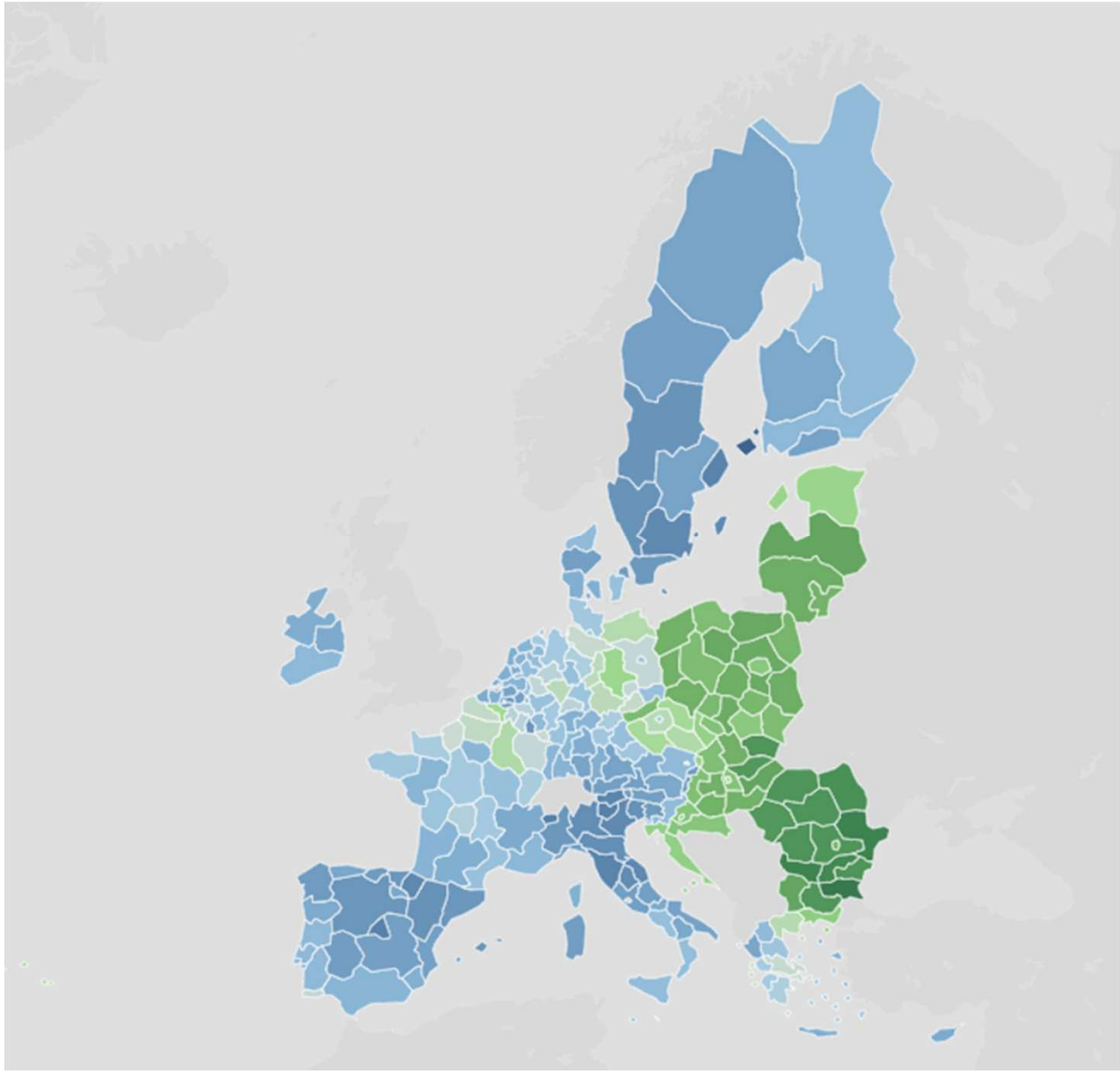
EU HEALTH EQUITY MAP

Mapping social and health inequalities in the EU

METHODOLOGY



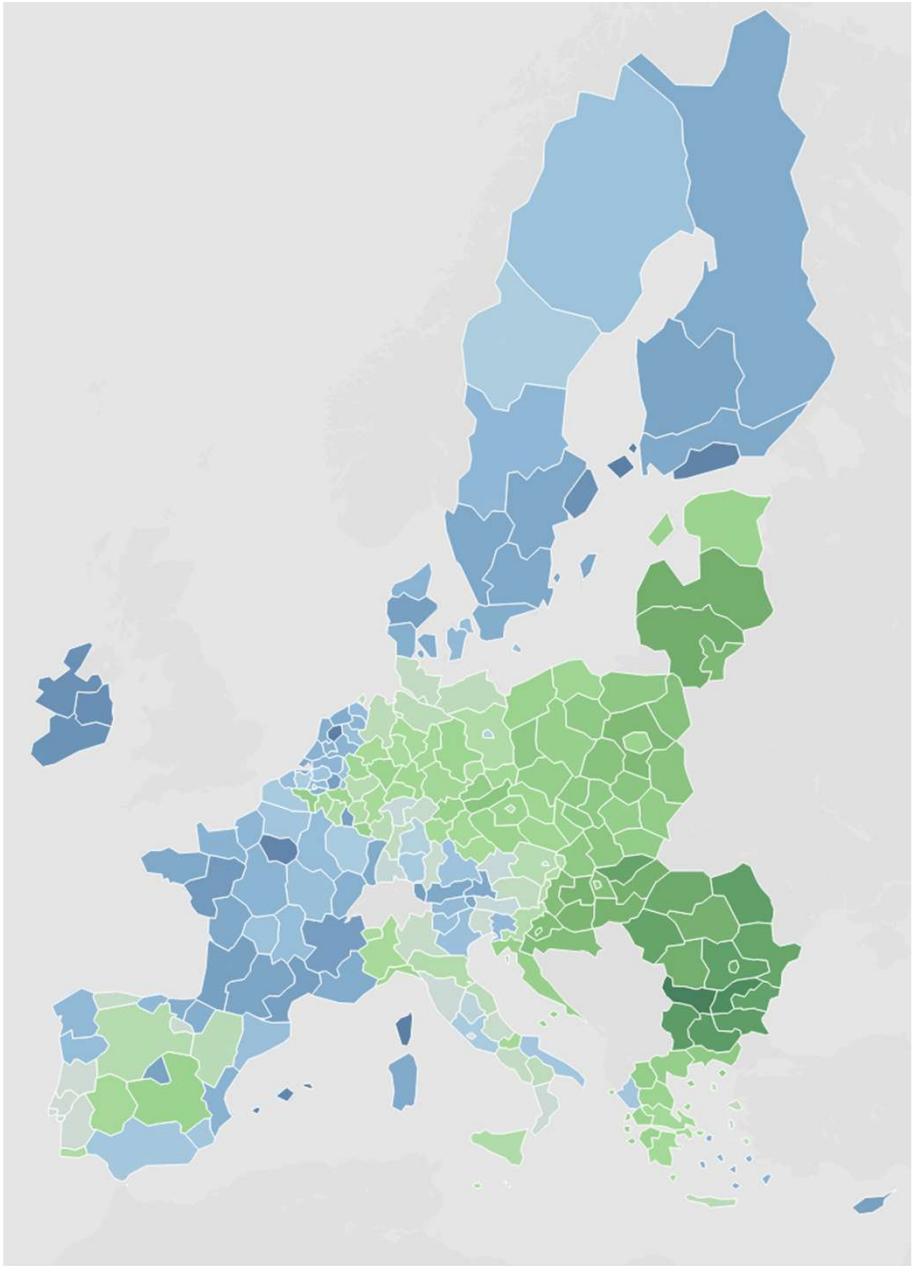
Content

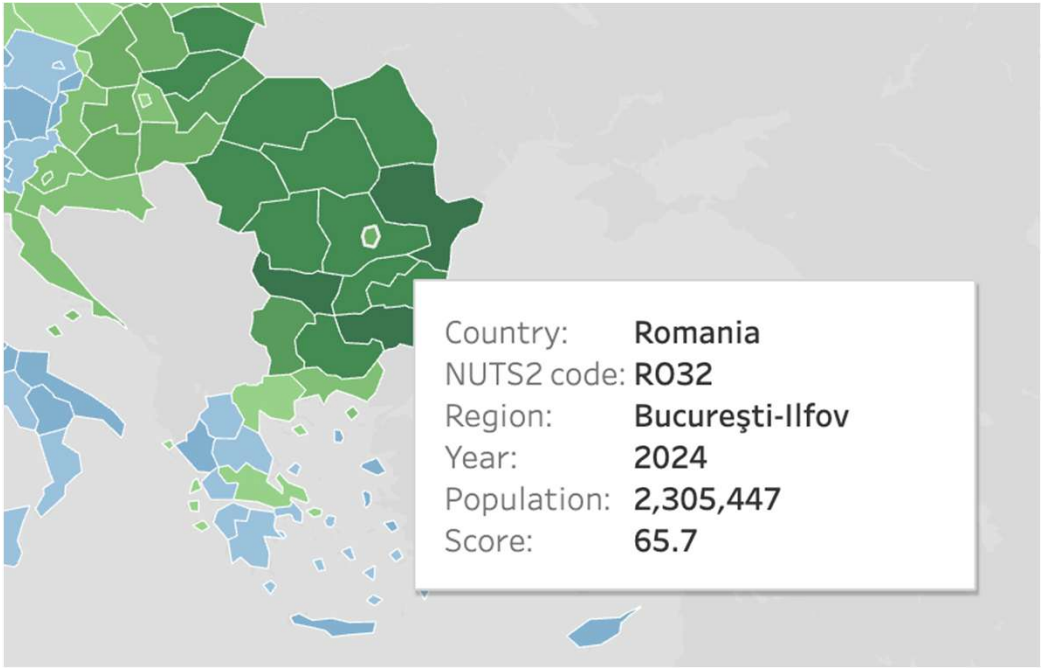
- EU Health Equity Map: Introduction
- Health Equity Framework
  - Concept. Indicator definitions. Data sources and coverage. Data treatment. Calculation. Results interpretation.
- Life Course Framework
  - Concept. Indicators definition & source (*incl. data coverage*). Data treatment. Calculation & results interpretation.
- Social Determinants of Health Analysis
  - Analytical framework. Data sources and coverage. EUR SPI and EU RCI frameworks. Data treatment. Calculation & results interpretation.

