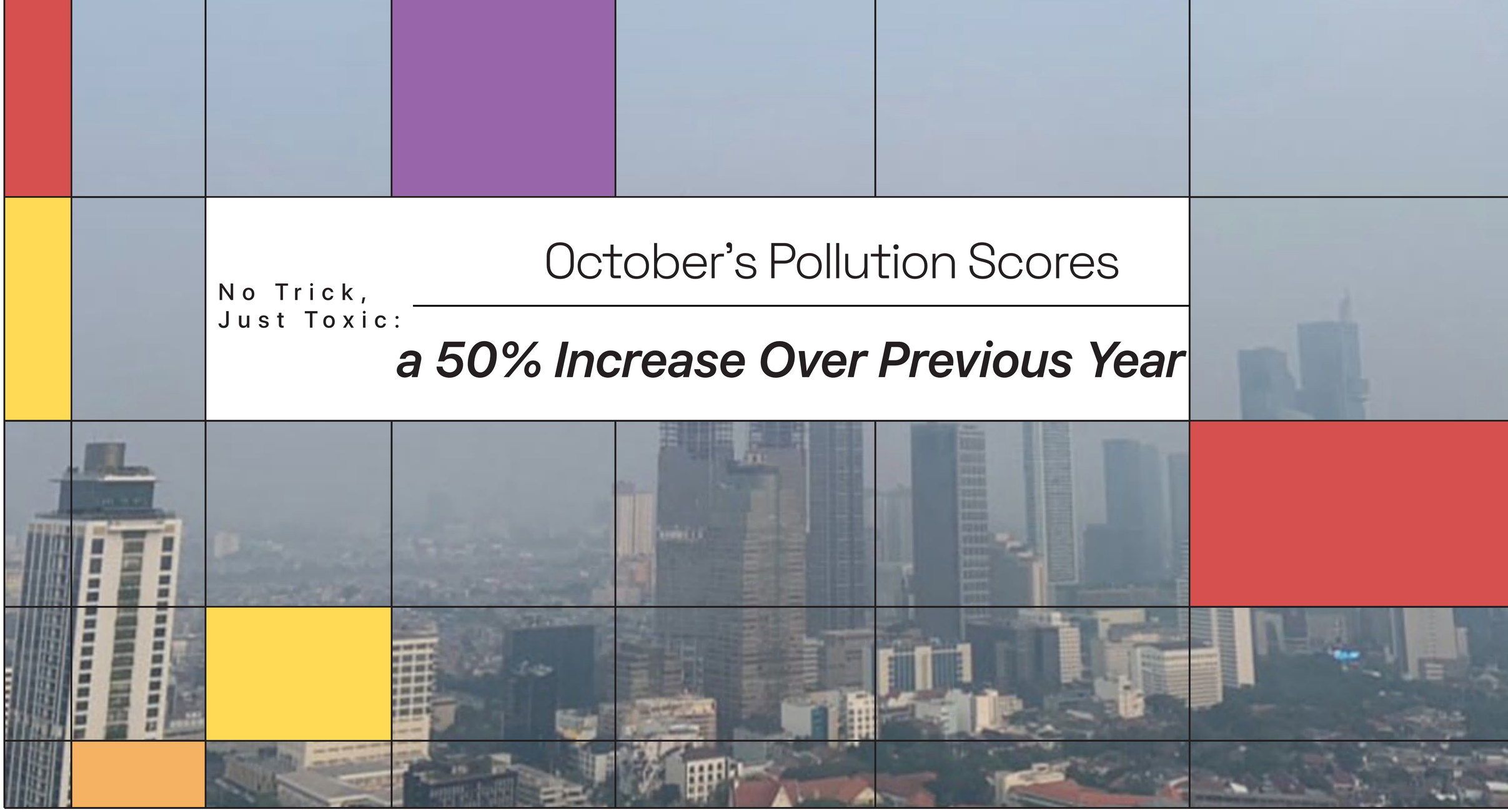


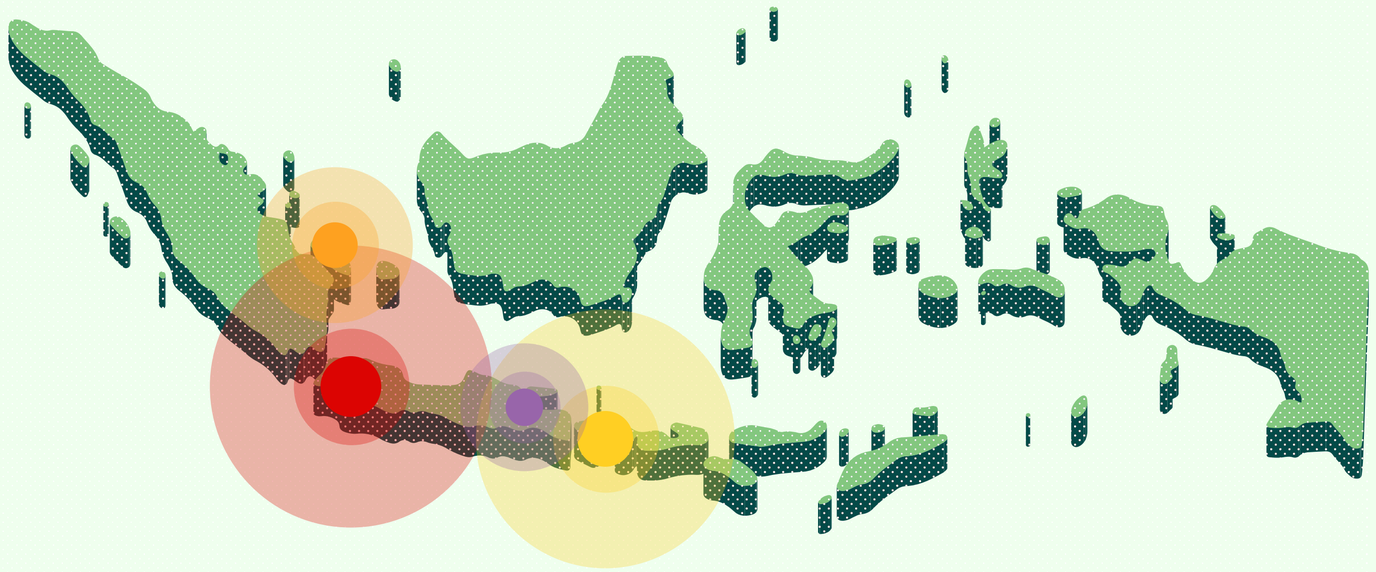
No Trick, Just Toxic: October's Pollution Scores *a 50% Increase Over Previous Year*

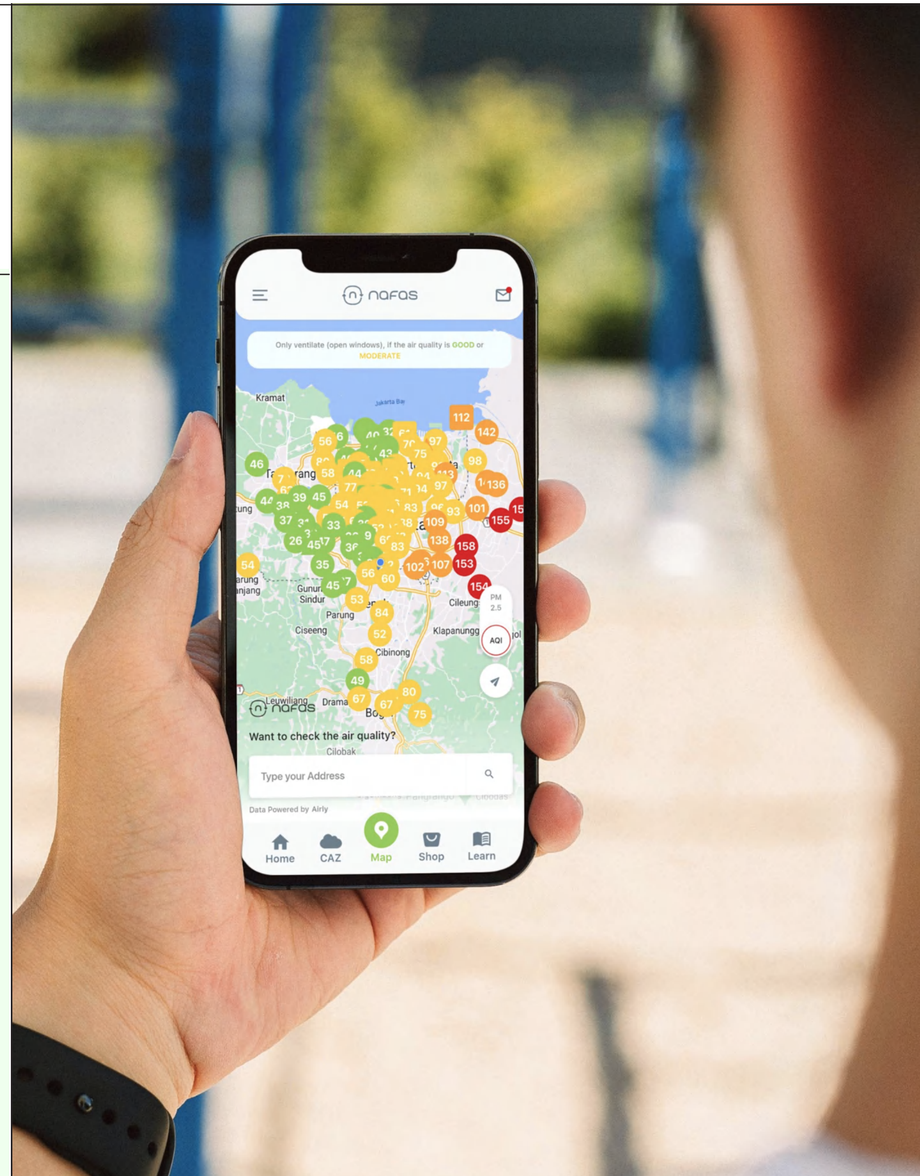
01

nafas & air quality

What is nafas?

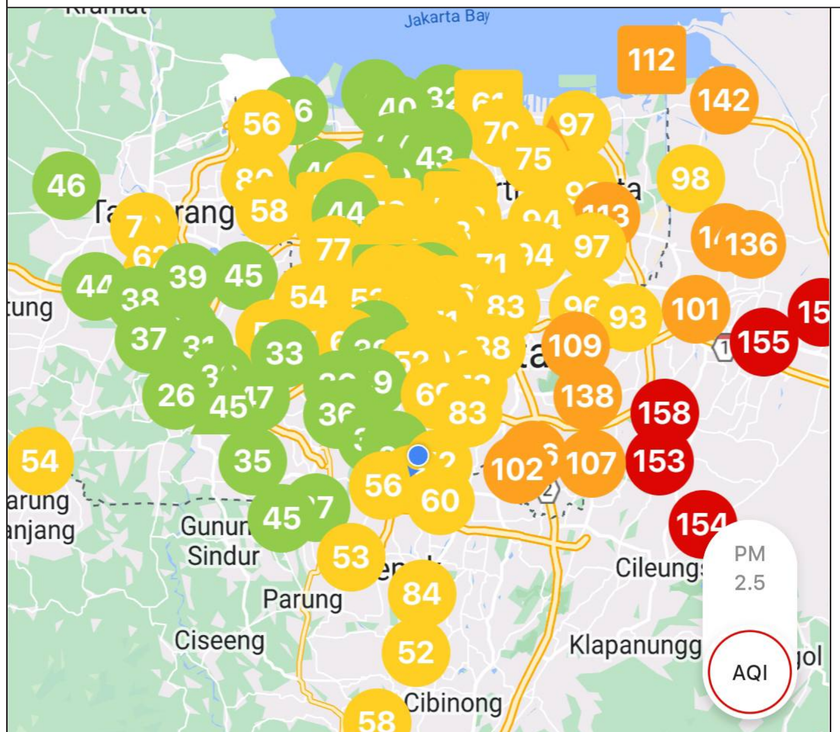
Nafas is an air quality health and wellness company, developing technologies to help urban citizen breathe healthier air

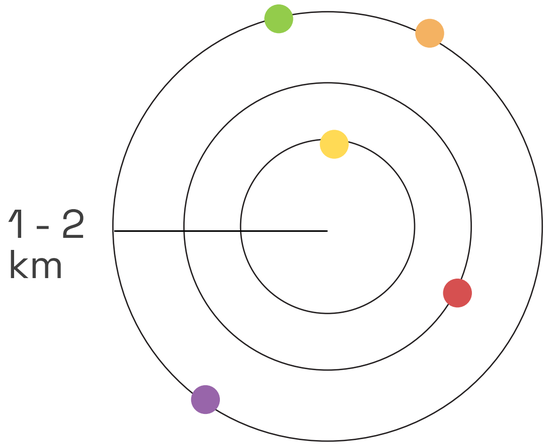




How does nafas the obtain air quality data?

Nafas obtains air quality data from low-cost sensors installed at over 180 locations on the ground. These sensors represent the air quality conditions within a radius of 1-2 km from each point. The data is received in real-time and can be accessed through the Nafas app.





How does nafas interpret the air quality data?

Nafas interprets air quality data using PM2.5 as the primary parameter, following the guidelines set by the US EPA. The results are measured in the unit µg/m³.

AIR QUALITY INDEX

The Air Quality Index, developed by the US EPA, provides a color-coded system to help us easily understand the quality of the air we breathe.

Good	Moderate	Unhealthy for Sensitive Groups	Unhealthy	Very Unhealthy	Hazardous
0 - 12	12.1 - 35.4	35.5 - 55.4	55.5 - 150.4	150.5 - 250.4	>250.4

What is PM2.5?

PM2.5 refers to air pollution particulate matter with a diameter of less than 2.5 micrometers. This size is about 36 times smaller than the diameter of a grain of sand.

Diameter in milimicron

<2,5µm
PM2.5

<10µm
PM10

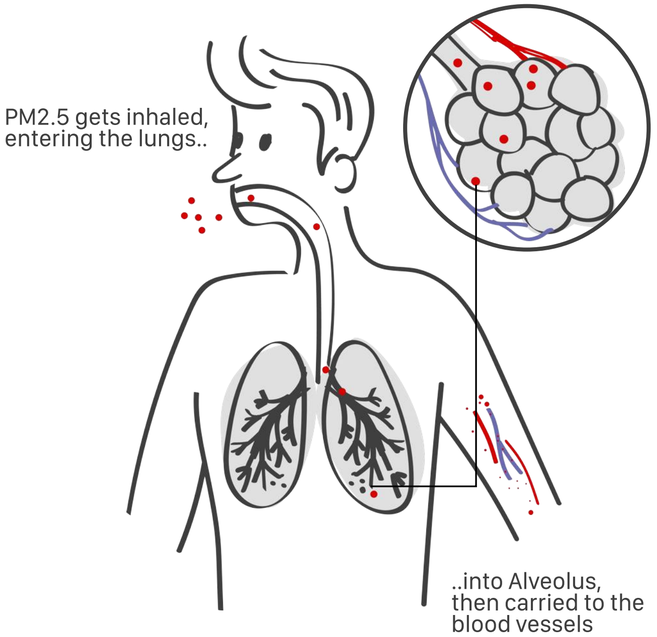
~90µm
A Graind of Sand

Combustion particles
Organic compounds
Metals

Dust
Pollen
Mold

WHY IS PM2.5 HAZARDOUS TO US?

Due to its microscopic size, PM2.5 particles cannot be effectively filtered by our body. Inhaling PM2.5 can lead to serious health issues, including **premature birth, asthma exacerbation, coughing, respiratory distress, coronary heart disease, diabetes, and even lung cancer.**



Sources of Air Pollution

A significant portion of air pollution results from human activities. What are these activities that emit pollutants?

How we mobilize

How we produce

How we generate power

How we manage our waste

Nature can also be one of the sources

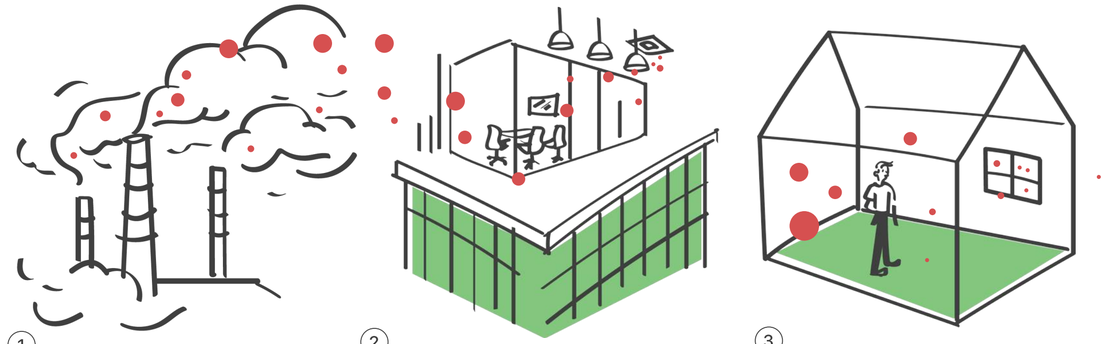
Properties of Air quality

HYPERLOCAL

EXAMPLE

Air pollution can change rapidly, increasing when there are pollution sources in the vicinity and the atmospheric conditions are conducive to the buildup of pollutants.

TRANSBOUNDARY



1 POLLUTION FROM FACTORY CHIMNEY

2 CARRIED BY THE WIND INTO THE CITY, ENTERING BUILDINGS

3 ..AND EVEN HOUSES

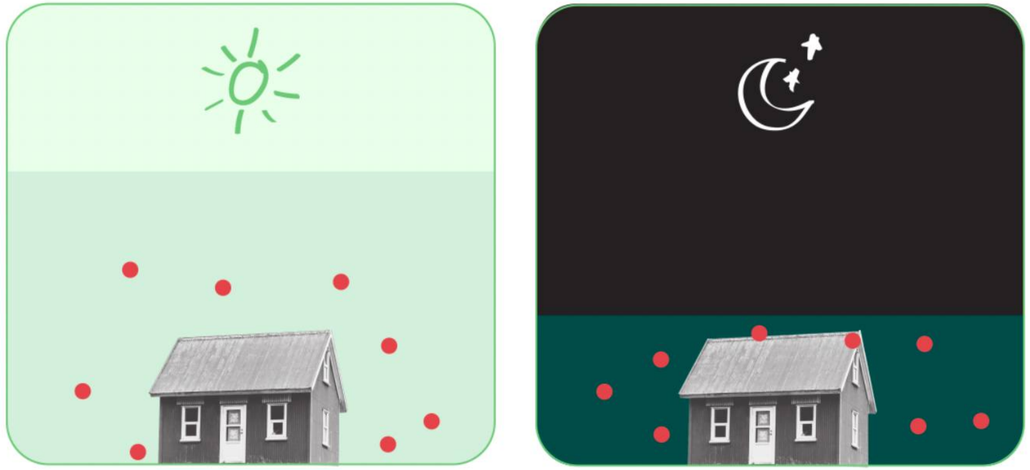
Wind can transport pollutants from their source, carrying them from one area to another, often crossing regional or national boundaries.

The Influence of Atmospheric Conditions on Air Quality

WIND AND RAIN

The direction and speed of the wind, coupled with rainfall, can either enhance air quality by dispersing pollutants or contribute to the decline of air quality by accumulating them.

PLANETARY BOUNDARY LAYER

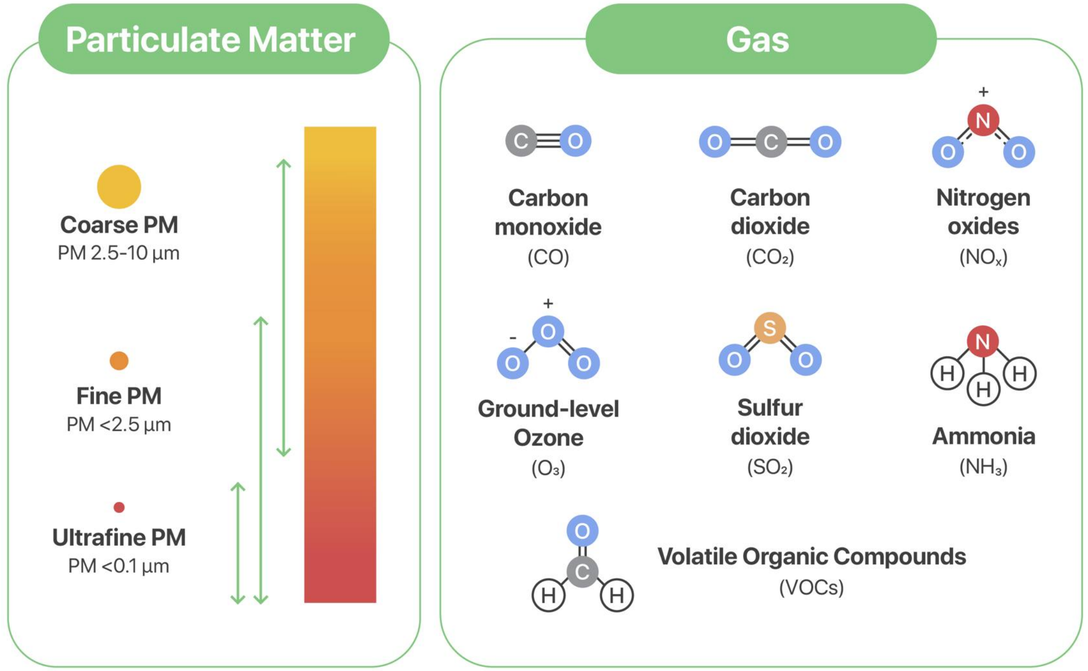


The Planetary Boundary Layer is an atmospheric layer that extends from the Earth's surface up to 800 meters.

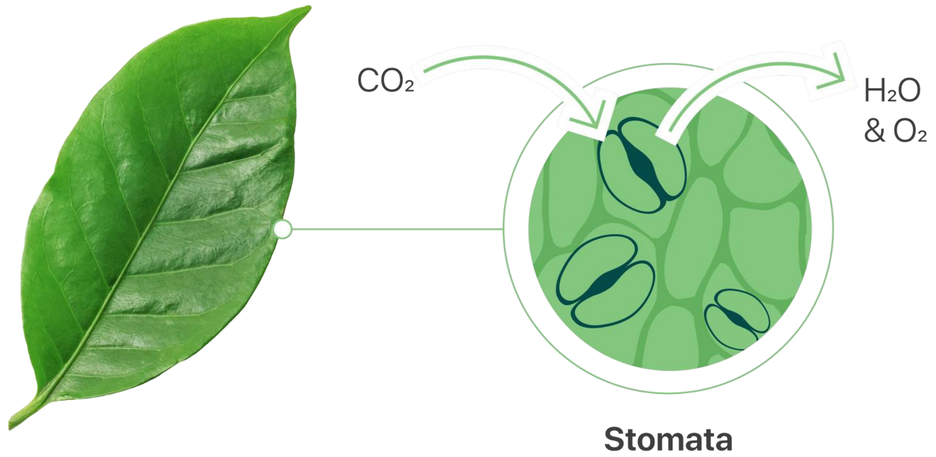
The conditions within this layer vary between morning and night. As the sun sets, the layer's altitude decreases. This reduction causes a higher concentration of pollutants due to the accumulation and limited vertical dispersion.

Why 'Greening' Isn't Sufficient to Combat Air Pollution

Air pollution exists in two primary forms: particulate and gaseous.



Plants and trees can only absorb the gaseous form of pollutants.



However, when these plants take in excessive amounts of certain gaseous pollutants, such as SO2, NOx, and CO, **they can weaken over time.** This is because they are not inherently equipped to handle such a 'burden.'

IMPORTANT TO NOTE 🔎

Deposition Deposition is the process where a substance transitions from a gas phase directly to a solid phase without passing through a liquid phase. This mechanism enables plants to 'trap' particulate pollutants, like PM2.5.

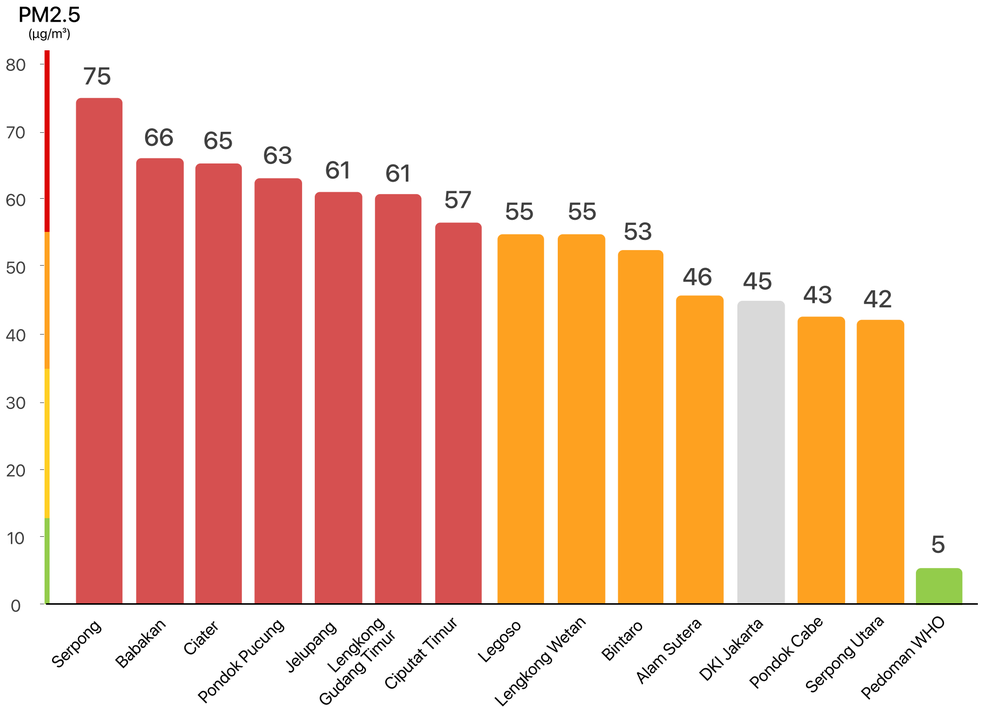
Why 'Greening' Isn't Sufficient to Combat Air Pollution

👩🏻‍🔬 A study from the US EPA indicates that trees remove only about 0.24% of PM2.5 from the air.

Satellite imagery shows an abundance of green areas in South Tangerang, particularly on the west side.

However, according to the Nafas monthly report from May 2023, despite South Tangerang being synonymous with 'green' residential areas, pollution levels remain high.

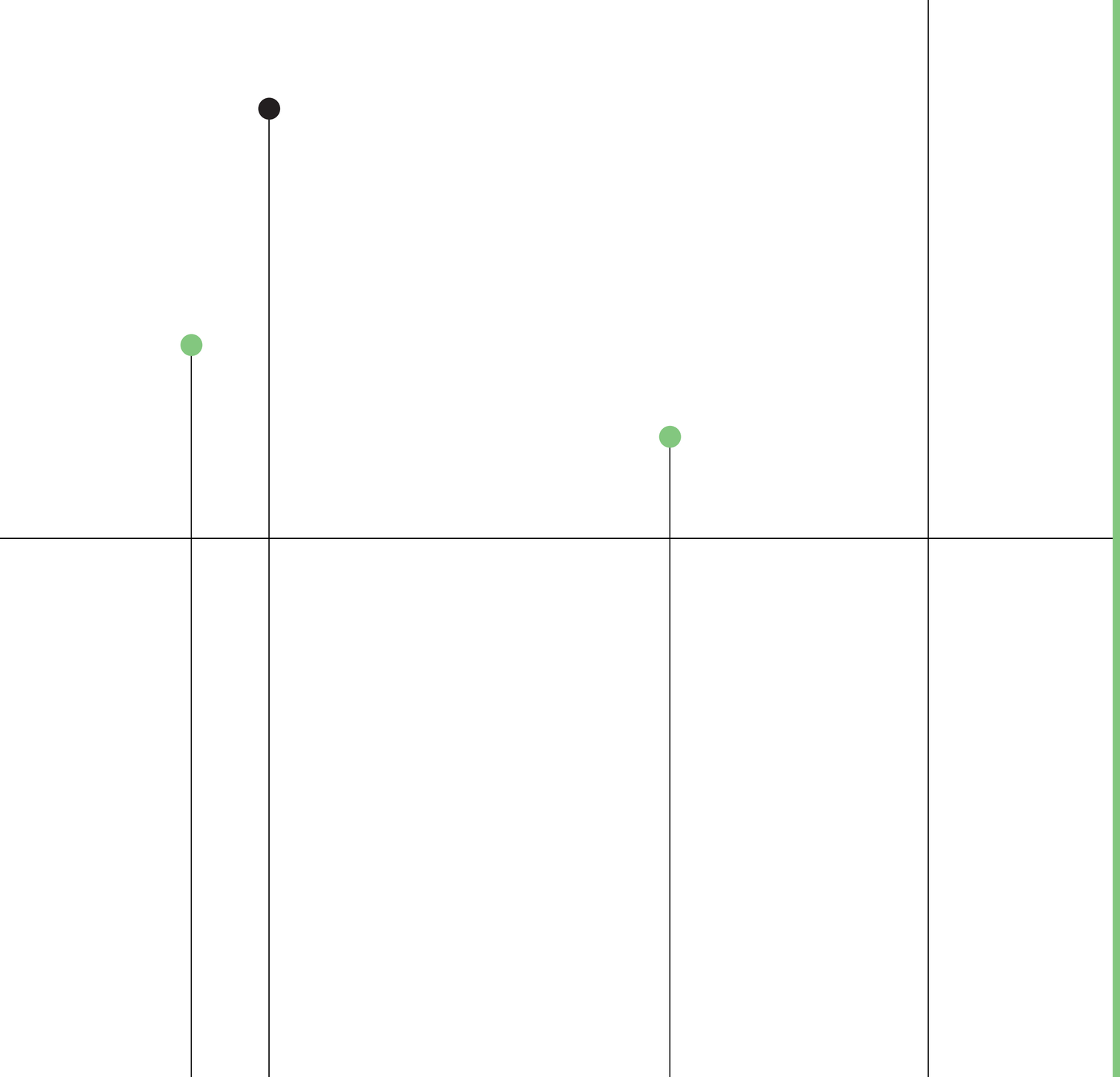
Sumber: fs.usda.gov



Good Moderate Unhealthy for Sensitive Groups Unhealthy Very Unhealthy

What is the conclusion?

SIMPLY GREENING AN AREA IS NOT AN EFFECTIVE SOLUTION TO THE AIR POLLUTION PROBLEM.



Thousands of studies have conclusively demonstrated that prolonged exposure to air pollution can adversely affect the physical and cognitive development of children.

