



The Index of Scottish Life Expectancy (THISLE)

The [THISLE index](#) is designed to focus attention on mortality inequalities across Scotland.

Index values are calculated using advanced statistical methods and are optimised in the mortality and life expectancy context and are available at the neighbourhood level (officially called Scottish Data Zones). The latest version of the index exploits mortality data up to the latest available year (2024) available from the National Register for Scotland (NRS).

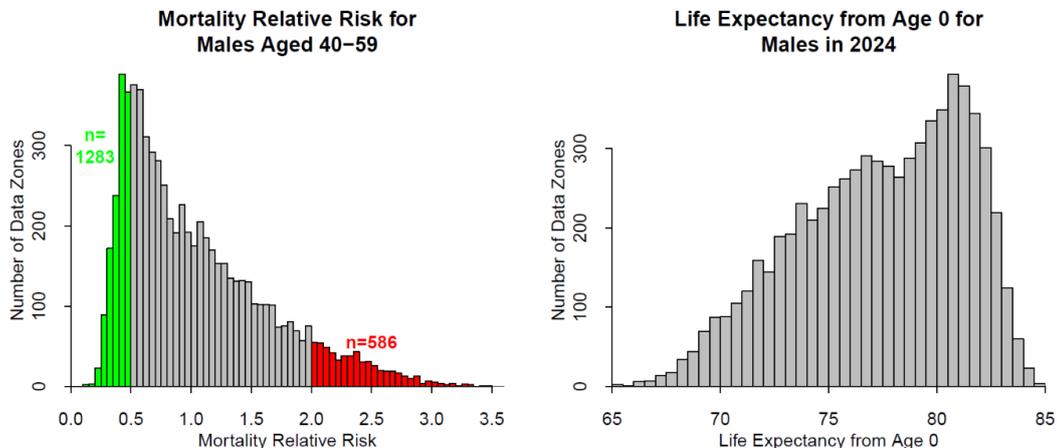
There are 6976 data zones with around 800 persons on average across all ages.

Index values are published for each data zone and come in two forms:

-  **Mortality Relative Risk:** this measures mortality rates relative to the national mortality rate by sex, year and age. For example, a value of 1.36 for a specific neighbourhood means that the mortality rate in the neighbourhood is 36% higher than the national rate.
-  **Life Expectancies:** these estimate the average life expectancy for people in the chosen neighbourhood from different starting ages.

And index values are available for males and females, and by age. Life expectancies use the latest available Scottish national mortality data: 2024.

The figure below illustrates the range of index values for Mortality Relative Risk (left) and Life Expectancy from birth (right).



