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### Data Profile - Public Transport Accessibility Indicators Data

### Introduction

This dataset is not a new version of the original PTAI data. It is a completely new data product based on new methodology and source datasets. This is the first in a planned series of releases of this data product to reflect changes in transit schedules and location of services.

The Public Transport Accessibility Indicators 2022 dataset offers a series of accessibility indicators at the Lower Super Output Area(LSOA/) level covering the whole of Great Britain (GB) in the United Kingdom (UK). Indicators by public transport include a range of key amenities and services such as: employment; general practice (GP) surgery; hospital; grocery store; supermarket; primary school; secondary school; and urban centre.

### **Scale and Extent**

Field	Value
Data Provider	Urban Big Data Centre
Analytical	LSOA/DZ
units	
Data format	CSV
Temporal	November 2021
extent	
Geographical	Great Britain (Scotland,
extent	England, Wales)

### **Citation Information**

The following statement should be included when citing the use of this dataset:

Urban Big Data Centre. Economic and Social Research Council. Public Transport Accessibility Indicators, 2022 [data collection]. University of Glasgow - Urban Big Data Centre.

### **Data Access**

The Public Transport Accessibility Indicators Data is classified as Open Data under the Open Government Licence v. 3.0

(https://www.nationalarchives.gov.uk/doc/open-government-licence/version/3/)

### Audience

Data of interest to academic staff for non-commercial research.

PTAIs can be used to study how access by public transport varies across space and it is important for a wide variety of urban research topics. Researchers might be interested in analysing the relation between public transport and employment/unemployment or the effect of access to urban amenities on land prices and gentrification.

### Content

Public transport accessibility indicators at aggregated by 2011 statistical geographies.

### Method of collection

### Origins



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Accessibility indicators were estimated for all 41,729 LSOA/DZ in Great Britain.
Origins are represented by LSOA/DZ population weighted centroids based on the boundaries defined for the 2011 Census.

LSOA's centroids for England and Wales were produced by the Office for National Statistics (ONS) and manually downloaded from the UK Government open data portal (https://data.gov.uk/) on the 2021-12-12 (version last updated on 2019-12-21). DZ centroids in Scotland are published by the Scottish Government and were manually downloaded from the UK Government's open data portal (https://data.gov.uk/) (version last updated on the 2021-03-26). 32,844 origins are located in England, 6,976 in Scotland, and 1,909 in Wales. The average number of inhabitants within LSOA/DZ for the year of reference 2020 is 1,562 and the mean surface area is 5.5 km<sup>2</sup>. On average, zones in Wales and Scotland are larger than those in England.

### **Destinations**

Potential destinations are represented by a range of amenities and services, namely: employment, general practitioner's (GPs) surgeries, hospitals, primary schools, secondary schools, city, greater city, and food stores (supermarkets). The location of destinations is represented by the population weighted centroid of the LSOA/DZ where these lie. The preferred source of information to identify the corresponding LSOA/DZ was the original source of information. If this was not available, the LSOA/DZ code was spatially joined to the services/amenities using the coordinates of destinations at the point

level. If this was not available, a spatial join was performed using the coordinates of destinations at the point level and the LSOA/DZ boundaries. The spatial definition of the LSOA/DZ areal units was obtained from the UK Data Service Census Support boundary dataset. When the coordinates of the destination were not available, the post code (6 digits) was used to match the information with that of ONS Postcode Directory (ONSPD, edition August 2021) accessed online via the Open Geography Portal on: https://geoportal.statistics.gov.uk/). The ONSPD includes the corresponding LSOA/DZ code for each post code defined for the 2011 Census.

### Destination sources and selection criteria

The preferred edition of the data was the closest available to the 22nd of November 2021 (the date of departure used for the estimation of travel time).

### Travel time estimates

The cost between origins and destinations in accessibility measures is represented by the estimated journey travel time. The software employed to model travel time is R5R, a package for R programming language. The calculations use information from the road and pedestrian network and public transport schedules as the main input. The source of road and pedestrian network data used is OpenStreetMap (OSM). The version employed is the latest as manually downloaded in .PBF format from the Geofabric web platform on the 2021-11-22 for Great Britain. The public transport



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timetables were obtained from Bus Open Data Service and Rail Delivery Group.

### **Model parameters**

The modelling parameters follow those used in the Journey Time Statistics (JTS) (DfT 2019) developed by the Department of Transport (DfT) where possible.

### **Outputs**

### Travel time matrix

The product of estimating the travel time from each origin to every potential destination results in a so-called all-to-all travel time matrix (TTM). The estimated TTM is included as an output since this can be used as the main input to customise or estimate new accessibility indicators according the needs the users of the present data collection.

### Accessibility indicators

The accessibility indicators include: (1) the directory of the output file; (2) the accessibility measure computed for the respective service/amenity, namely cumulative opportunities, relative cumulative, and/or minimum travel time, and; (3) a description of the measure computed.