Health Impacts of Air Pollution

SHORT-TERM EFFECT

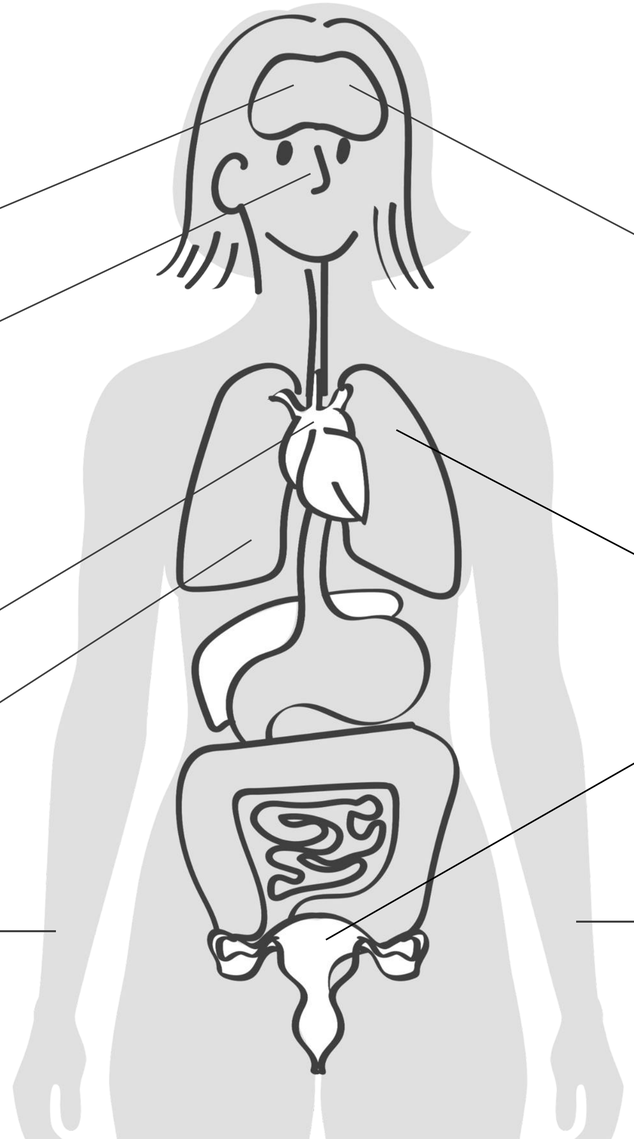
Brain
ADHD (From infancy to childhood)

Respiratory
Influenza, Rhinitis

Heart
Heart attack, arrhythmia

Lung
Asthma, Bronchiolitis

Skin
Atopic dermatitis (eczema), acne, early aging



LONG-TERM EFFECT

Brain
Alzheimer, Parkinson's, stroke, cognitive degradation

Lung
Pneumonia, lung cancer, asthma

Ovary
Premature birth

Whole Body
Blood blockage

*This content is for educational purpose. We recommend to consult directly to medical professionals if one or more symptoms appear.

Source: Compiled from various research journals.

ADHD, influenza, and heightened asthma attacks are just three of the numerous adverse effects of PM2.5 on children

16 µg/m³

Increased risk of ADHD

Children exposed to PM2.5 concentrations of 16 µg/m³ during their first three years have heightened risk potentials. This risk escalates further when PM2.5 levels surpass 50 µg/m³.

Source

15%

Increased risk of influenza

There's a 15% higher risk with every exposure to PM2.5 levels exceeding 10 µg/m³ over a span of 6 days.

Source

3.6%

Increased risk of asthma attack

There's a 3.6% increased risk for every 10 µg/m³ rise in PM2.5 exposure.

Source

Glosarium

a

ATMOSPHERE

A layer of gases that envelops our Earth. We reside in the lowermost layer of the atmosphere, known as the troposphere, which extends from the Earth's surface up to about 12 km.

b

ANNUAL THRESHOLD LIMIT VALUE

This is an air quality standard established by the World Health Organization (WHO). In 2021, the WHO revised the annual threshold limit value, reducing it from 10 µg/m³ to 5 µg/m³. The daily threshold limit value (covering a 24-hour period) is set at 15 µg/m³.

BOUNDARY LAYER

This atmospheric layer extends from the Earth's surface up to 2 km and can vary over time.

g

GROUND-LEVEL AIR POLLUTION

Refers to air pollution that is found very close to the Earth's surface

h

HYPERLOCAL POLLUTION

A phenomenon where air pollution is highly concentrated in a specific, limited area due to the presence of local pollution sources within that vicinity.

p

PM2.5

articles in air pollution that are 2.5 micrometers in size, which is about 36 times smaller than the diameter of a grain of sand.

s

SENSITIVE/VULNERABLE GROUP

This refers to individuals who are particularly susceptible or at a higher risk of being affected by certain conditions. Examples include children, the elderly, individuals with allergies, and those suffering from asthma.

t

TRAPPING LAYER

An atmospheric layer that has the capacity to hold or trap pollutants near the Earth's surface, thereby increasing detectable pollution levels in that area. This is commonly known as the inversion layer.

Nathan
Roestandy

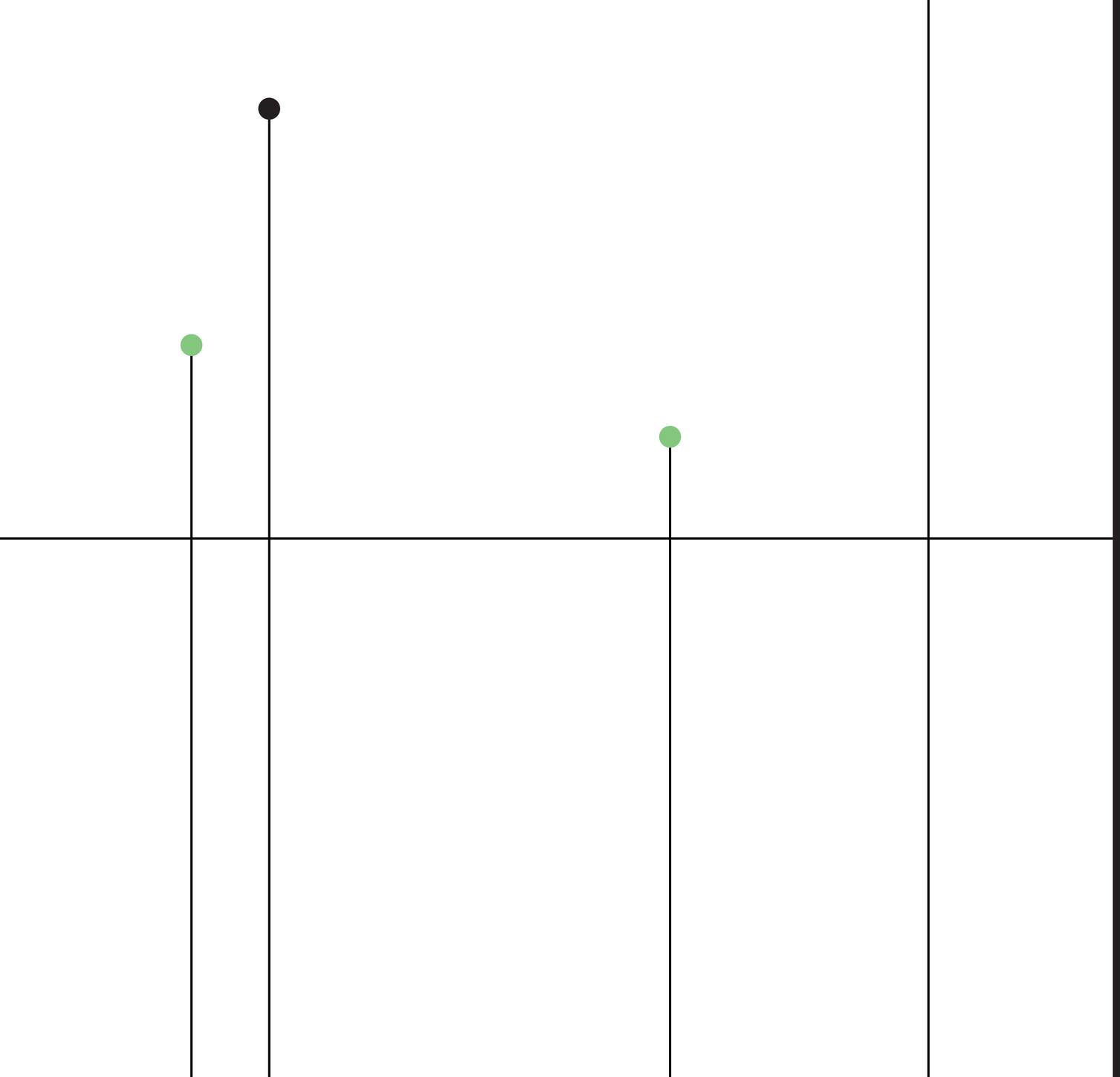
Co-founder &
CEO of nafas

Piotr
Jakubowski

Co-founder &
CGO of nafas

As we move into the final quarter of 2023, we transition into the inter-season. **This year's dry season has stretched longer than in previous years,** with its impact keenly felt across widespread droughts, an increase in fire incidents, and rising levels of air pollution. This October, in particular, has seen **a record-breaking surge in pollution compared to the previous year.**

The journey towards clean and healthy air is still a long one. Stay vigilant and always check the air quality before engaging in outdoor activities!

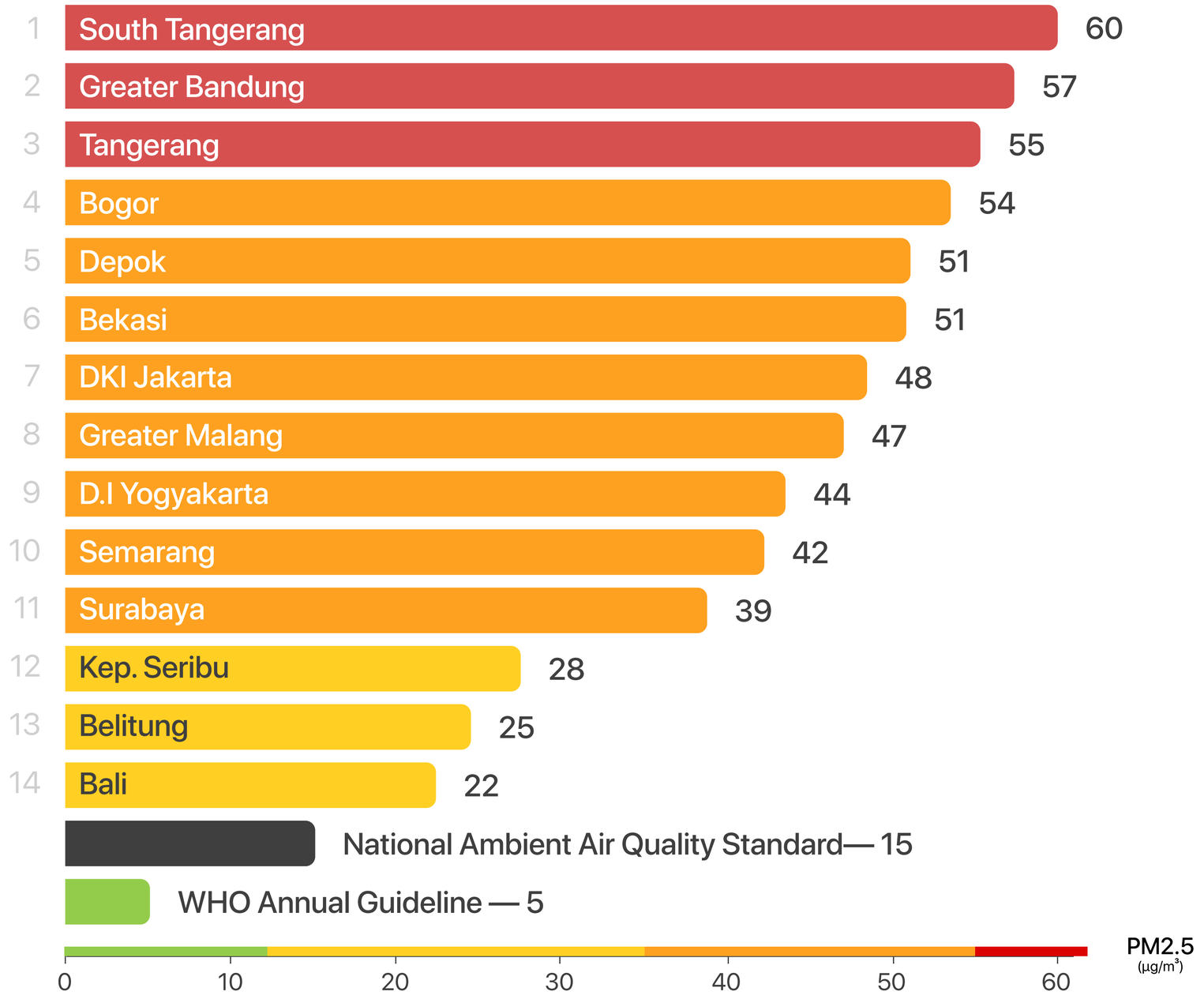


02

october 2023 air quality data

City Rankings

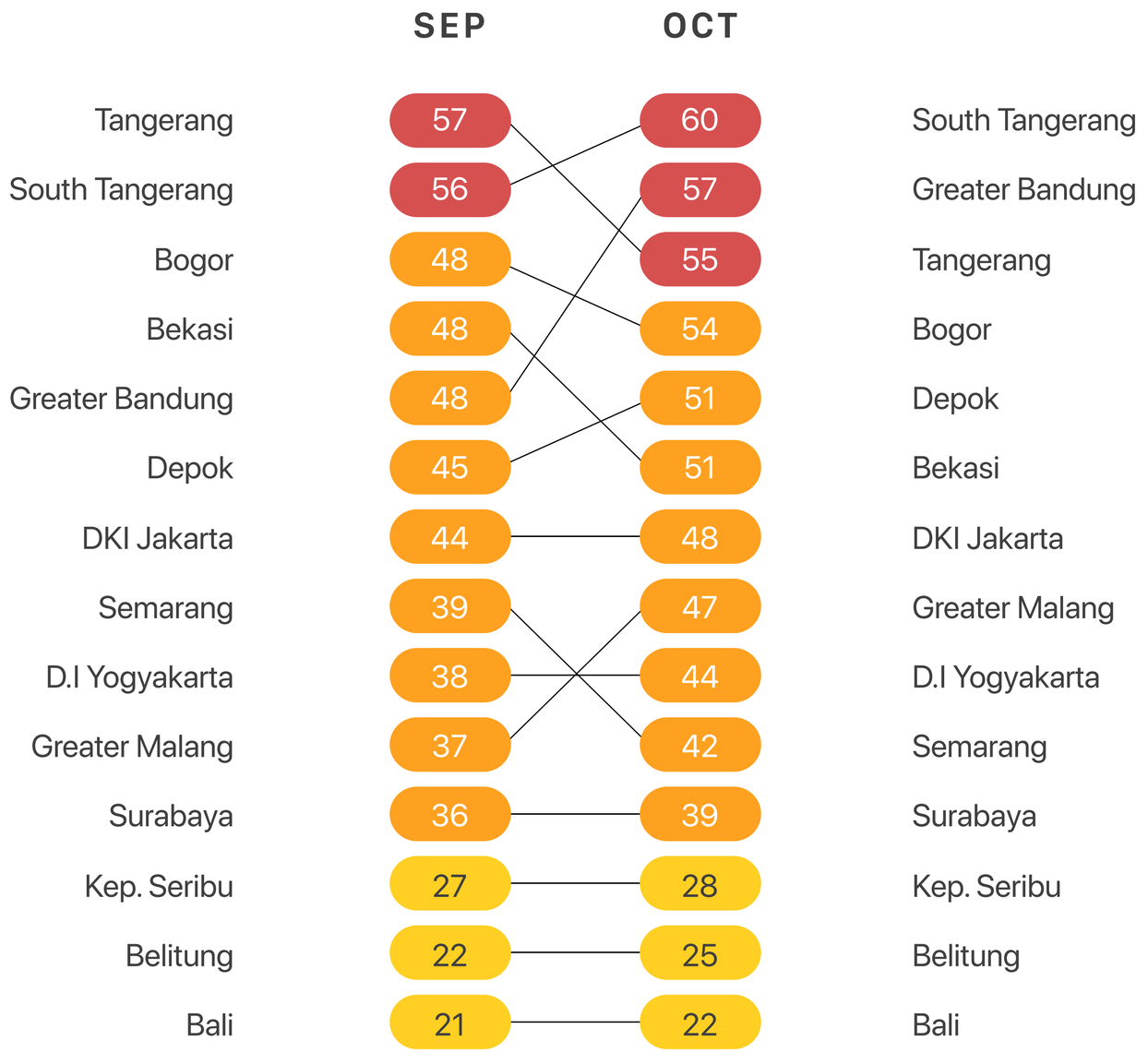
This ranking is determined by the cities with the highest PM2.5 concentration levels in October 2023.



- Good
- Moderate
- Unhealthy for Sensitive Group
- Unhealthy

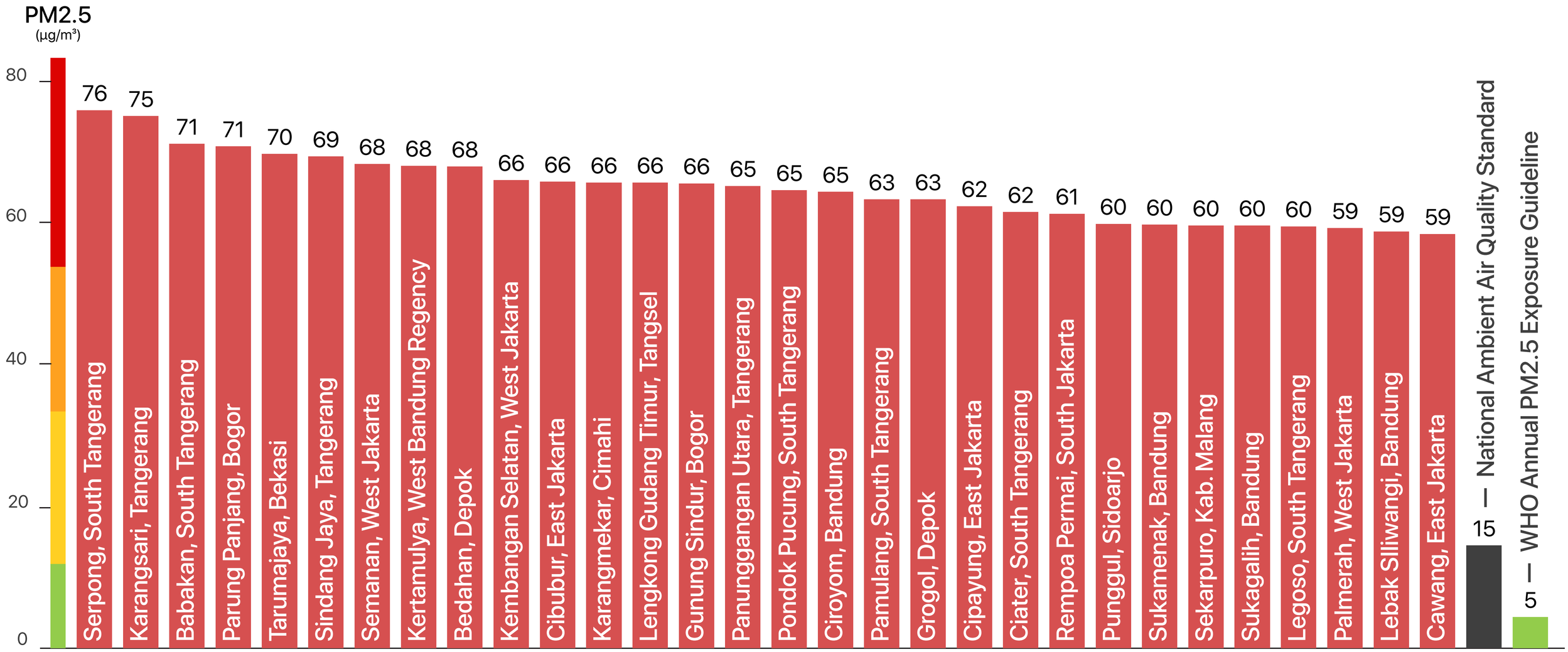
City Rankings

This displays the rankings of cities based on their PM2.5 pollution levels, providing a comparison with the previous month's data.



- Good
- Moderate
- Unhealthy for Sensitive Group
- Unhealthy

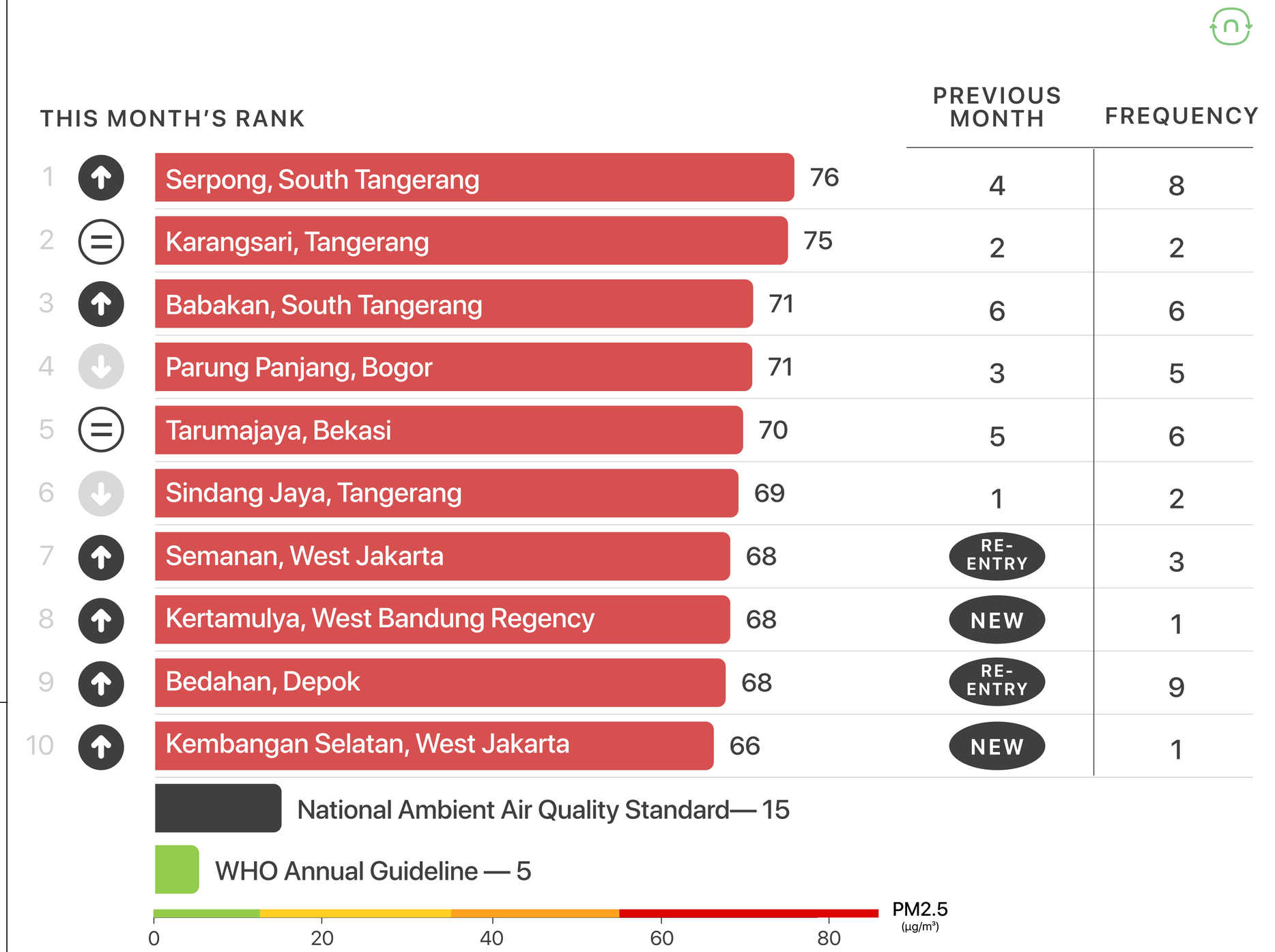
30 Most **Polluted Locations**



Top 10 Most Polluted Location

This ranking identifies the sensor points with the highest PM2.5 concentrations in October 2023 and compares them with the conditions from the previous month.

- Good
- Moderate
- Unhealthy for Sensitive Group
- Unhealthy



Cigarettes Equivalence

October 2023

The equivalence to cigarette smoke is determined by the daily average of PM2.5.

A concentration of 22 µg/m³ is equivalent to the exposure from one cigarette.

*) Measurement methodology is based on berkeleyearth.org

		NUMBER OF CIGARETTES
1	Serpong (TANGSEL)	107
2	Karangsari (TNG)	106
3	Babakan (TANGSEL)	100
4	Parung Panjang (BGR)	100
5	Tarumajaya (BKS)	98
6	Sindang Jaya (TNG)	98
7	Semanan (JAKBAR)	96
8	Kertamulya (BDG)	96
9	Bedahan (DPK)	96
10	Kembangan Selatan (JAKBAR)	93

Cigarettes **Equivalence**

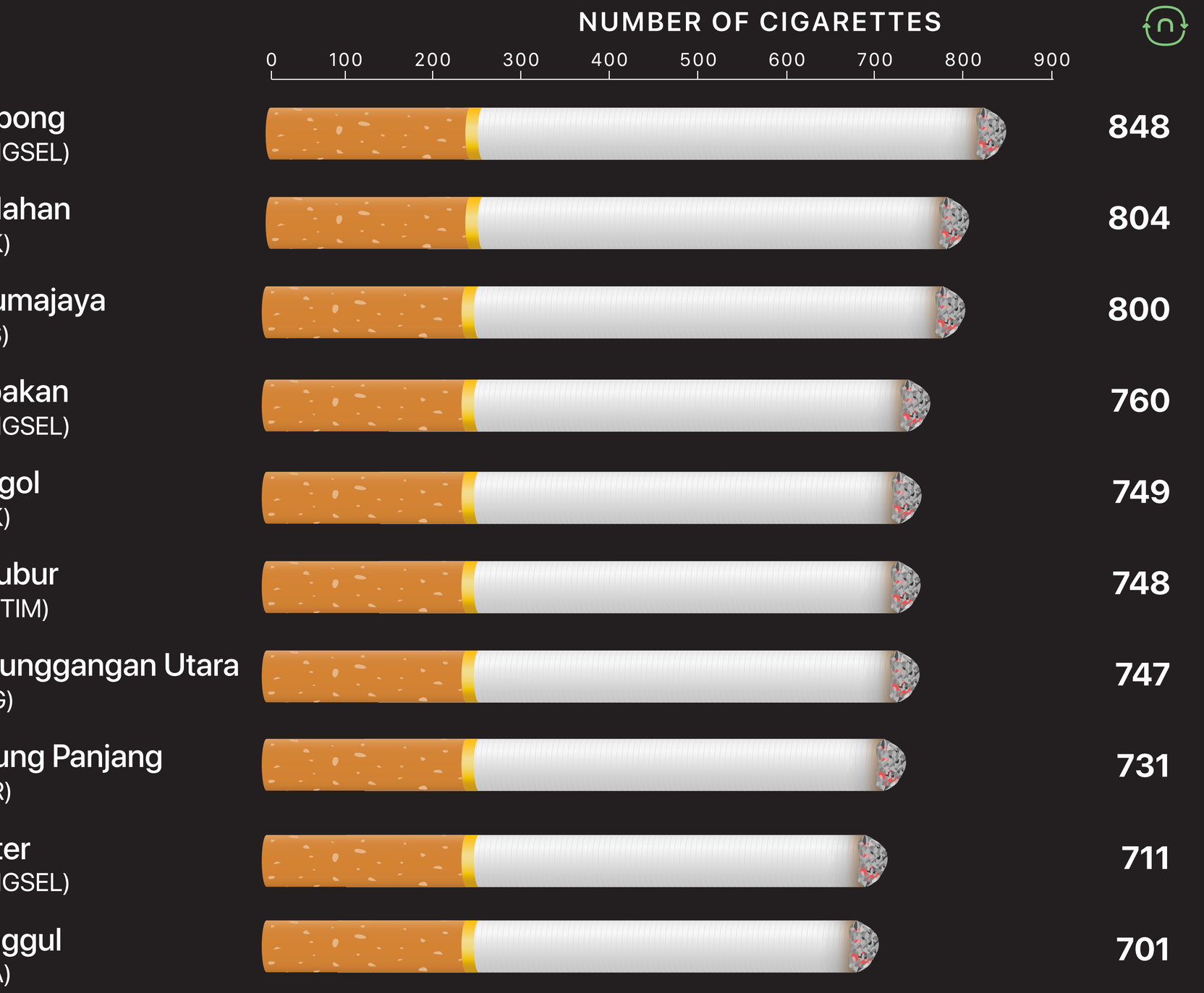
January - October 2023

Which locations have registered the highest cigarette equivalents throughout 2023?

The equivalence to cigarette smoke is determined by the daily average of PM2.5.

A concentration of 22 µg/m³ is equivalent to the exposure from one cigarette.

*) Measurement methodology is based on berkeleyearth.org

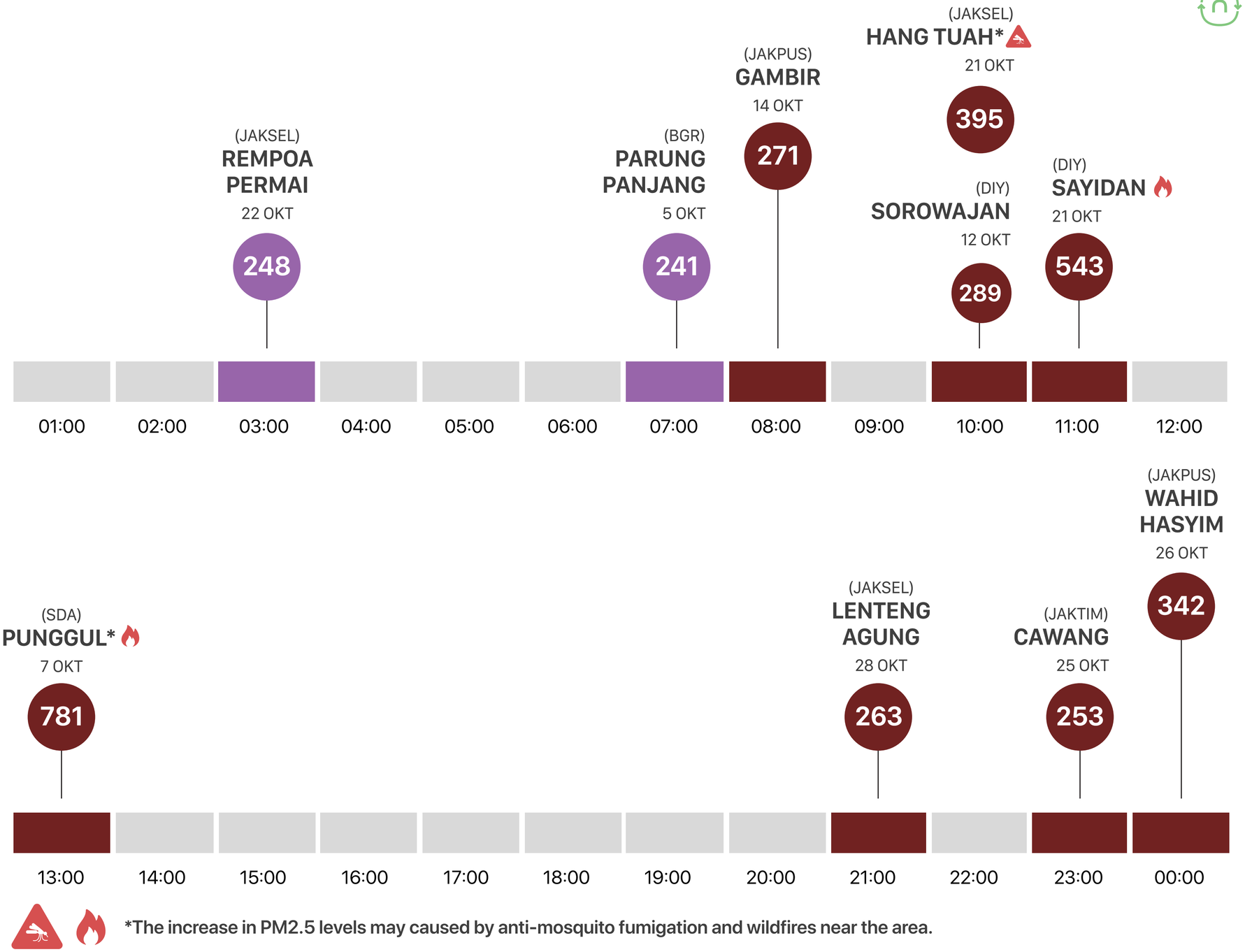


Top 10 Most Polluted Hours

The ranking is based on the time when the worst PM2.5 pollution occurs on October 2023

Should PM2.5 levels reach the "Hazardous" category, do not panic. Stay alert to notifications, such as those related to mosquito fogging activities. However, remember that spikes in PM2.5 levels can result from various factors, not just one. Stay informed and vigilant!