Mortality Relative Risk

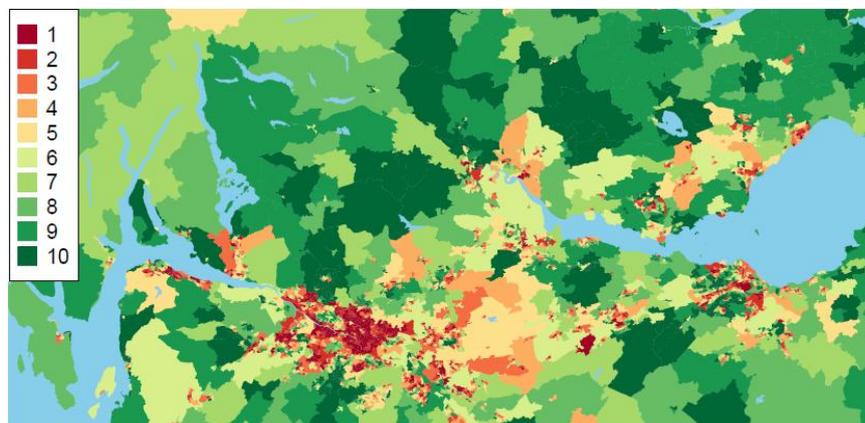
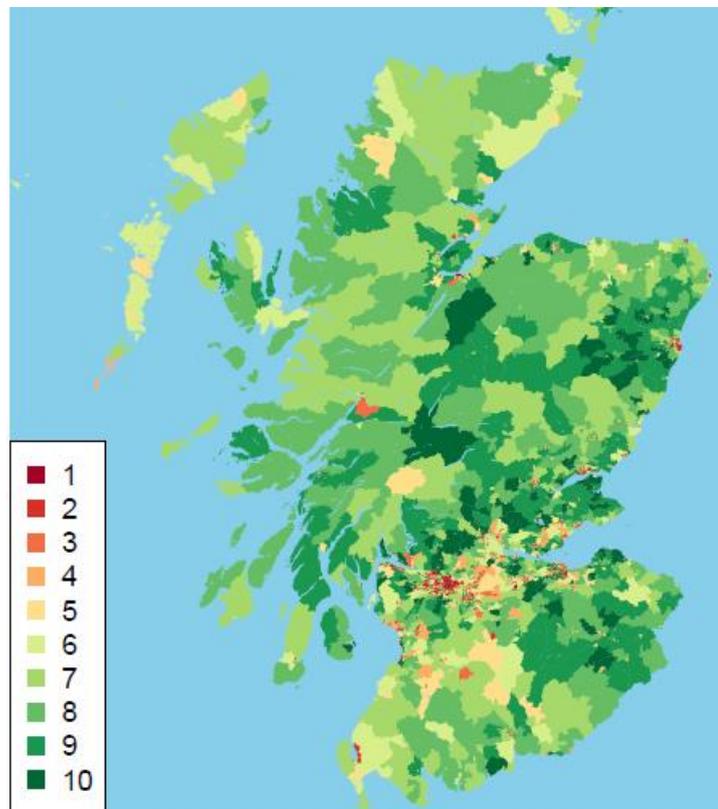
-  For males in the age range 40 to 59, 1283 data zones (green; 18%) have mortality rates that are **less than half** the national mortality rate. 558 (red; 8%) have mortality that is **more than double** the national rate.
-  The 1% of data zones with the highest risk have a mean mortality relative risk of 3. The lowest 1% have a mean of 0.25. So, the top 1% have mortality rates that are about 12 times higher than the lowest 1% in this age range.

Life Expectancy from Age 0

The right-hand chart shows a huge range in life expectancies with a maximum difference of almost 20 years based on the latest data.

Mapping and Visualisation

The research team at Heriot-Watt University has developed a web-based app that allows users to explore and visualise the index. Examples for the mortality relative risk for males:



The maps are coloured by decile: the 10% of data zones with the highest mortality relative risk (group 1) are coloured dark red; the 10% with the lowest mortality (group 10) are coloured dark green).

The interactive mapping tool can be accessed at

<https://m-dice.shinyapps.io/thisle/>

What do the underlying statistics reveal: what is already known and what is new?

- 🌿 This is the first time that customised and reliable estimates of mortality rates and life expectancies by neighbourhood have been made available.
- 🌿 Some of the important *predictors of high or low mortality* are what we would expect to see: unemployment rates and education. These are predictors that are known to be highly correlated with life-shortening health behaviours such as smoking, poor diet, lack of exercise etc.
- 🌿 Other predictors are quite unexpected, especially in terms of their magnitude:
 - People who live in neighbourhoods with high marriage rates (married or civil partnership) experience significantly lower mortality rates. And the impact of this is much larger for men than for women.
 - Migration around the age or 65 when people retire or downsize. Neighbourhoods that experience high levels of net *immigration* around retirement age experience significantly lower mortality rates than areas that experience net *emigration*. Sometimes this is referred to as a healthy migrant effect, but usually this effect refers to international migration. Here this is mainly due to internal migration.
 - When we compare estimates to those based on the Scottish Index of Multiple Deprivation only the biggest differences can be seen in neighbourhoods that have strong levels of *emigration* around age 65. The healthier migrants are leaving behind people who are less healthy and who, perhaps, lack the energy or the resources to move away.
- 🌿 Crime rates are also significant as risk factor but only in the neighbourhoods with the highest crime rates.
- 🌿 Mortality rates are also affected significantly by the presence of a care home in a neighbourhood. We filter out this effect to give an estimate of mortality rates in the non-care-home population in each neighbourhood.
- 🌿 Mortality inequalities as measured by the range of values for the mortality relative risk are greatest around age 40, and gradually narrow with age. And mortality inequalities for men are significantly wider than those for women.
- 🌿 The gender difference in life expectancy from age 0 between females and males varies considerably. For healthy neighbourhoods (high life expectancy) the gender difference is around 2 years, whereas for neighbourhoods with low life expectancy, the difference is much higher at around 7 years.
- 🌿 Compared to mortality based on Scottish Index of Multiple Deprivation (SIMD) groupings:
 - the THISLE index gives more accurate and often significantly different estimates of mortality inequalities (compared to SIMD);
 - reliable estimates of THISLE are available at neighbourhood (data zone) level;
 - the THISLE index is both sex and age specific, while the SIMD is not.