### Quality

The present collection comes with the following limitations:

 The transport model does not include intercity coaches (e.g. services provided by companies as 'National Express' or 'Megabus'). This is due to the incompatibility in which timetables are published.

- The location of destinations is represented by the respective LSOA/DZ population weighted centroid where the service/amenity falls and not the exact location of it.
- The heterogeneity of sources and/or systems accounting for destination between nations poses challenges resulting from the variability in the criteria employed for collecting data or originating from the actual compatibility of schooling systems. This specially affects hospitals and education establishments. Therefore, caution is advised for making comparison between locations across countries for these type of indicators
- The locations included account only for major brands and do not make a clear-cut distinction between a supermarket and a grocery-shop. This is also related to the lack of official or standard definitions across nations in GB.

### **Related Datasets**

Glasgow CCTV Automated Object
Detection Data





### Field Level Metadata – Safeguarded data

### **Description for Accessibility indicators**

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GPs  Minimum travel time  Closest LSOA/DZ that contains at least one GP  Hospitals  Cumulative: time cut 15, 30, 45, 60, 75, 90, 105, 120  Hospitals  Relative cumulative: time cut 15, 30, 45, 60, 75, 90, 105, 120  Number of hospitals within N minutes by public transport divided by the total number in Great Britain  Hospitals  Minimum travel time contains at least one hospital  Education: Cumulative: Number of primary schools time cut 15, 30, 45, 60, 75, 90, 105, 120  Education: Relative  Number of primary schools Viransport  Number of primary schools Viransport  Number of primary schools		30, 45, 60, 75,	in Great Britain
Hospitals  Cumulative: time cut 15, 30, 45, 60, 75, 90, 105, 120  Hospitals  Relative cumulative: time cut 15, 30, 45, 60, 75, 90, 105, 120  Hospitals  Relative cumulative: time cut 15, 30, 45, 60, 75, 90, 105, 120  Hospitals  Minimum closest LSOA/DZ that travel time cut 15, 30, 45, 60, 75, 90, 105, 120  Education:  Cumulative: Number of primary schools within Number of primary schools  Relative contains at least one hospital  Number of primary schools  Vitality in Number of primary schools  Number of primary schools  Number of primary schools  Relative  Number of primary schools		90, 105, 120	
Hospitals  Cumulative: time cut 15, 30, 45, 60, 75, 90, 105, 120  Hospitals  Relative cumulative: time cut 15, 30, 45, 60, 75, 90, 105, 120  Hospitals  Relative cumulative: time cut 15, 30, 45, 60, 75, 90, 105, 120  Hospitals  Minimum closest LSOA/DZ that contains at least one hospital  Education:  Primary schools  Education:  Relative  Relative  Number of hospitals within N minutes by public transport divided by the total number in Great Britain  Closest LSOA/DZ that contains at least one hospital  Number of primary schools within N minutes by public transport  Relative  Number of primary schools	GPs	Minimum	Closest LSOA/DZ that
time cut 15, 30, 45, 60, 75, 90, 105, 120  Hospitals Relative cumulative: time cut 15, 30, 45, 60, 75, 90, 105, 120  Hospitals Minimum closest LSOA/DZ that contains at least one hospital Education: Primary schools Primary schools Relative Relative Relative Rumber of hospitals within N minutes by public transport divided by the total number in Great Britain Closest LSOA/DZ that contains at least one hospital  Education: Number of primary schools within N minutes by public transport  90, 105, 120  Education: Relative Number of primary schools		travel time	contains at least one GP
Hospitals Relative cumulative: time cut 15, 30, 45, 60, 75, 90, 105, 120  Hospitals Minimum travel time  Education: Cumulative: Number of hospitals within N minutes by public transport divided by the total number in Great Britain  Closest LSOA/DZ that contains at least one hospital  Number of primary schools within N minutes by public transport  Yermany schools  Relative Number of primary schools  Number of primary schools  Number of primary schools  Number of primary schools	Hospitals	Cumulative:	Number of hospitals within
Hospitals Relative cumulative: Number of hospitals within Number of hospitals within Number of hospitals within Number of hospitals within Number of hospitals transport divided by the total number in Great Britain  Hospitals Minimum Closest LSOA/DZ that contains at least one hospital  Education: Cumulative: Number of primary schools within Number of primary schools transport  30, 45, 60, 75, 90, 105, 120  Education: Relative Number of primary schools		time cut 15,	N minutes by public
Hospitals  Relative cumulative: time cut 15, 30, 45, 60, 75, 90, 105, 120  Hospitals  Minimum travel time Cumulative: Drimary schools Primary schools  Relative Relative Relative Relative Relative Relative Number of hospitals within N minutes by public total number in Great Britain Closest LSOA/DZ that contains at least one hospital Number of primary schools within N minutes by public transport transport Yumber of primary schools Relative Number of primary schools		30, 45, 60, 75,	transport
cumulative: time cut 15, 30, 45, 60, 75, 90, 105, 120 Britain  Hospitals Minimum Closest LSOA/DZ that travel time contains at least one hospital  Education: Cumulative: Number of primary schools within N minutes by public transport  30, 45, 60, 75, 90, 105, 120  Education: Relative Number of primary schools		90, 105, 120	
time cut 15, 30, 45, 60, 75, 90, 105, 120  Hospitals  Minimum travel time cut 15, 30, 45, 60, 75, 90, 105, 120  Education:  Primary schools Primary schools  Education:  Relative  Relative  Cumusport divided by the total number in Great Britain  Closest LSOA/DZ that contains at least one hospital  Number of primary schools transport transport  Number of primary schools	Hospitals	Relative	Number of hospitals within
30, 45, 60, 75, 90, 105, 120 Britain  Hospitals Minimum travel time contains at least one hospital  Education: Cumulative: Number of primary schools within N minutes by public transport 90, 105, 120  Education: Relative Number of primary schools		cumulative:	N minutes by public
Hospitals  Minimum travel time  Education:  Primary schools  Primary schools  Primary schools  Relative  Relative  Primary schools  Relative  Britain  Closest LSOA/DZ that contains at least one hospital  Number of primary schools within N minutes by public transport  Number of primary schools		time cut 15,	transport divided by the
Hospitals  Minimum travel time contains at least one hospital  Education:  Primary schools Primary schools 20, 45, 60, 75, 90, 105, 120  Education:  Relative  Closest LSOA/DZ that contains at least one hospital  Number of primary schools transport  Number of primary schools		30, 45, 60, 75,	total number in Great
travel time contains at least one hospital  Education: Cumulative: Number of primary schools within N minutes by public transport  Education: Relative Number of primary schools		90, 105, 120	Britain
Education:  Primary schools Primary schools  1	Hospitals	Minimum	Closest LSOA/DZ that
Education:  Primary schools  time cut 15, 30, 45, 60, 75, 90, 105, 120  Education:  Cumulative: Number of primary schools within N minutes by public transport  Number of primary schools		travel time	contains at least one
Primary schools time cut 15, 30, 45, 60, 75, 90, 105, 120  Education: Relative within N minutes by public transport  Number of primary schools			hospital
Primary schools time cut 15, 30, 45, 60, 75, 90, 105, 120  Education: Relative within N minutes by public transport  Number of primary schools	Education:	Cumulative:	Number of primary schools
30, 45, 60, 75, 90, 105, 120 transport  Education: Relative Number of primary schools	Primary schools	time cut 15,	· · · · · · · · · · · · · · · · · · ·
90, 105, 120  Education: Relative Number of primary schools	,	,	, ,
Education: Relative Number of primary schools			·
	Education:		Number of primary schools
	Primary schools	cumulative:	within N minutes by public



