Factsheet:

The Indonesia and the World Health Organization's Air Quality Guidelines

22nd September 2021, GREENPEACE INDONESIA

Background

The World Health Organization (WHO) publishes *Air Quality Guidelines* which describe pollution concentrations that, if achieved, will reduce the health impacts of air pollution. The most recent guidelines were updated in 2005 (Table 1).

Table 1: Most recent WHO Air Quality Guidelines. *Source: WHO (2006).*

Pollutant	Guideline Concentration (µg/m^3)	Averaging Period
$PM_{2.5}$	25	24 hour mean
	10	Annual mean
PM_{10}	50	24 hour mean
	20	Annual mean
SO_2	500	10 minute mean
	20	24 hour mean
O_3	100	8 hour mean
NO_2	200	1 hour mean
	40	Annual mean

New WHO Air Quality Guidelines are due to be published in September 2021.

The WHO defines air pollution as: "Air pollution is the presence of one or more contaminants in the atmosphere, such as dust, fumes, gas, mist, odour, smoke or vapor, in quantities and duration that can be injurious to human health."

The Global Picture

1) Experts agree that there is no 'safe' level of air pollution.

2) In 2019, air pollution was ranked as the fourth leading risk factor for early death globally, accounting for an estimated 6.67 million deaths (HEI, 2020). High blood pressure, tobacco use and poor diet were the only more significant risk factors identified.

3) It is estimated that 91% of the global population are exposed to annual $PM_{2.5}$ concentrations above the WHO guideline. $PM_{2.5}$ includes pollutants such as sulfate, nitrates and black carbon, which enter the lungs and cardiovascular system and can be of high risk to human health (WHO, 2016).

4) More than half the world's population was exposed to increasing levels of fine particulate matter ($PM_{2.5}$) air pollution between 2010 and 2016. The burden of exposure was highest for people living in low- and middle-income countries, particularly in Asia, the Middle East and Africa (Shaddick et al., 2020).

5) Air pollution in the five biggest cities of the world is estimated to have caused 163,000 avoidable deaths and cost USD 85.1 billion in 2020 alone (Table 2).

Table 2: The estimated impacts on health and finance in the world's most populated cities from $PM_{2.5}$ in 2020 (Jan to Dec). *Source: Greenpeace Southeast Asia, 2020.*

City	Population	Estimated premature deaths	Estimated economic cost US$
Delhi	30 million	54,000	US$8.1 billion
Mexico City	22 million	15,000	US$8 billion
São Paulo	22 million	15,000	US$7 billion
Shanghai	26 million	39,000	US$19 billion
Tokyo	37 million	40,000	US$43 billion
Jakarta, Indonesia	10.5 million	13,000	U$3.4 billion

6) It has been estimated that worldwide 4.5 million premature deaths each year can be attributed to the air pollution generated by burning fossil fuels (Farrow et al., 2020).

7) Approximately 40% of global deaths in 2017 attributed to ambient $PM_{2.5}$ were caused by emissions from the residential (heating, cooking etc), industrial and energy sectors – sectors that predominantly rely on fossil fuels (McDuffie et al., 2021).

8) Annual exposure to $PM_{2.5}$ air pollution far exceeds the WHO Air Quality Guideline in almost all regions of the world (Figure 3). This puts the health of the citizens of those places at higher risk of many serious diseases. The energy and industrial sectors are significant sources of $PM_{2.5}$.