EU Health Equity Map

Delivering on EU ambitions for cohesion, resilience and a wellbeing economy requires tools that translate these complex realities into actionable evidence for policy makers at all levels.

The new **Health Equity Map** for EU regions provides a consolidated, comparable overview of health outcomes and inequalities across the Union's regions, using harmonised indicators and robust regional data.



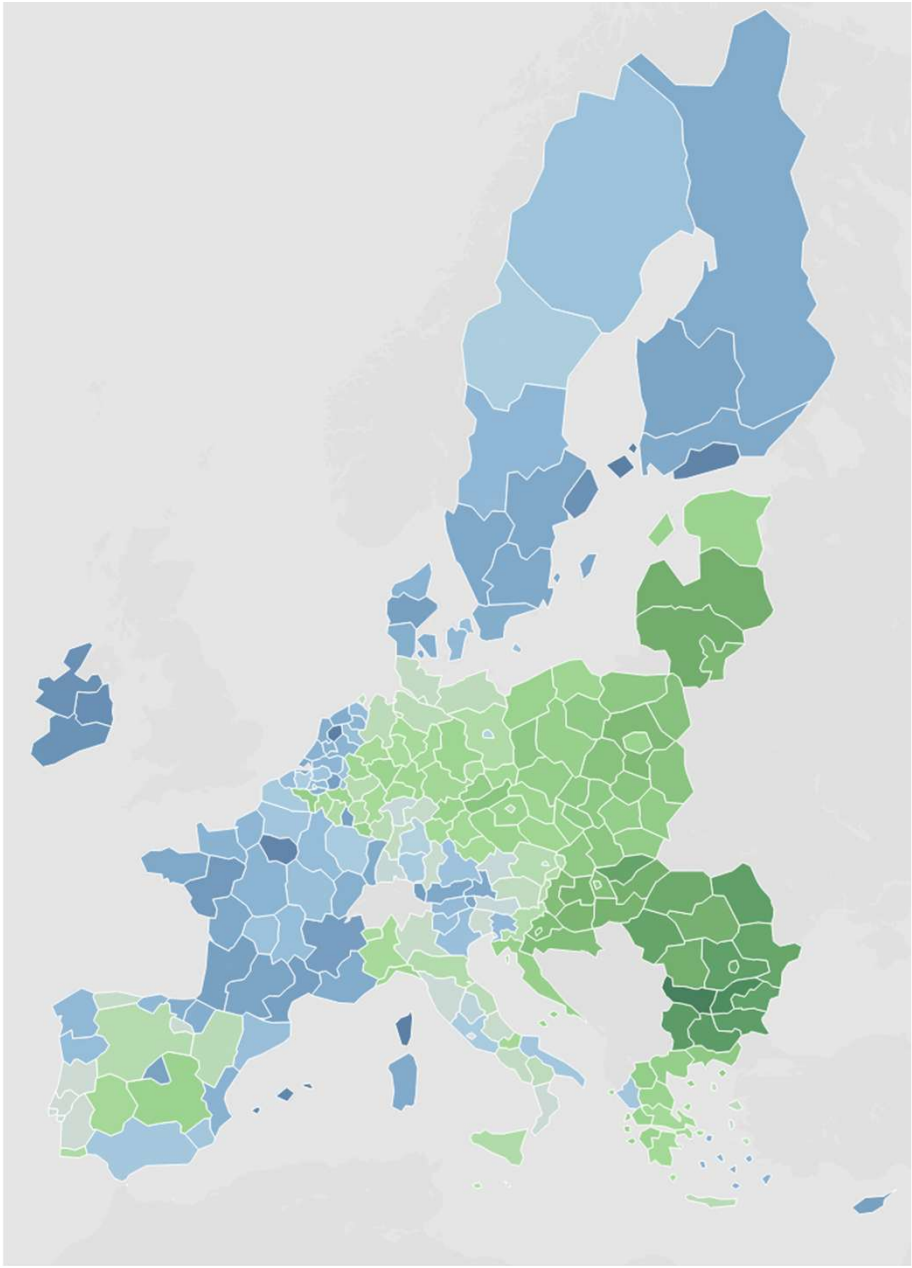


The **EU Health Equity Map** enables users to identify where gaps in health outcomes are widest, which population groups and territories are most at risk, and where progress is being made over time.

