

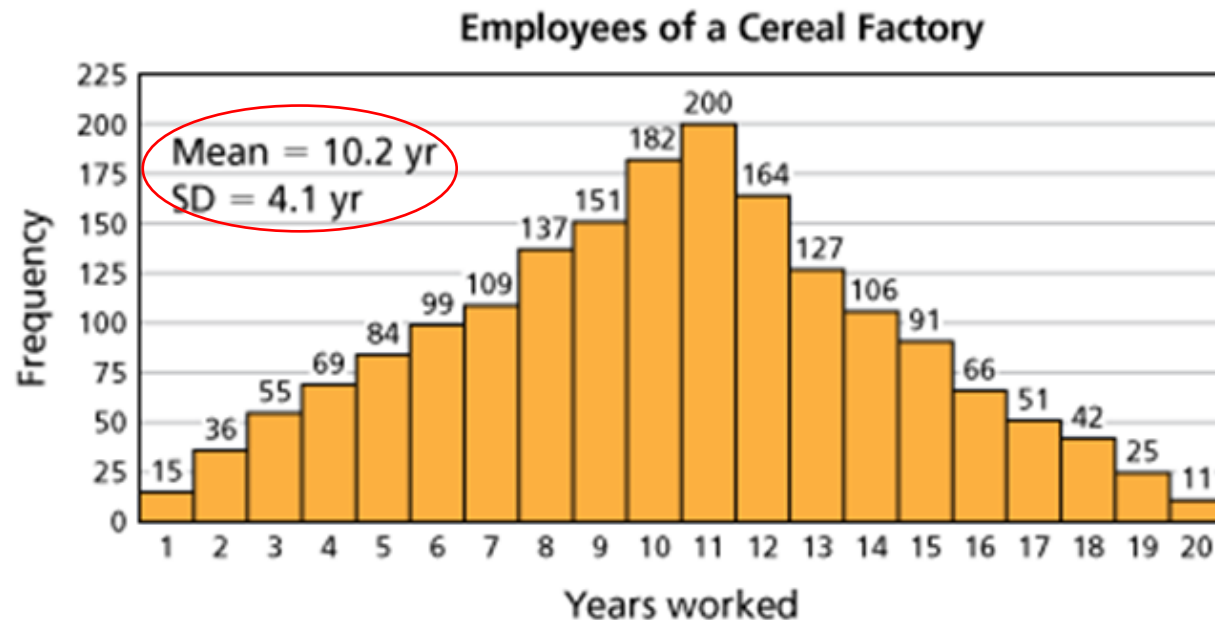
Cost of Living Indices methodology

Southampton City Council



Statistical terms & Z-Scoring

- **Mean:** All the values added up, divided by how many values you have giving a statistical average
- **Standard deviation (SD)**– a statistical measure of how the far data is distributed from the mean



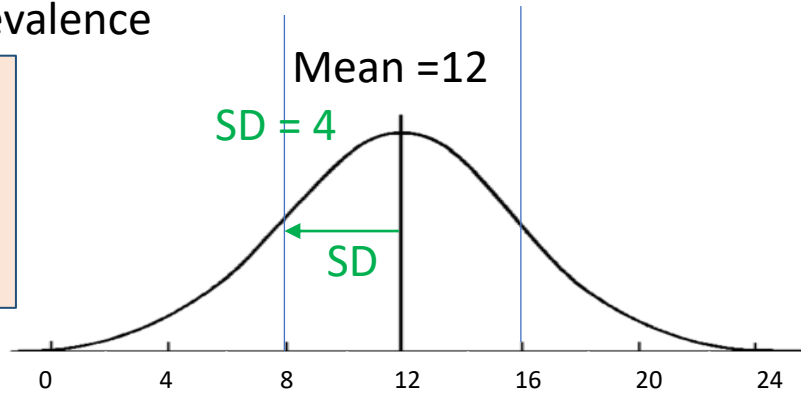
- 68.3% of the data is +/- a standard deviation distance from the mean
- One standard deviation back from the mean is $10.2 - 4.1 = 6.1$
- One standard deviation forward from the mean is $10.2 + 4.1 = 14.3$
- 68.3% of the employees have worked there for between 6.1 years and 14.3 years