- Good
- Moderate
- Unhealthy for Sensitive Groups
- Unhealthy
- Very Unhealthy
- Hazardous



*The increase in PM2.5 levels may caused by anti-mosquito fumigation and wildfires near the area.

Nafas Alert

LATEST UPDATE ON THE NAFAS APP

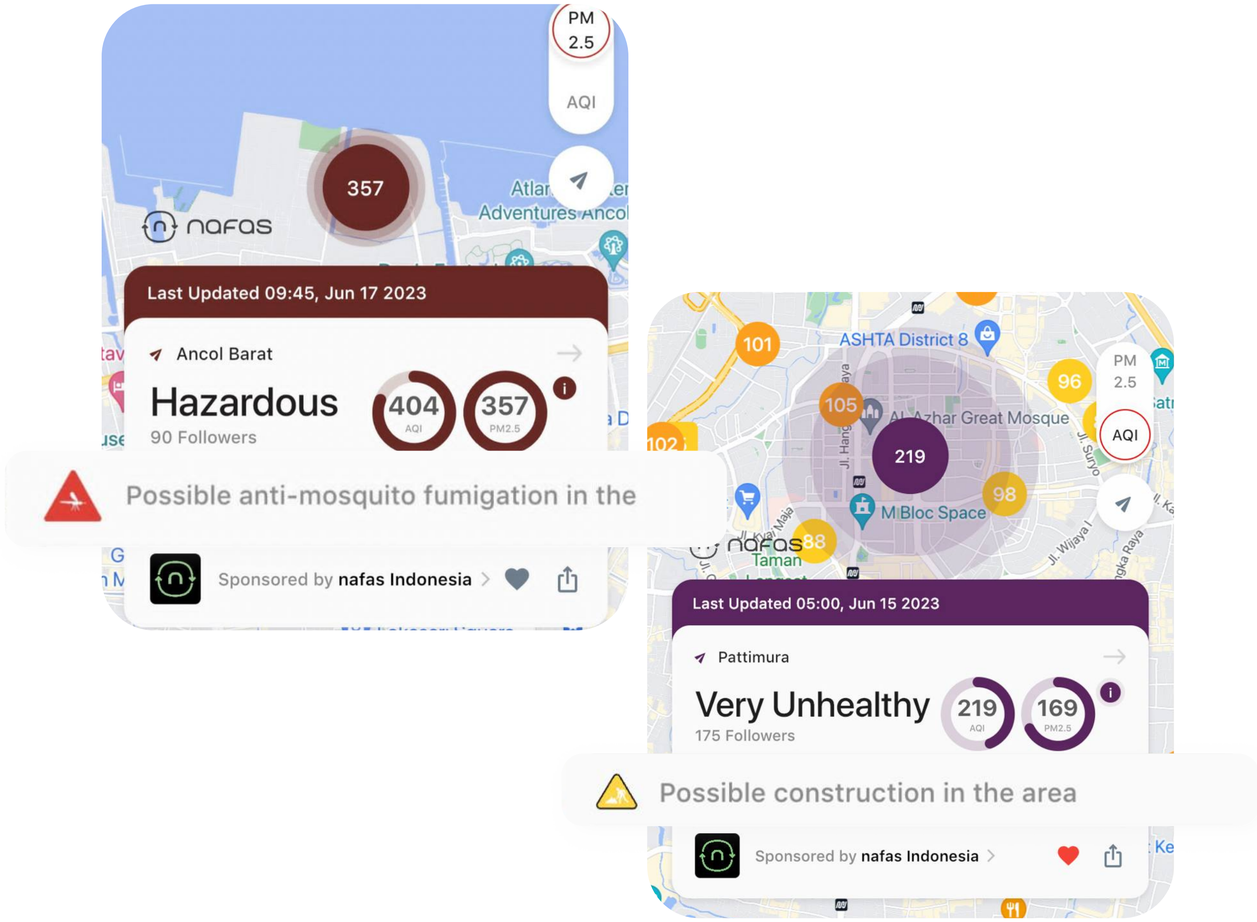
Apart from the **Anti-mosquito Fumigation Alert**, now we have added **Construction Alert** so you can find out why the air quality might dip in certain areas.

WHAT YOU NEED TO KNOW

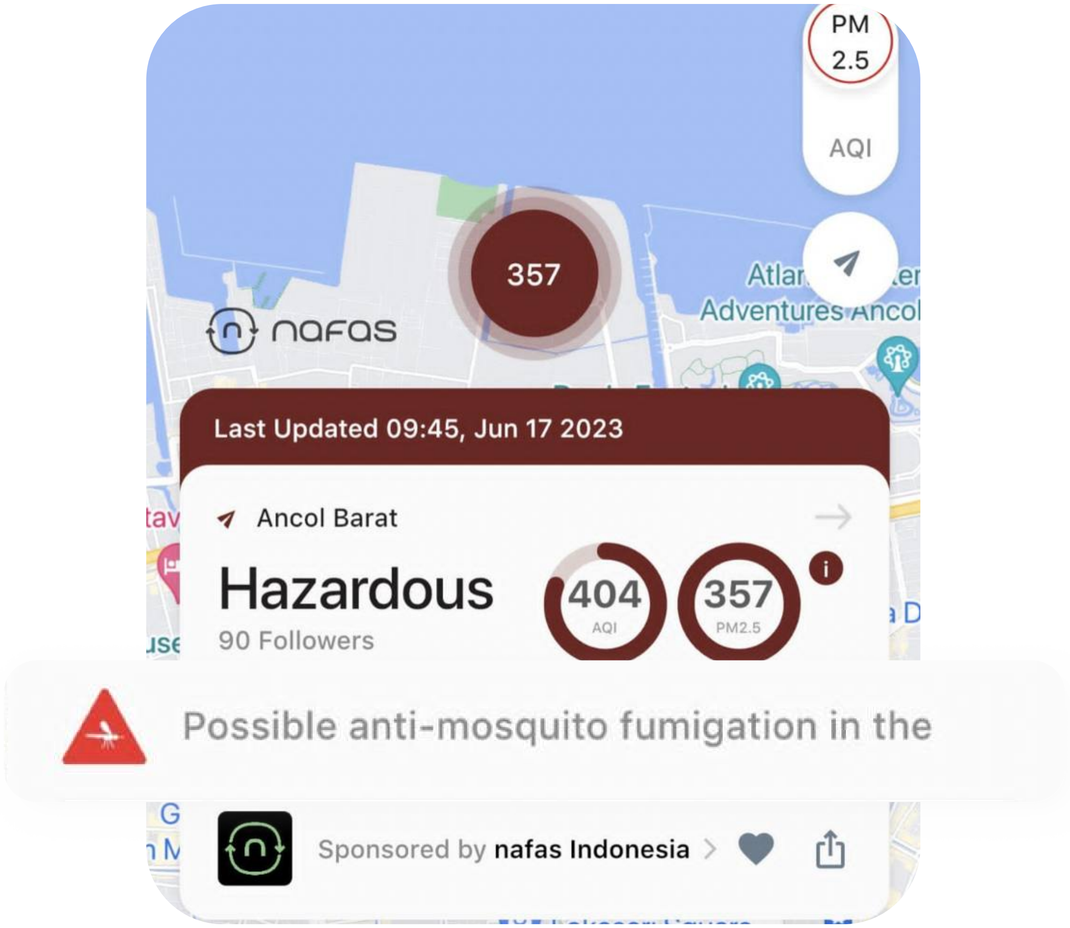
🦟 When there's anti-mosquito fumigation, the PM2.5 levels can suddenly skyrocket, sometimes even reaching the 'Hazardous' level. But don't panic! This spike is temporary and things will settle back to normal pretty quickly.

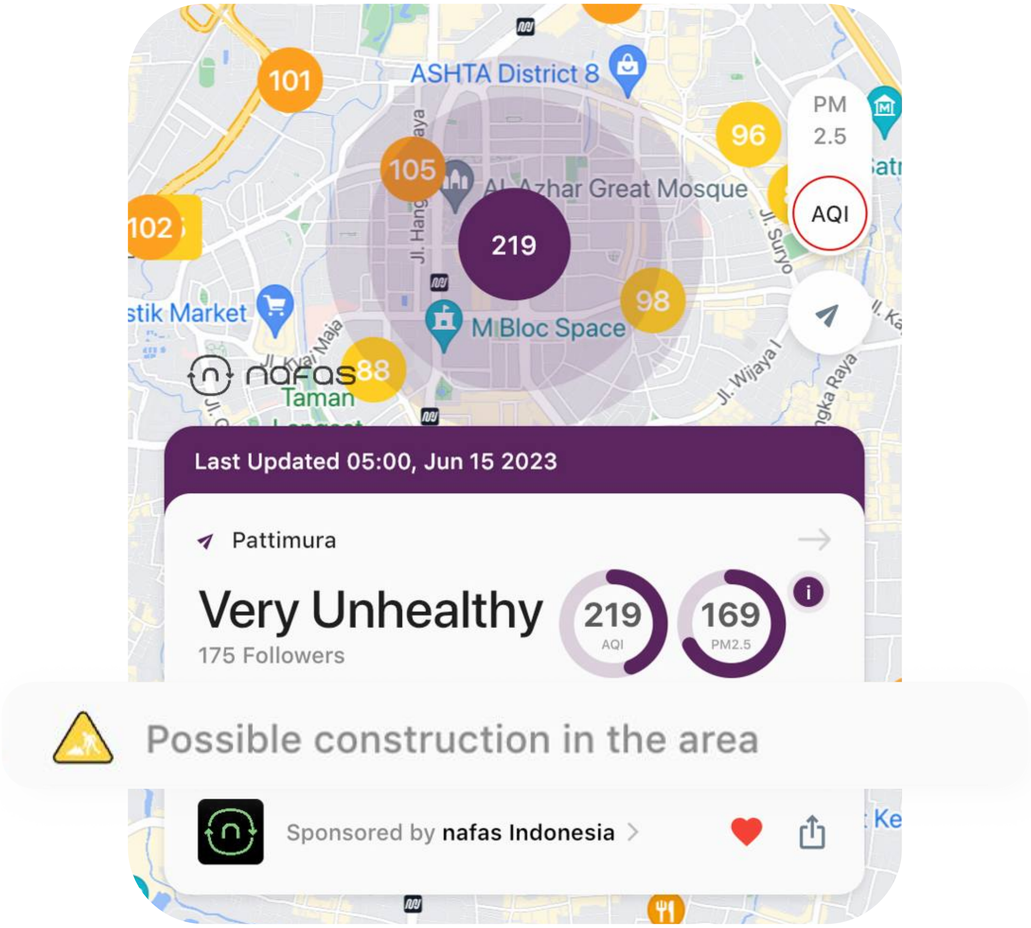
🏗️ Construction alerts? Well, this one sticks around longer and can be a daily thing. For instance, if there's construction near the Pattimura sensor in South Jakarta, you'll notice a regular bump in PM2.5 levels from evening till the early hours.

Stay alert and don’t forget to regularly check the air quality on our app! 🍃



Nafas Alert





03

air
quality
stories &
insights

October Shades of Grey


1 Okt ‘23, Jakarta

Foto: @georgejkristian


4 Okt ‘23, Jakarta

Foto: @rica_bread_n_cakes

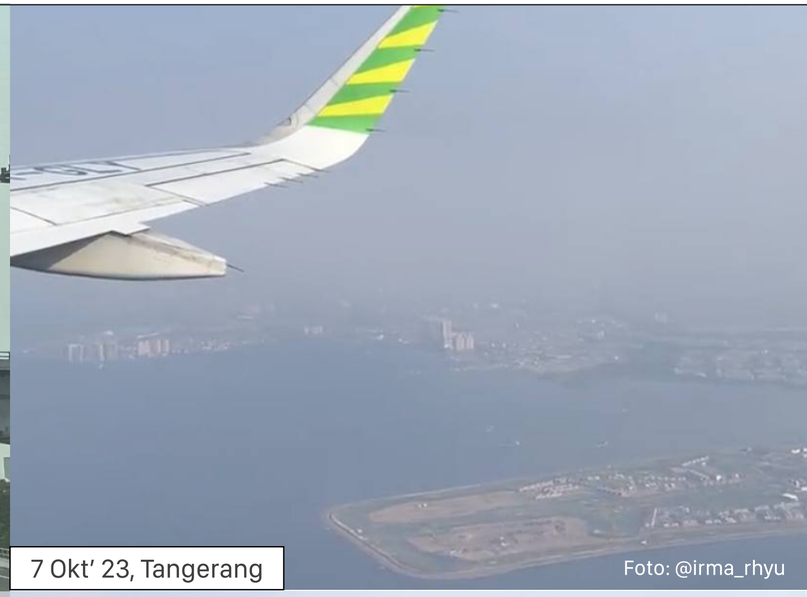

7 Okt’ 23, Tangerang

Foto: @irma_rhyu

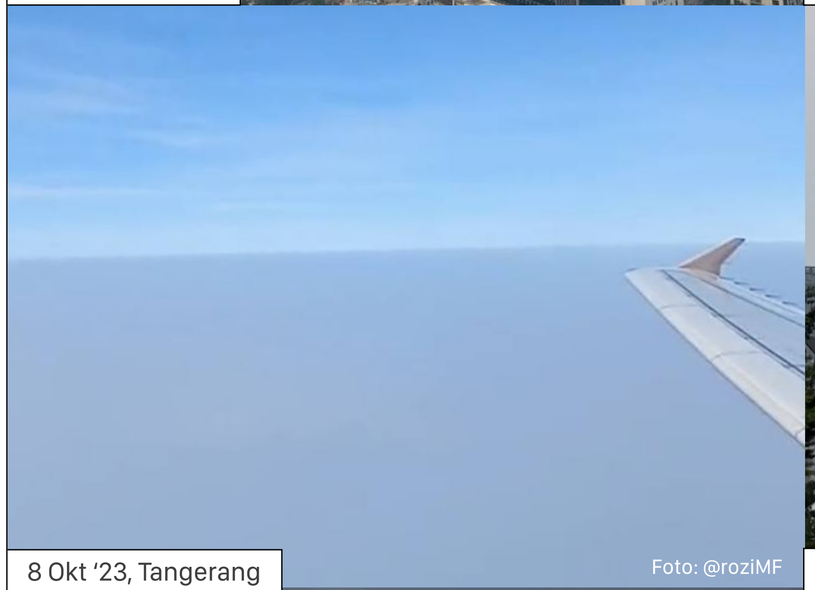

8 Okt ‘23, Tangerang

Foto: @roziMF

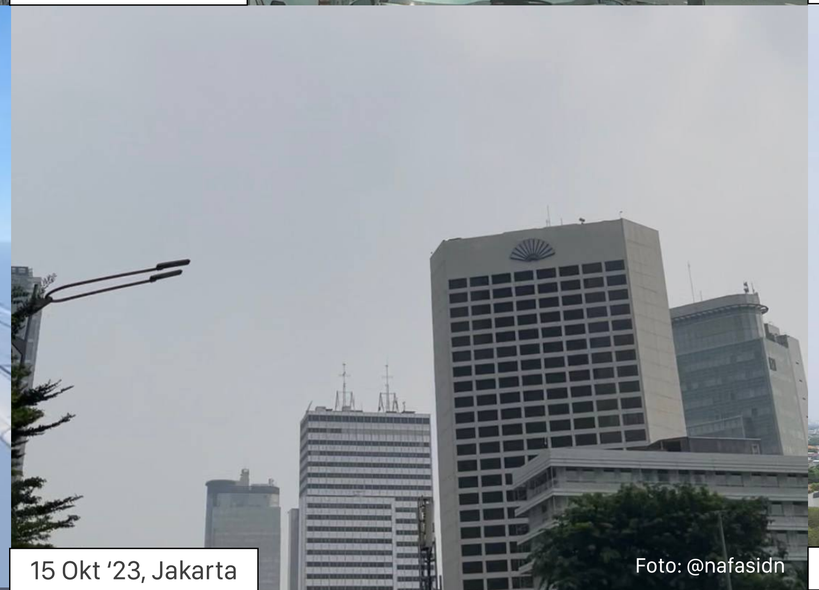

15 Okt ‘23, Jakarta

Foto: @nafasidn


22 Okt ‘23, Jakarta

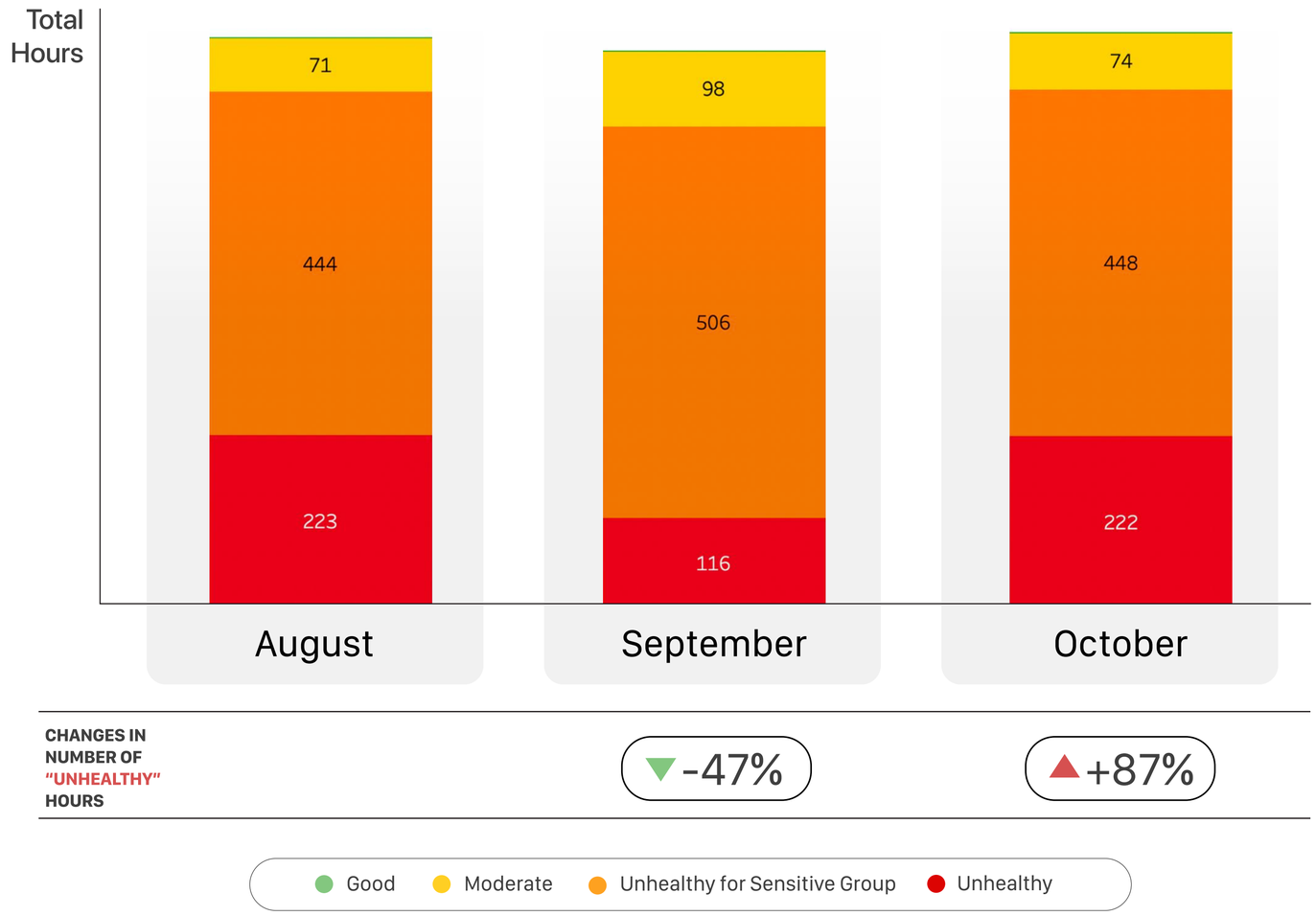
Foto: @Polusi_udara01

INSIGHT
№ 1

"Unhealthy" Air Quality Periods Doubled in Frequency

During this transitional season, pollution has surged to levels comparable to those of the dry season (August).

The number of **"Unhealthy" air quality** hours in October has doubled **compared to the previous month (September) is doubled.**



*A slight difference occurs due to the number of days in each month.

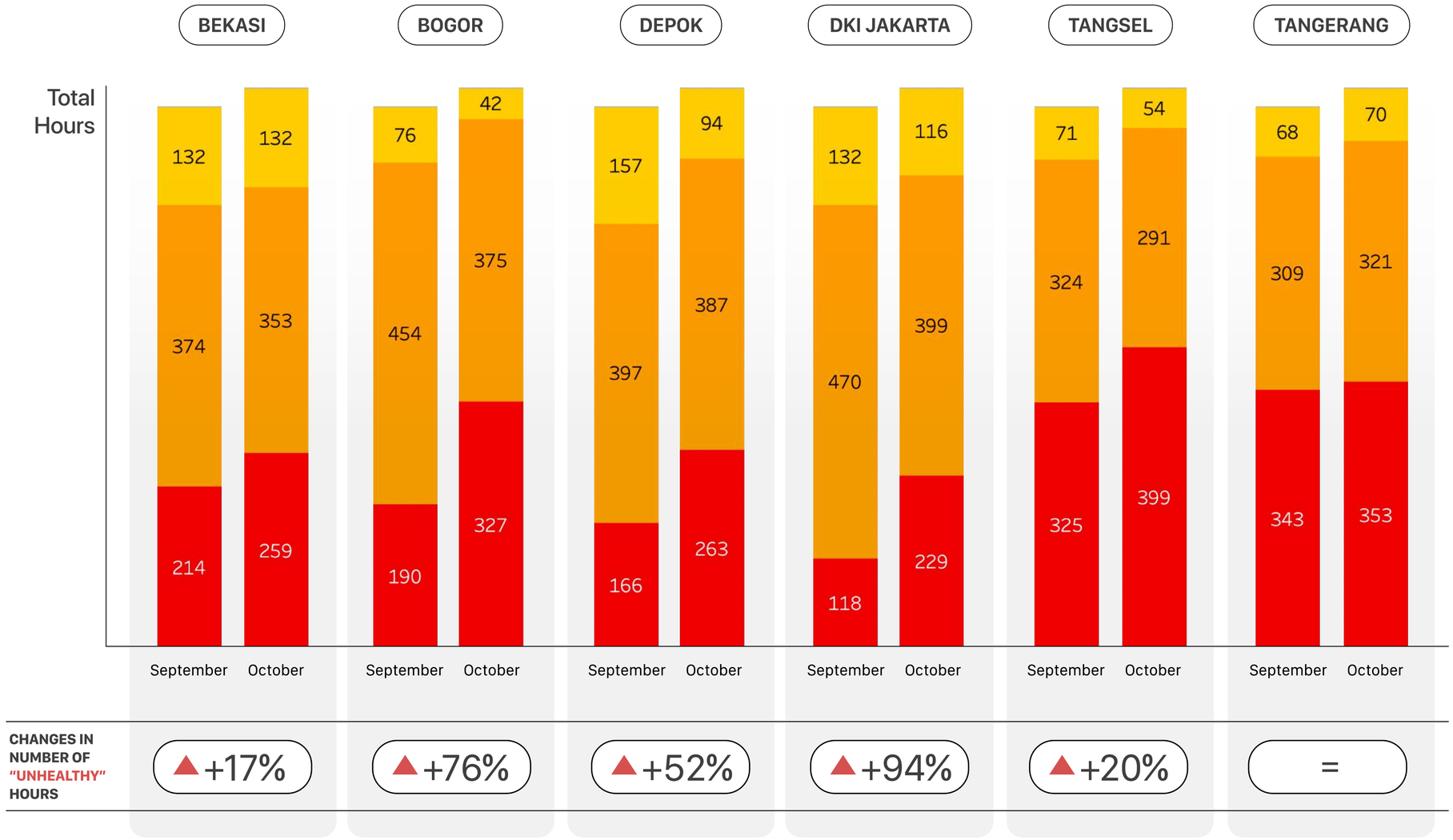
INSIGHT
№ 1

Increase in "Unhealthy" Air Quality Periods Across Multiple Regions

There is a rising trend of high pollution levels in several areas, especially in **Bogor Regency & City, Depok, DKI Jakarta, and South Tangerang.**

Meanwhile, the trend of high pollution in Tangerang has remained consistent in frequency over the past two months.

- Good
- Moderate
- Unhealthy for Sensitive Group
- Unhealthy



*A slight difference occurs due to the number of days in each month.

INSIGHT
№ 1

Jakarta Residents Breathed "Unhealthy" Air More Often Last October

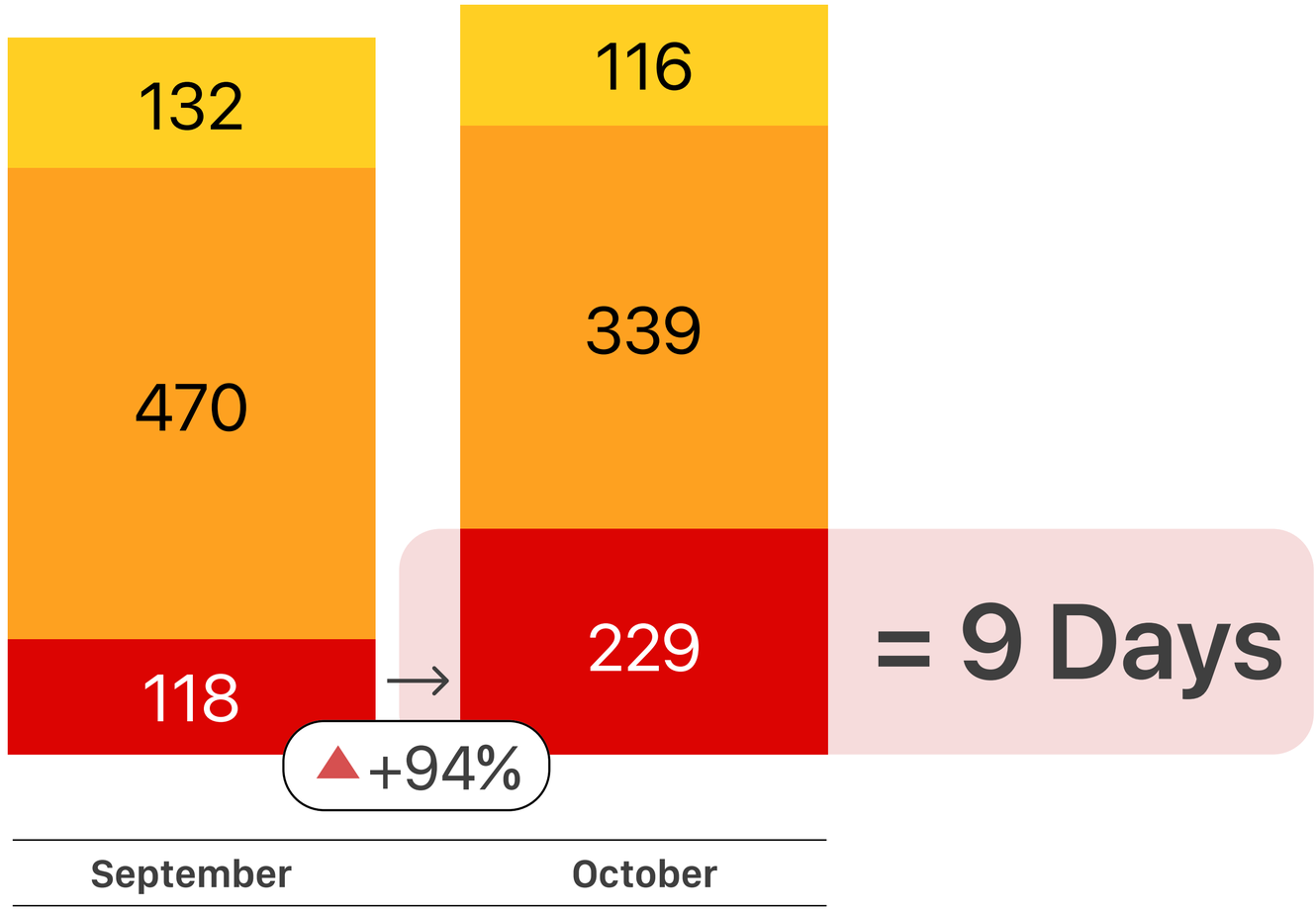
nafas

The number of hours with **"Unhealthy"** air quality in **Jakarta soared by 94%.**

Jakarta residents were exposed to "Unhealthy" air for a total of **229 hours,** which is **equivalent to 9 full days,** during October 2023.

- Good
- Moderate
- Unhealthy for Sensitive Group
- Unhealthy

Numbers of “Unhealthy” Hours
DKI Jakarta — September & October 2023



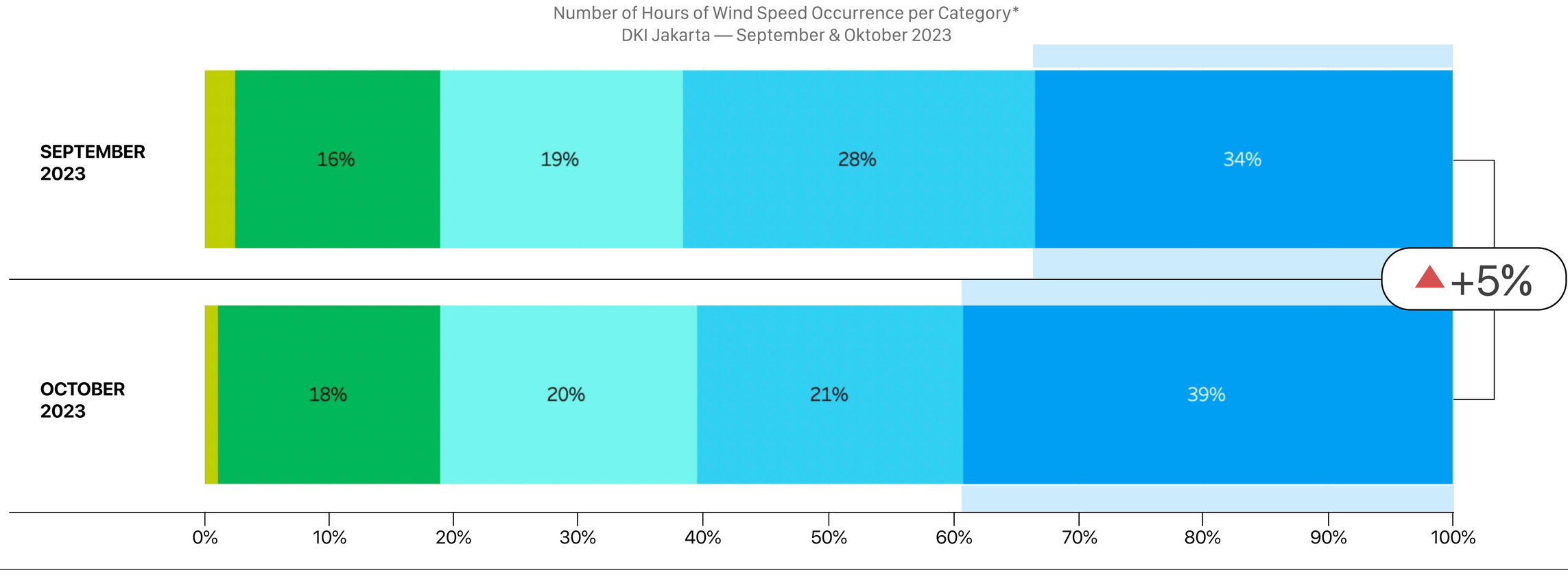
*A slight difference occurs due to the number of days in each month.