It enables an in-depth analysis of regional inequalities within Member States, of trends and progress over time of specific health outcomes, as well as understanding the specific issues faced by different age groups

EU Health Equity Map

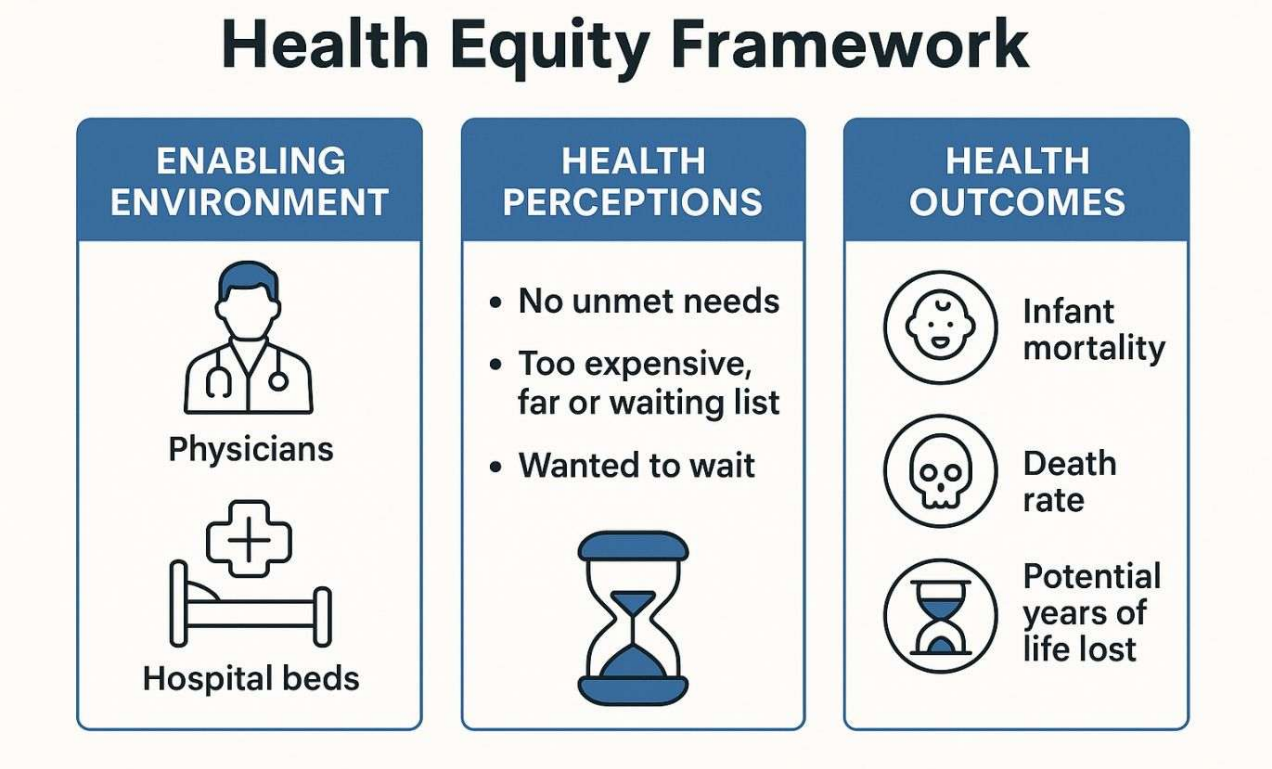
- Evaluates the health realities of EU citizens at a granular (NUTS2) level using **health equity** and **life-course cycle** frameworks.
  - **Health equity** is assessed through three complementary lenses: the enabling environment, health outcomes, and health perceptions.
  - The **life-course framework** compares regional mortality outcomes separately for different age groups.
- To better understand the **social determinants** of health across EU regions, insights from both frameworks are **cross-analyzed** with indicators from the **EU Regional Social Progress Index**, and the **EU Regional Competitiveness Index**.