Data can be transformed in different ways

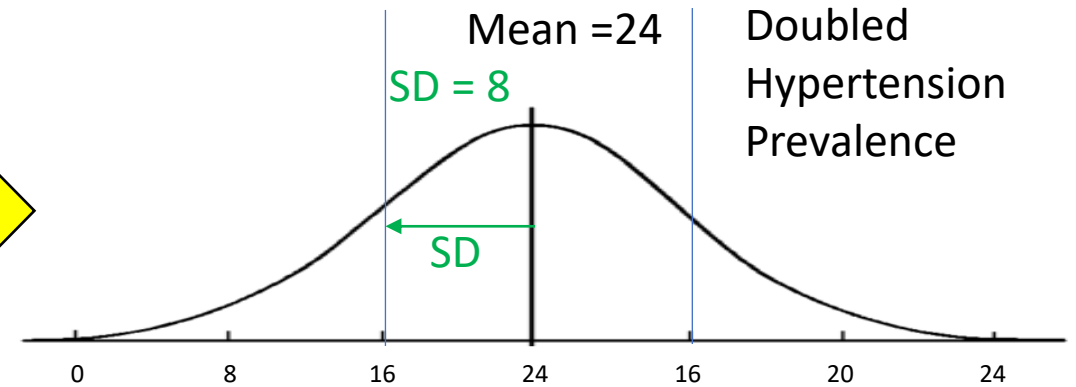
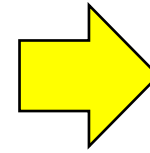
It can be doubled.....

Hypertension prevalence

Double each
value in the
data
x2



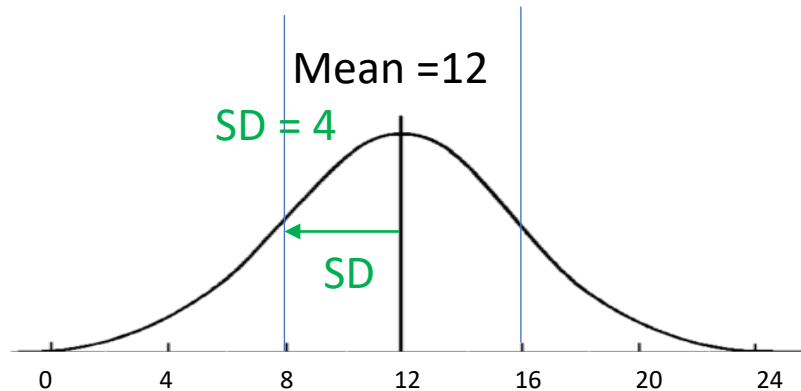
x2



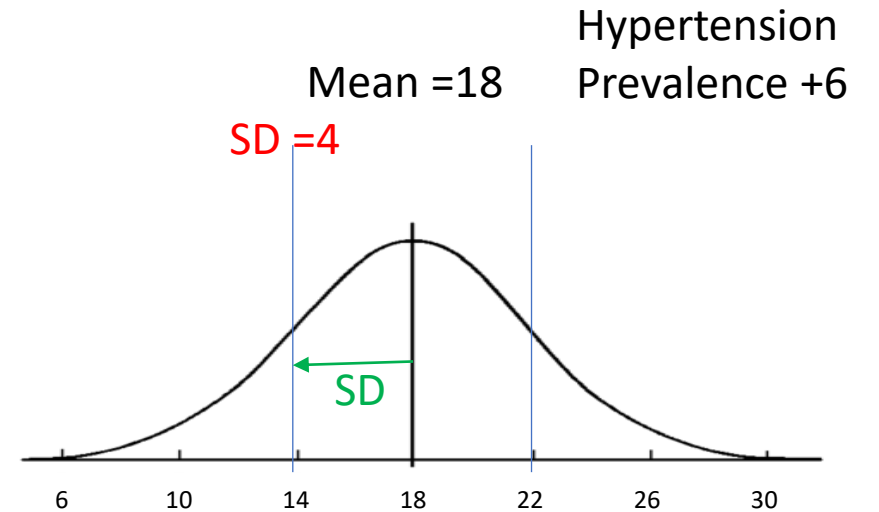
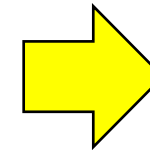
Or each value can have a factor (number) added/subtracted from it...