INSIGHT
№ 1

Why is Poor Air Quality Becoming More Frequent in Jakarta?

In October, the prevailing **winds were predominantly light** (0-2 m/s or Light Air*), a condition that causes **pollutants to move minimally.** As a result, pollutants from various sources accumulate and reach high concentrations.

*Beaufort Wind Scale

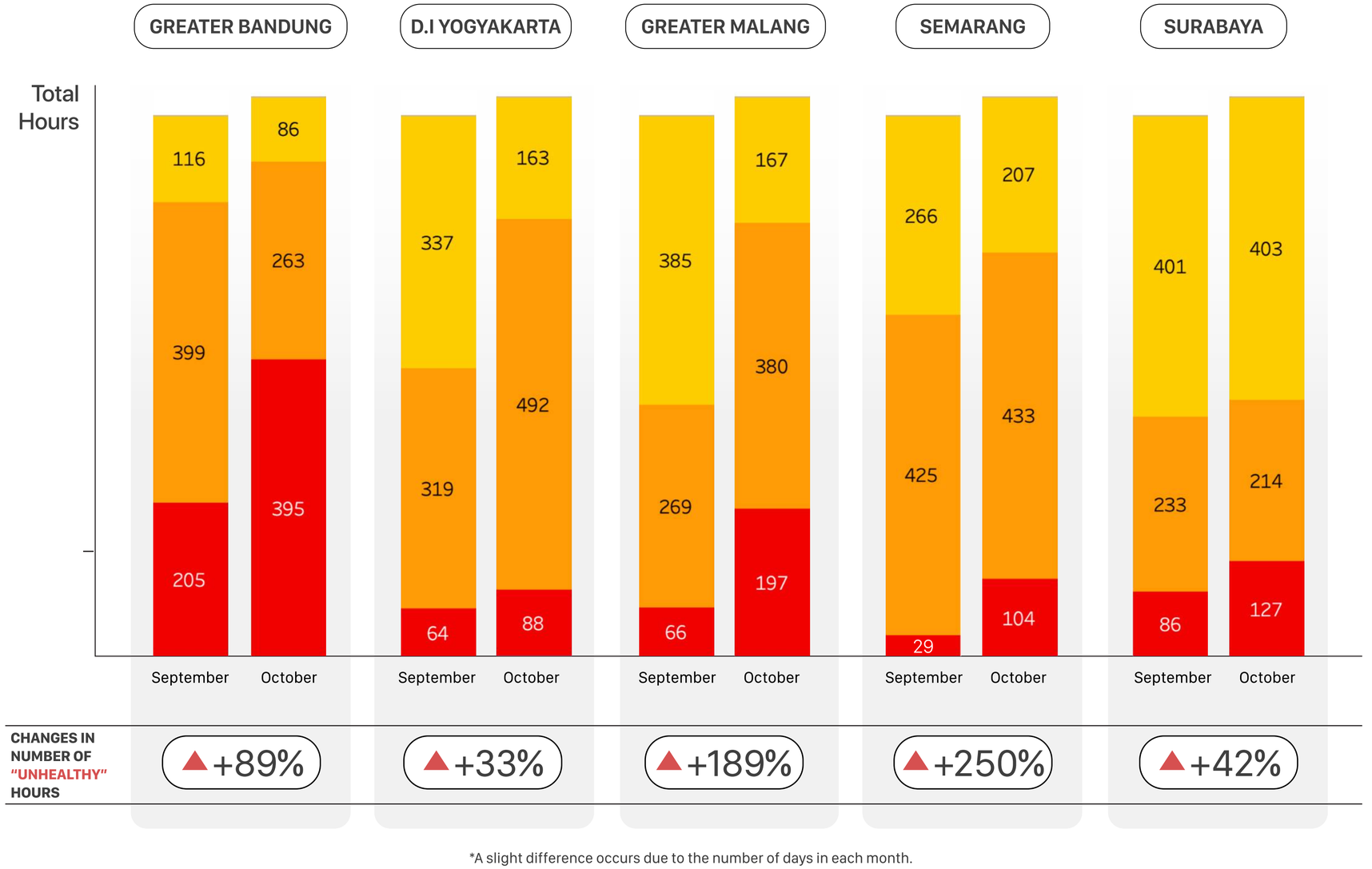


INSIGHT
№ 1

Rise in "Unhealthy" Air Quality Hours Extends Beyond Jabodetabek

Air pollution is **not an issue confined to the Greater Jakarta area** alone.

The highest number of **"Unhealthy"** air quality hours in October was recorded in the **Bandung** and **Malang** metropolitan areas.



- Good
- Moderate
- Unhealthy for Sensitive Group
- Unhealthy

*A slight difference occurs due to the number of days in each month.

INSIGHT
№ 1

Beyond Jabodetabek, Bandung and Malang Regions Set Records for "Unhealthy" Air Quality Hours

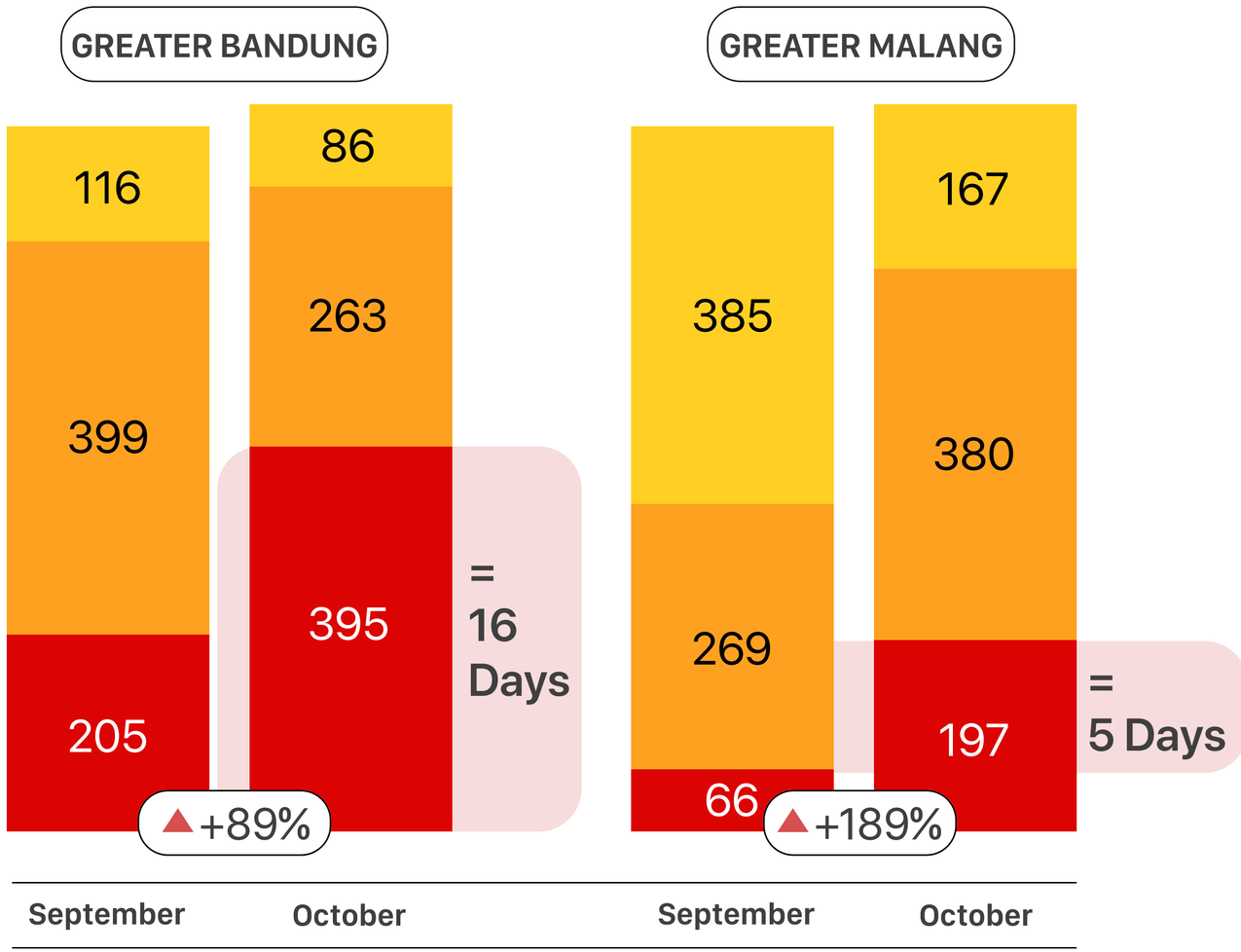
In October, the **Bandung** region experienced **395 hours, equivalent to 16 days, of "Unhealthy" air quality.** This situation is likely more **influenced by pollution sources and wind conditions.**

On the other hand, the **Malang region** saw an increase of **131 "Unhealthy" air quality hours, equivalent to 5 days.** This accumulation of pollutants was supported by **increasingly weaker wind conditions,** occurring 14% more frequently in October compared to September.

*Wind speed 0-2 m/s

- Good
- Moderate
- Unhealthy for Sensitive Group
- Unhealthy

Numbers of “Unhealthy” Hours
DKI Jakarta — September & October 2023



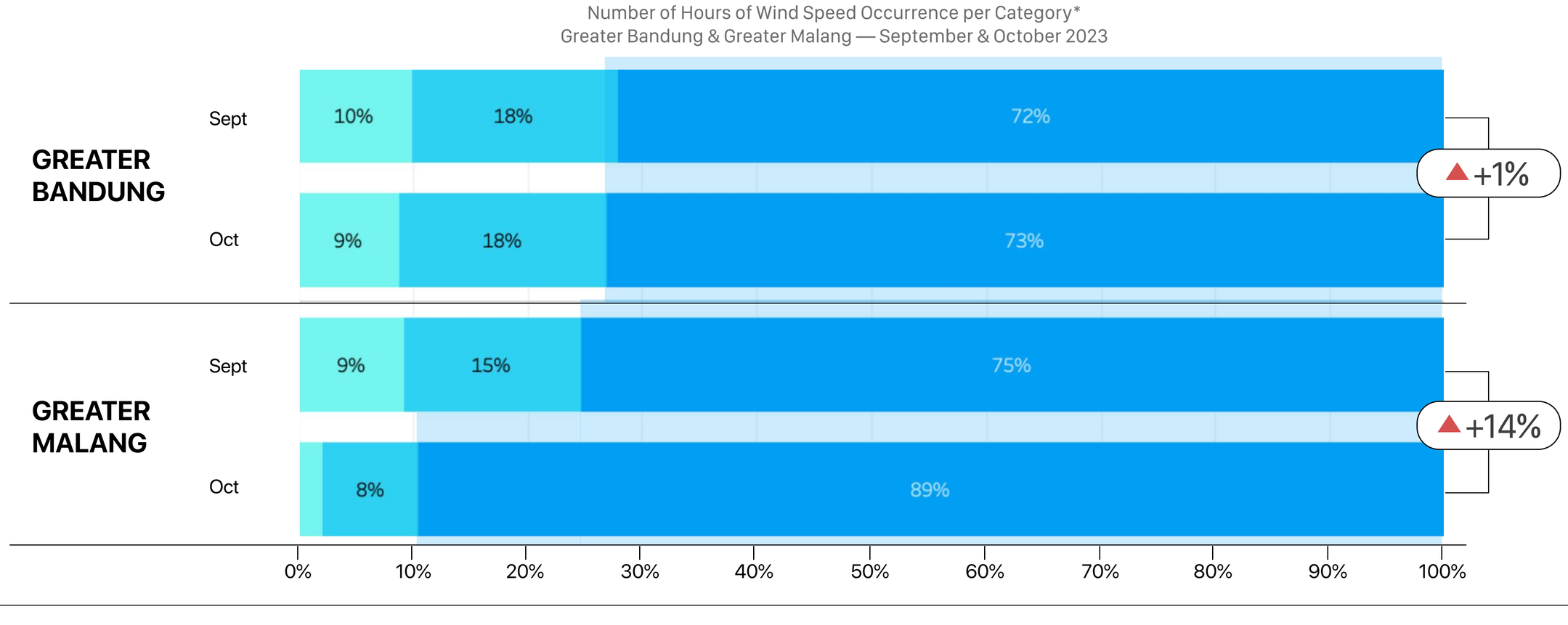
*A slight difference occurs due to the number of days in each month.

INSIGHT
№ 1

Besides Jabodetabek, "Unhealthy" Air Most Frequently Occurs in Bandung and Malang

A similar situation unfolded in **Greater Malang**, where **light winds (0-2 m/s or Light Air*) dominated last October.** Consequently, pollutants accumulated, resulting in high pollution levels. The situation in **Bandung** is slightly different. The increase in pollution **could be more influenced by variations in pollution sources and atmospheric dynamics.**

*Beaufort Wind Scale



INSIGHT
№ 1

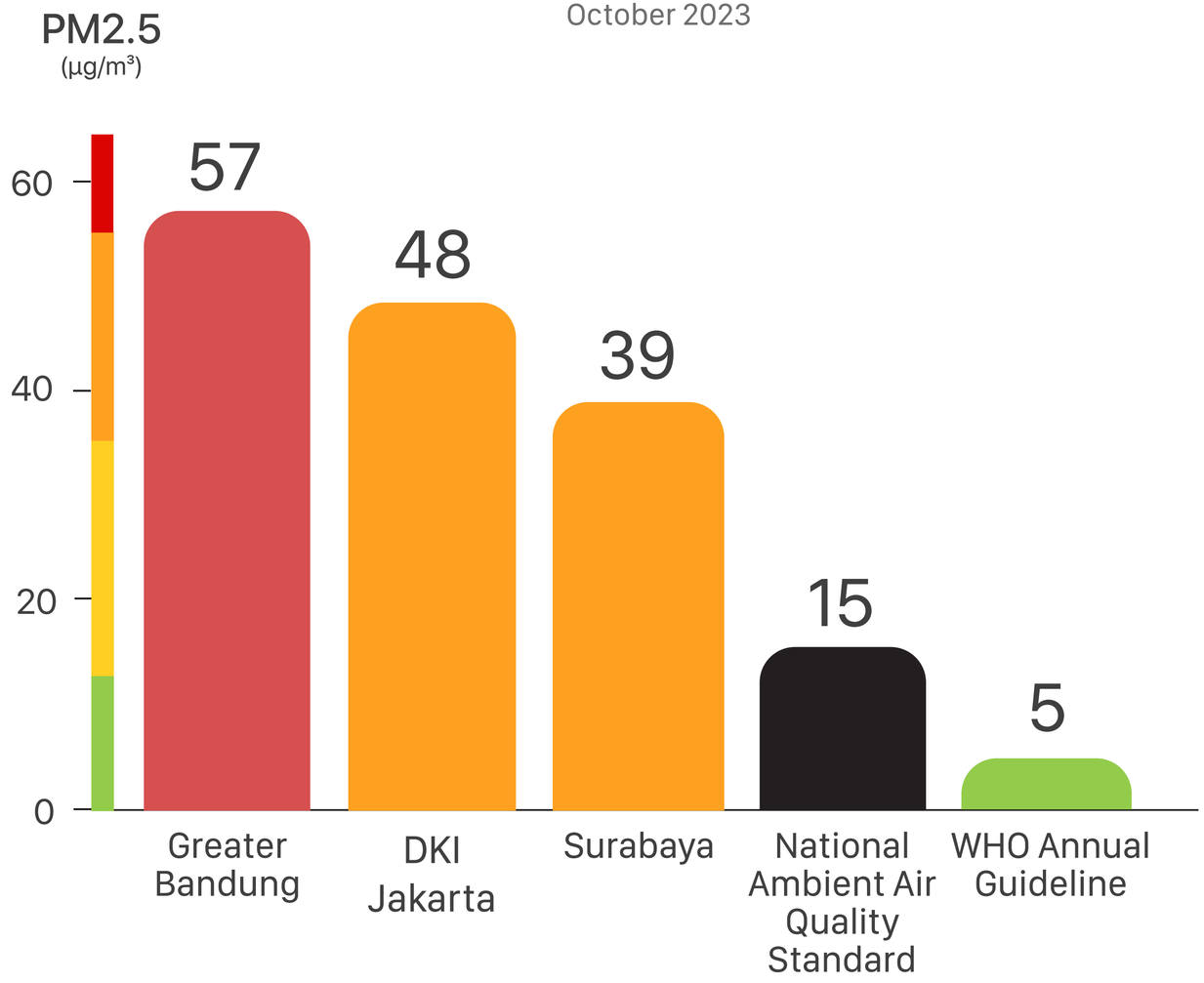
Bandung Was More Polluted than Jakarta and Surabaya

In October 2023, **Greater Bandung experienced higher levels of pollution than Jakarta and Surabaya** by 18% and 32%, respectively.

This was influenced by the frequency of strong winds in Surabaya, which occurred 10% and 30% more often than in Jakarta and Bandung, respectively.

- Good
- Moderate
- Unhealthy for Sensitive Group
- Unhealthy

PM2.5 in Greater Bandung vs DKI Jakarta & Surabaya
October 2023



INSIGHT
№ 1

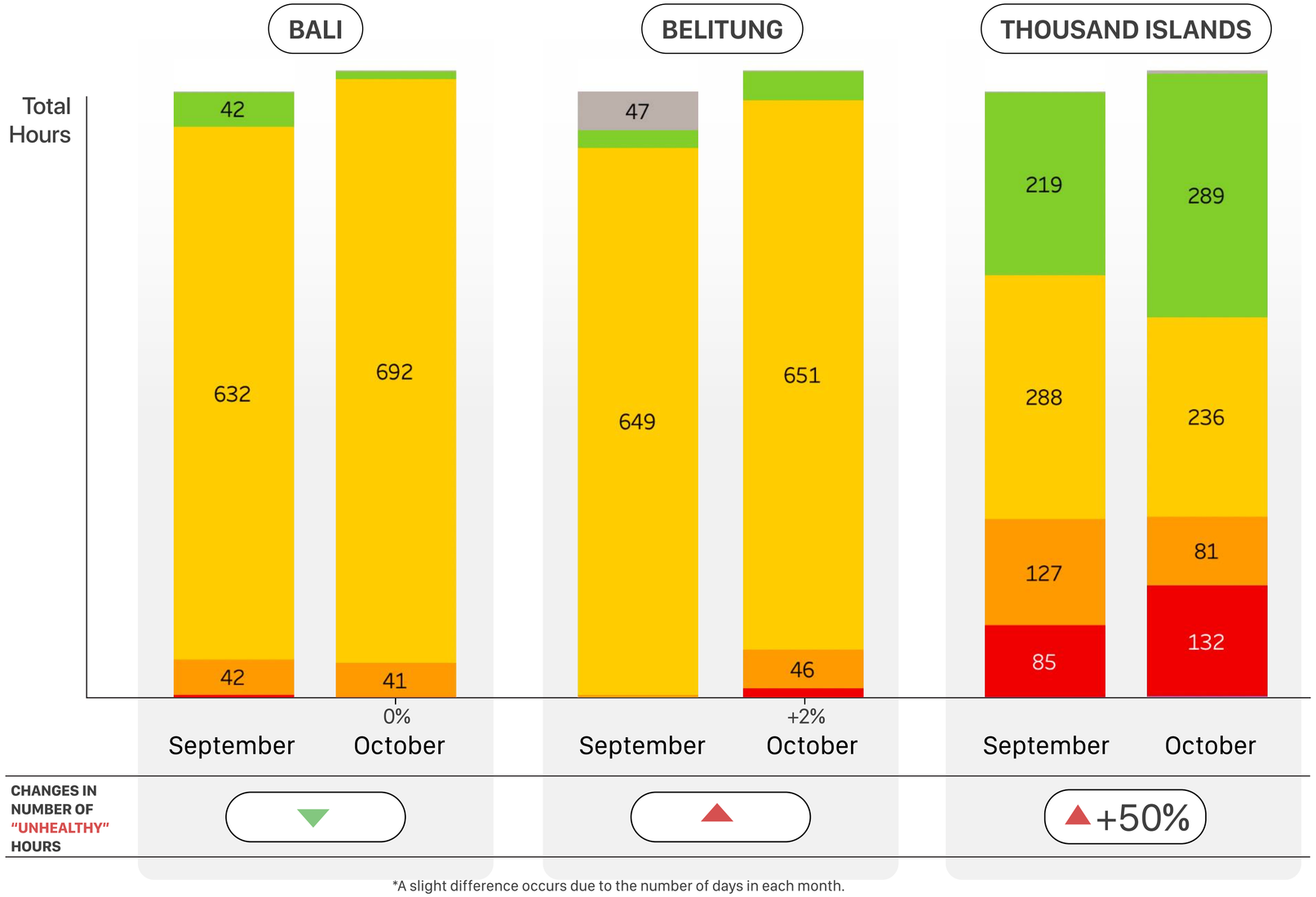
High Pollution Levels Also Rise in Tourist Destinations!

These three archipelagos are popularly known as "Healthy" air destinations in the Nafas sensor network.

Regrettably, **Belitung and the Thousand Islands** do not always maintain **"Healthy"** air quality. An increase in the number of **"Unhealthy"** air quality hours has been observed.

If you're planning a trip, ensure to consistently monitor the air quality.

- Good
- Moderate
- Unhealthy for Sensitive Group
- Unhealthy



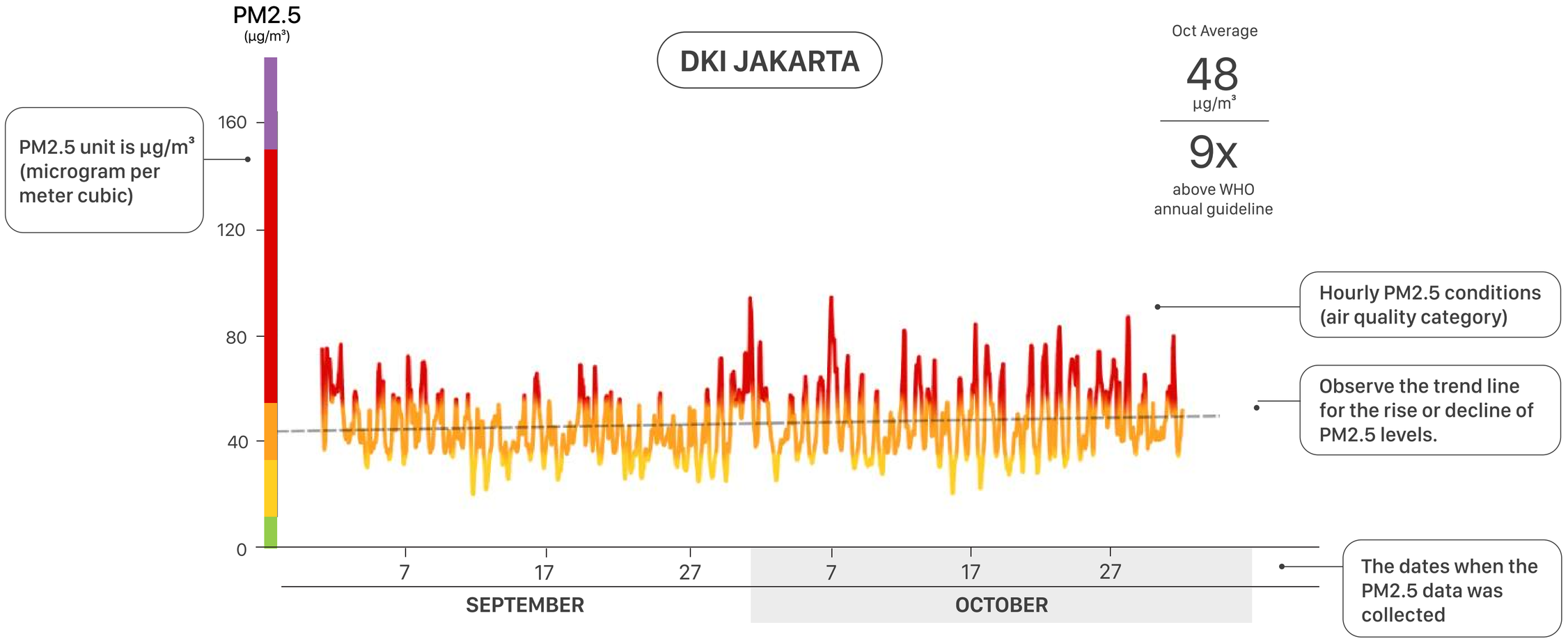
*A slight difference occurs due to the number of days in each month.

INSIGHT
№ 2

High Pollution Returns in October!

nafas

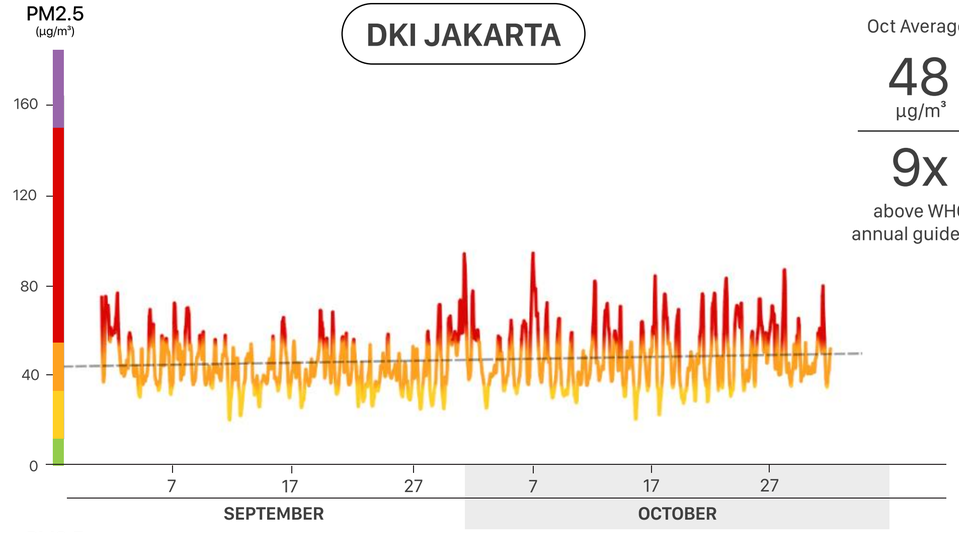
Brief Guide to Understanding the Insight Data



INSIGHT
№ 2

After A Brief Improvement, High Pollution Levels Have Returned in October!