Health Equity Framework

The **Health Equity framework** is composed of 3 dimensions that, together, form a holistic perspective of a person's health conditions:

1. An enabling environment
2. Perceptions of health
3. Health outcomes



It enables policymakers and researchers to see how access to healthcare and infrastructure (the enabling environment) interact with people's lived experiences and perceptions of their health, as well as with objective measures such as disease prevalence and mortality rates. Taken together, these dimensions help identify regional disparities, uncover underlying determinants of inequality, and guide targeted interventions to promote fairer health opportunities for all EU residents.

Health equity framework: indicators definitions

- **Enabling environment**
  - Physicians per 100,000 people – number of physicians in a region, recalculated to 100,000 people
  - Hospital beds per 100,000 people – number of hospital beds in a region, recalculated to 100,000 people
- **Health Outcomes**
  - Infant mortality – infant mortality by NUTS 2 region of residence, 3 year average
  - Death rate – standardised death rate by NUTS 2 region of residence, 3 year average
  - Potential years of life lost – years and potential years of life lost by NUTS 2 region of residence, 3 year average
- **Health Perceptions**
  - No unmet needs – % of people with no unmet needs for medical examination
  - Too expensive, too far, or on a waiting list – % of people with unmet needs for medical examination due to the following reasons: too expensive, or too far, or on a waiting list
  - Wanted to wait – % of people who wanted to wait and see whether the medical problem would go away on its own

Health equity framework: data sources and coverage

- **Enabling environment** (Physicians per 100,000 people; Hospital beds per 100,000 people)
  - Both indicators come from the Eurostat, covering various time periods, and overlapping from 1990 to 2022

- **Health Outcomes** (Infant mortality; Death rate; Potential years of life lost)
  - All three indicators come from the Eurostat, covering various time periods, and overlapping from 2013 to 2021

- **Health Perceptions** (No unmet needs; Too expensive, too far, or on a waiting list; Wanted to wait)
  - All three indicators come from the EU SILC, covering period of 2008–2024; they were downloaded through the Eurostat portal

Health equity framework: data treatment

- **Imputations of missing values**
  - Within imputations: if a value was missing at the begining or at the end of a time series for a specific region, the nearest existing value was brought forward or backward to replace missing values
  - Hierarchichal imputations: if a value was completely missing for a NUTS2 level, but existed for a corresponding higher level administrative unit (NUTS1, or possibly a country value), the nearest higher level value was used to replace missing values

- **Transformations**
  - indicators for which higher values mean worse performance (e.g., mortality indicators) were „inverted“ (multiplied by -1) so that for all indicators it holds that higher values mean better performance
  - all indicators were than normalized to 0-100 scale using a simple min-max procedure:
    - $X_{score[0\text{-}100]} = ((X_{value} – min) / (max – min)) * 100$
    - for Health Perceptions indicators, min-max were derived from the complete dataset (2008-2024)
    - for Enabling Environment and Health outcome indicators, the observed min-max were used
    - however, for the scaled (0–100) scores, zeros were winsorized by the second lowest values

Health equity framework: calculations

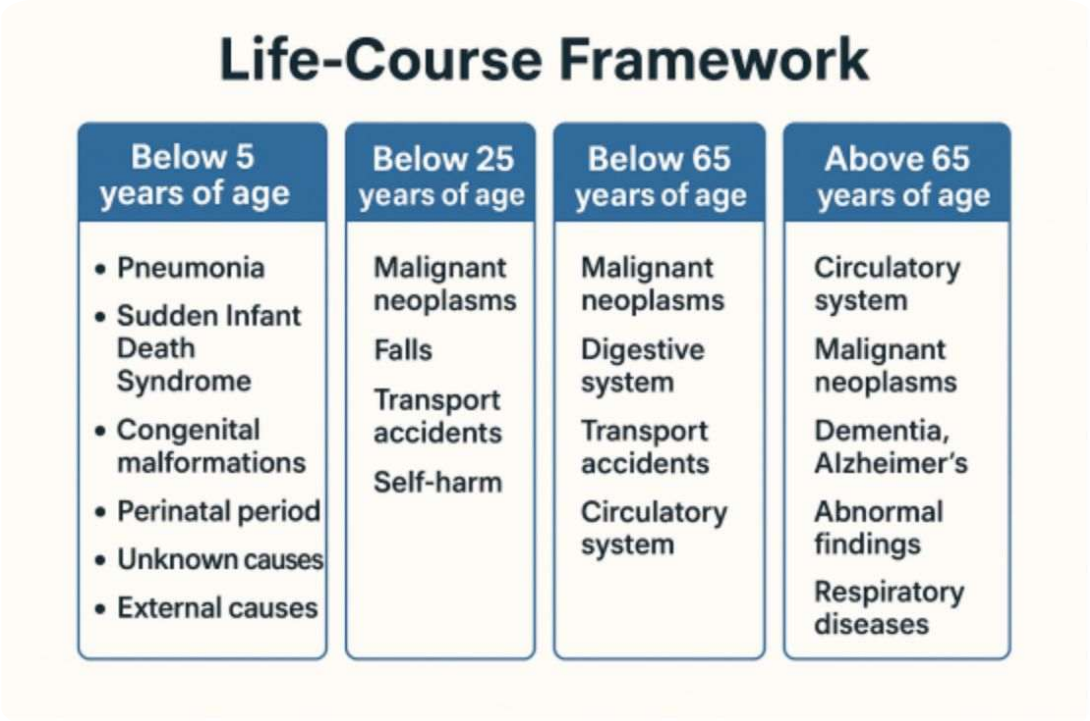
- **EU average standardization**
  - for each indicator, EU-average value of 2013 was calculated as the population-weighted average of NUTS2 values in 2013
  - All values for all indicators were then recalculated to this EU-average of 2013, which was set to 100 in all cases