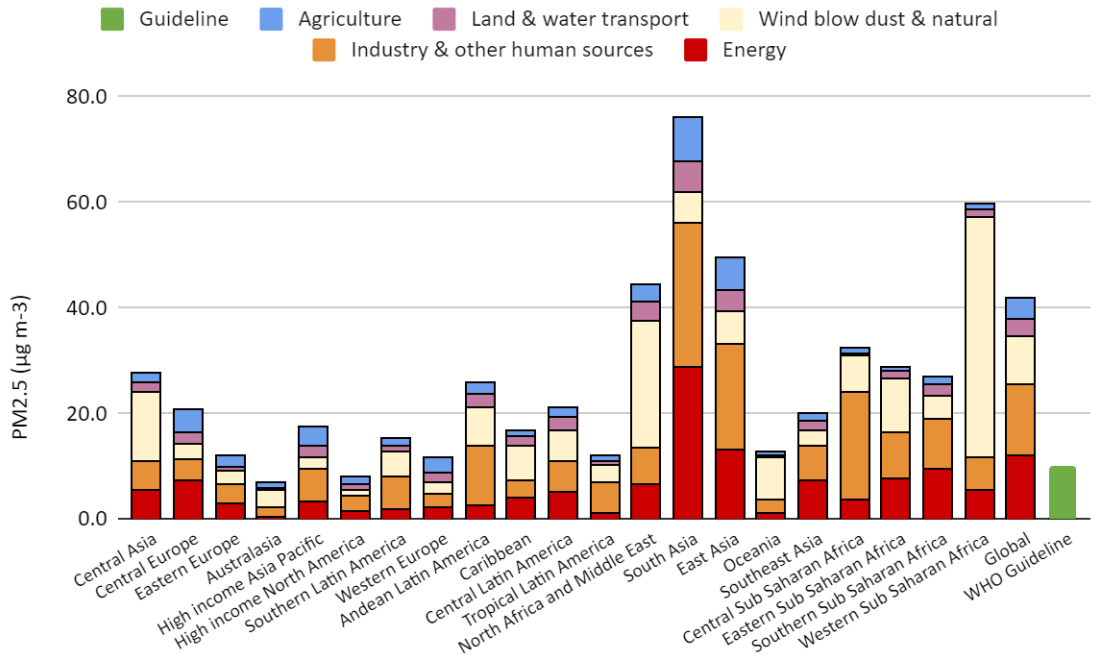

Figure 1: Population-weighted* fine particulate matter exposure in global regions in 2019.
Data source: McDuffie et al., 2021.

9) The health impacts from air pollution are well documented. Research suggests that exposure to an air pollutant or combination of air pollutants, such as fine particulate matter ($PM_{2.5}$), nitrogen dioxide (NO_2) and ozone (O_3), is associated with increased risk of diseases including ischaemic heart disease, chronic obstructive pulmonary disease (more commonly known as COPD), lung cancer, lower respiratory infections, premature birth (preterm birth), type II diabetes, stroke and asthma (Wang et al., 2014; Han et al., 2016; Cohen et al., 2017; Sunyer & Dadvand, 2019).

10) In 2019, the population weighted* estimated annual average exposure to ambient $PM_{2.5}$ ranged from 6.8 µg m^{-3} across Australasia to 77.3 µg m^{-3} in south Asia (McDuffie et al., 2021). Individuals may experience higher or lower exposure than the population average.