DKI JAKARTA

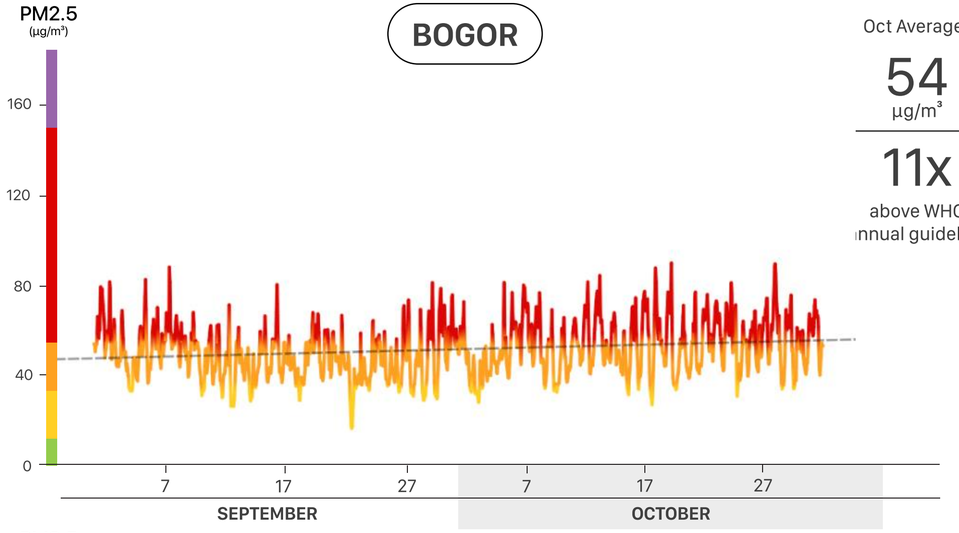


Oct Average

48
µg/m³

9x
above WHO
annual guideline

BOGOR

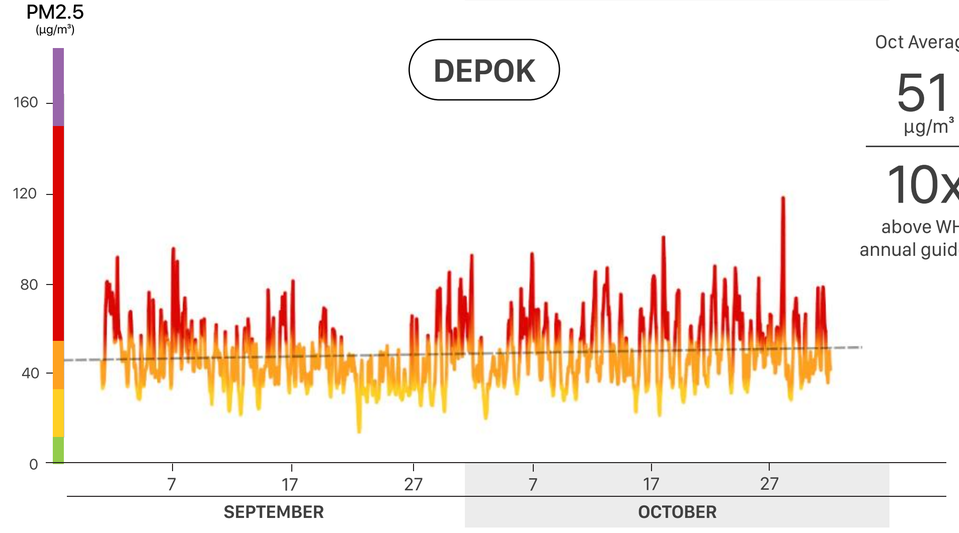


Oct Average

54
µg/m³

11x
above WHO
annual guideline

DEPOK

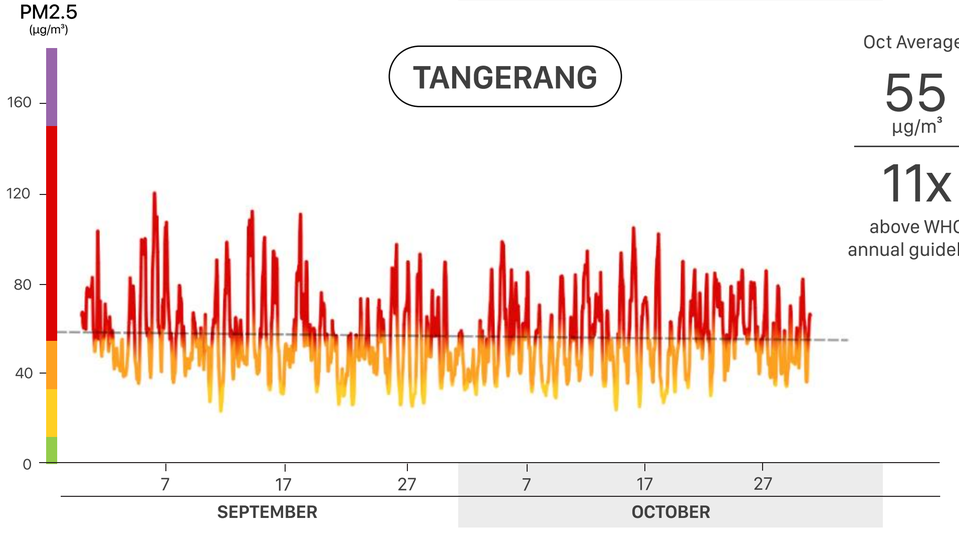


Oct Average

51
µg/m³

10x
above WHO
annual guideline

TANGERANG



Oct Average

55
µg/m³

11x
above WHO
annual guideline

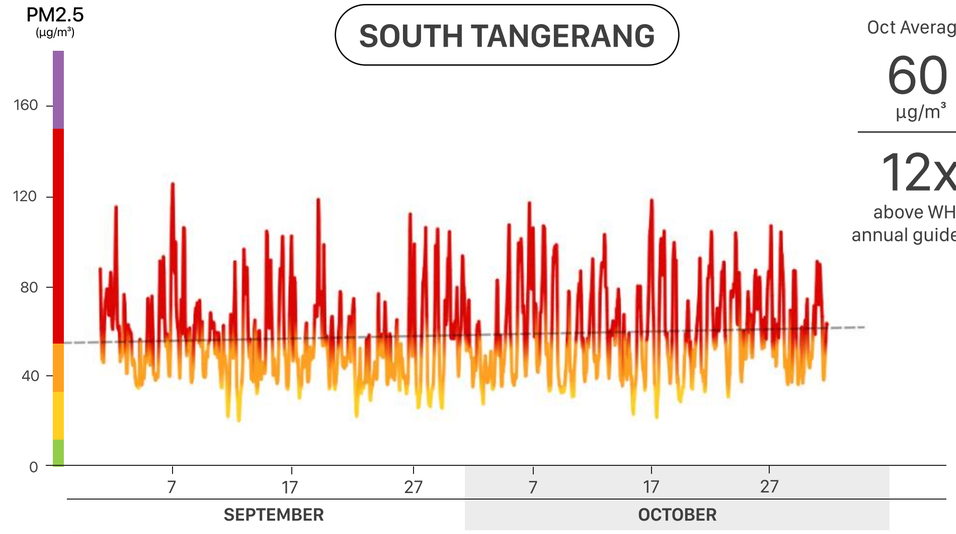
Good · Moderate · Unhealthy for Sensitive Groups · Unhealthy · Very Unhealthy

*) WHO Guideline = Annual exposure limits

INSIGHT
№ 2

South Tangerang Experiences Frequent High Pollution for the Past Two Months

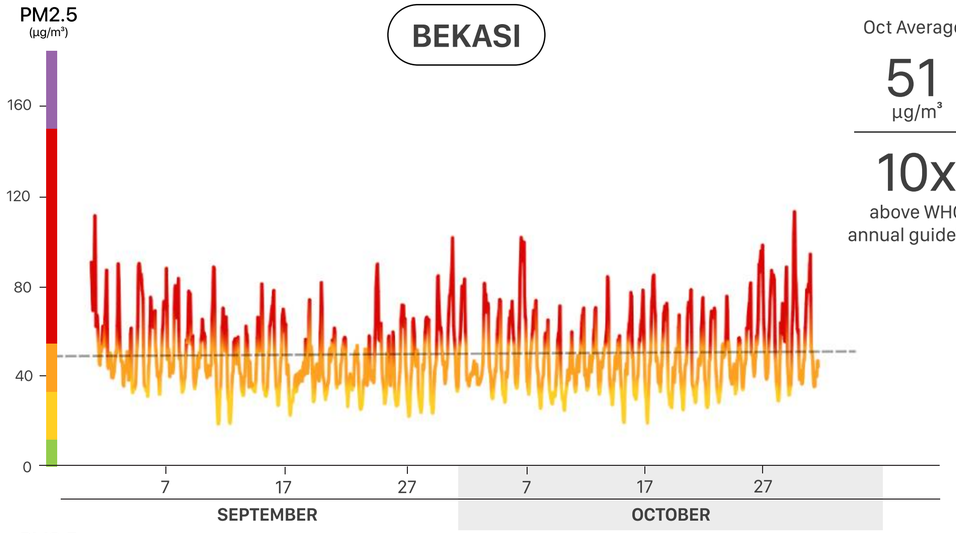
SOUTH TANGERANG



Oct Average
60
µg/m³

12x
above WHO
annual guideline

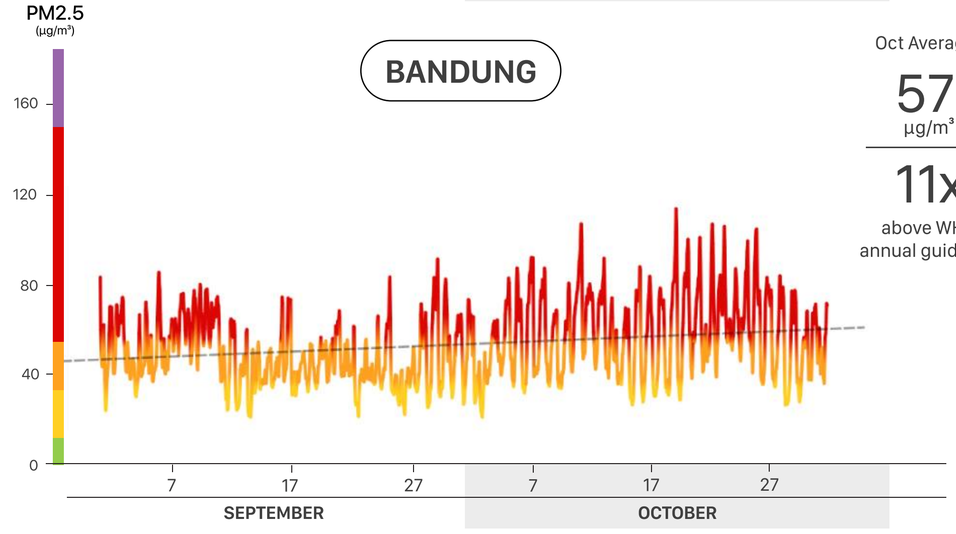
BEKASI



Oct Average
51
µg/m³

10x
above WHO
annual guideline

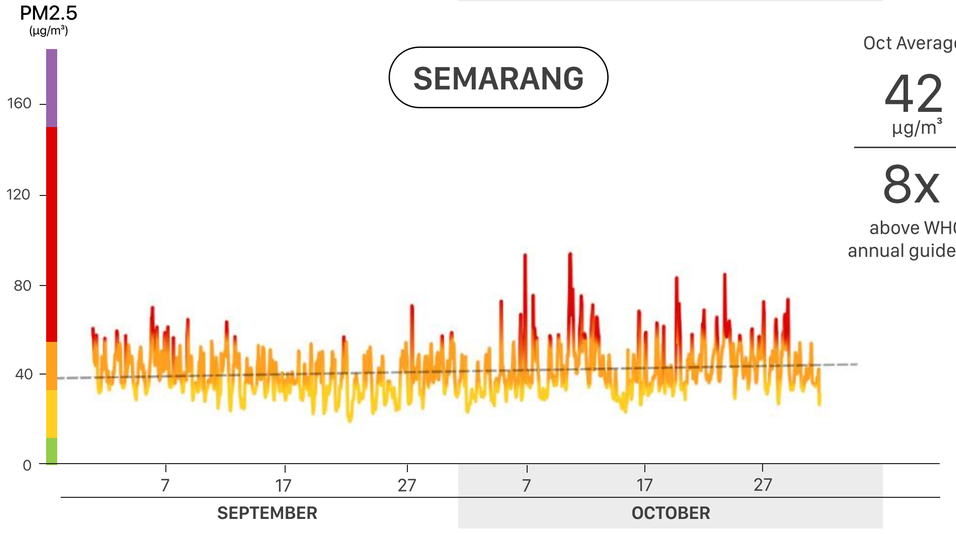
BANDUNG



Oct Average
57
µg/m³

11x
above WHO
annual guideline

SEMARANG



Oct Average
42
µg/m³

8x
above WHO
annual guideline

Good · Moderate · Unhealthy for Sensitive Groups · Unhealthy · Very Unhealthy

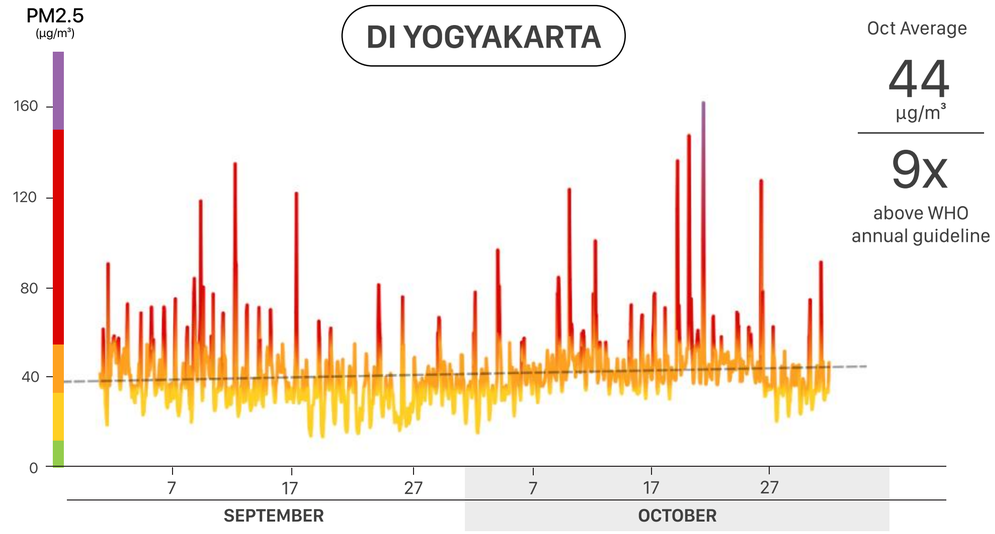
*) WHO Guideline = Annual exposure limits

INSIGHT
№ 2

Malang and Yogyakarta Increasingly Face High Pollution

nafas

DI YOGYAKARTA



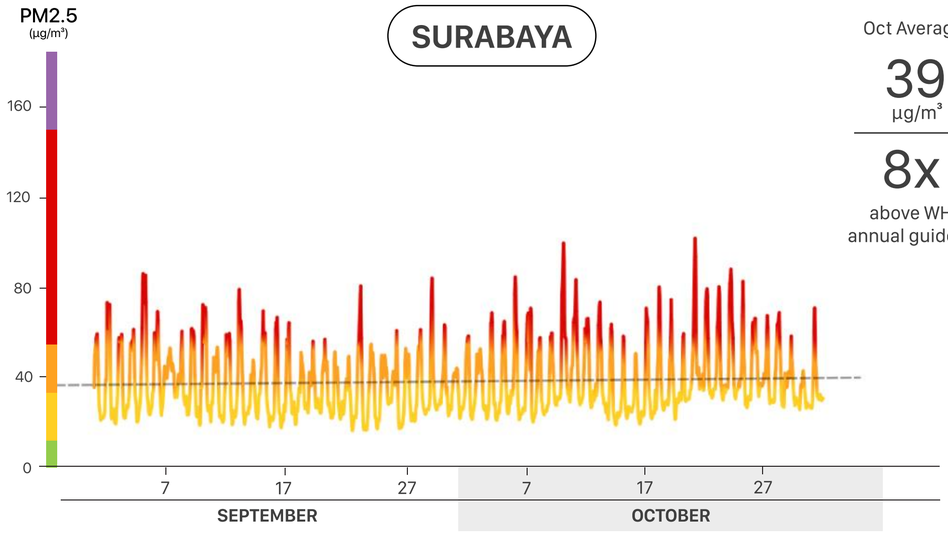
Oct Average

44 µg/m³

9x

above WHO annual guideline

SURABAYA



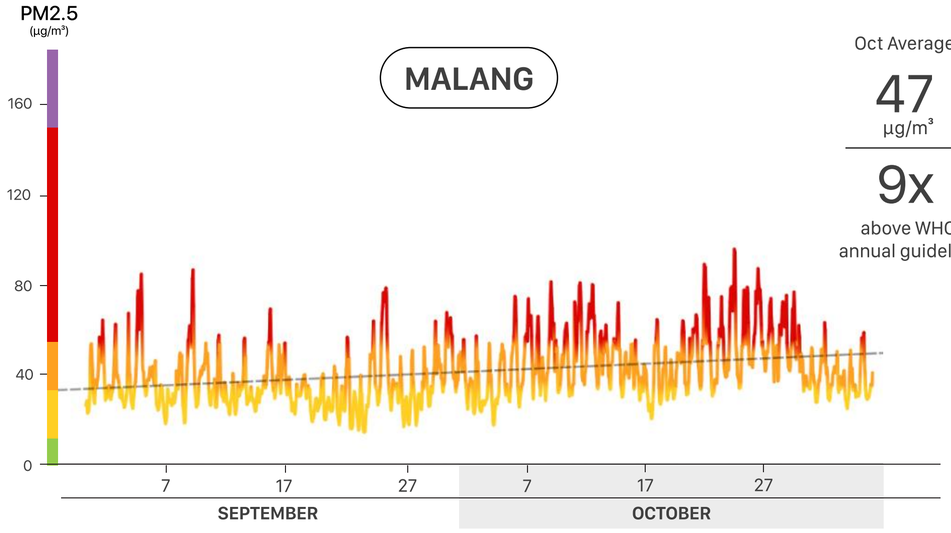
Oct Average

39 µg/m³

8x

above WHO annual guideline

MALANG



Oct Average

47 µg/m³

9x

above WHO annual guideline

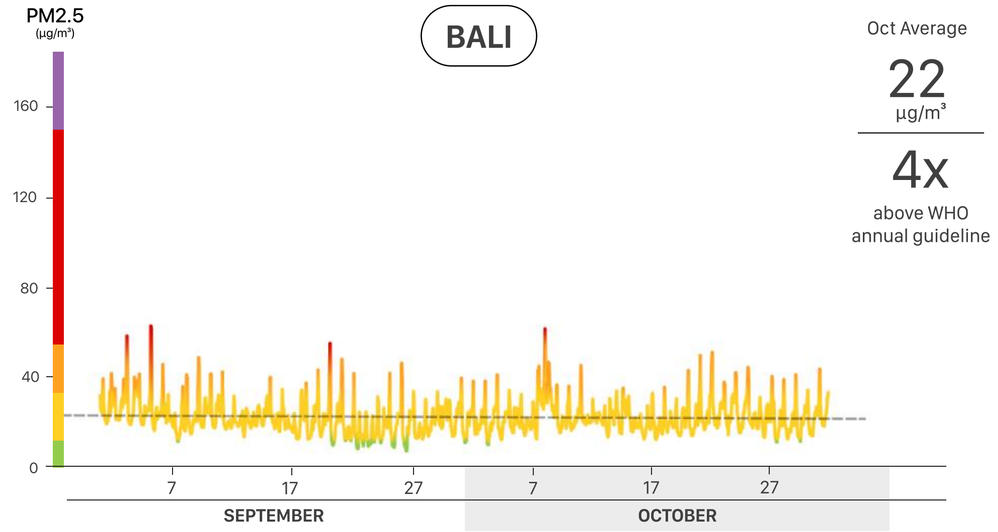
Good · Moderate · Unhealthy for Sensitive Groups · Unhealthy · Very Unhealthy

*) WHO Guideline = Annual exposure limits

INSIGHT
№ 2

Poor Air Quality in the Thousand Islands Often Occurs in the Morning!

BALI

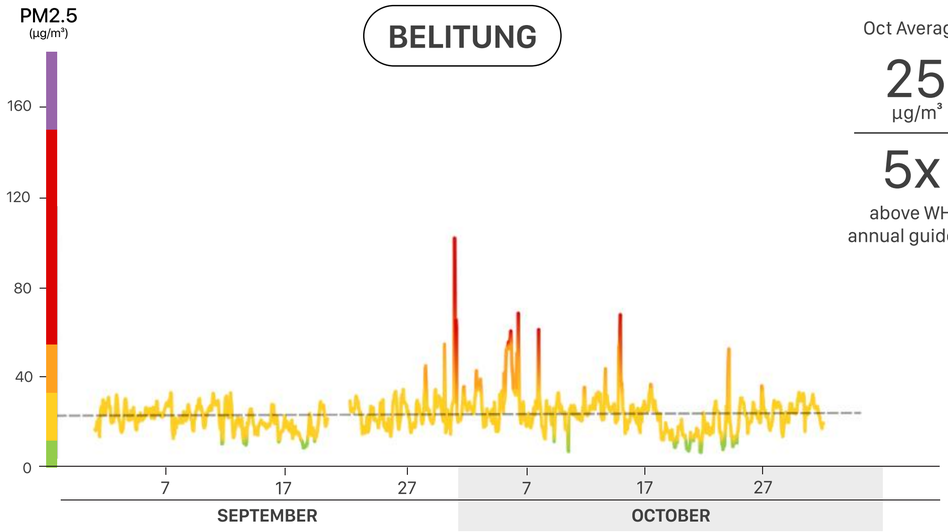


Oct Average

22
µg/m³

4x
above WHO
annual guideline

BELITUNG

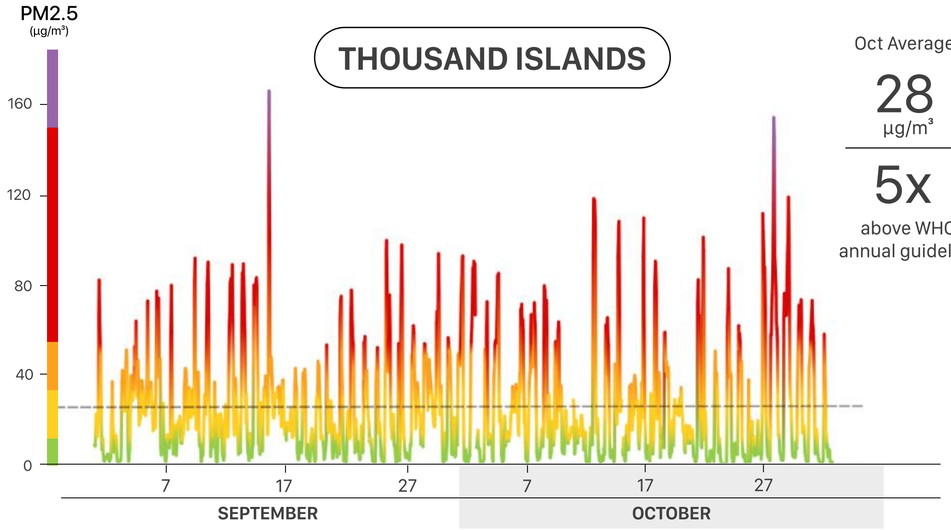


Oct Average

25
µg/m³

5x
above WHO
annual guideline

THOUSAND ISLANDS



Oct Average

28
µg/m³

5x
above WHO
annual guideline

Good | Moderate | Unhealthy for Sensitive Groups | Unhealthy | Very Unhealthy

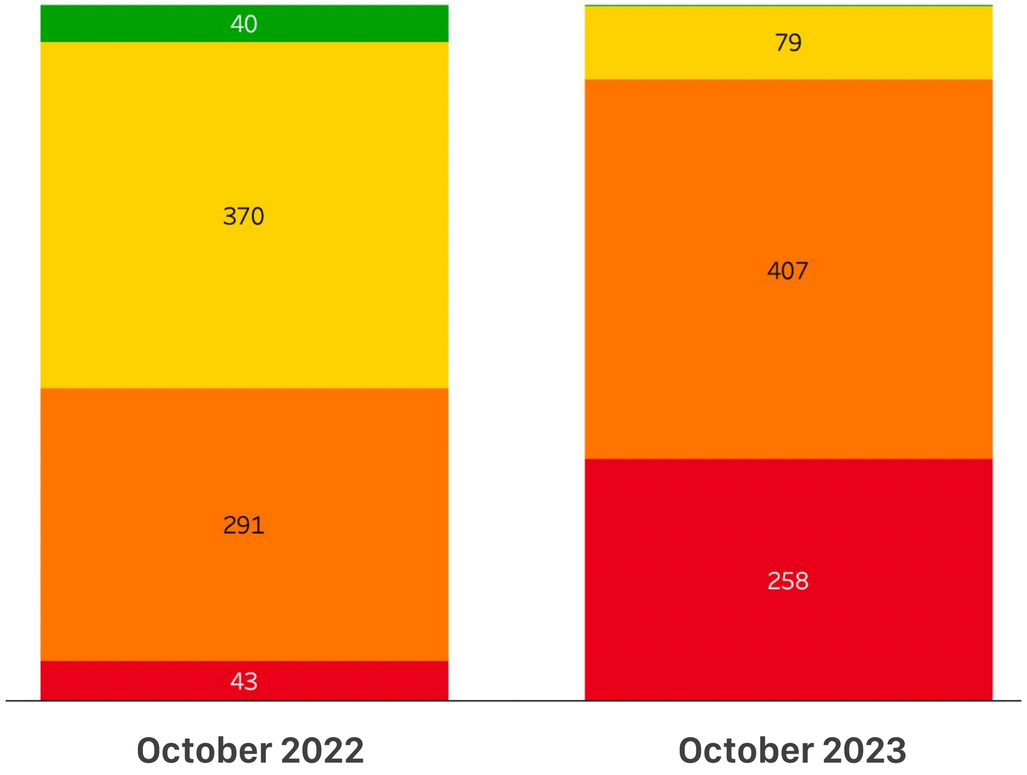
*) WHO Guideline = Annual exposure limits

INSIGHT
№ 3

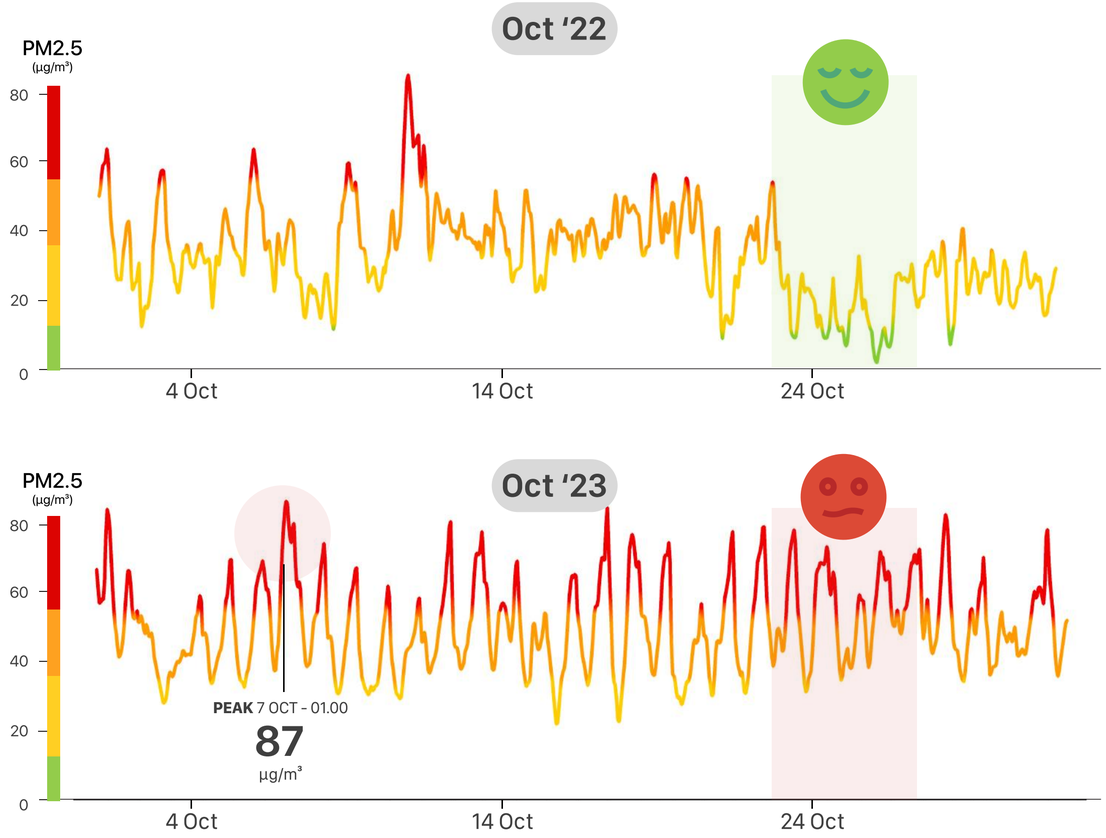
This October's Air Pollution is 50% Higher Than Previous Year!

There is a significant difference in air quality between this October and the previous year. The infrequent and uneven rainfall has contributed to the more frequent occurrence of "Unhealthy" air in the Jabodetabek area. Is this the true level of pollution?

Numbers of "Unhealthy" Hours
October 2022 & October 2023

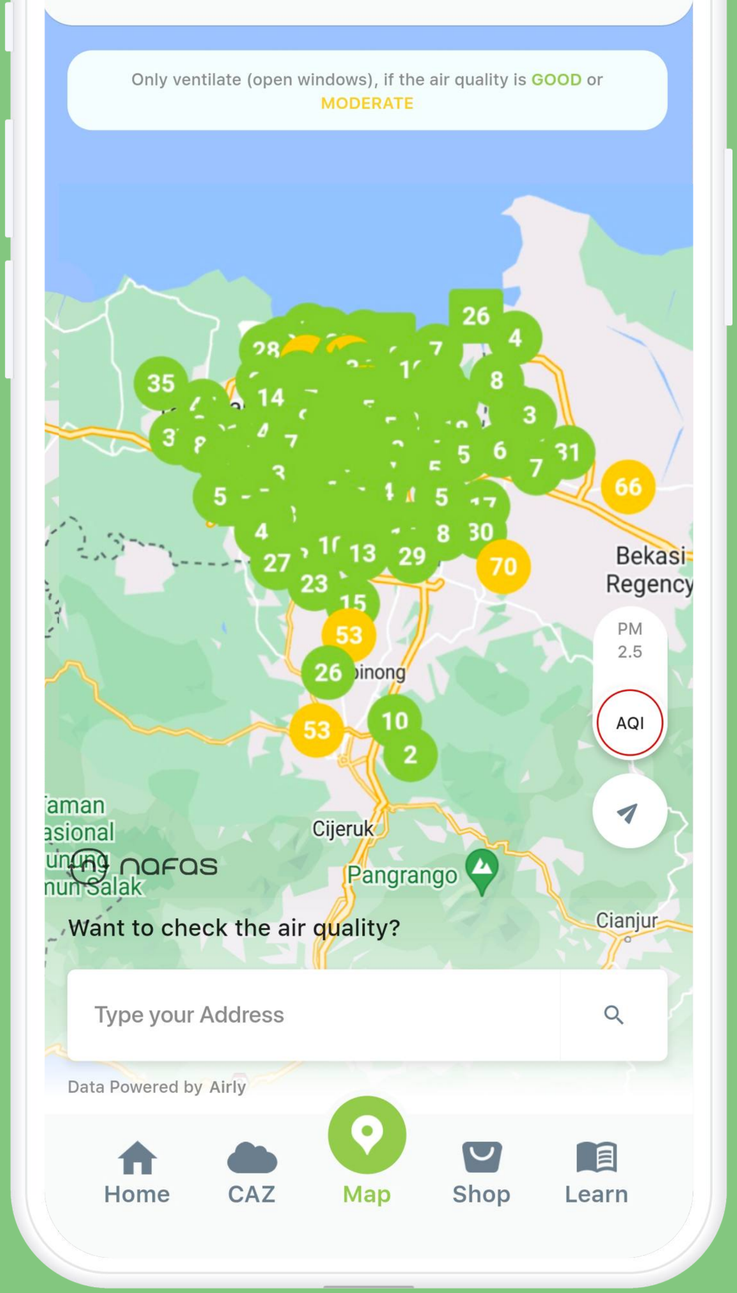


PM2.5 in Jabodetabek
October 2022 vs October 2023



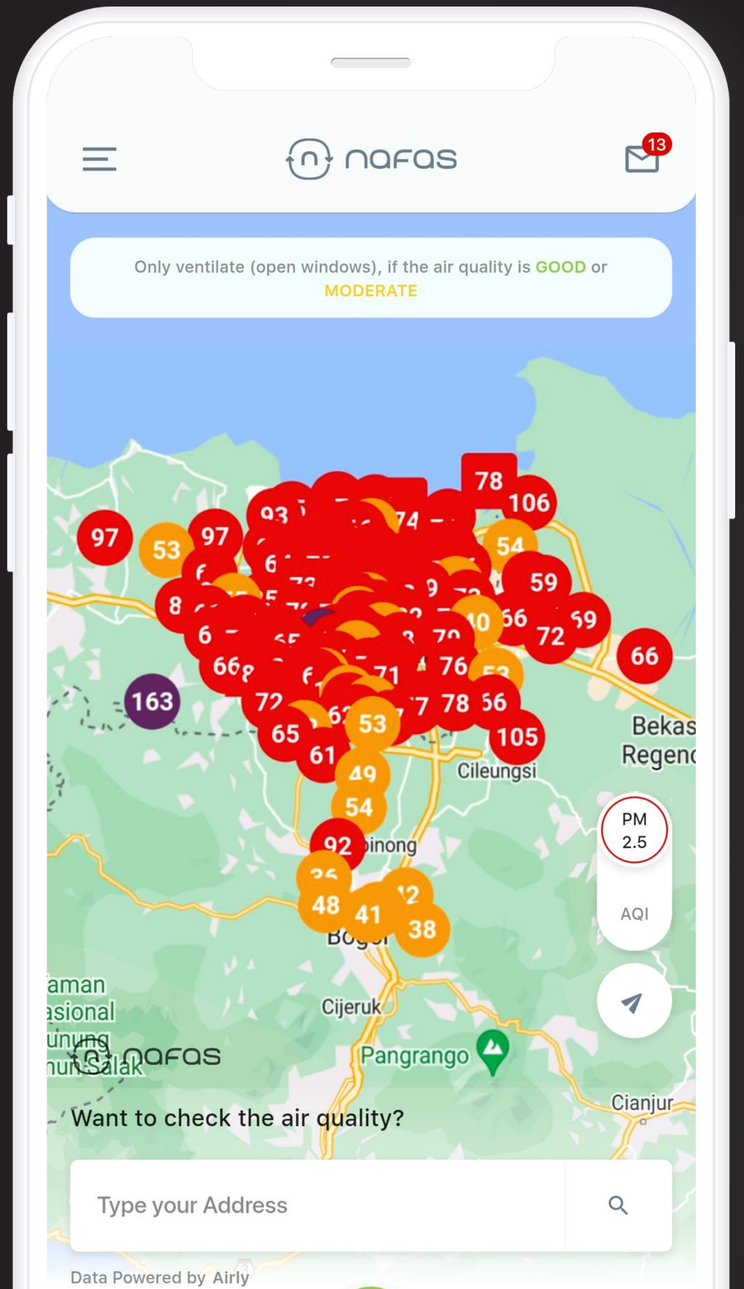
Good · Modetate · Unhealthy for Sensitive Groups · Unhealthy · Very Unhealthy

INSIGHT
№ 3



26 October 2022 — 03.00 WIB

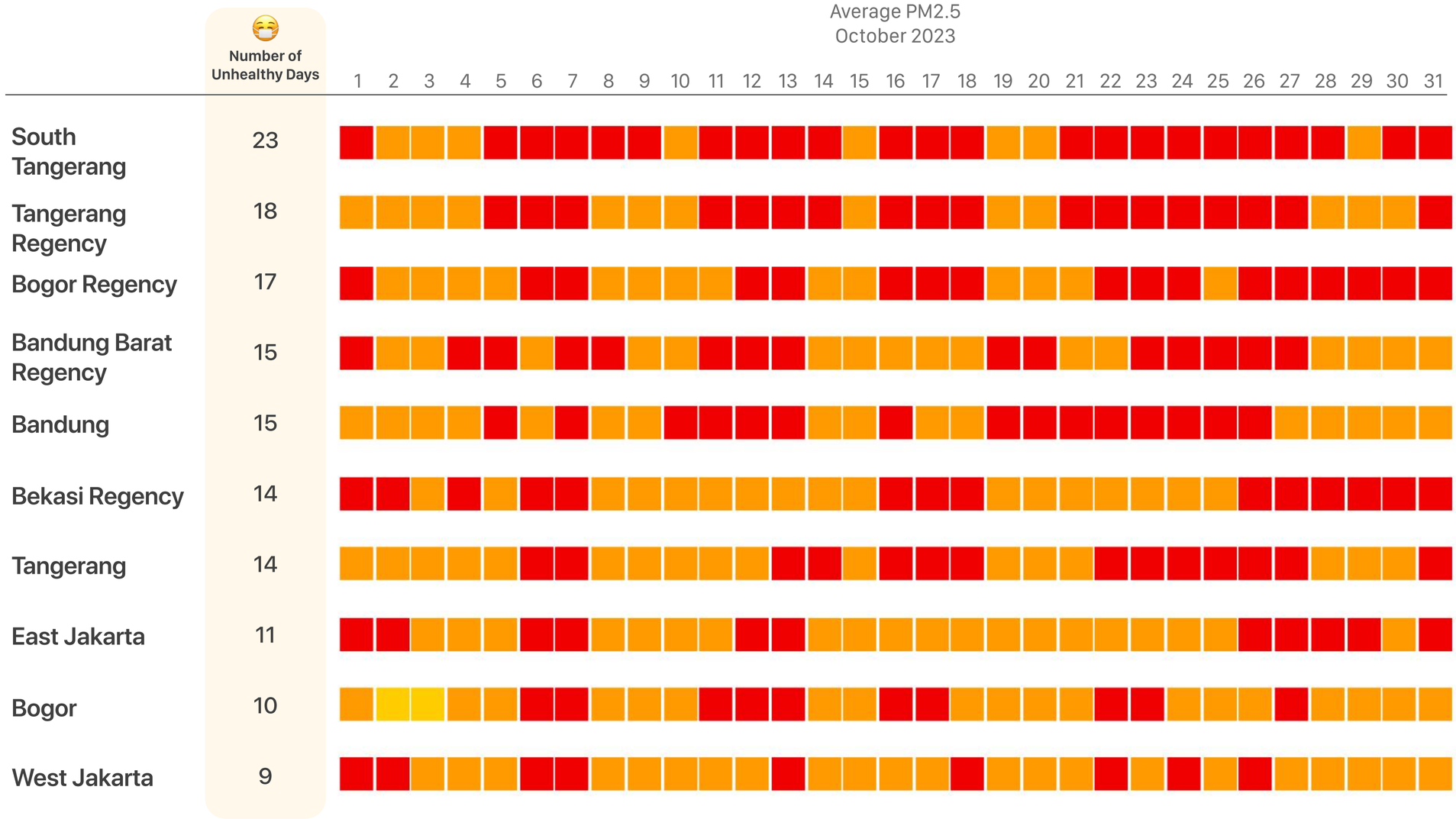
26 October 2023 — 03.00 WIB



INSIGHT
№ 3

How Bad Was the Air Pollution This October?