- **Aggregation**
  - For each pillar (Enabling Environment, Health Outcomes, Health Perceptions), a composite value was calculated as a simple (arithmetic) average of the standardized values (to the EU-average of 2013) of the indicators in that particular pillar

Health equity framework: results interpretation

- For each indicator as well as pillar (composite), higher values mean better performance.
- Values higher than 100 mean that a region is performing better than the EU average was in 2013.
- Values lower than 100 mean that a region is performing worse than the EU average was in 2013.
- Increasing values of a region over time mean an improving performance of that region over time.
- Declining values of a region over time mean a deteriorating performance of that region over time.
- Country values (used in some visualisations) are calculated as an average of regions in that country.
- If a value does not change over time at all, it is likely a consequence of *within imputations*.
- If values do not vary within a country, it is likely that values were unavailable at the NUTS2 level and they were imputed using the hierarchical imputations.

Life-Course Framework



Guided by the life-course approach, the framework recognises that health outcomes are shaped by cumulative experiences and exposures throughout different stages of life.

The framework focuses on the **causes of death mortalities**, and enables a comprehensive understanding of how health determinants and risks evolve from early development to older age:

- **Prenatal and Early Childhood (below 5 years)**: Focuses on early childhood conditions, including congenital malformations, perinatal health, and preventable mortality.
- **Childhood and Adolescence (below 25 years)**: Emphasizes physical and mental health, injury prevention, and emerging risks like accidents and early-onset diseases.
- **Adulthood (below 65 years)**: Concentrates on non-communicable diseases and mortality from external causes, influenced by lifestyle and environmental factors.
- **Older Age (above 65 years)**: Focuses on healthy aging, chronic disease management, and major causes of mortality like circulatory diseases and dementia.

Life course framework: indicators definition & source

- The life course framework uses indicators based on **Causes of death – crude death rate** by NUTS 2 region of residence, 3 year average.
- **Definition**
  - Crude death rate is the number of registered deaths per 100 000 inhabitants, not adjusted to a standard age distribution. It is structured by causes of death, by the region where the person resided, and by sex, and expressed as an average of the last 3 years.
- **Data Source**
  - Eurostat. DOI: https://doi.org/10.2908/HLTH_CD_YCDR2. Last update: 21/03/2025 (data code:hlth_cd_ycdr2)
- **Data coverage**
  - Causes of death coded by the state according to the 10th edition of the International Statistical Classification of Diseases and Related Health Problems (ICD-10).
  - Time coverage:
    - Aggregate level assessment: 2013–2021
    - Specific mortalities: 2013–2022

Life course framework: data treatment

- The life-course framework provides an overall assessment of spacial differences in age group mortalities across the EU and emphasizes individual mortalities specificities for selected age groups.
- It does so in the following manner:
  - On the aggregate level, for each age group, the framework uses „All causes of death (A00-Y89) excluding S00-T98“ (code A-R-V-Y) to provide an overal assesment for each NTS2 region.
  - For each age group, the framework selects specific mortalities that are particularly relevant for the age group to provide more granular insights into the performance of regions.
  - The overall assessment data are available 2013-2021, specific mortalities data are available 2013-2022.

- **Imputations of missing values**
  - Within imputations: if a value was missing at the begining or at the end of a time series for a specific region, the nearest existing value was brought forward or backward to replace missing values.

- **No transformations**
  - indicators are not transformed, and higher values mean worse performance

Life course framework: calculations & interpretations

- **EU average standardization**
  - **It was done ONLY for the aggregate („all causes of death“) assessment!** Also, in this assessment, all values were transformed to 0–100 scores (using a simple min-max procedure) prior the 2013 EU average standardization.
  - for each indicator, EU-average value of 2013 was calculated as the population-weighted average of NUTS2 values in 2013.
  - All values for all indicators were then recalculated to this EU-average of 2013, which was set to 100 in all cases.
  - **INTERPRETATIONS**
    - **Lower values mean better performance!** Values lower than 100 mean that a region is performing better than the EU average was in 2013. Values higher than 100 mean that a region is performing worse than the EU average was in 2013.