Hypertension prevalence

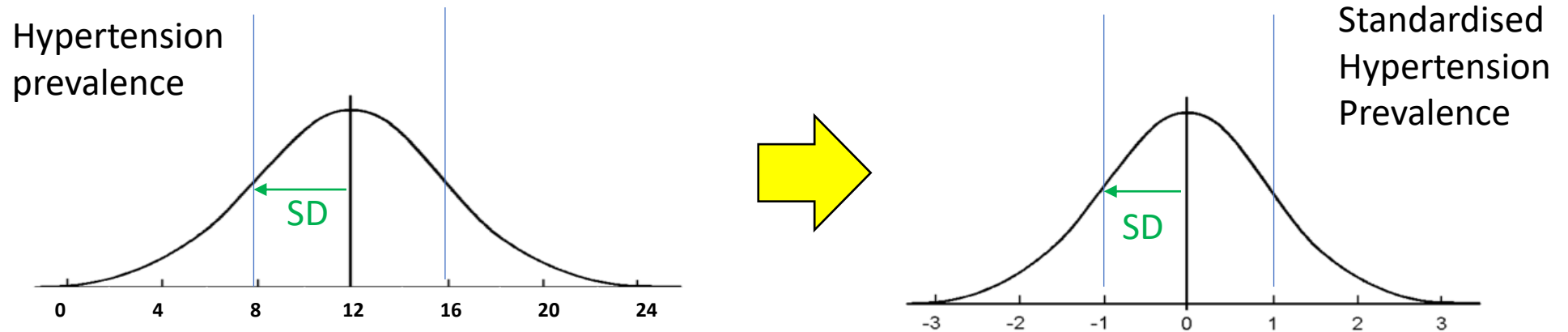
Add six to
each value



+6



- We can transform data using Z scoring, that transforms any distribution of data to have a mean of zero and a SD of 1

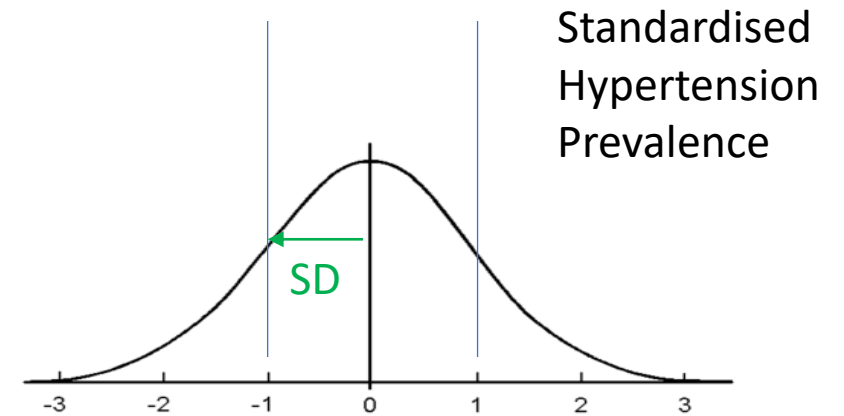
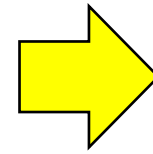
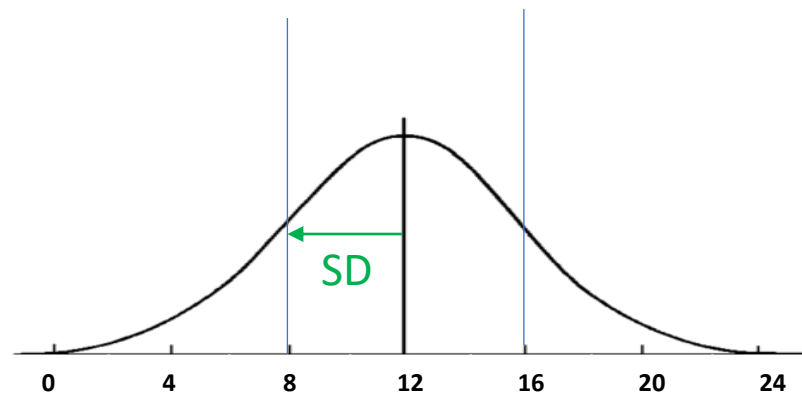