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	time cut 15,	transport divided by the
	30, 45, 60, 75,	total number in Great
	1 ' ' '	
- L	90, 105, 120	Britain
Education:	Minimum	Closest LSOA/DZ that
Primary schools	travel time	contains at least one
		primary school
Education:	Cumulative:	Number of secondary
Secondary	time cut 15,	schools within N minutes by
schools	30, 45, 60, 75,	public transport
	90, 105, 120	
Education:	Relative	Number of secondary
Secondary	cumulative:	schools within N minutes by
schools	time cut 15,	public transport divided by
	30, 45, 60, 75,	the total number in Great
	90, 105, 120	Britain
Education:	Minimum	Closest LSOA/DZ that
Secondary	travel time	contains at least one
schools		secondary school
Urban centre:	Minimum	Closest main subcentre.
Main	travel time	
Urban centre:	Minimum	Closest urban subcentre.
Subcentre	travel time	
Supermarkets	Cumulative:	Number of supermarkets
·	time cut 15,	within N minutes by public
	30, 45, 60, 75,	transport
	90, 105, 120	·
Supermarkets	Relative	Number of supermarkets
·	cumulative:	within N minutes by public
	time cut 15,	transport divided by the
	30, 45, 60, 75,	total number in Great
	90, 105, 120	Britain
Supermarkets	Minimum	Closest LSOA/DZ that
	travel time	contains at least one
		supermarket
		Supermarket



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## **Description for Travel Time matrix (TTM)**

Variable	Туре	Description
fromId	nominal	2011 LSOA/DZ geo-code of origin
told	nominal	2011 LSOA/DZ geo-code of destination
travel_time_p025	numeric	25 travel time percentile by public transport in minutes
travel_time_p050	numeric	50 travel time percentile by public transport in minutes
travel_time_p075	numeric	75 travel time percentile by public transport in minutes