- For **specific mortalities**, data were not standardized to the EU average – they are death rate per population.
  - **INTERPRETATIONS**
    - **Lower values mean better performance!** (lower death rates)

Social Determinants of Health

Social determinants of health – analytical framework

Health outcomes are greatly influenced by **social determinants**, including income, education, employment, social status, environment, and access to healthcare. This was evident during the Covid-19 pandemic, exposing deep vulnerabilities at all levels of our society and revealing once again that wealth alone does not guarantee superior wellbeing.

Analysing health outcomes data against social, economic and environmental data thus provides a deep understanding of the social determinants of health, and evidence to inform a holistic approach to health equity policy – one that is preventative, targeted, and comprehensive.

To better understand the social determinants of health across EU regions, insights from both frameworks are cross-analyzed with indicators from the **EU Regional Social Progress Index** (EU RSPI), and the **EU Regional Competitiveness Index** (EU RCI).

- The **composite (pillar) measures** from the **Health Equity framework** are analyzed against the various elements of both EU RSPI and EU RCI
- The aggregate mortality measure (in each of the four age categories) is correlated with the different elements of both EU RSPI and EU RCI

Social determinants of health – data sources and coverage

The EU Regional Social Progress Index is a valuable tool for understanding the underlying conditions of a society not reflected through economic indicators alone or by focusing on a single measurement. The index uses administrative data that capture the lived experiences of all people, focusing exclusively on social and environmental outcome indicators, and was designed precisely to make visible the issues and the people that are left behind in a purely economic paradigm. The Social Progress Index is an aggregate index of social and environmental outcomes that measure progress across three dimensions – Basic Human Needs, Foundations of Wellbeing, and Opportunity – asking universally important questions about the success of our societies.

Source of data: European Commission
Data coverage: The latest edition of EUR SPI 2.0 (2024 edition) was used in this analysis.

The **EU Regional Competitiveness Index** provides a complementary perspective by assessing the ability of regions to offer an attractive and sustainable environment for businesses and residents alike. The RCI captures a broad range of factors – from infrastructure, innovation, and digital connectivity to education, labour market efficiency, and institutional quality – all of which influence economic performance and, indirectly, health outcomes.

Source of data: European Commission, DG Regio
Data coverage: The latest edition of the EU RCI 2.0 (2022 edition) was used in this analysis.

SPI and RCI frameworks

Social determinants of health – data treatment

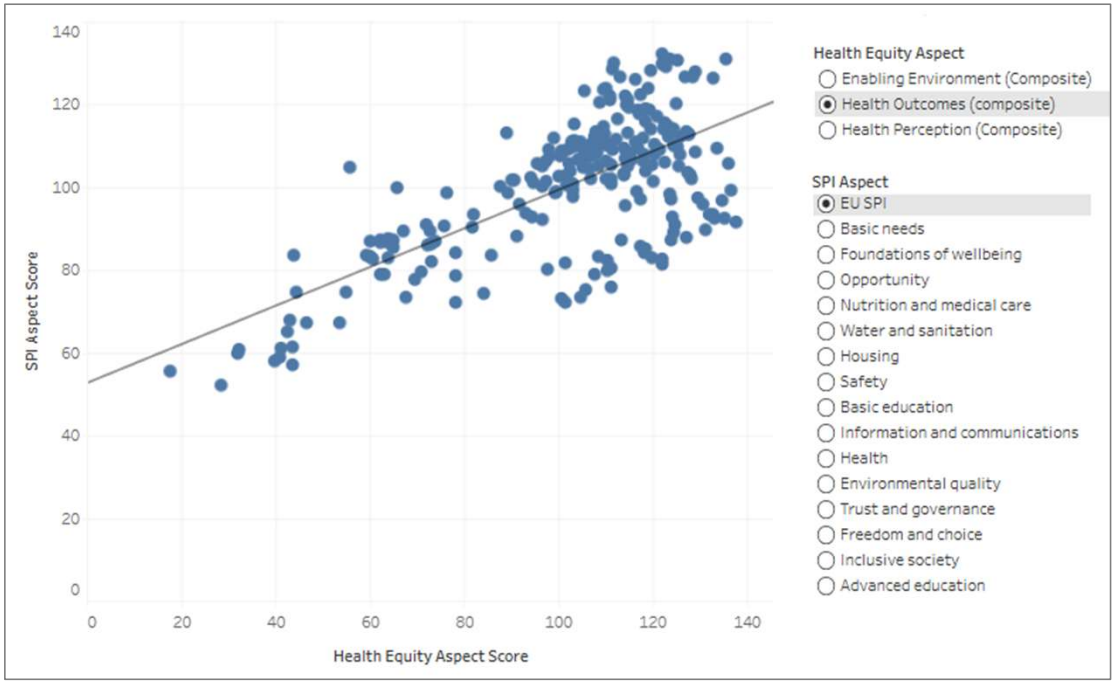
- Data from the two EU regional health frameworks follow the treatment specified earlier.
  - Note that in the Health Equity Framework, higher values mean better performance. In the Life Course Framework, higher values show higher mortalities, therefore higher values mean worse performance!
- For both regional indices (EUR SPI, EU RCI), values are scores – implying that higher values show better performance.
- Relationships are analyzed for the most recent year available for each health aspect and index aspect.

