

SDG Goal 3	Good health and well-being
SDG Target 3.9	By 2030, substantially reduce the number of deaths and illnesses from hazardous chemicals and air, water and soil pollution and contamination
SDG Indicator 3.9.1	Mortality rate attributed to household and ambient air pollution
Time series	Attributable deaths due to long-term exposure to fine particulate matter (PM_{2.5}) in the population aged 25 years and older

1. General information on the time series

- Date of national metadata: 21 June 2024
- National data: <http://sdg-indicators.de/3-9-1/>
- Definition: The time series presents the number of deaths as a result of a disease classified with the following ICD-10-codes, which are attributable to fine particulate matter (PM_{2.5}):
 - J40-J44.9; J47-J47.9: Chronic obstructive pulmonary disease (COPD)
 - C33-C34.9; D02.1-D02.3; D14.2-D14.3; D38.1: Lung cancer
 - G45-G46.8; I60-I62.9; I63-I63.9; I65-I66.9; I67.0-I67.3; I67.5-I67.6; I68.1-I68.2; I69.0-I69.3: Stroke
 - I20-I25: Ischemic heart diseases
 - E11; Proportions of E13-E14: Diabetes mellitus type 2

ICD-10 is the International Statistical Classification of Diseases and Related Health Problems 10th Revision (German Modification).

- Disaggregation: age group; disease

2. Comparability with the UN metadata

- Date of UN metadata: December 2023
- UN metadata: <https://unstats.un.org/sdgs/metadata/files/Metadata-03-09-01.pdf>
- The time series is not compliant with the UN metadata, but provides additional information. It represents
 - 1) the number of attributable deaths and not the mortality rate as required in the UN metadata and
 - 2) the time series refers to ambient air pollution and here to urban and rural background pollution and not, as required in the UN metadata, to household and ambient air pollution.

3. Data description

- The data is derived from the German Environment Agency (UBA). Attributable deaths are the deaths that can be statistically attributed to exposure to a risk factor. In calculations of the environmental burden of disease, the number of attributable deaths is determined by multiplying the population attributable fraction estimated for a specific risk factor by the number of deaths from a particular disease, stratified by sex and age-groups. It is assumed that these deaths are due to the exposure to the risk factor. This means, in turn, that if the exposure to a risk factor was completely reduced, it would not lead to any disease burden. Thus, if the risk factor was no longer present, these persons would live longer.

4. Access to data source

- Health relevance of fine particulate matter (only available in German):
<https://www.umweltbundesamt.de/daten/umwelt-gesundheit/gesundheitsrisiken-durch-feinstaub>
- Number of deaths - GBE:
<https://www.gbe-bund.de/gbe10/i?i=6:55583E>
- Population in 100 meters grid (only available in German):
<https://www.zensus2011.de/DE/Home/Aktuelles/DemografischeGrunddaten.html>

5. Metadata on source data

- Health relevance of fine particulate matter (only available in German):
<https://www.umweltbundesamt.de/daten/umwelt-gesundheit/gesundheitsrisiken-durch-feinstaub>

6. Timeliness and frequency

- Timeliness: May vary.
- Frequency: Annual

7. Calculation method

- Unit of measurement: Attributable deaths
- Calculation:

Attributable deaths = Deaths [Number] · Proportion attributable to a specific risk factor as cause [%]

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SDG Indicator 3.9.1	Mortality rate attributed to household and ambient air pollution
Time series	DALYs due to long-term exposure to fine particulate matter (PM_{2.5}) in the population aged 25 years and older

1. General information on the time series

- Date of national metadata: 21 June 2024
- National data: <http://sdg-indicators.de/3-9-1/>
- Definition: The time series presents the total sum of healthy life years lost which are attributable to fine particulate matter. The following diseases are taken into account according to the health studies:
 - J40-J44.9; J47-J47.9: Chronic obstructive pulmonary disease (COPD)
 - C33-C34.9; D02.1-D02.3; D14.2-D14.3; D38.1: Lung cancer
 - G45-G46.8; I60-I62.9; I63-I63.9; I65-I66.9; I67.0-I67.3; I67.5-I67.6; I68.1-I68.2; I69.0-I69.3: Stroke
 - I20-I25: Ischemic heart diseases
 - E11; Proportions of E13-E14: Diabetes mellitus type 2
- Disaggregation: age group; disease

2. Comparability with the UN metadata

- Date of UN metadata: December 2023
- UN metadata: <https://unstats.un.org/sdgs/metadata/files/Metadata-03-09-01.pdf>
- The time series is not compliant with the UN metadata, but provides additional information.

3. Data description

- The data is derived from the German Environment Agency (UBA). Disability-adjusted life years (DALYs) are the healthy life years lost due to death and morbidity that can be statistically attributed to exposure to a risk factor. In calculations of the environmental burden of disease, the number of DALYs is determined by multiplying the population attributable fraction for a specific risk factor by the number of deaths from a particular disease, stratified by sex and age-groups. It is assumed that all these DALYs are attributable to exposure to the risk factor. This means, in turn, that if the exposure to a risk factor was completely reduced, it would not lead to any disease burden and thus no DALYs. Thus, if the risk factor was no longer present, the population's life expectancy would rise.

4. Access to data source

- Health relevance of fine particulate matter (only available in German):
<https://www.umweltbundesamt.de/daten/umwelt-gesundheit/gesundheitsrisiken-durch-feinstaub>
- Health in Germany today (only available in German):
https://public.tableau.com/app/profile/robert.koch.institut/viz/Gesundheit_in_Deutschland_aktuell/GEDA_20192020-EHIS
- 12-month prevalence of known chronic obstructive pulmonary disease (COPD) in Germany (only available in German):
<https://edoc.rki.de/bitstream/handle/176904/2783/20vT7kfS6gfmG.pdf?sequence=1&isAllowed=y>
- 12-month prevalence of known diabetes mellitus in Germany (only available in German):
https://edoc.rki.de/bitstream/handle/176904/2580/JoHM_2017_01_gesundheitliche_lage2.pdf?sequence=4&isAllowed=y
- 12-month prevalence of stroke or chronic complaints resulting from stroke in Germany (only available in German):
https://edoc.rki.de/bitstream/handle/176904/2583/JoHM_2017_01_gesundheitliche_lage5.pdf?sequence=4&isAllowed=y

5. Metadata on source data

- Health relevance of fine particulate matter (only available in German):
<https://www.umweltbundesamt.de/daten/umwelt-gesundheit/gesundheitsrisiken-durch-feinstaub>

6. Timeliness and frequency

- Timeliness: May vary.
- Frequency: Annual

7. Calculation method

- Unit of measurement: DALYs
- Calculation:

DALYs = Years of life lost due to death [number] + Years lived with disability [number]

Years of life lost due to death = $D_{a,c} \cdot RLE_a$

Years lived with disability = $P_{a,c} \cdot DW_c$

$D_{a,c}$ = Age (a) and cause (c) specific number of deaths in the respective year

RLE_a = Age (a) specific remaining life expectancy at age of death

$P_{a,c}$ = Age (a) and cause (c) specific prevalence in the respective year

DW_c = Cause (c) specific disability weight indicating the severity of a disease