- Z scoring..... $(\text{value} - \text{mean}) / \text{SD}$
- Take the mean of 12.... $12 - 12 / 4 = 0$
- Or the value of 8, one standard deviation before the mean... $(8 - 12) / 4$ $-4 / 4$ = -1
- Or the value of 16, one standard deviation after the mean... $(16 - 12) / 4$ $4 / 4$ = 1
- The height of each point on the chart is the frequency, here how many LSOAs have that value, the height remains the same when transformed

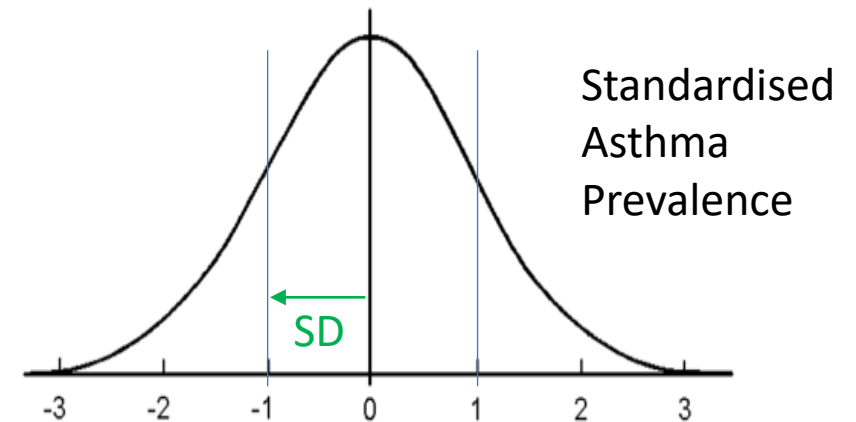
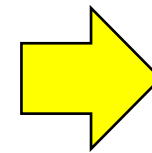
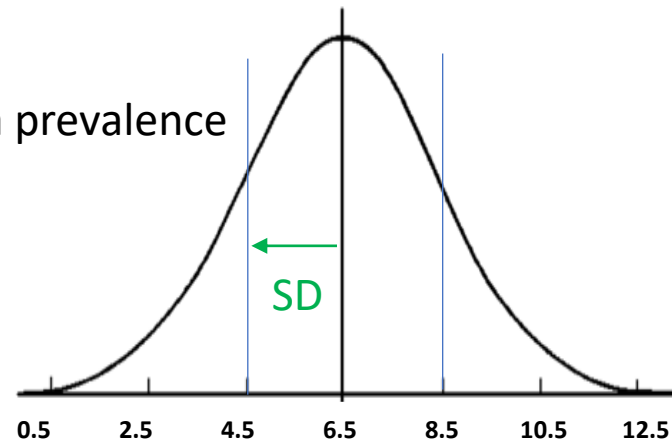


