

WHO's Ambient Urban Air Pollution database – Update 2016

version 0.3

Description of methods and disclaimer

Description

The database compiles ground measurements of annual mean concentrations of particulate matter of a diameter of less than 10 μm (PM₁₀) or 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 from 2010 to 2015, unless the latest available data was older.

Size of human settlements considered

The database covers 3000 human settlements ranging in size from a few hundred to more than 9 million inhabitants. Most of these are urban areas of 20,000 inhabitants or more – thus the reference to an “urban air quality data base”. However, about 25% are smaller areas of up to 20,000 residents, and a limited proportion (mostly in Europe) are settlements of only a few hundred to a few thousand inhabitants – although these may also be located in proximity to a larger urban agglomeration (see the breakdown below).

Table 1: Summary statistics for the settlements population in the AAP database, 2016 version

Population of settlements				

	Percentiles	Smallest		
1%	0	0		
5%	1'240	0		
10%	4'173	0	Observations	2977
25%	20'000	0		
41%	50'000	0		
50%	80'756		Mean	543'664.7
		Largest		
75%	314'719	2.10e+07		
90%	1'150'153	2.11e+07		
95%	2'313'328	2.37e+07		
99%	8'741'365	2.57e+07		

Data sources

Primary sources of data include official reporting from countries to WHO, official national/subnational reports, national/subnational web sites containing measurements of PM₁₀ or PM_{2.5}. Furthermore, measurements reported by the following regional networks were used: Clean Air Asia¹ for Asia, and the Air quality e-reporting database² from the European Environment Agency for Europe. In the absence of the above-mentioned data, data from (a) UN agencies, (b) Development agencies, (c) articles from peer reviewed journals and (d) ground measurements compiled in the framework of the Global Burden of Disease project³ were used.

¹ Clean Air Asia, <http://cleanairasia.org/>

² European Environment Agency, Air quality e-reporting database, <http://www.eea.europa.eu/data-and-maps/data/aqereporting>

³ Global Burden of Disease, Institute for Health Metrics and Evaluation, www.healthdata.org/gbd

Type of data used

Included in the database were annual mean concentrations of particulate matter (PM₁₀ or PM_{2.5}) based on daily measurements, or data which could be aggregated into annual means. In the absence of annual means, measurements covering a more limited period of the year were exceptionally used.

In order to present air quality that is largely representative for human exposure, only urban measurements characterized as urban background, residential areas, commercial and mixed areas were used. Air quality stations characterized as covering particular "hot spots" or exclusively industrial areas were not included, unless they were contained in reported city means and could not be dissociated. 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 captured for the purpose of identifying the highest-exposure areas, and were deemed to be less representative of mean exposures across most of the urban 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 2008 were included in the database.

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

The search strategy included the following approaches:

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.

Data processing and reporting

Where available, urban means reported by the original sources are included in the database. Where no urban mean was available, the eligible city data were averaged, which is not necessarily representative of the city's mean air pollution.

Population data used for weighting and for estimating the share of urban population covered were either based on (a) UN Population Statistics when available for all human settlements covered, or (b) Census data from National Statistical Offices.

For completeness, cities with only PM₁₀ (or resp. PM_{2.5}) reported, PM_{2.5} (or PM₁₀) concentration was calculated from PM₁₀ (resp. PM_{2.5}) using national conversion factors (PM_{2.5}/PM₁₀ ratio) either provided by the country or estimated as population-weighted averages of urban-specific conversion factors for the country. Urban-specific conversion factors were estimated as the mean ratio of PM_{2.5} to PM₁₀ of stations for the same year. If national 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}/PM₁₀ may vary according to location, the converted PM₁₀ 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 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 are known to exist, but 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 ebdassessment@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

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Acknowledgement

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For further information, please contact:
Department of Public Health, Environmental and Social Determinants of Health
World Health Organization, 1211 Geneva 27, Switzerland
Website: www.who.int/phe
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