# Methodology for summary rank indicators

## Overview

Each of the service areas within the Public Health Dashboard, for which summary ranks are calculated[[1]](#footnote-1), contains between two and five component indicators. These component indicators have been transformed, normalised and combined into one overall indicator for each service area. This has been calculated as the average of the normalised transformed component scores.

For presentation in the Public Health Dashboard, the combined indicators have been ranked from best to worst for each service area and divided into four categories described below.

## Detailed methodology

The summary rank indicator is the simple rank of each combined indicator. Each combined indicator is comprised of two or more component indicators. The methodology for constructing these is set out below.

For each component indicator, the distribution of values was first assessed to ensure that it exhibited substantial variation between local authorities (LAs), i.e. that the range of values across LAs was more than would be expected simply through random variation. Any indicators not exhibiting substantial variation were discarded.

The indicators were then transformed according to the type of indicator: Those that were rates were log-transformed and proportions were transformed using the logit transformation, after which their distributions were approximately normal.

For percentage-based indicators, if any percentages were greater than 100%, the log value given for these was the highest log value specified within that indicator multiplied by 1.25. Conversely, if any percentages were less than 0%, the log value given for these would be the lowest log value specified within that indicator multiplied by 1.25.

The transformed values for each LA of each component indicator were then normalised, generating *z*-scores (OECD 2008, p84). To do this, the mean and standard deviation of the (log or logit) transformed valid observed LA values are calculated, and then each LA value is transformed onto a standard normal distribution by subtracting the mean and dividing by the sample standard deviation. Indicators for which low values represented ‘good’ outcomes have their *z*‑scores inverted (i.e. subtracted from zero) so all positive *z*‑scores indicate good outcomes and all negative *z*‑scores represent poor outcomes. This methodology ensures that each component indicator has equal weight in the calculation of the combined indicator, regardless of its scale or variability.

where

are the individual valid observed LA values

is the mean of the LA values

is the sample standard deviation of the LA values

is the number of valid LA values – all summations above are from

The combined indicators are calculated as a simple mean of the component indicator *z*‑scores and ranked to give the summary rank indicator.

## Missing data

Where, for any LA, a valid indicator value for any component indicator is not available, the combined indicator is not calculated for that LA, but values for the other component indicators are made available. The *z*‑scores for each component indicator are calculated using all LAs that have a valid value for that indicator.

## Allocation to categories

The combined indicators are ranked from 1 to 151[[2]](#footnote-2) with 1 being the ‘best’ value for the component indicator. These summary ranks are presented in the Public Health Dashboard tool. The *z*-scores and average *z*-scores used in the calculation are not published as they are abstract numbers that don’t have an obvious interpretation.

For presentation, the summary rank indicator values for all LAs are allocated to quartiles and labelled as follows:

|  |  |  |
| --- | --- | --- |
| **Group** | **Definition** | **Label** |
| 1st quartile | Lowest 25% of LAs (low rank is good) | Best |
| 2nd quartile | LAs with values that lie between 25% and 50% in the rankings | Better than average rank |
| 3rd quartile | LAs with values that lie between 50% and 75% in the rankings | Worse than average rank |
| 4th quartile | Highest 25% of LAs | Worst |

Quartile boundary ranks (*Q1*, *Q2* and *Q3*) are calculated as follows:

where

is the number of valid LA values

LAs with a rank less than or equal to *Q1* are in the 1st Quartile, those with ranks greater than *Q1* and less than or equal to *Q2* are in the second quartile, those with ranks greater than *Q2* and less than or equal to *Q3* are in the third quartile and those with ranks greater than *Q3* are in the fourth quartile.

In cases where the number of valid LA values is exactly divisible by 4, each group will contain exactly a quarter of the LAs. Where the number of valid LA values is not exactly divisible by 4, the ‘extra’ LAs are allocated as follows:

|  |  |
| --- | --- |
| 1 extra LA value | Extra LA in 1st quartile |
| 2 extra LA values | Extra LAs in 1st and 4th quartiles |
| 3 extra LA values | Extra LAs in 1st, 2nd and 4th quartiles |

The component indicators are presented using RAG (red-amber-green) ratings[[3]](#footnote-3) based on statistical significance against the national comparator value, as in other PHE Fingertips products.

The unitary authorities of Leicestershire and Rutland, Cornwall and Isles of Scilly, and the London boroughs of City of London and Hackney, are combined where data are not available for either of them individually. Combined data are used as proxies for Leicestershire, Cornwall and Hackney respectively, but data are only presented for Rutland, Isles of Scilly and/or City of London where specific values for those LAs are available.

## Comparison with similar local authorities

LAs’ values for the summary ranks and the component indicators are presented in relation to all LAs in England with valid values and in relation to a subset of ‘similar’ LAs. LAs are defined as ‘similar’ using their 2019 Index of Multiple Deprivation (IMD) scores, by grouping LAs into deciles. The IMD Average Scores for the LAs are calculated (by [ONS](https://opendatacommunities.org/resource?uri=http%3A%2F%2Fopendatacommunities.org%2Fdata%2Fsocietal-wellbeing%2Fimd2019%2Findicesbyla)) by taking the average of the IMD scores for the LA’s constituent lower layer super output areas (LSOAs). The 16 UTLAs with the highest Average Scores make up decile 1 (the most deprived decile), the next 15 make up decile 2, and so on, with 15 UTLAs in each decile until decile 10, which has the 15 UTLAs with the lowest Average Scores.

In addition to the deprivation deciles, LAs can be shown in relation to their nearest statistical neighbours, as defined by the Chartered Institute of Public Finance and Accountancy (CIPFA, 2018).

## Geographies used

The summary rank indicators have been produced at post-April 2019 geographies. Due to this change, it hasn’t been possible to calculate summary ranks for the new unitary authorities for the ‘NHS Health Checks’, ‘Alcohol treatment’ and ‘Drug treatment’ domains, as the data for the component indicators were produced for pre-April 2019 geographies.

Data for the component indicators are available at post-April 2019 geographies, and for the short-term, at pre-April 2019 geographies. These are available at <https://fingertips.phe.org.uk/profile/public-health-dashboard-ft>.

## References

OECD 2008. Handbook on constructing composite indicators: methodology and user guide. ISBN 978-92-64-04345-9. <https://www.oecd.org/std/42495745.pdf>

CIPFA 2018. Nearest Neighbours Model. <https://www.cipfastats.net/resources/nearestneighbours/>

1. The air quality service area contains just one indicator, which is presented in its original form – this indicator has not been transformed or ranked. The Best Start in Life summary rank indicator is based on three of the component indicators only, the breastfeeding indicator is not included. [↑](#footnote-ref-1)
2. Or however many valid LA values there are [↑](#footnote-ref-2)
3. RAG ratings are used where the polarity of the indicator is clear, i.e. high values are ‘good’ or low values are ‘good’. The indicator on long-acting reversible contraceptive (LARC) prescribing is rated neutral using ‘blue-orange-blue’ as there are caveats around its interpretation, but in the summary rank calculations it is assumed that high is ‘good’. [↑](#footnote-ref-3)