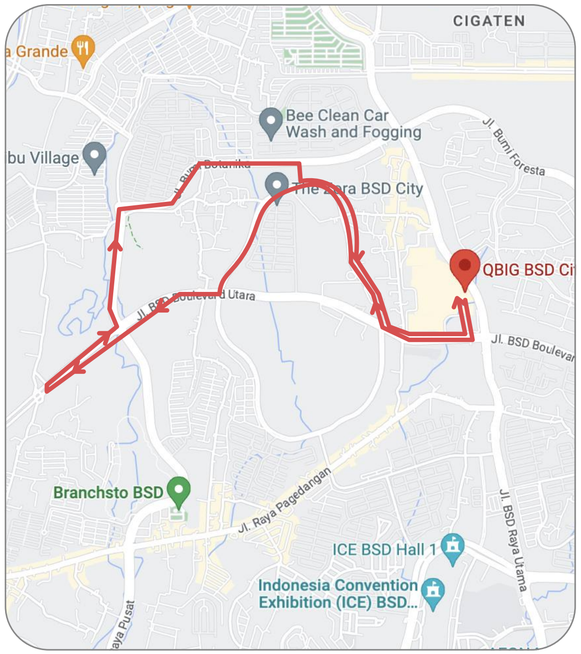
Throughout October, the western part of **Greater Jakarta,** including **South Tangerang, Tangerang Regency, and Bogor Regency,** experienced "Unhealthy" air quality for **17 to 23 days.**



INSIGHT
№ 4

Running a Marathon During High Pollution: More Health Benefits or Risks?

Two major marathon events were held in mid-October in **Banten and Jakarta**, coinciding with the car-free day (Sunday). With the reduced number of motor vehicles, does it imply that the air quality was satisfactory and pollution levels low? The Nafas sensor network in Banten revealed high air pollution levels along **both marathon routes from 03:00 AM to 11:00 AM**. The PM2.5 levels ranged from **44 µg/m³ (Unhealthy for Sensitive Groups) to 117 µg/m³ (Unhealthy).**



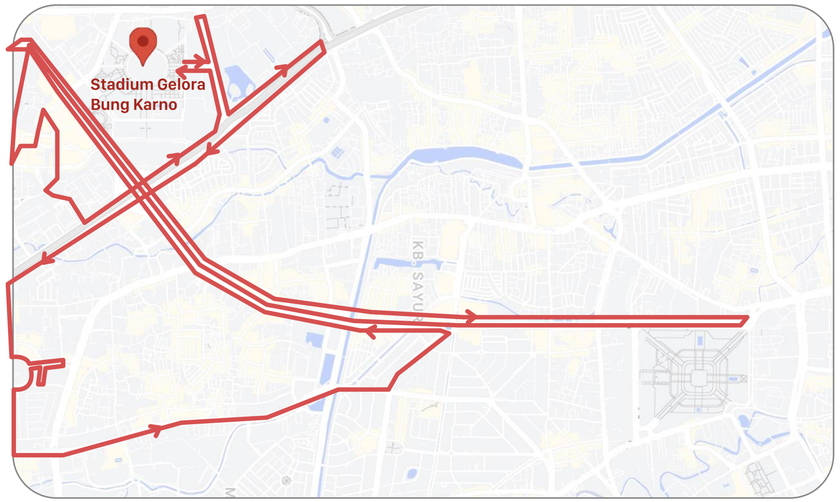
PM2.5 in Banten Region
October 22nd, 2023

	03.00	04.00	05.00	06.00	07.00	08.00	09.00	10.00	11.00
Lengkong Gudang Timur	102	102	115	116	105	90	72	63	60
Lengkong Wetan	91	99	105	117	111	80	66	61	58
Sampora	101	106	106	94	95	79	63	56	53
Serpong Utara	66	80	90	92	88	64	50	48	44

Good · Modetate · Unhealthy for Sensitive Groups · Unhealthy · Very Unhealthy

INSIGHT
№ 4

Running a Marathon During High Pollution: More Health Benefits or Risks?



PM2.5 in DKI Jakarta Region
October 22nd, 2023

	03.00	04.00	05.00	06.00	07.00	08.00	09.00	10.00	11.00
Gelora	81	76	80	81	83	79	66	60	67
Karet Semanggi	79	75	78	79	84	72	60	58	60
Kuningan Timur	60	58	63	64	64	61	51	48	51
SCBD	84	82	84	86	87	82	68	61	63
Senopati	58	60	61	62	62	56	47	42	49
Setia Budi	64	56	61	63	66	62	52	48	45

Good · Modetate · Unhealthy for Sensitive Groups · Unhealthy · Very Unhealthy

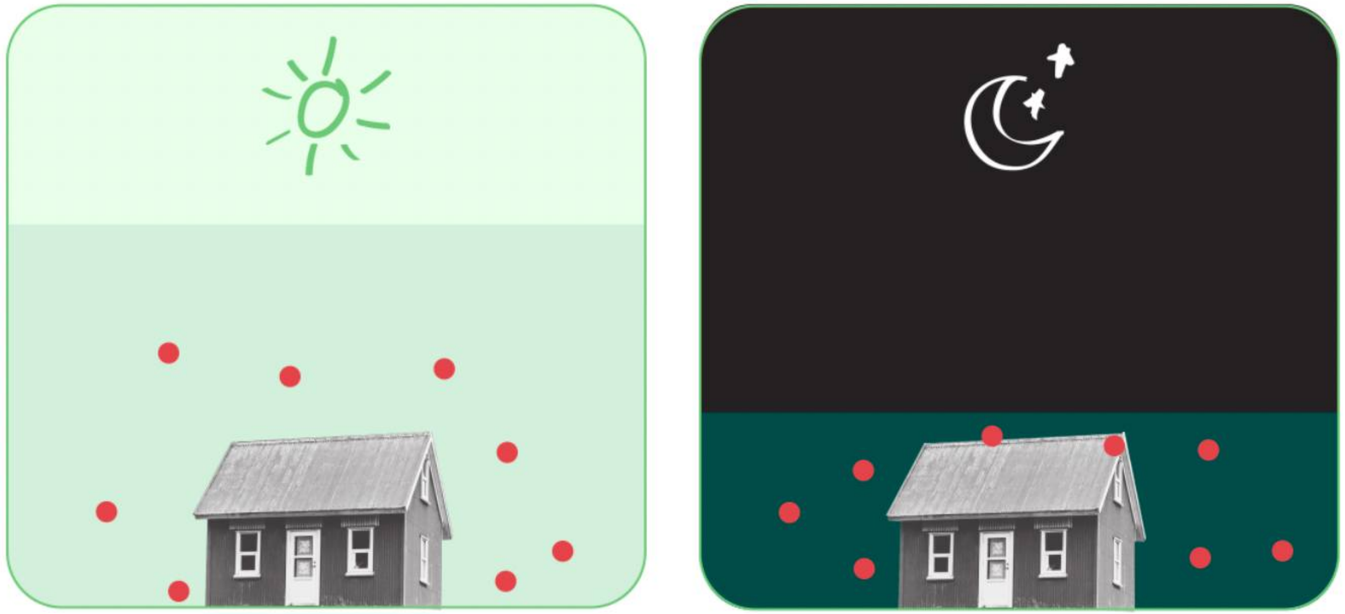
INSIGHT
№ 4

Running a Marathon During High Pollution: More Health Benefits or Risks?

Why are pollution levels high in the morning despite the lack of vehicles? What's the cause?

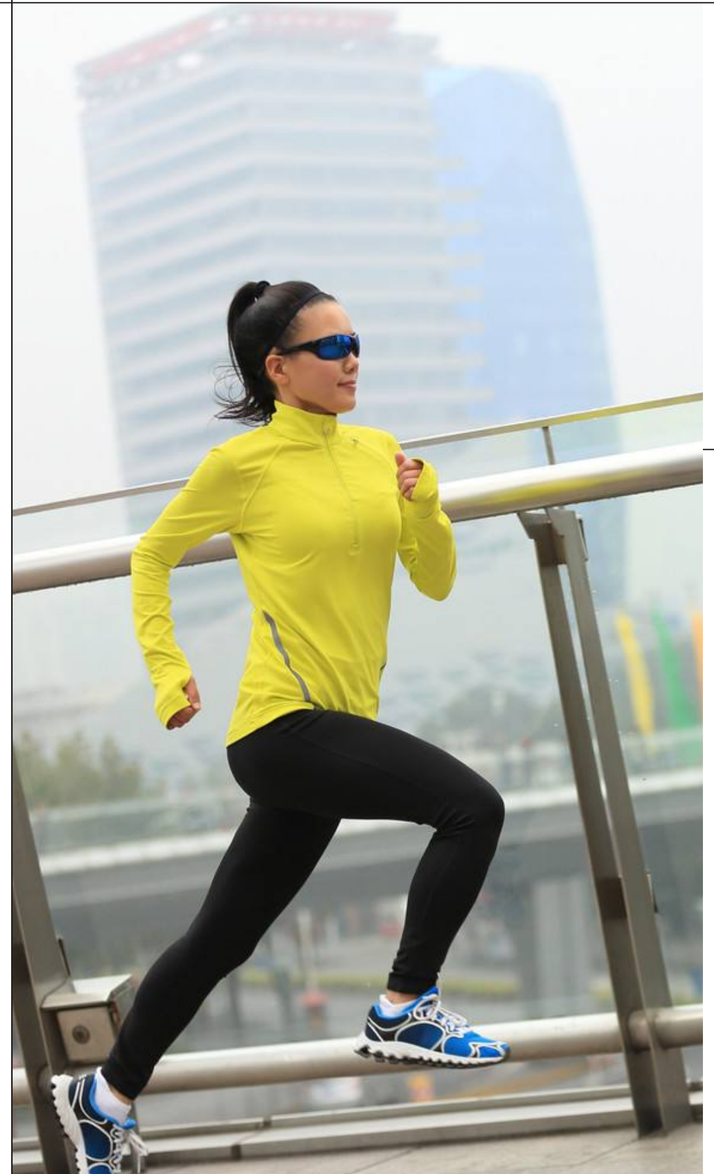
The change in the **Planetary Boundary Layer (PBL)**, which varies between day and night, contributes to fluctuations in air pollution levels.

In the morning, when the PBL is lower, PM2.5 **pollutants tend to accumulate near the surface, resulting in high pollution readings.**



INSIGHT
№ 4

Running a Marathon During High Pollution: More Health Benefits or Risks?



"Exercising outdoors when air pollution levels are high can trigger short-term health risks, particularly for sensitive groups or those with a history of pulmonary and cardiac diseases.

— dr Efriadi, Sp. P(K),
Pulmonologist and Respiratory Medicine Specialist

Study from Seoul National University:

Adults (ages 25-30) who regularly exercise outdoors for 10 years in areas with PM2.5 levels above 26 µg/m³ have a

higher risk of developing heart disease

compared to those who do not exercise at all.

INSIGHT
№ 5

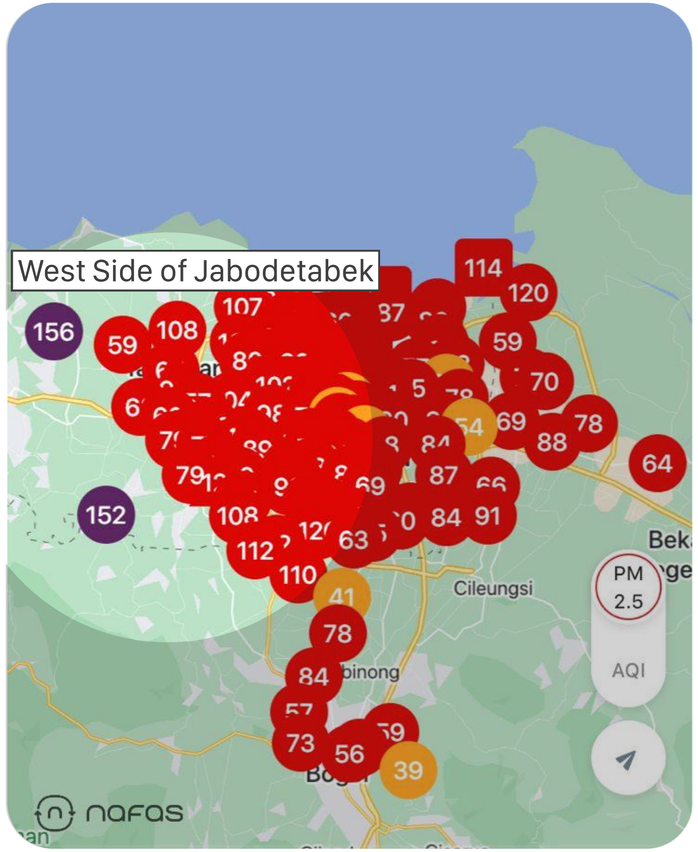
Two Weeks of Fires Make Rawa Kucing Landfill a Major Pollution Contributor in Tangerang and Surrounding Areas

The Rawa Kucing landfill is one of the 30 landfills that have caught fire this year. The fire began on Friday, October 20th in the afternoon and was only brought under control by Wednesday, November 1st, 2023.

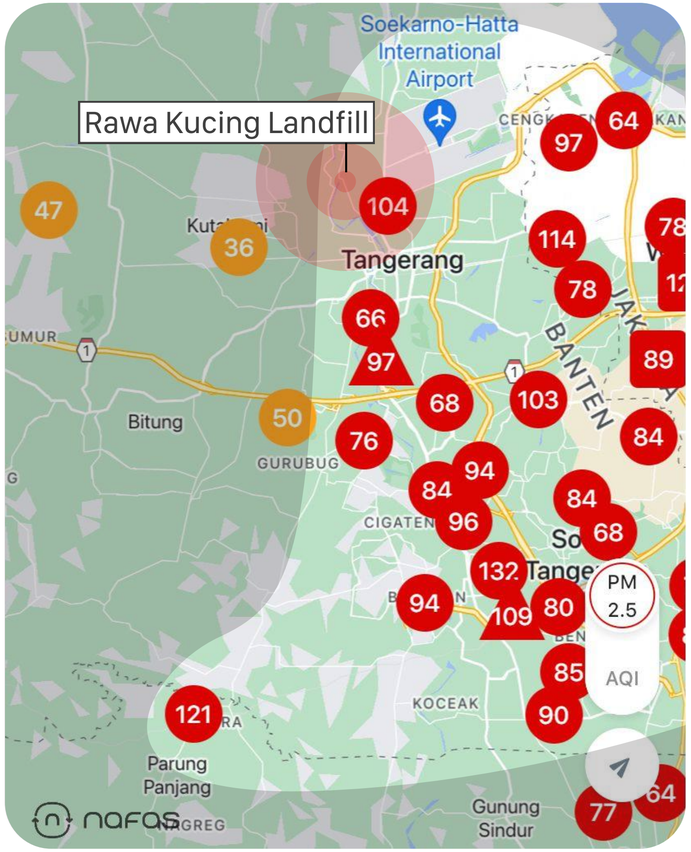
- Good
- Moderate
- Unhealthy for Sensitive Group
- Unhealthy
- Very Unhealthy

PM2.5 in Jabodetabek

October 21st, 2023 — 07.19 WIB



October 23rd, 2023 — 06.38 WIB

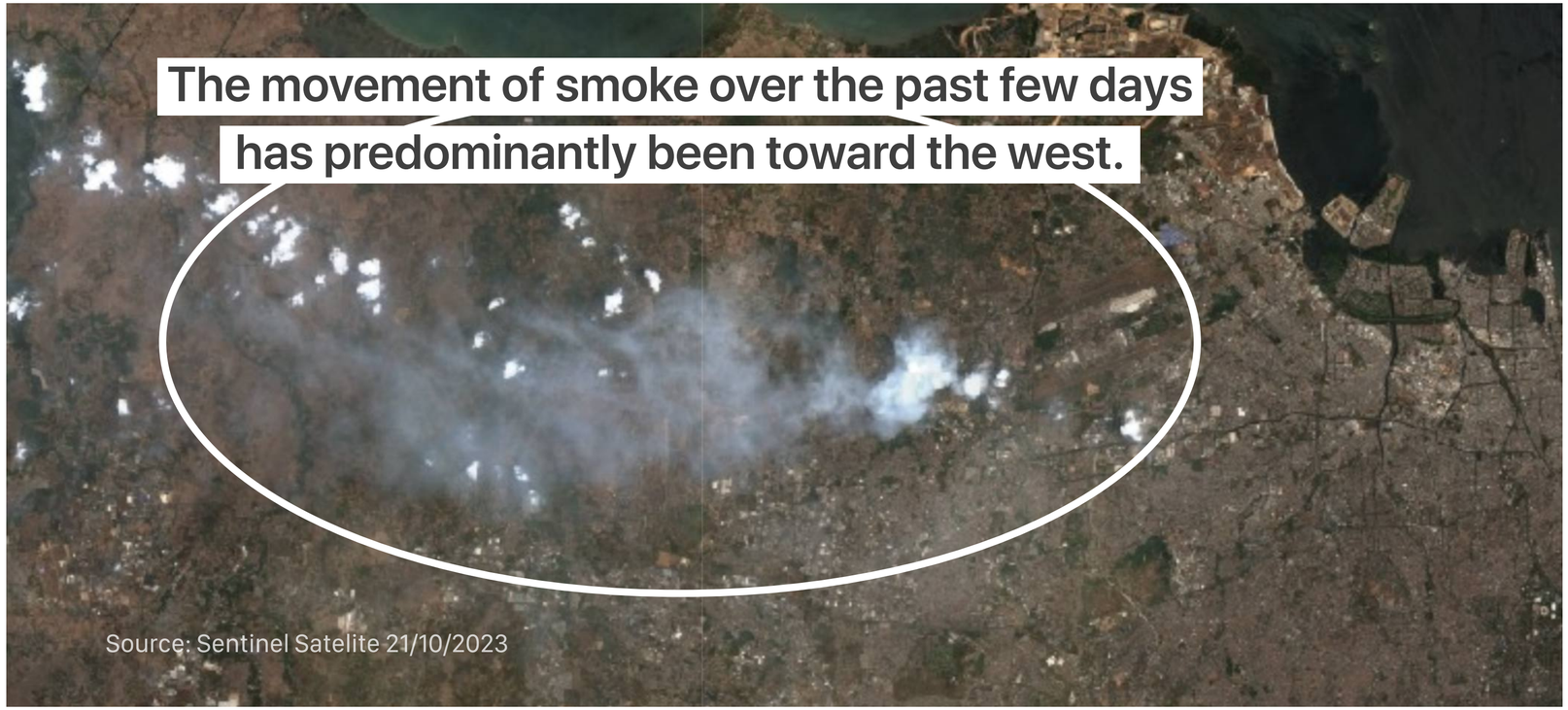


INSIGHT
№ 5

Two Weeks of Fires Make Rawa Kucing Landfill a Major Pollution Contributor in Tangerang and Surrounding Areas

Satellite observations by the Nafas team detected **smoke movement predominantly towards the west, exacerbating air pollution in the areas surrounding the fire**. Several areas on the **western side of Greater Jakarta** experienced **'Unhealthy' (red) to 'Very Unhealthy' (purple)** air quality levels at times.

From this incident, it is evident that the **Rawa Kucing landfill fire in Tangerang has significantly impacted the air quality of the surrounding region.**



INSIGHT
№ 6

Bantargebang Landfill Fire, Did It Affect the Air Quality of Surrounding Regions?

On October 29, around 13.45 WIB, Bantargebang, the largest Integrated Waste Treatment Site (TPST) in Indonesia, caught fire.

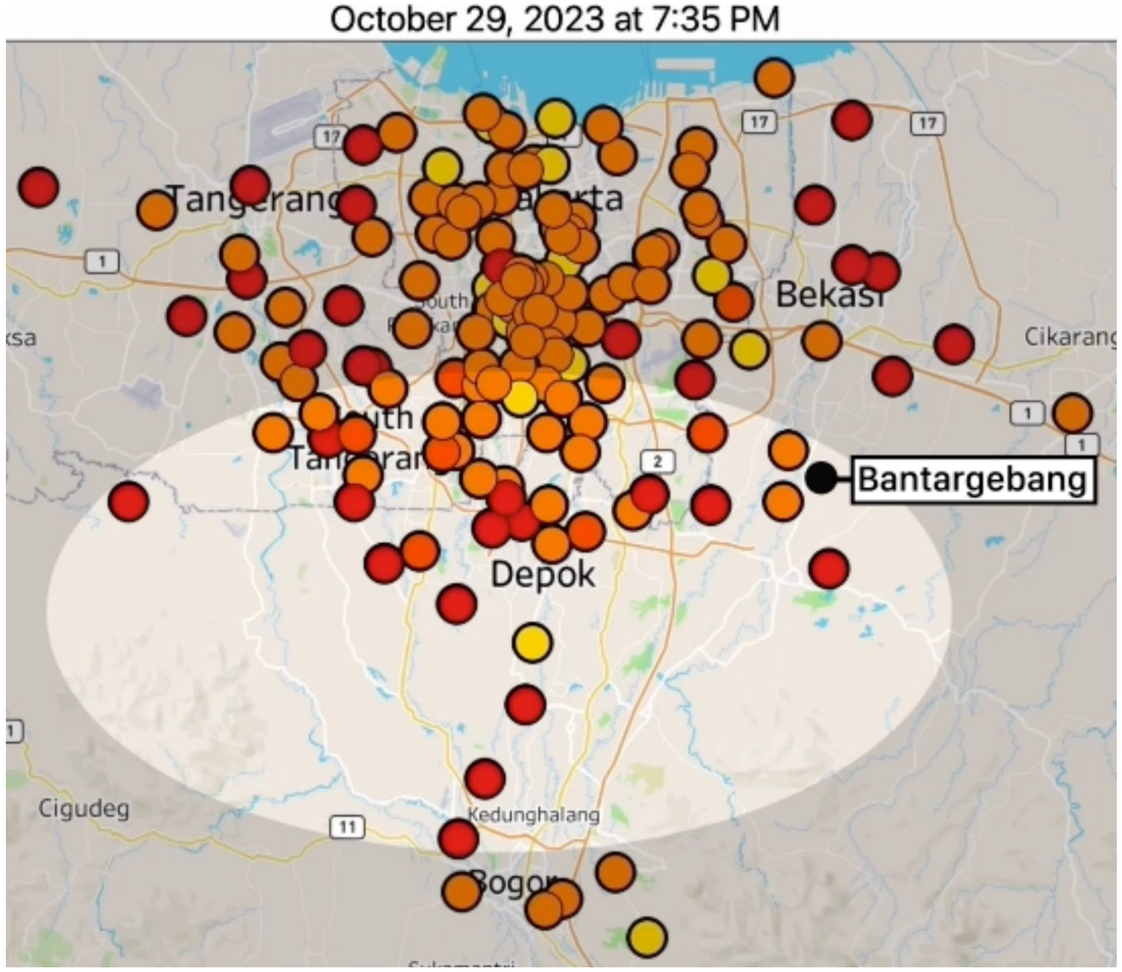
What happens when Indonesia's largest landfill, spanning 108 hectares and equivalent in volume to a 16-story building, burns? The impact, given the scale, is bound to be significant.

The Nafas sensor network detected fluctuations in air pollution levels across the Greater Jakarta area from 1:00 PM to 8:00 PM, **reaching "Unhealthy" levels.**

During the fire incident, **strong winds blew towards the Southwest,** leading the Nafas sensor network to detect an **increase in PM2.5 concentration levels in the Greater Jakarta area.**

The regions most affected by the smoke from the Bantargebang landfill fire included **Greater Bogor, Tangerang, South Tangerang, and Depok.**

Air Quality Worsen After the Landfill Fire



INSIGHT
№ 6

Assesing Each Presidential Candidates' Clean Air Agenda

nafas

Vote for leaders who advocate for the citizens' right to breathe clean air!

Anies - Muhaimin

Transition and creating incentive systems for **New Renewable Energy (NRE) sources**

Integrated Public Mass Transit Housing

Enforcing standards for water and air pollution control

Enforcing standards for water and air pollution control (e.g., through solar panels)

Limiting new construction and early retirement of coal-fired power plants

Reforesting and optimizing the restoration of peatlands to prevent forest fires

Electrification of various sectors, particularly **transportation and industry**

Reducing greenhouse gas emissions

Ganjar - Mahfud

Reduce Greenhouse Gas

Emissions Mitigating air pollution from **vehicle and industrial emissions**

Implementing comfortable, safe, and **environmentally friendly public transportation**

Utilizing **New Renewable Energy (NRE)**

Transitioning **towards Net Zero**

Integrated waste management

Emissions Development of green spaces

Prabowo - Gibran

Sustainable Development

Retire coal-fired power plants based on principles of fairness and balance

Develop alternative biofuels such as bioethanol (from cassava and sugarcane), biodiesel, and bio-aviation fuel (from palm oil)

Decarbonization and acceleration towards achieving **net-zero emissions targets**

Prevent and strictly enforce actions against polluters, environmental destructors, and those responsible for forest fires

Develop **alternative green energy sources:** hydro, wind, solar, and geothermal power.

Source: Presidential Candidates' Platforms

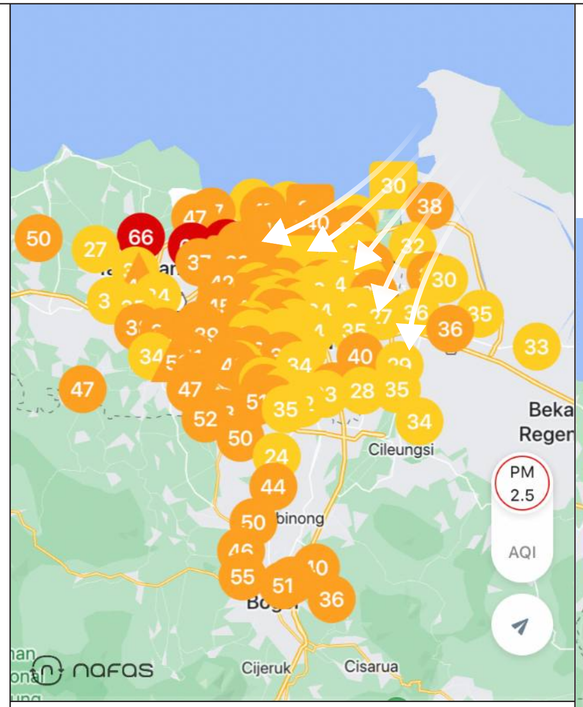
INSIGHT
№ 7

The Yin-Yang Pattern Reemerges

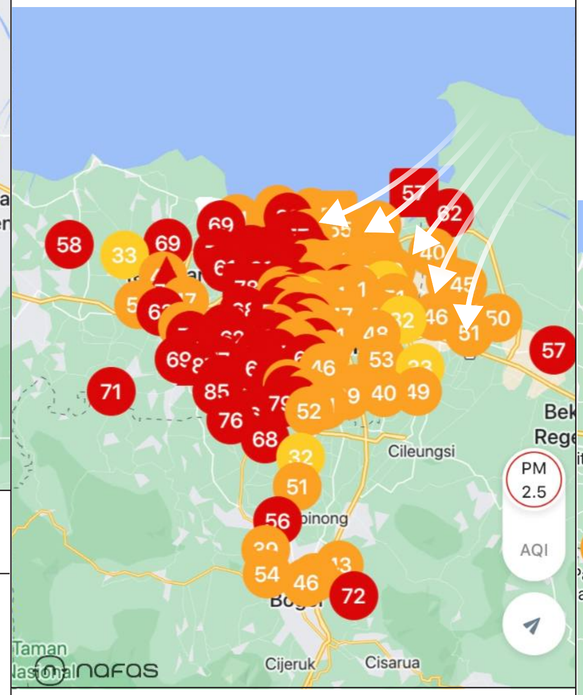
This pollution pattern often emerges towards the end of October.