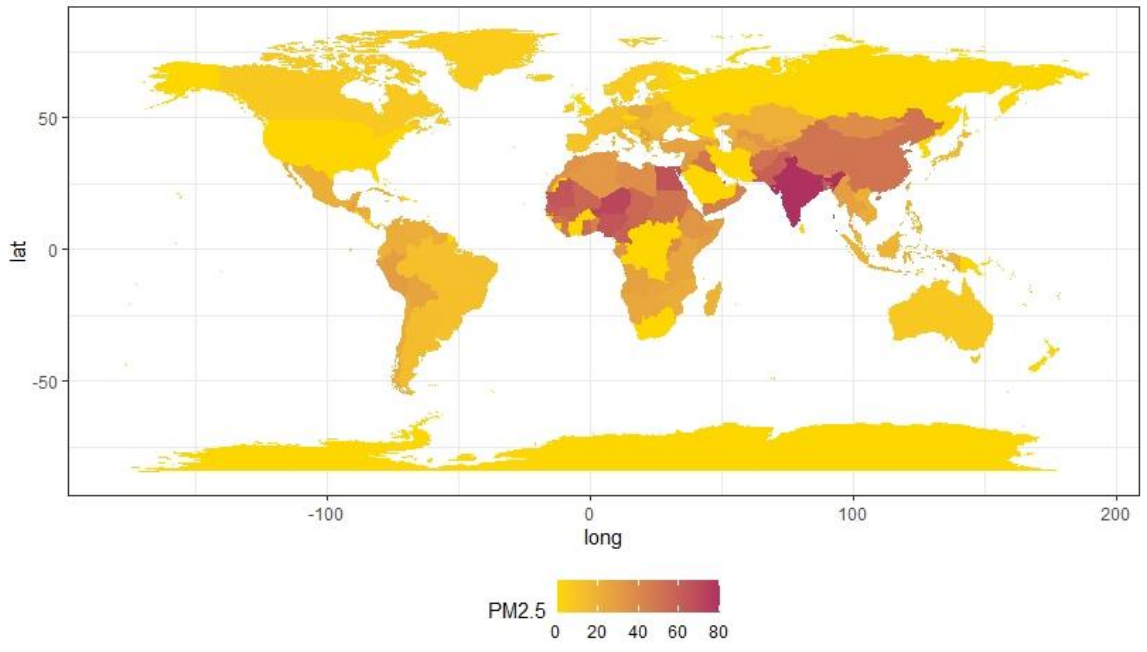

Figure 2: Population-weighted annual average $PM_{2.5}$ concentration (µg m^{-3}) by territory (McDuffie et al., 2021). *Greenpeace is politically independent and does not take sides in territorial disputes. Boundaries on geographic illustrations reflect those of the data source.*

Local section: Indonesia

1) The latest ambient air pollution data (available online from MoEF) are from 2019 and indicate that the annual mean level of $PM_{2.5}$ in cities in Jakarta was 37.66 µg/m^3, which exceeds the WHO Air Quality Guidelines.

2) Computer modelling has projected that the annual population-weighted exposure* to $PM_{2.5}$ in urban areas in Indonesia is 18 µg/m^3 (WHO, 2016, in Annex 1).

3) National guidelines for air pollution in Indonesia are less strict than the WHO Air Quality Guidelines.

> The Indonesia latest standard In 2021 ; national air quality standards were set for concentrations; $PM_{2.5}$ 24-hour concentration 55 µg/m^3, $PM_{2.5}$ at an annual concentration 15 µg/m^3; PM_{10} at an annual concentration of 40 µg/m^3; O_3 at an 8-hour daily maximum of 100 µg/m^3; NO_2 24-hour concentration 65 µg/m^3; SO_2 over a 24-hour period at a concentration of 75 µg/m^3; and CO over an 8-hour timeframe of 4000 µg/m^3.
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> For reference, the WHO Air Quality Guidelines for maximum concentrations of the classic air pollutants set in the year 2006 (the most recent revision) are: $PM_{2.5}$ annual concentration 10 µg/m^3; PM_{10} annual concentration 20 µg/m^3; O_3 at an 8-hour daily maximum of 100 µg/m^3; NO_2 annual concentration 40 µg/m^3; SO_2 over 24-hours is 20 µg/m^3; and CO over an 8-hour timeframe of 10 mg/m^3 (Kutler Joss et al., 2017).

4) In 2012 (the most recent year for which data are available), 15.4 % of all the deaths in Indonesia aged 14 and older were attributed to long term exposure to fossil-fuel related $PM_{2.5}$ (Vohra et al., 2021, in Table S2 extended data).

5) In 2012, the mean population weighted annual $PM_{2.5}$ concentration in Indonesia was 20.9 µg/m^3 (Vohra et al., 2021, in Table S2 extended data).

6) In 2019, the population weighted annual average ambient $PM_{2.5}$ in Indonesia was estimated at 18.7 µg/m^3, which is slightly lower than the Southeast Asia average of 20.5 µg/m^3 but almost double the WHO Air Quality Guideline for annual average concentration for $PM_{2.5}$ of 10 µg/m^3 (McDuffie et al., 2021, in Supplementary Data File 3).

7) 61,000 premature deaths during 2018 have been attributed to air pollution from fossil fuels in Indonesia. The total economic cost of this air pollution during 2018 was estimated to be US$16,000 million, 1.6% of GDP (Farrow et al., 2020).

8) Estimates of the annual average population weighted exposure to $PM_{2.5}$ exceed the WHO Air Quality Guideline amount in Indonesia and many neighbouring countries. The region's countries

with the highest 5 of $PM_{2.5}$ levels from energy sectors are Myanmar, Vietnam, Thailand, Indonesia, and Cambodia (McDuffie et al., 2021).

