World Health Organization

WHO's Ambient (Outdoor) Air Quality Database – Update 2018

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Description of methods and disclaimer

Description

The database compiles ground measurements of annual mean concentrations of particulate matter of a diameter equal or smaller than 10 μm (PM_{10}) or equal or smaller than 2.5 μm ($PM_{2.5}$) and aims at representing an average for the city or town as a whole, rather than for individual stations. Years of measurements range mostly from 2010 to 2016, but in few cases the latest available data was older.

Data sources

Primary sources of data include official reporting from countries to WHO, official national/subnational reports, national/subnational web sites containing measurements of PM_{10} or $PM_{2.5}$ and ground measurements compiled in the framework of the Global Burden of Disease project[1]. Furthermore, measurements reported by the following regional networks were used: Clean Air for Asia[2] , and the Air quality e-reporting database[3] from the European Environment Agency for Europe. In the absence of the above-mentioned data, data from (a) UN agencies, (b) Development agencies, and (c) articles from peer reviewed journals were used.

Type of data used

Included in the database were annual mean concentrations of particulate matter (PM_{10} or $PM_{2.5}$) based on daily measurements, or data which could be aggregated into annual means from stationary measurements. In the absence of annual means, measurements covering a more limited period of the year were exceptionally used.

In order to present air quality data representing human exposure, mostly urban measurements characterized as urban background, residential areas, commercial and mixed areas were used. Only stationary measurements, as opposed to mobile stations, were used. Air quality stations characterized as covering particular "hot spots" or exclusively industrial areas were not included. This selection is in line with the aim of capturing representative values for average human exposure. In contrast, measurements from hot spots and industrial areas are often considered for the purpose of identifying the highest-exposure areas, and were deemed to be less representative of mean exposures of the population. "Hot spots" were either designated as such by the original reports, or were qualified as such due to their exceptional nature (e.g. exceptionally busy roads etc.). Omitting these, may, however, have led to an underestimation of the mean air pollution levels of a city.

Where the data from various sources were available for an urban area, only the latest data and most reliable sources were used. Only data measured since the year 2010 were included in the database. For those locations for which no new data was available, data from the past version of the database were included for the following analysis.

[1] Global Burden of Disease, Institute for Health Metrics and Evaluation, www.healthdata.org/gbd
[2] Clean Air Asia, http://cleanairasia.org/
[3] European Environment Agency, Air quality e-reporting database, http://www.eea.europa.eu/data-and-maps/data/aqereporting

It was not possible to retrieve or use all publicly available data of interest. Reasons included language barriers, or incomplete information on the data (such as missing year of reference). Data were used as presented in their original sources. The indicated numbers of monitors do not necessarily correspond to the number of existing or operational stations in the cities, but the numbers of stations used for the indicated city means.

Search strategy

When official reporting from countries to WHO was not available data were searched using the following strategy:

1. Screening of the web sites of the Ministries of Environment, Health, and Statistics Offices.

2. Web searches with the terms "air quality", "air pollution", suspended particles", "monitoring", "PM10", "PM2.5"

Languages used: English, French, Spanish, Portuguese, Italian, German and Russian.

Data processing and reporting

Where available, city or towns means reported by the original sources are included in the database. Where no mean was available, the eligible city data were averaged from the monitoring station data available within the city or town. Monitoring stations may be placed in locations that are not representative of the background level, therefore their aggregation in a city mean may not necessarily be representative of the city's mean air pollution. This risk was partly mitigated by excluding monitoring stations located in hot spots for the calculation of the city means, as previously described.

Population data used for weighting and for estimating the share of population covered were either based on (a) UN Population Statistics when available for all human settlements covered[4], or (b) Census data from National Statistical Offices[5]. When no population data was available, a median over a specific set of the population manually retrieved from (b) was used.

For completeness, in cities with only PM_{10} reported, $PM_{2.5}$ concentration was calculated using national conversion factors ($PM_{2.5}/PM_{10}$ ratio) either provided by the country or estimated for the country. The same applied for $PM_{2.5}$. Country specific conversion factors were estimated as the mean ratio of $PM_{2.5}$ to PM_{10} of stations for the same year. If country-specific conversion factors were not available, regional ones were used, which were obtained by averaging country-specific conversion factors.

As the conversion factor $PM_{2.5}/PM_{10}$ may vary according to location, the converted PM_{10} (or PM_{25}) value for individual settlements may deviate from the actual value (generally between 0.4 and 0.8), and should be considered as approximate only.

The temporal coverage represents the number of days per year covered by measurements, or any alternative qualification as provided in the original sources. If data from several monitoring stations

[4] United Nations, World Urbanization Prospects: The 2014 Revision: United Nations; 2014.

[5] City Population – Population Statistics in Maps and Charts for Cities. www.citypopulation.de

in one city or town were available, their average temporal coverage was used for the overall average. Information on temporal coverage was not always available, however reporting agencies do often have their own reporting threshold for the number of days covered before reporting on a station's measurement value, or using it for estimating the city mean.

Limitations

Data from different countries are of limited comparability because of

a) Different location of measurement stations;
b) Different measurement methods;
c) Different temporal coverage of certain measurements; if only part of the year was covered, the measurement may significantly deviate from the annual mean due to seasonal variability;
d) Possible inclusion of data which were not eligible for this database due to insufficient information to ensure compliance;
e) Differences in sizes of urban areas covered: for certain countries, only measurements for larger cities were found, whereas for others also cities with just a few thousand inhabitants were available. Heterogeneous quality of measurements;
f) Omission of data which could not yet be accessed due to language issues or limited accessibility.

Feedback, update and improvement of the database

Countries, municipalities or their agencies with relevant measurement data are welcome to provide more recent or complete data in order to update or improve the database. Please contact us by writing to ambientair@who.int.

Disclaimer

The data presented do not necessarily reflect the views or position of the World Health Organization. All reasonable precautions have been taken by the World Health Organization to verify the information contained in this database. However, the published material is being made available without warranty of any kind, either expressed or implied. The responsibility for the interpretation and use of the material lies with the reader. In no event shall the World Health Organization be liable for damages arising from its use. Countries may have more recent, complete and accurate data.

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