On average, t**he wind direction, predominantly from the East and Northeast, has the potential to 'push' pollutants** from the East side towards the Western part of Jabodetabek, resulting in the Western side appearing more polluted than the East.

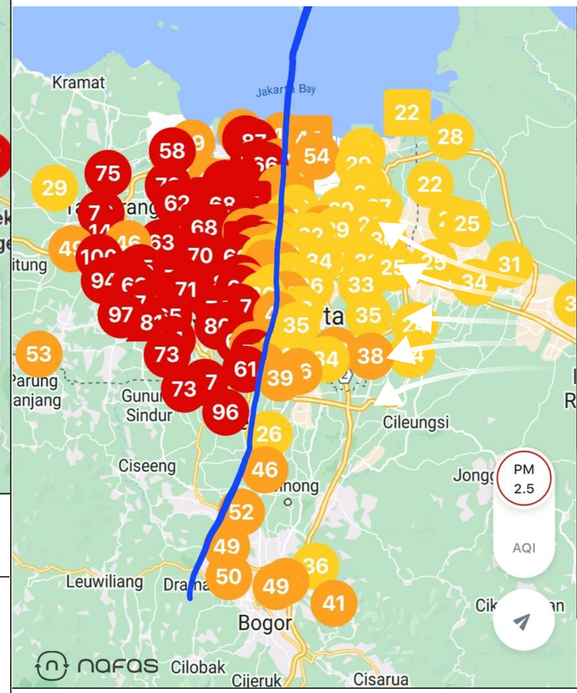
- Good
- Moderate
- Unhealthy for Sensitive Groups
- Unhealthy
- Very Unhealthy



October 7th 2023 — 17.45 WIB



October 18th 2023 — 09.18 WIB



October 22nd 2023 — 18.12 WIB
Source: @FarouqArifin

INSIGHT
№ 8

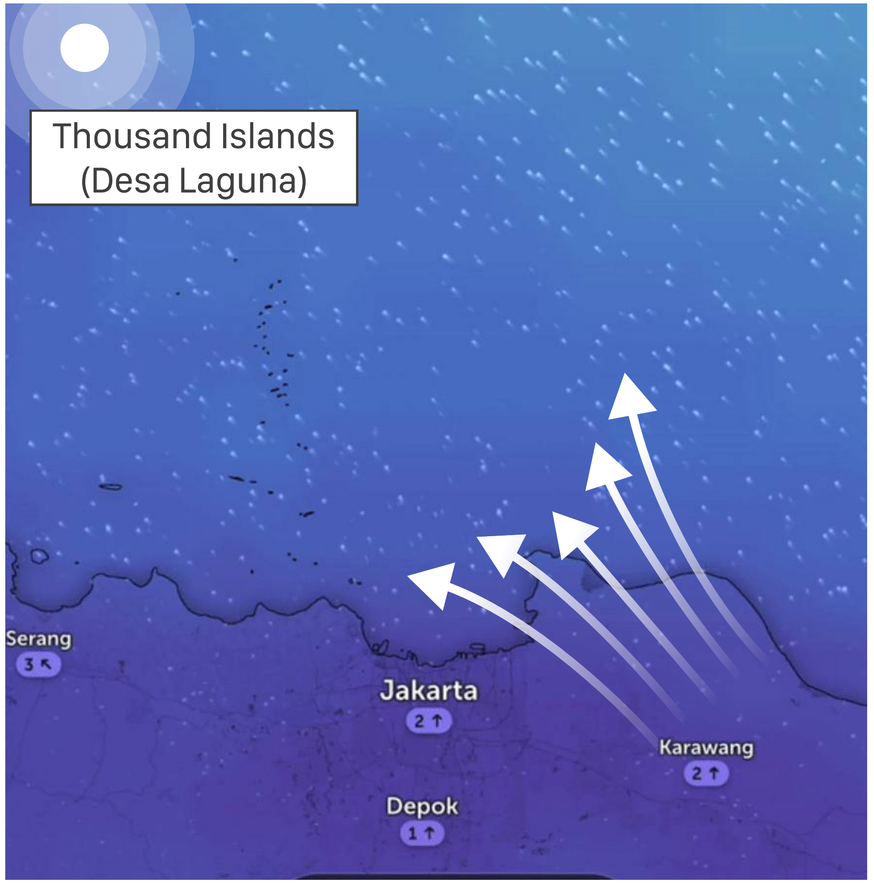
The Greater Jakarta Area Also Contributes to High Pollution in the Thousand Islands

High pollution events in the Thousand Islands **often occur in the morning.**

The increase in high pollution incidents is potentially influenced more by pollution 'contributed' by the Greater Jakarta Area, with **winds from the northeast becoming more frequent.**

- Good
- Moderate
- Unhealthy for Sensitive Groups
- Unhealthy
- Very Unhealthy

Wind Direction & PM2.5 Levels
October 26th — 07.57 WIB



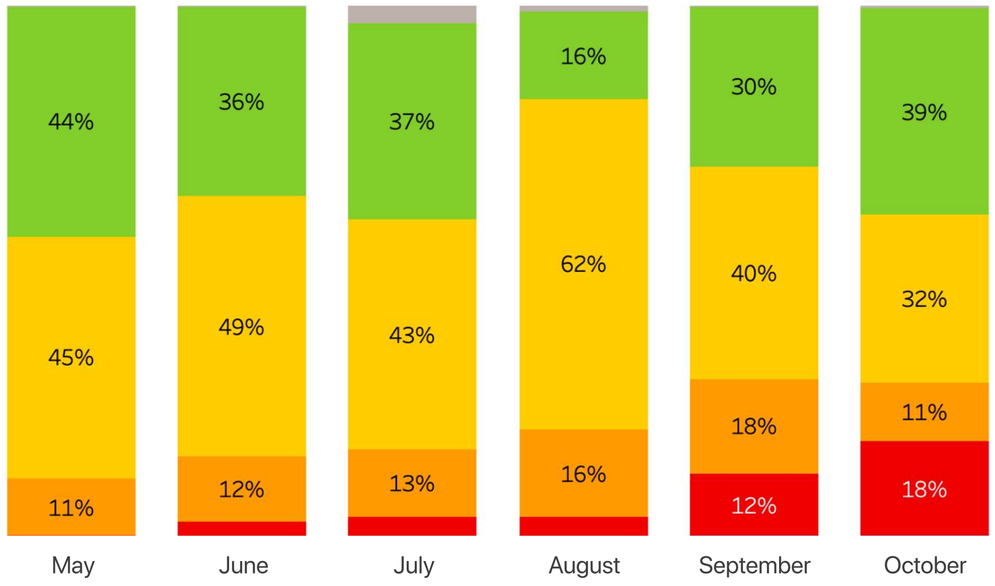
Source: earth.nullschool.net/

INSIGHT
№ 9

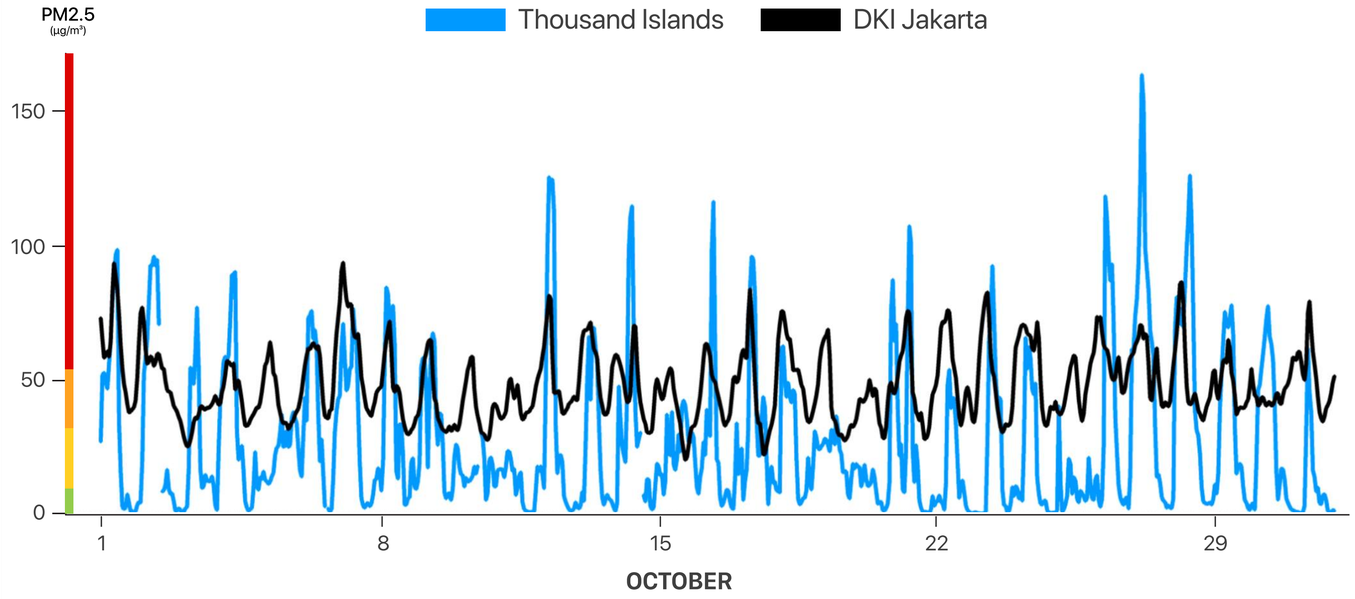
Pollution Levels in the Thousand Islands Continue to Rise

Throughout the dry season to the present, **the frequency of high pollution events (classified as "Unhealthy" air) in the Thousand Islands has been increasing**. On average, Jakarta has higher pollution concentrations compared to the Thousand Islands. However, there have been instances when pollution levels have spiked, particularly towards the end of October.

Numbers of “Unhealthy” Hours
Thousand Islands, May - October 2023



PM2.5 in Thousand Islands vs DKI Jakarta
October 2023



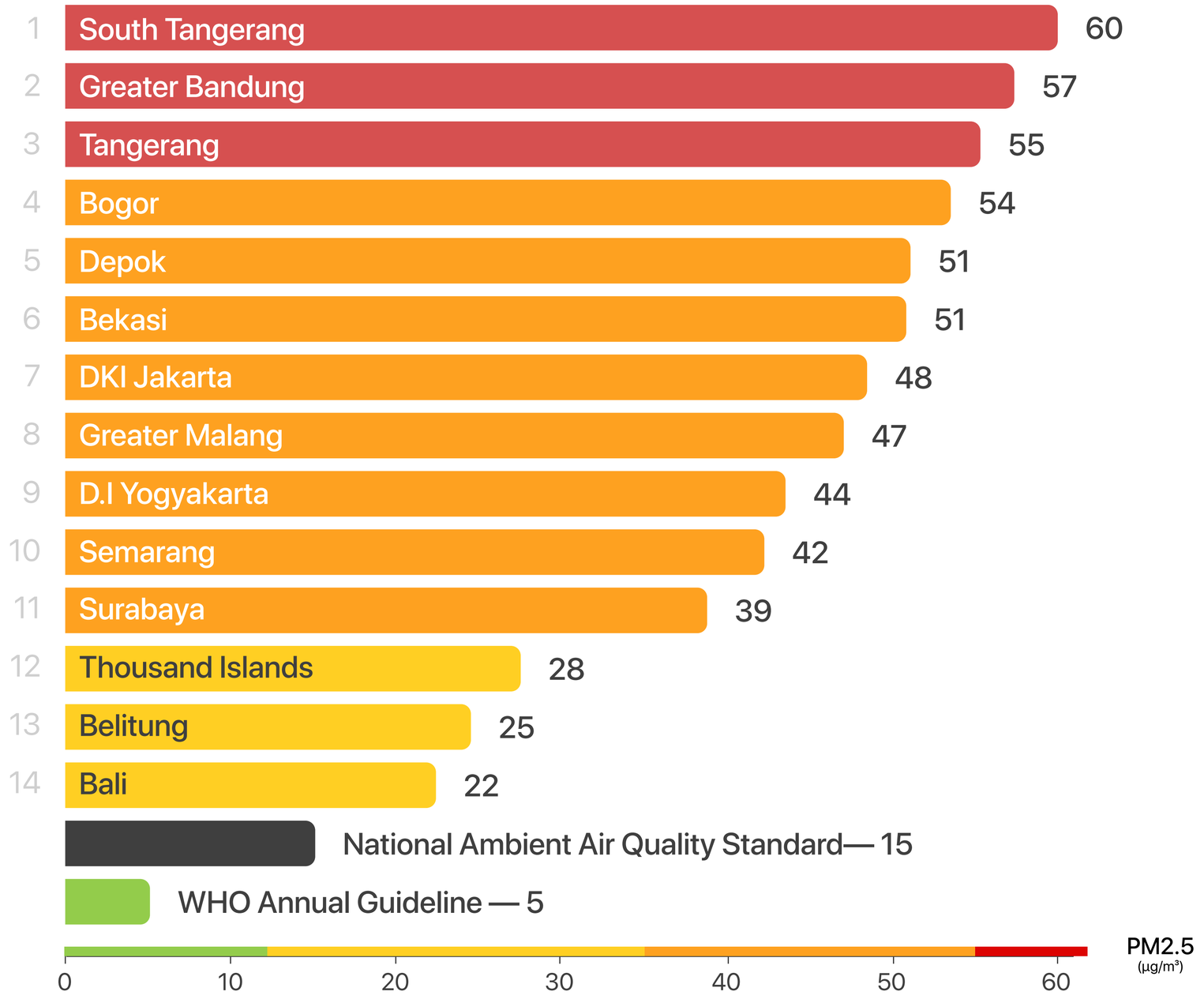
Good Moderate Unhealthy for Sensitive Group Unhealthy Very Unhealthy

04

city overview

City Rankings

This ranking is determined by the cities with the highest PM2.5 concentration levels in October 2023.



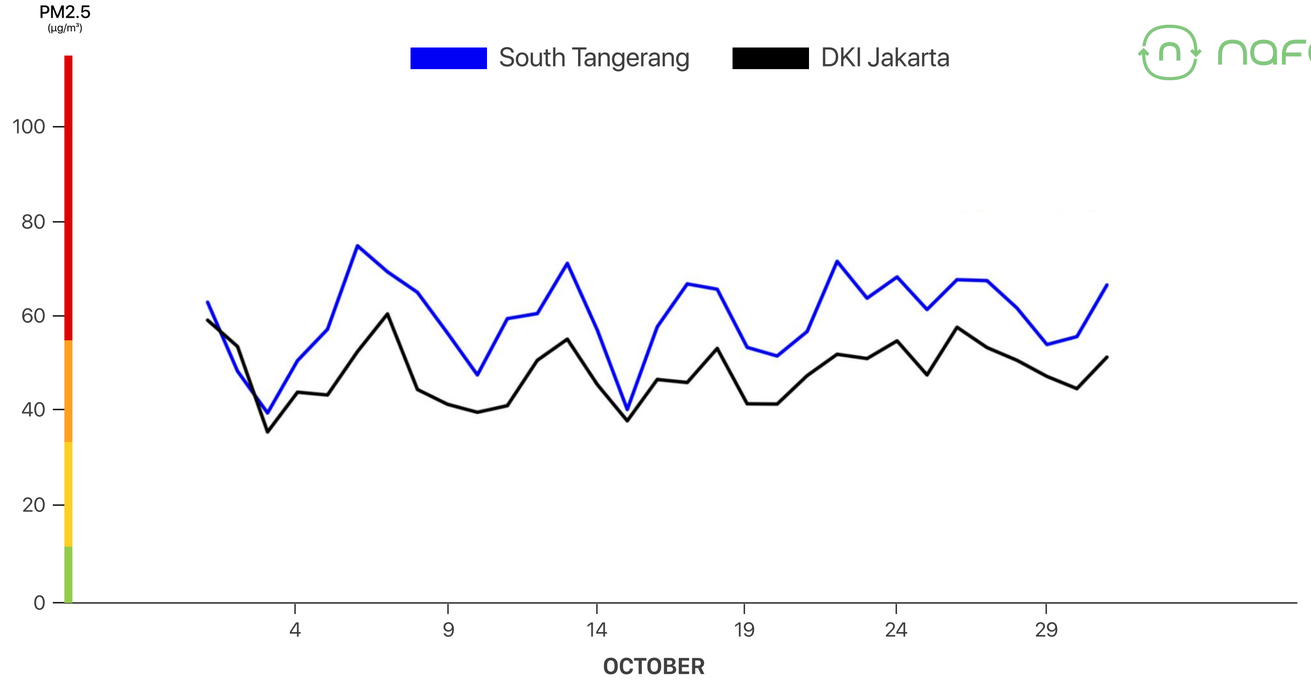
- Good
- Moderate
- Unhealthy for Sensitive Group
- Unhealthy

South Tangerang

October 2023

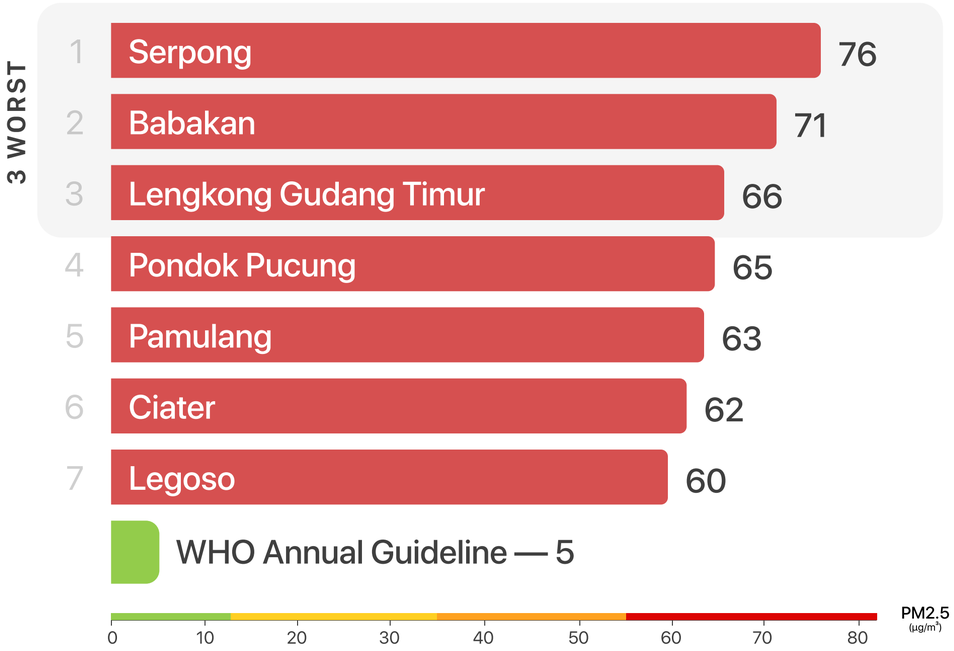
Once again claiming the title of the most polluted city, South Tangerang (Tangsel) presents alarming figures with the highest monthly average of PM2.5 recorded in Serpong, reaching 76 µg/m³.

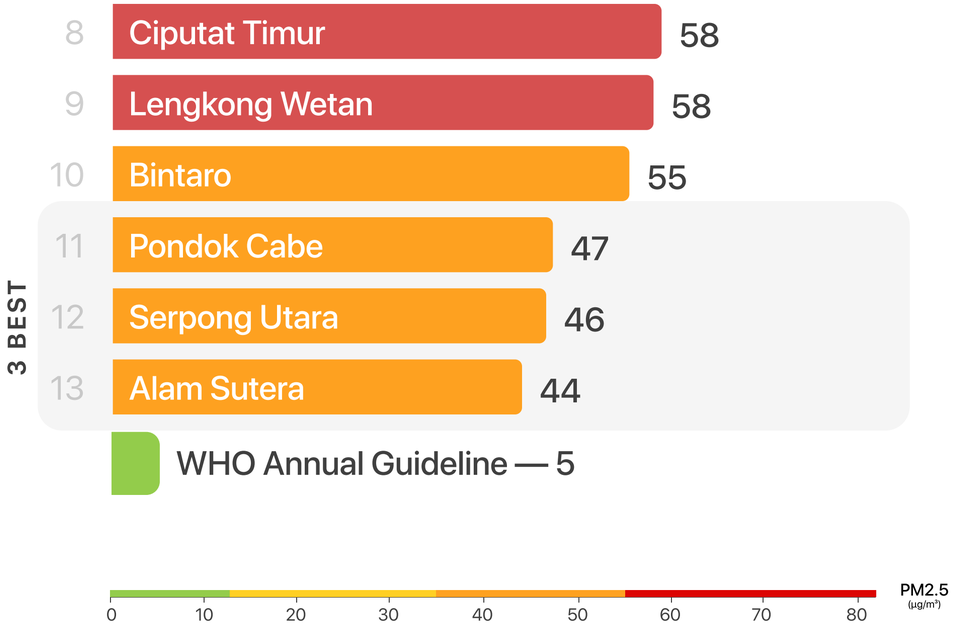
SOUTH TANGERANG VS DKI JAKARTA



24%

Worse than DKI Jakarta





- Good
- Moderate
- Unhealthy for Sensitive Group
- Unhealthy

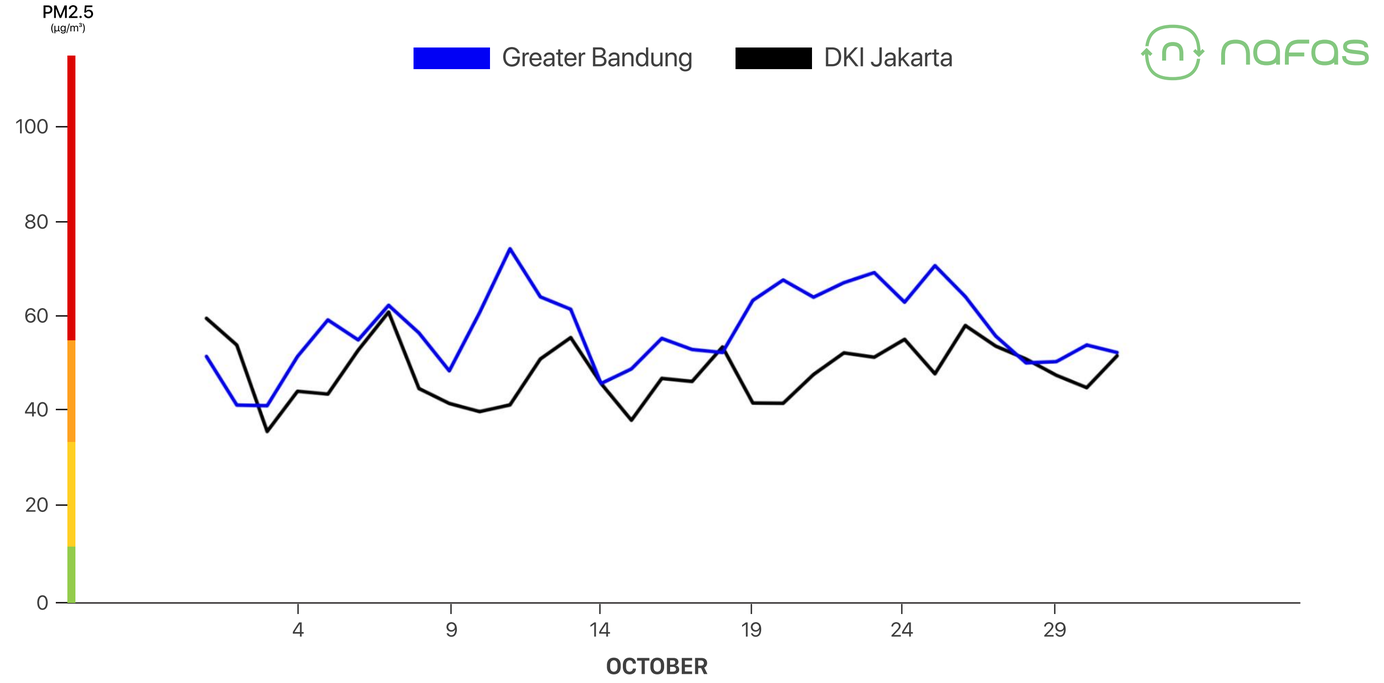
Greater Bandung

October 2023

Moving up from fifth place, the Bandung Raya region now holds the position as the second most polluted area, with an average air quality that is 18% worse compared to DKI Jakarta.

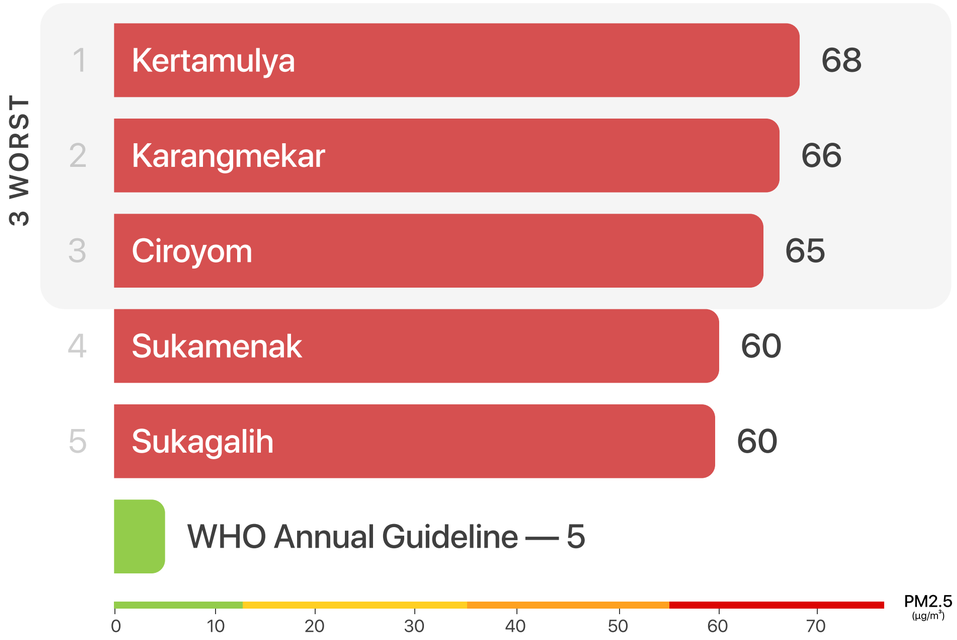
- Good
- Moderate
- Unhealthy for Sensitive Group
- Unhealthy

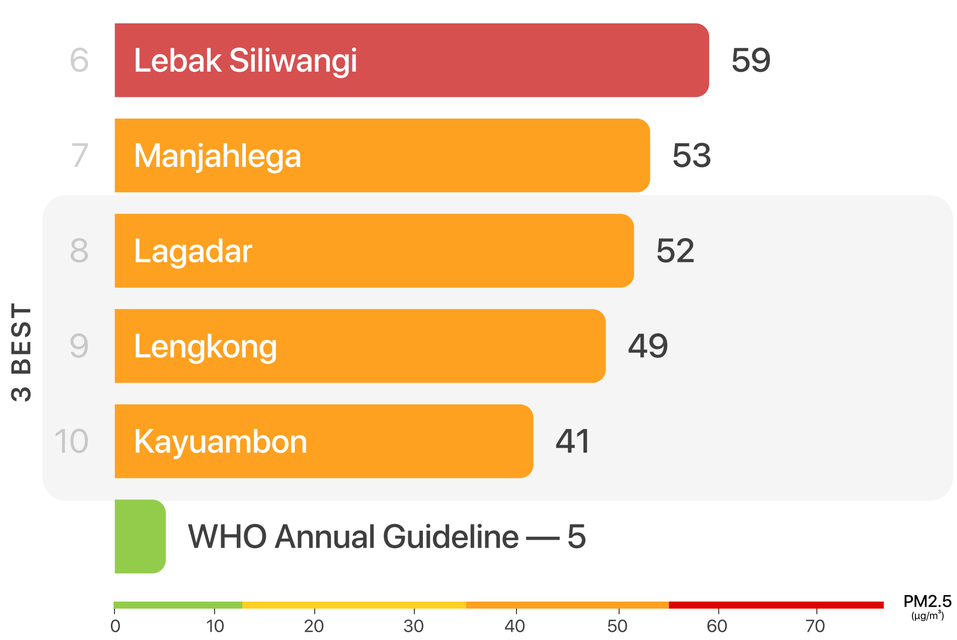
GREATER BANDUNG VS DKI JAKARTA



18%

Worse than DKI Jakarta



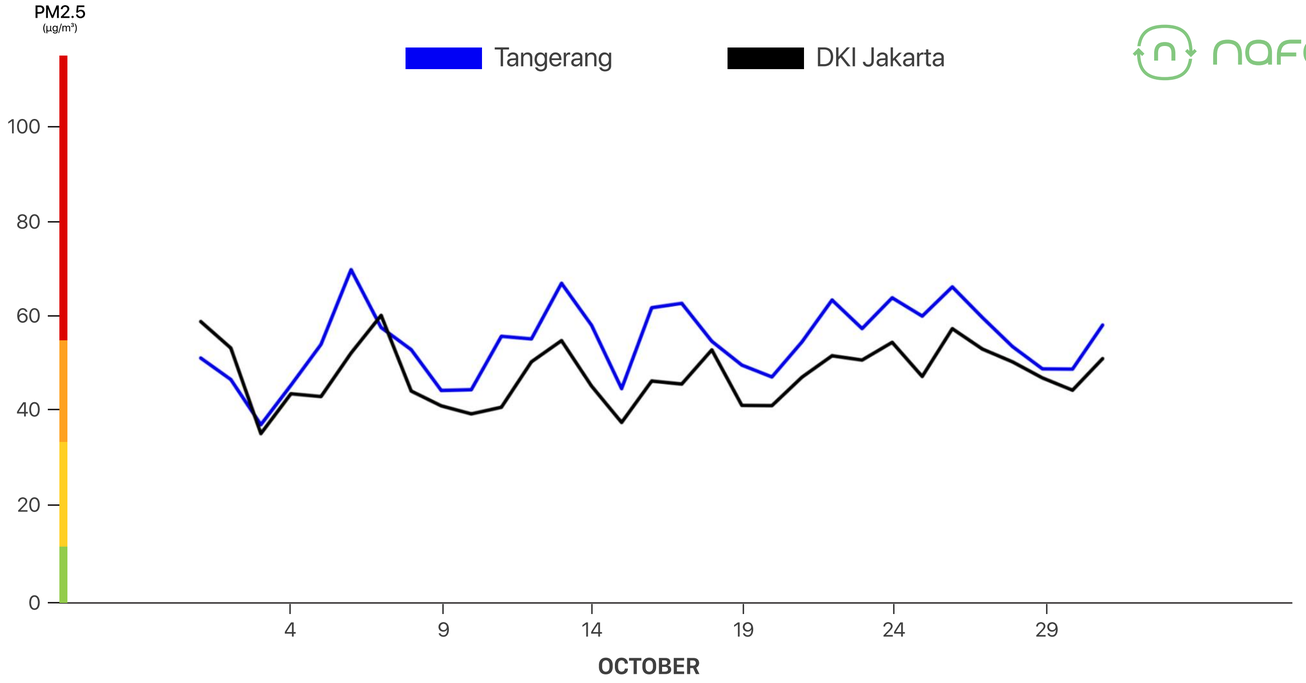


Tangerang

October 2023

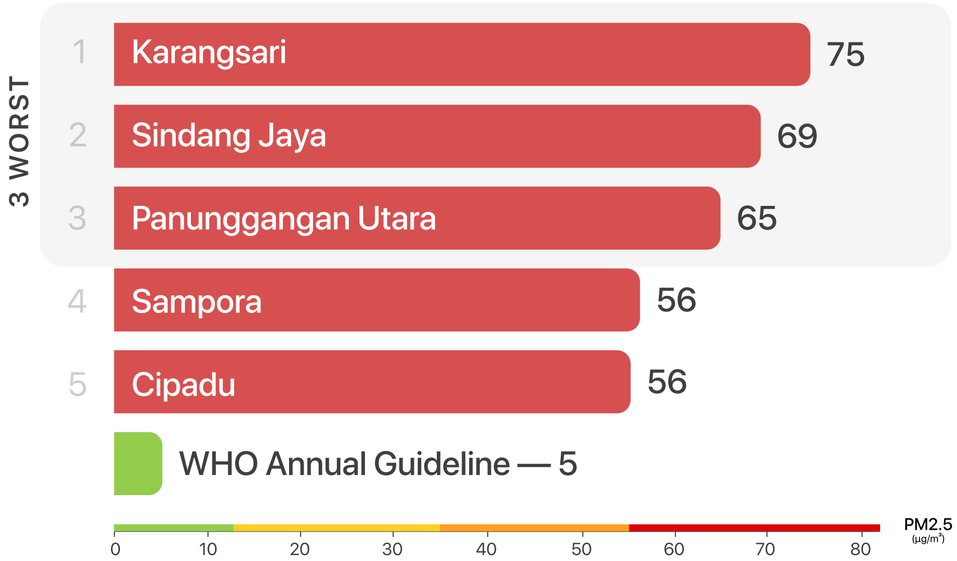
Although no longer at the top, pollution levels in Tangerang remain high. The areas of Karangsari and Sindang Jaya are recorded as the most polluted, with PM2.5 concentrations reaching 75 µg/m³ and 69 µg/m³, respectively.