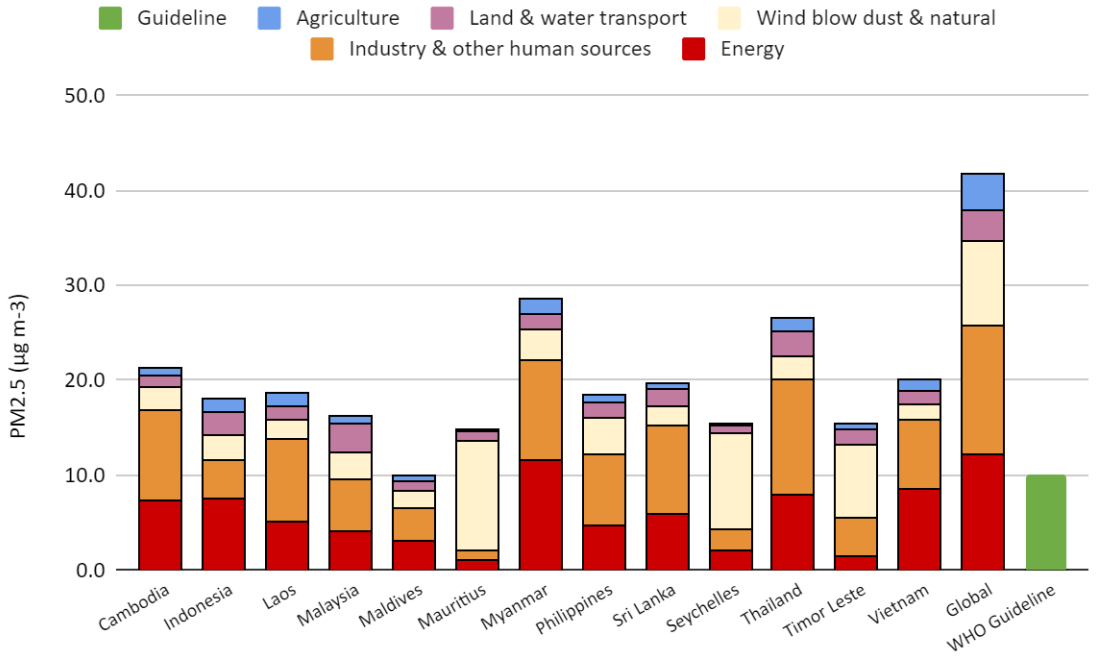

Figure 3: Population weighted average annual exposure to fine particulate matter by sector in Southeast Asia in 2019. *Data source: McDuffie et al., 2021.*

Recommendations and actions that need to be taken to address the air pollution crisis

- Encourage national governments to adopt the WHO Air Quality Guidelines, which are based on the latest scientific understanding – the situation at present is a series of global nations with no globally coherent clean air policy. Some national governments have not set any standards at all.
- Encourage national governments to urgently seek alternatives to burning fossil fuels for power, transport and industry because burning coal, oil and gas are major sources of the global burden of disease and mortality from $PM_{2.5}$.
- Encourage national governments to prioritise provision of transport infrastructure that revolves around walking and cycling – or for longer distances and people with additional needs, electric buses, trams and trains – and stop using fossil fuelled modes of transport.
- Establish private vehicle-free days in urban areas to (i) alleviate pollution (ii) encourage people to enjoy the streets safely and (iii) illustrate that it is possible to travel about the city without private vehicles.
- Create green spaces in urban areas and encourage biodiversity by planting trees and encouraging wildflowers to grow.
- Communicate with local residents: describe the health and financial problems of air pollution in their region (whether urban or rural) and present the solutions. Ensure that the solutions can be easily achieved and take care not to overwhelm by making the solutions small steps rather than huge leaps (large changes will require policy changes from governments but small changes can be from the grassroots).

***Note on population-weighted exposure.** Population-weighted statistics account for both the level of pollution and the number of people affected. Proportionately greater weight is given to air pollution concentrations where most people live. This gives an estimate of the amount of pollution the average citizen is exposed to. For example, if most residents in a country live in a heavily polluted urban environment and only a few live in a relatively clean rural area, the data will be balanced to take that into account.

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