- **Z scoring.....** means all indicators have the same mean of 0 and the same standard deviation of 1, which each value kept in the same order when ranked highest to lowest as the original data set

Hypertension prevalence



Asthma prevalence



- **Once on the same scale, the values of each LSOA can be added together, to make a combined overall score. You can do this for all clinical indicators to get an overall clinical domain score where each indicator is equally weighted**

Pros

- It allows us to compare raw values between distributions and create relative combined domains, each indicator has an equal weighting when combined
- Allows comparison and combination of different measures, e.g. SMR (standardised mortality ratio), prevalence (%), DSR (directly age standardised rate), etc.
- Relatively simple to do and can be applied to create separate domains with multiple differing indicators

Cons

- Normal distribution is assumed (depends on Central Limit Theorem for those variables that are skewed, $n > 30$)
- Interpretability is reduced as the z-score and combined domain scores no longer has the original unit, the unit of z-score is in SD



Indicators definitions

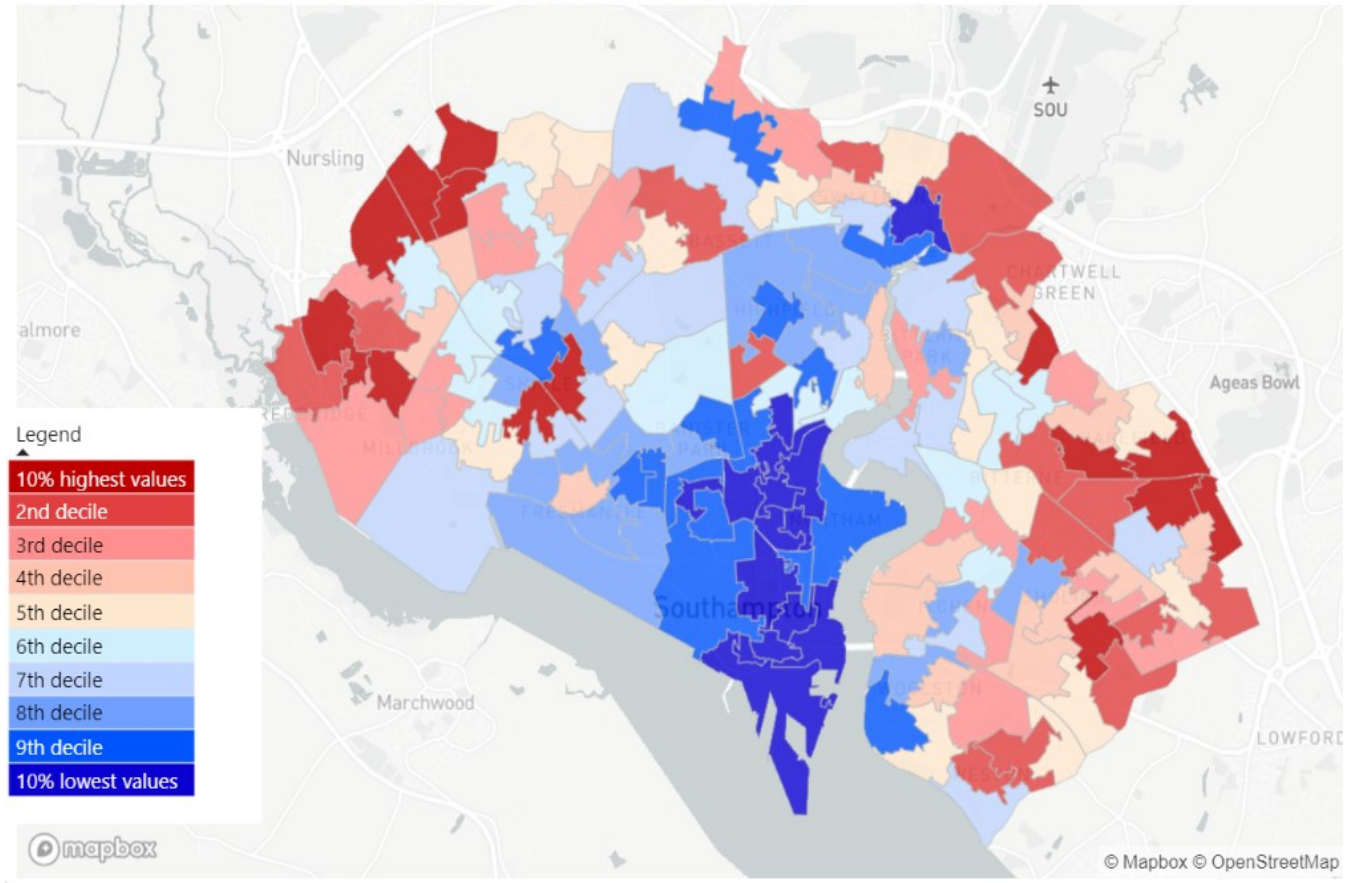
Definition

- The prevalence in each LSOA is calculated by taking the number of people diagnosed by a GP and/or taking medication in that area and dividing it by the number of patients known to be living there.
- Taken at same time point and same source/population (February 2021)
- The data is based on those people GP diagnosed and/or receiving medication for a condition, not self-reported and only includes those people registered with a GP practice

Conditions included as more at risk of exacerbating under 'Cost of Living'

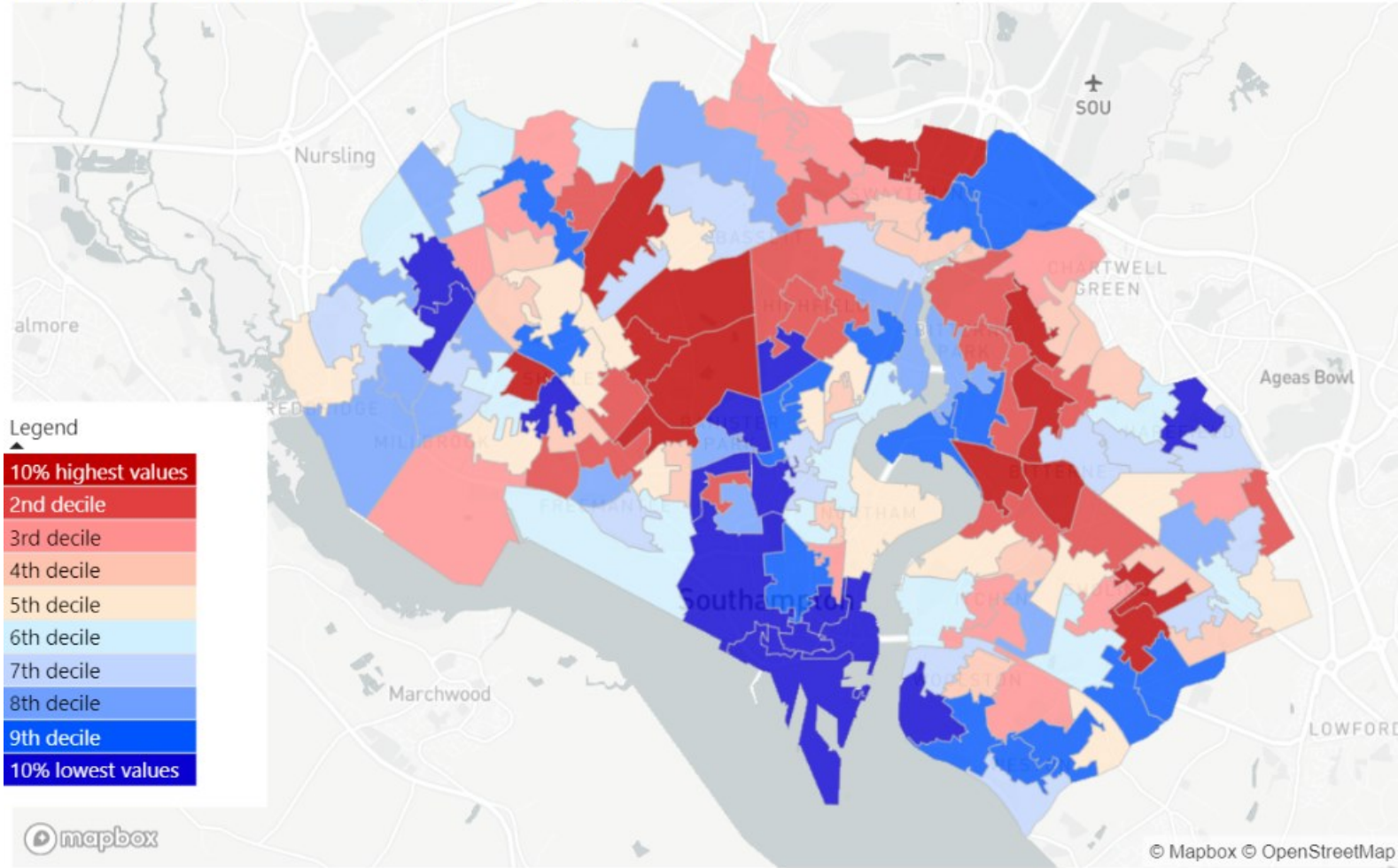
- **Hypertension** - 32.7k (those who have a diagnosis recorded on the hypertension disease register, prescription for hypertension or both)
- **IHD (Ischaemic Heart Disease)** – 6.7k (those who have a diagnosis recorded on the Ischaemic Heart disease register)
- **COPD (Chronic Obstructive Pulmonary Disease)** - 6.8k (those who have a diagnosis recorded on the COPD disease register)
- **Asthma** – 17.0k (those who have a diagnosis recorded on the asthma disease register AND a prescription for asthma)

