Metadata

Information topic	Details
Indicator name	1. **Monitoring sites exceeding the WHO daily average guideline for PM$_{2.5}$** 2. **Monitoring sites exceeding the WHO annual average guideline for PM$_{2.5}$**
Domain and topic	Air Quality: Particulate matter
Indicator definition and units	1. Number of monitored sites that exceeded the WHO daily average guideline for PM$_{2.5}$: exceedances occur when annual average concentrations are greater than 15µg/m^3. 2. Average annual concentrations of PM$_{2.5}$ at air quality monitoring stations: exceedances of the WHO recommendation occur when concentrations are greater than 5µg/m^3.
Data source	Ministry for the Environment and Stats NZ. 'Our Air' - New Zealand's Environmental Reporting Series.
Numerator	Number of sites exceeding WHO 2021 guidance values
Denominator	Nil
Methodology	**Daily & Annual Average Calculation** Raw data is received in the form of daily (24hr) averages measurements, and annual average values are calculated by EHINZ using these as a base. **Daily Average** values are determined based on the average of the hourly recordings for a given day – only if sufficient data for that day is available (see below). **Average annual** values are calculated based on the average value of all the hourly recordings in a given year. - Averages are not calculated where the day/year in question is 'incomplete' i.e. it lacks sufficient data for the calculation (see below). - Averages are not adjusted for the number of hours used to calculate them, i.e. an annual average based on 8,760 hourly measurement (100% of all annual hours) would be treated equally to one based on 6,570 measurements (75%). **Data Validity Check** In the calculation of daily/annual average values, a check to make sure the data meets the 75% completion requirement (Ministry for the Environment and Stats NZ. 2021) is made. - A day must have at least 18 hours of data to be 'complete'.

Metadata

	• A year must have at least 274 complete days (275 in leap years) to be considered complete. • Average concentrations and numbers of exceedances are not calculated or reported for incomplete days & years.
Time period and time scale	Annual, 2007 onwards
Population coverage	Nil
Spatial Coverage	All sites with valid data that were reported by the Ministry for the Environment and Stats NZ. Validity of data is discussed in the 'methodology' section above.
Measures of frequency	Number of exceedances of the relevant air quality limit/guideline value per year
Limitations of indicator	• The population coverage of the monitoring site is unknown, meaning a national representative average cannot be applied.
Limitations of data source	• Monitoring information is only reported if the site achieves greater than 75% valid data collection and data were present for at least three consecutive years. • Monitoring site data is only applicable a small area around the site – a single station is not representative of a whole city, let alone a full region • The small (<30) number of sites further reduces the spatial coverage of the data • Some of the monitoring occurs at peak sites (sites expected to have high concentrations e.g. where home heating emissions accumulate, close to high-volume road traffic or near industrial activities). These sites may therefore not be representative of the surrounding area.
Related indicators	• Monitoring sites exceeding the national environmental standard (one-hour average) for sulphur dioxide • Monitoring sites exceeding the WHO daily guideline for sulphur dioxide • Monitorign sites exceeding national standards/WHO guidance for PM_{10} • Carbon monoxide 8-hour maximum levels at monitored sites
For more information	Ministry for the Environment and Stats NZ. Environmental reporting on air. URL: https://www.mfe.govt.nz/air/state-of-our-air/environmental-reporting-air
References	Ministry for the Environment and Stats NZ. 2021. *Our Air 2021*. Wellington: Ministry for the Environment.

Metadata

	WHO. 2021. *WHO global air quality guidelines: particulate matter (PM2.5 and PM10), ozone, nitrogen dioxide, sulfur dioxide and carbon monoxide.* Bonn: WHO European Centre for Environment and Health