Do neighbouring data zones always have similar levels of mortality?

Often yes, but not always.

In the map you can see that green data zones are usually near other greens; reds are typically near other reds. But in the table below we give some examples of neighbouring data zones that are side by side where there is a very large difference in life expectancies.

Neighbourhood pairs	Life Expectancy from age 0	Life expectancy from age 40
Drumchapel South 03	69yrs 10mths	32yrs 1mth
South Castlehill & Thorn 05	83yrs 2mths	44yrs 1mth
Summerston North 02	71yrs 6mths	33yrs 7mths
Westerton East 05	83yrs 4mths	44yrs 3mths
Wyndford 05	65yrs 2mths	28yrs 4mths
Kelvindale 05	82yrs	42yrs 10mths
Gorgie West 03	71yrs 5mths	33yrs 6mths
Balgreen & Roseburn 02	81yrs 9mths	42yrs 9mths
Clovenstone & Wester Hailes 03	69yrs 8mths	32yrs 1mth
Baberton & Juniper Green 03	82yrs 8mths	43yrs 7mths

In some cases, but not all, these neighbourhoods with contrasting life expectancies are separated by a physical barrier such as a river, railway or major road.

Underpinning research methodology

Andrew J.G. Cairns, Jie Wen and Torsten Kleinow (2024) Drivers of Mortality: Risk Factors and Inequality. *Journal of the Royal Statistical Society, Series A*. 187: 989-1012.

Explore the Index

-  The web-based THISLE app can be accessed at: <https://m-dice.shinyapps.io/thisle/>
-  Additional materials including whole-of-Scotland data and interactive maps covering the whole of Scotland are here: <https://www.macs.hw.ac.uk/~andrewc/THISLE/>
-  If you would like to request a custom map or dataset, or to send feedback, please email Andrew Cairns: A.J.G.Cairns@hw.ac.uk

Other noteworthy bits of data.

- 🌸 Male life expectancy at age 0:
 - Lowest: Wyndford 05: LE0=65.1yrs
 - Highest: Cults, Bielside & Milltimber East 03: LE0=84.9yrs
 - So, nearly 20 years difference between the most extreme.
- 🌸 Female life expectancy at age 0:
 - Lowest: Carntyne West & Haghill 04: 72.6yrs
 - Highest: Cults, Bielside & Milltimber East 01: 86.6yrs
 - So, a 14-year difference.
- 🌸 These compare with (data from the National Records of Scotland, NRS)
 - Males: a 13.2 year gap by deprivation decile (2022-24)
 - Females: a 10.9 year gap by deprivation decile
 - Males: a 7.2 year gap by council area
 - Females: a 7.2 year gap by council area
- 🌸 The much larger gaps that we estimate are due to
 - A more granular approach: data zones rather than deprivation deciles
 - The use of a customised approach for mortality rather than using the deprivation indices as a proxy.