Clinical domain: Overall - Southampton LSOAs grouped into deciles



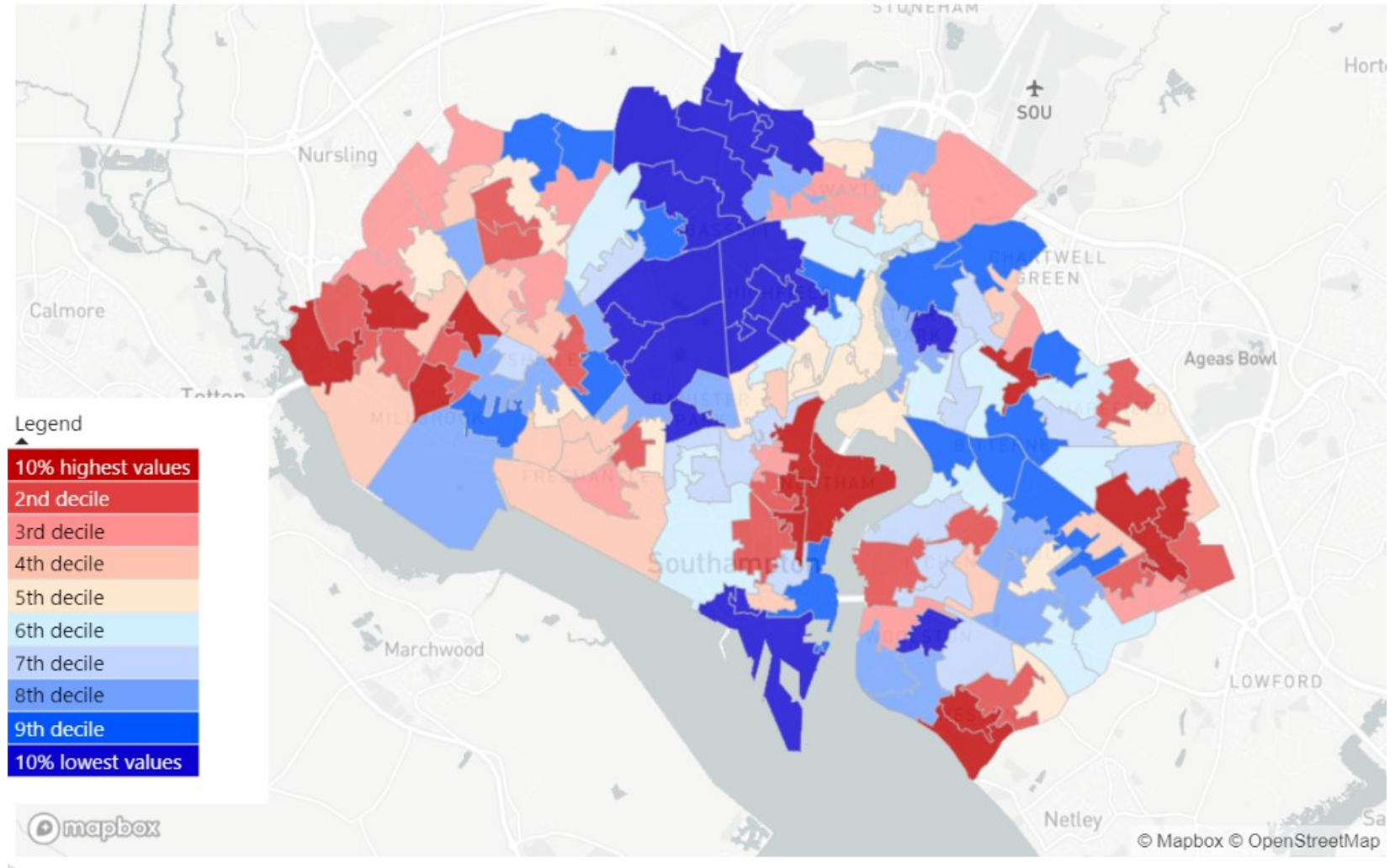
- The data used is EPC (Energy Performance Certificate) data for **residential** properties in **Southampton**.
- EPCs rate the current and potential energy efficiency of a home out of 100 (these ratings are also grouped A to G). **Energy 'poor' rated** properties are deemed to be those with a **current** rating of **D to G** calculated from the **amount** of certificates **available** for properties in that area
- Data snap shot taken in December 2022
- **Not every** residential property in **Southampton** has an EPC rating as they have **only been mandatory** for properties being **sold or rented after 2008**
- Areas with the **highest percentages** of **'energy poor'** properties are in **red**
- **1 out of 10 flats** and **maisonettes** do **not** have a **certificate**
- **4 out of 10 houses** and **bungalows** do **not** have a **certificate**

Energy domain: Overall - Southampton LSOAs grouped into deciles



- **Pre-payment meter** data and **benefit** data was **combined** to create the **economic** indicator
- Pre-payment meter data looks at the **percentage of households** in a **neighbourhood** that have **prepayment meters** installed using the Hampshire County Council Small Area Population Forecast dwelling data for 2017
- Pre-payment meter data was most recently last recorded in 2017 which is the data set used
- **Benefit data** calculated for each neighbourhood shows the **percentage of working age adults claiming universal credit**. The latest snap shot from DWP covering December 2022 was used.
- Full metadata for the Universal Credit data and Pre Payment meter is available in the dashboard

Economical domain: Overall - Southampton LSOAs grouped into deciles



- The **food insecurity** indicator data is supplied by the University of Southampton in February 2023, a refreshed data set originally used in the study [Household food insecurity risk indices for English neighbourhoods](#) (Smith *et al.* 2021).
- The study link includes full methodology and data sources.
- The **overall index** used here **combines** the **two** sub domains; **compositional** (including benefit claimants, low income, mental health and educational attainment) and **structural** (bus stops, distances to employment, distances to food stores and internet speeds)

Food insecurity domain: Overall - Southampton LSOAs grouped into deciles

