![Public Health England logo]

Protecting and improving the nation's health

Technical Guide

Spine Charts

What is a spine chart?

A spine chart is a popular visualisation that shows, at a glance, how one area compares with others across a range of indicators. Summary statistics for each measure are displayed such that the average values are aligned to form one central line or 'spine' on the chart. This spine is the comparator and is usually the national or regional average to which local area values are compared. The summary information for each measure are scaled and displayed on each 'vertebra' of the spine. Most often the vertebrae show the range of values (the minimum and maximum) and the 25th and 75th percentiles. Area specific values are placed on top of these summaries, allowing the viewer to understand how that area compares with the rest of the areas for that measure. Often, the area specific value is coloured to represent the significance of its value compared to the comparator.

Additional information can also be included, such as different comparator group values.

Presentation

Spine chart displays have a number of features and considerations:

Figure 1, a labelled vertebra of a spine chart
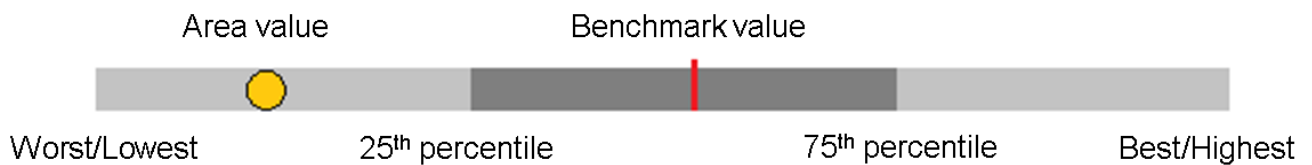
- the **range** of values is represented by the outer edges of the light grey areas (Figure 1). The smallest or worst value is the furthest left, and the largest or best value is the furthest right
- the **interquartile range** is represented by the dark grey area (Figure 1). The left edge of it is the 25th percentile, where 25% of local values are worse/lower than this value. The right edge is the 75th percentile, where 25% of local values are better/higher than this value
- the **polarity** of the indicator can determine whether the left hand side is the lowest or highest value. It is common to present a set of indicators so that worse values are on the left of the benchmark, and better values are on the right regardless of the value itself (for example, a high mortality rate is bad so can be presented on the left hand side). When high/low values are neither good or bad, the high value is displayed to the right of the comparator
- the **significance** of the area specific value compared to the benchmark can be represented by the colour of the circle displaying the value for the area. These colours can indicate whether the value is significantly better, worse, higher, lower or not significantly different from the benchmark
- **missing** vertebrae can occur either when it is inappropriate to display that indicator on a spine chart, when there are not enough values for that indicator to calculate a reliable average, or because there has been suppression of that area's value for that indicator
- it is common to display the **data table** for the spine chart beside it since the spine chart itself displays only relative differences between areas and does not provide any quantifiable figures or statistics. Usually the table includes the local count value, the local statistic, the average of the comparison geographies for example the England average, and the minimum/worst and maximum/best values for each indicator (Figure 2)

Interpretation

Figure 2, example spine chart taken from Fingertips for 6 indicators

Indicator	Period	Area			Region	England	England			
		Recent Trend	Count	Value	Value	Value	Worst/ Lowest	Range		Best/ Highest
Healthy life expectancy at birth (Male)	2012 - 14	−	-	63.6	64.0	63.4	55.0			70.5
Healthy life expectancy at birth (Female)	2012 - 14	−	-	65.9	64.1	64.0	54.4			72.2
Life Expectancy at birth (Male)	2012 - 14	−	-	81.8	80.3	79.5	74.7			83.3
Life Expectancy at birth (Female)	2012 - 14	−	-	86.7	84.2	83.2	79.8			86.7
Children in poverty (all dependent children under 20)	2013	↓	10,435	28.1%	21.8	18.0	35.5%			5.9%
Children in poverty (under 16s)	2013	↓	8,935	27.6%	21.8	18.6	34.4%			6.1%

Figure 2 can be interpreted as follows for the **area** displayed:
- healthy life expectancy is not significantly different from the England value for both males and females (the circles for the first two indicators are amber)
- life expectancy is significantly better than the England value for both males and females (the middle two circles are green). The female life expectancy for the area is the highest in the country (the fourth column gives the value 86.7, which is the same as the best/highest value on the right hand side of the spine). In addition, the value for male life expectancy is in the top 25% of areas in the country (the circle is in the light grey area to the right of the benchmark)
- both children in poverty indicators for the area are significantly worse than the England value (the bottom two circles are red). Furthermore, both are in the worst 25% of areas in the country (the circles are in the light grey area on the left)
- the six indicators are generally normally distributed. This can be inferred because of the symmetry of the grey areas around the red benchmark line. The indicator for *Children in poverty (all dependent children under 20)* is an example of a slightly skewed distribution as the light and dark grey areas to the left of the benchmark line are bigger than the corresponding areas on the right, indicating that the values that are worse than the benchmark are more spread out
- for each indicator, the interquartile range makes up less than half of the total length of the vertebra. This means the area values for the indicators have a wider spread in the top and bottom 25% than in the middle 50%
- higher values are better for the first four indicators. The last two indicators are worse for higher values

What the spine chart doesn't tell you

Spine charts only display relative differences. The supplementary data table that is usually displayed alongside it provides actual values.

The chart highlights the quartiles within the range of values for each area. It is not possible to ascertain spread of data within quartiles though. This has the effect of masking real outliers if any exist for an indicator.

Even if an indicator is better than the average, there may still be a health issue in the area that is worthy of intervention e.g. childhood obesity, for which the England average is thought to be unacceptably high.

Spine charts in Fingertips

Spine charts are available in Fingertips for some indicators under the Area Profiles tab.

PHE Technical Guides

This document forms part of a suite of PHE technical guides that are available on the Fingertips website: https://fingertips.phe.org.uk/profile/guidance