4
e2011_urban_rural	England: 2011 Urban-Rural classification 1=Urban 2=Rural	integer: 1
ni2015_urban_rural	Northern Ireland: 2015 Urban-Rural classification 1=Urban, 2=Rural, 3= mixed Urban/Rural	integer: 1
s2016_urban_rural	Scotland: 2016 Urban-Rural classification 1= Urban, 2=Rural	integer: 1
w2011_urban_rural	Wales: 2011 Urban-Rural classification 1=Urban 2=Rural	integer: 1



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