Social determinants of health – calculations & interpretations

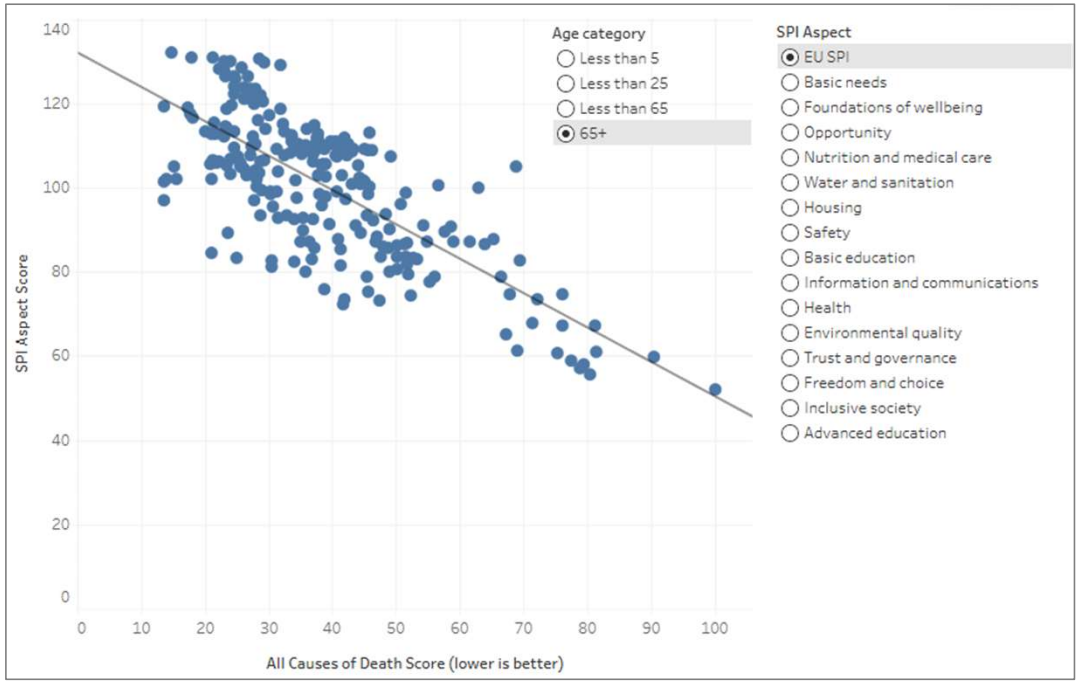
- Analyses are presented on scatterplots.
- The direction and strength of the relationship are shown by the trend line, and the corresponding statistics.
  - The steeper the line is, the stronger the relationship: declining lines show negative relationships (higher values of one variable are associated with lower values of the other variable, and vice versa), while rising lines represent positive relationships (lower and higher values of the two variables are associated with each other). Horizontal lines mean no relationship.
  - Coefficient of determination (R^2) is shown when hovered over the trend line. It may take values from 0 to 1. The higher the R^2, the stronger the relationship. The p-value of a related statistical test is also presented. If the p-value <0.05, then the relationship is statistically significant at the 5% significance level.
  - The correlation coefficient (r) – a direct measure of a strength of a relationship – can be calculated by taking the square root of the R^2 value.

Interpreation examples: For the **Health Equity Framework aspects**, steeply rising lines show positive relationship between the health aspect and the index aspect: for example, better performance in health outcomes is related to a better performance in the Social Progress Index. **For the Life Course Framework aspects**, steeply declining lines show negative relationship between the mortalities and the index aspect: for example, lower mortalities are related to a better performance in the Social Progress Index.

Health outcomes vs. Social Progress Index



65+ all causes mortality vs. Social Progress Index



The EU Health Equity Map

Explore the EU Health Equity Map interactive visualisations at:

https://www.socialprogress.org/eu-health-equity-map