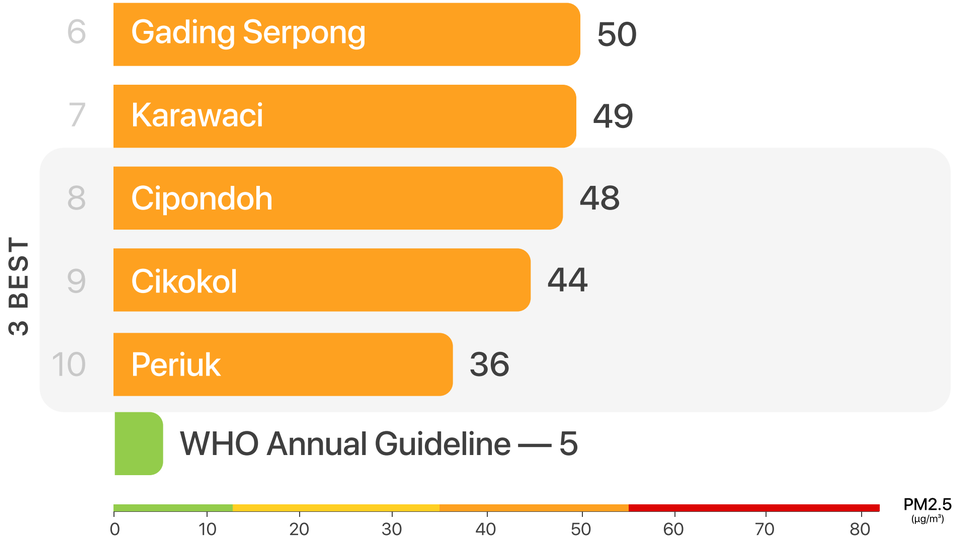
TANGERANG VS DKI JAKARTA



14%

Worse than DKI Jakarta





- Good
- Moderate
- Unhealthy for Sensitive Group
- Unhealthy

Bogor
October 2023

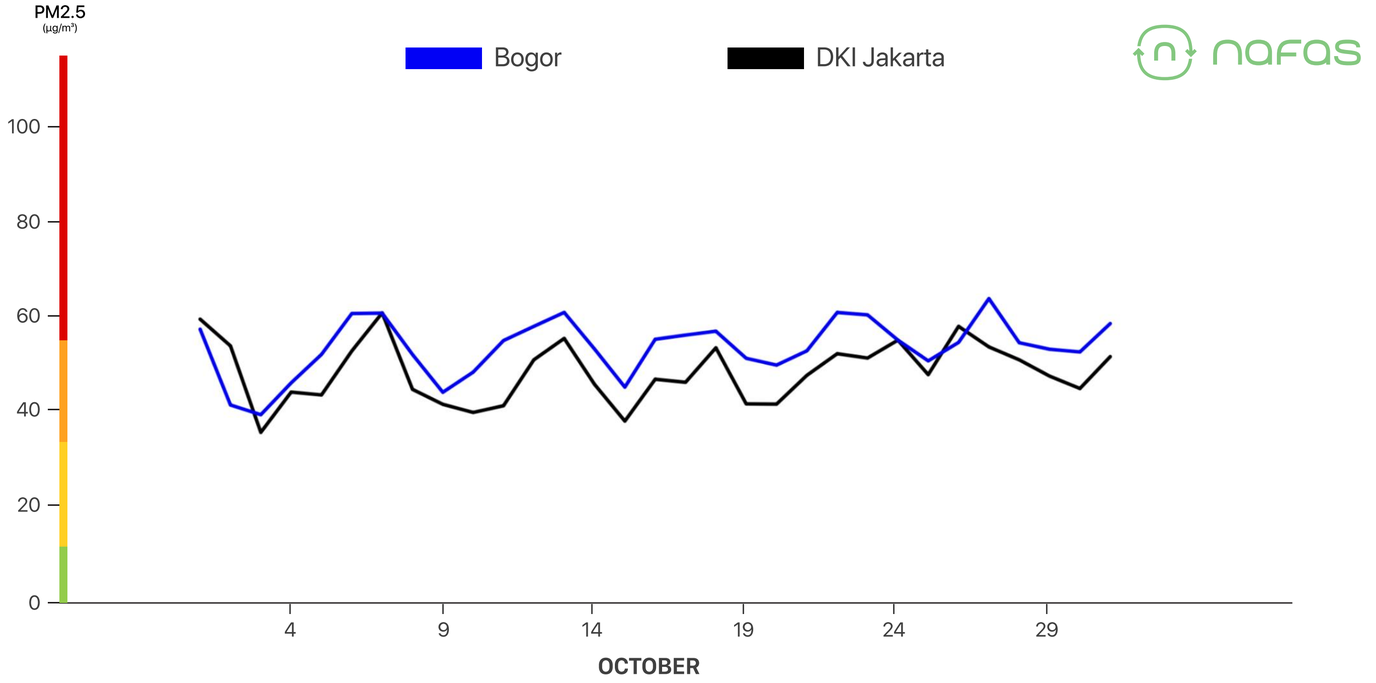
Throughout October, the air quality in Bogor was observed to be fluctuating, yet on average, it was recorded to be 11% higher than that of the capital city.

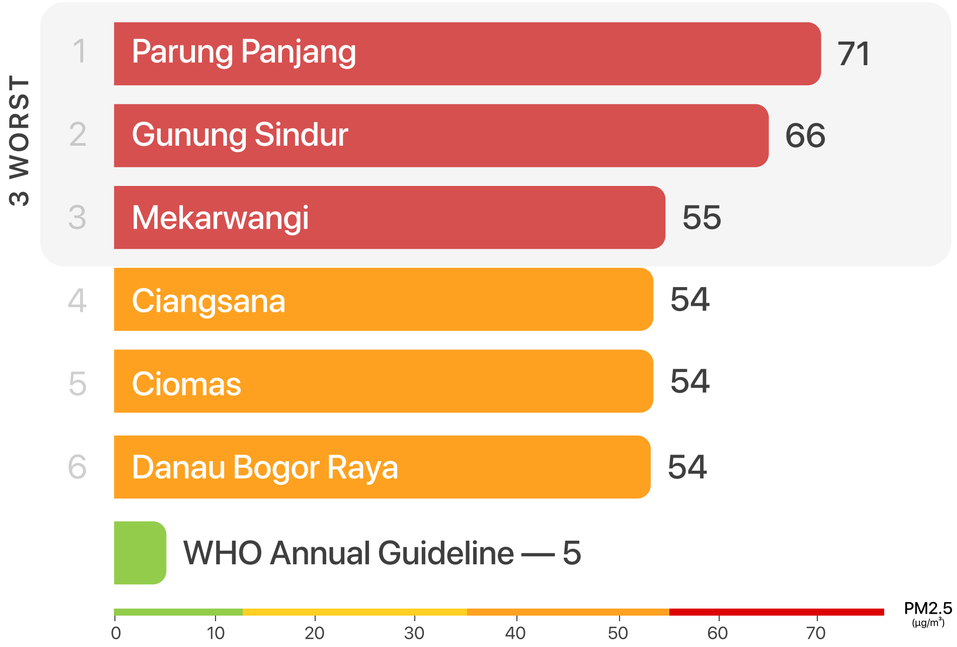
- Good
- Moderate
- Unhealthy for Sensitive Group
- Unhealthy

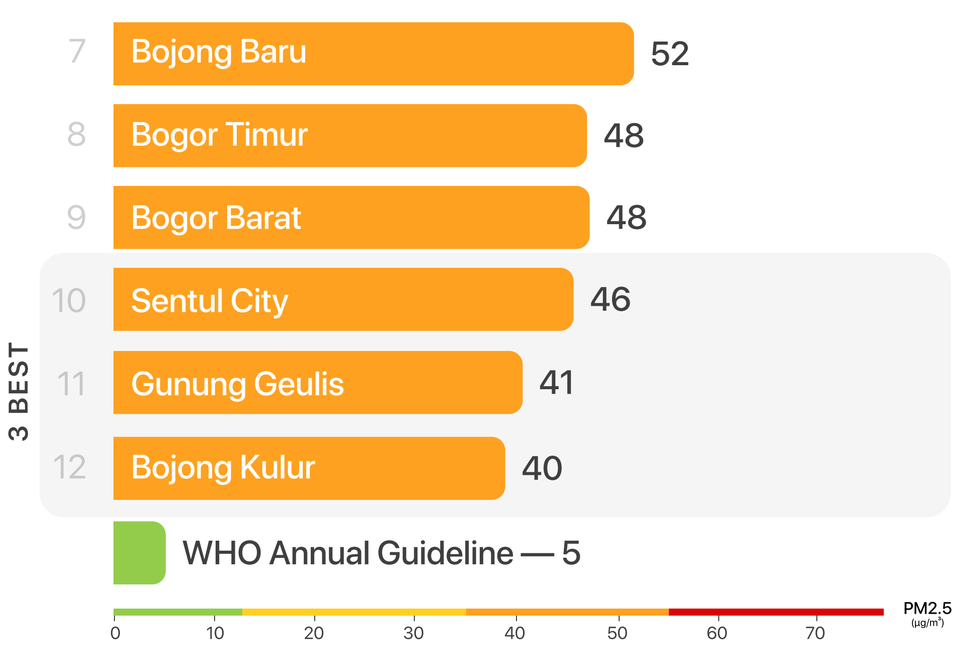
BOGOR VS DKI JAKARTA

11%

Worse than DKI Jakarta







Depok

October 2023

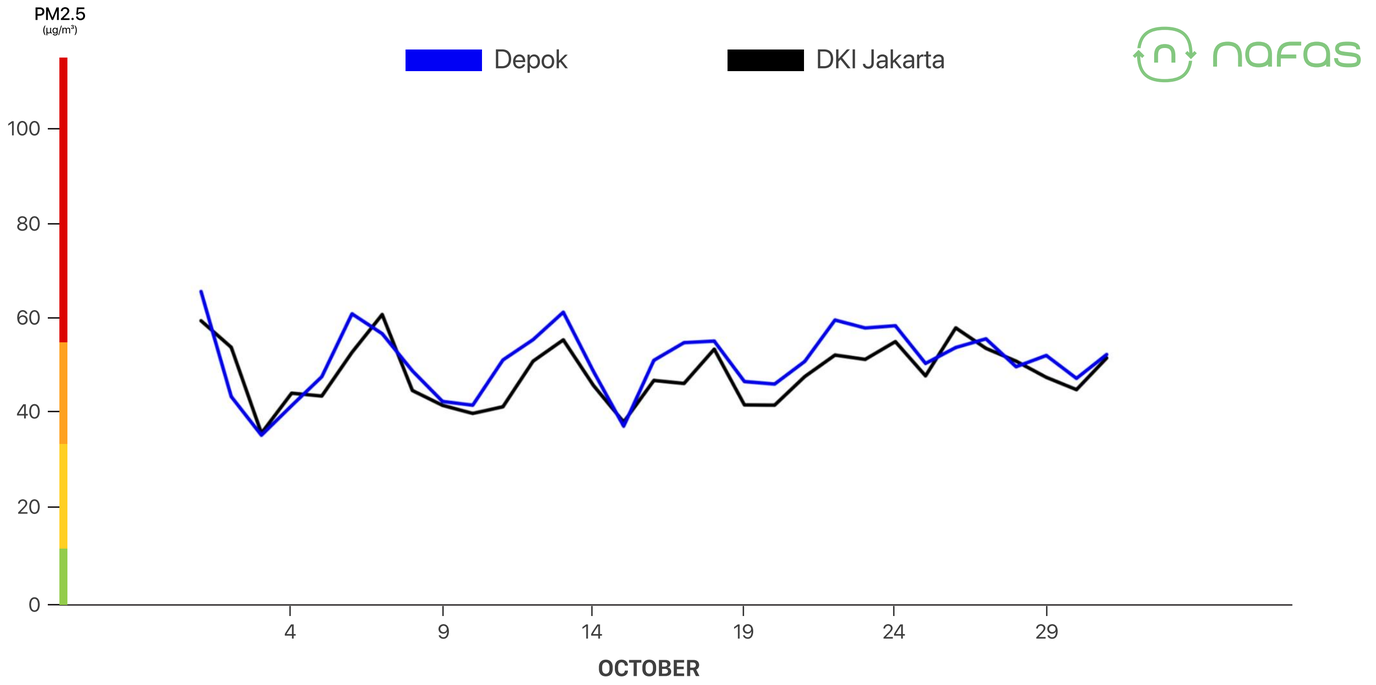
Bedahan consistently ranks as the most polluted area in Depok. The monthly average PM2.5 pollution level reaches 68 µg/m³, which is twice as high as the area with the lowest pollution in Depok, namely Cipayung at 34 µg/m³.

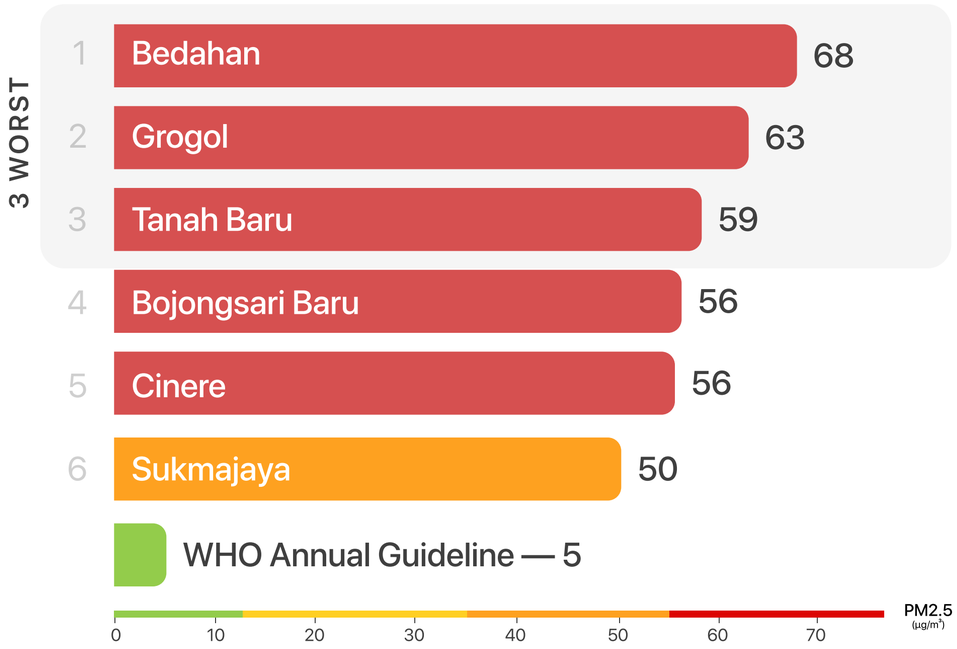
- Good
- Moderate
- Unhealthy for Sensitive Group
- Unhealthy

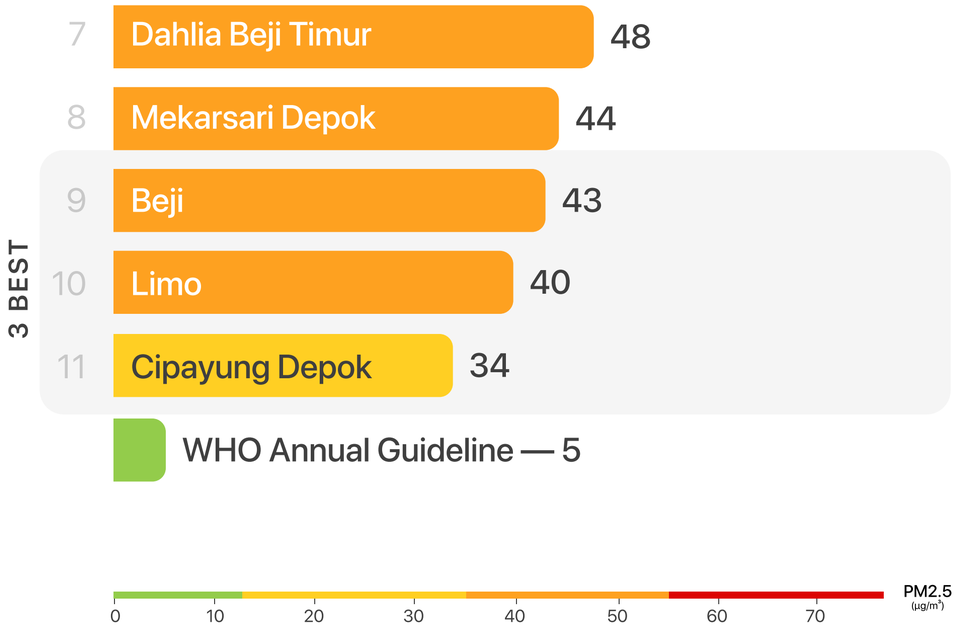
DEPOK VS DKI JAKARTA

5%

Worse than DKI Jakarta







Bekasi

October 2023

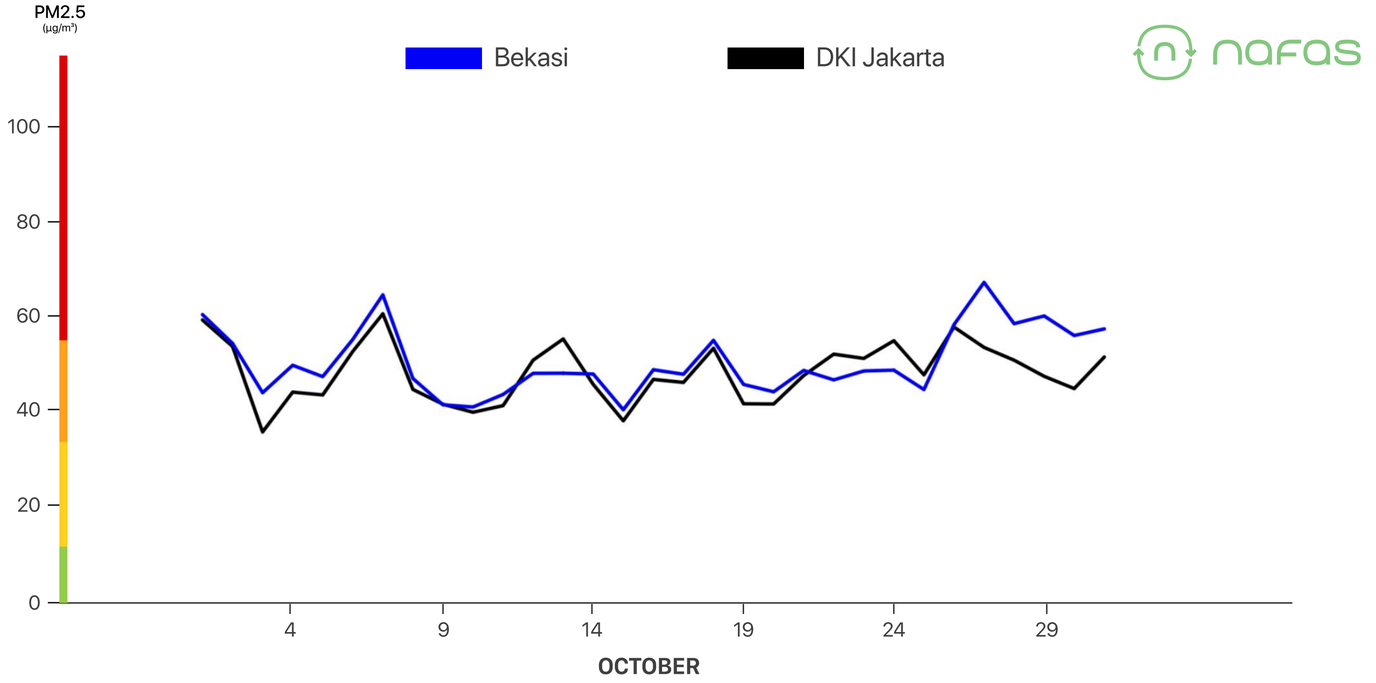
Throughout the month of October, the average pollution level in Bekasi was nearly equivalent to that of DKI Jakarta. However, there was a sharp increase towards the end of the month. On the other hand, Jatibening managed to maintain relatively good air quality.

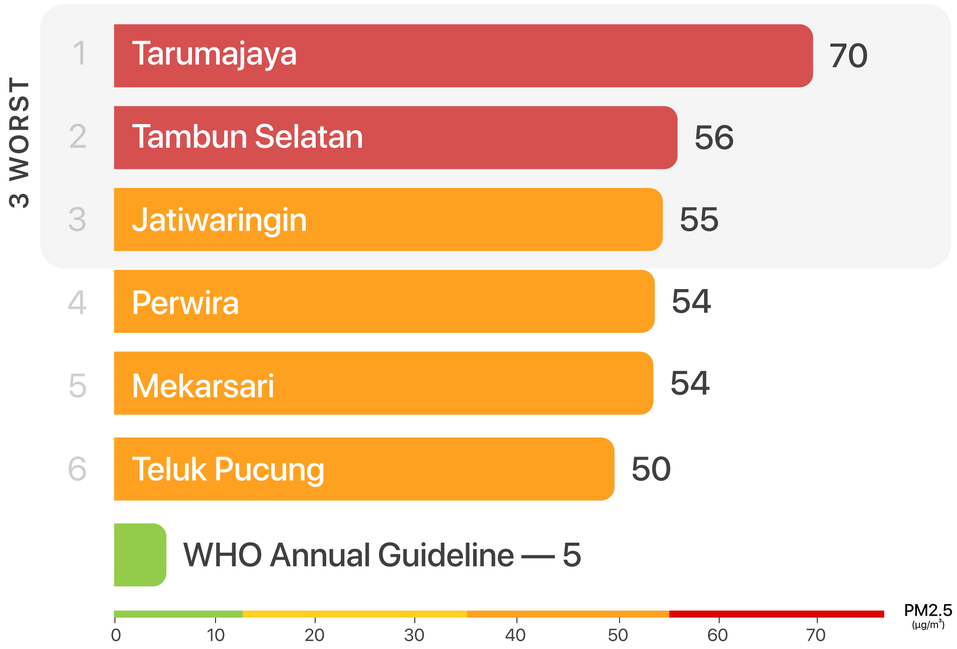
- Good
- Moderate
- Unhealthy for Sensitive Group
- Unhealthy

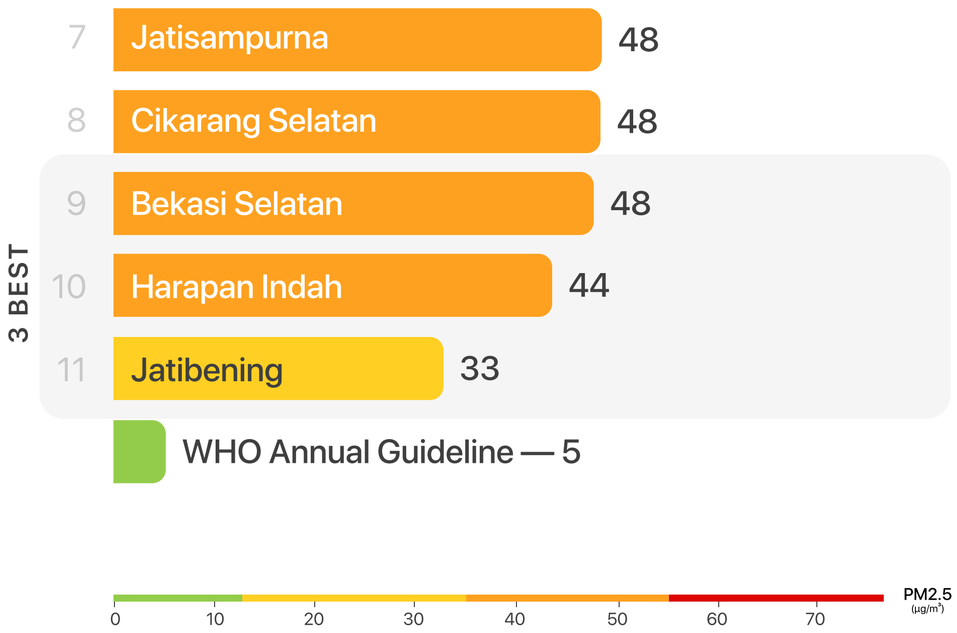
BEKASI VS DKI JAKARTA

5%

Worse than DKI Jakarta







East Jakarta

October 2023

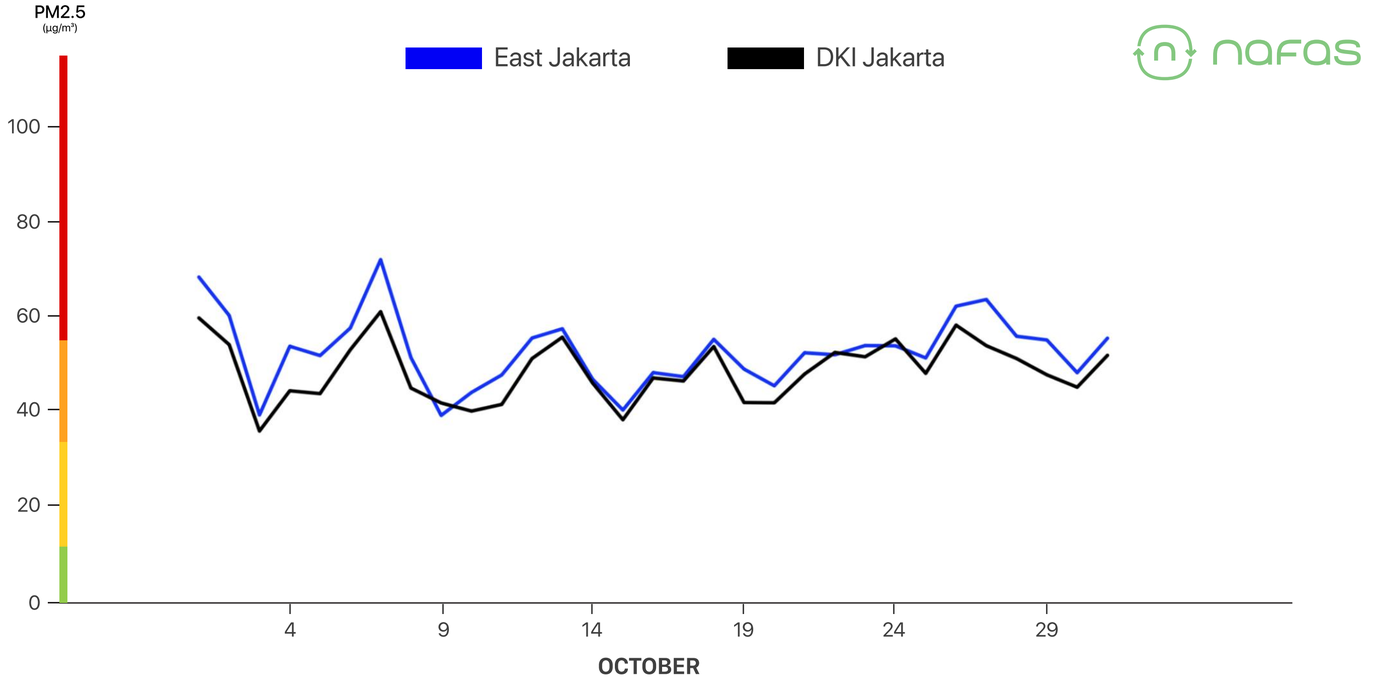
Out of the 13 areas in East Jakarta monitored by the Nafas sensor network, nearly all recorded high levels of pollution with an "Unhealthy" air quality status for both sensitive and general groups. Only Duren Sawit was noted to have reasonably good air quality.

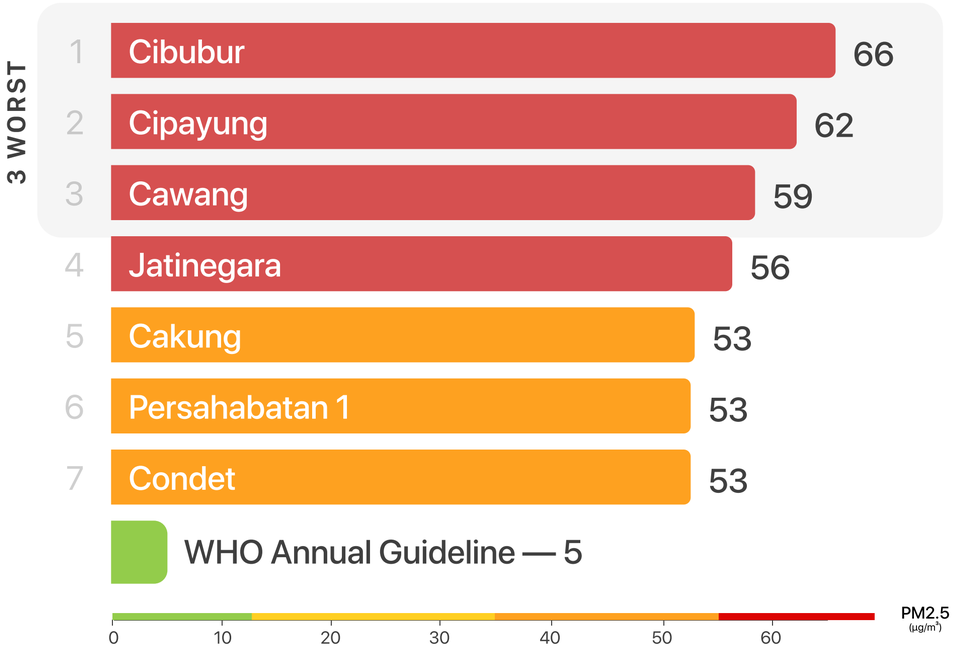
- Good
- Moderate
- Unhealthy for Sensitive Group
- Unhealthy

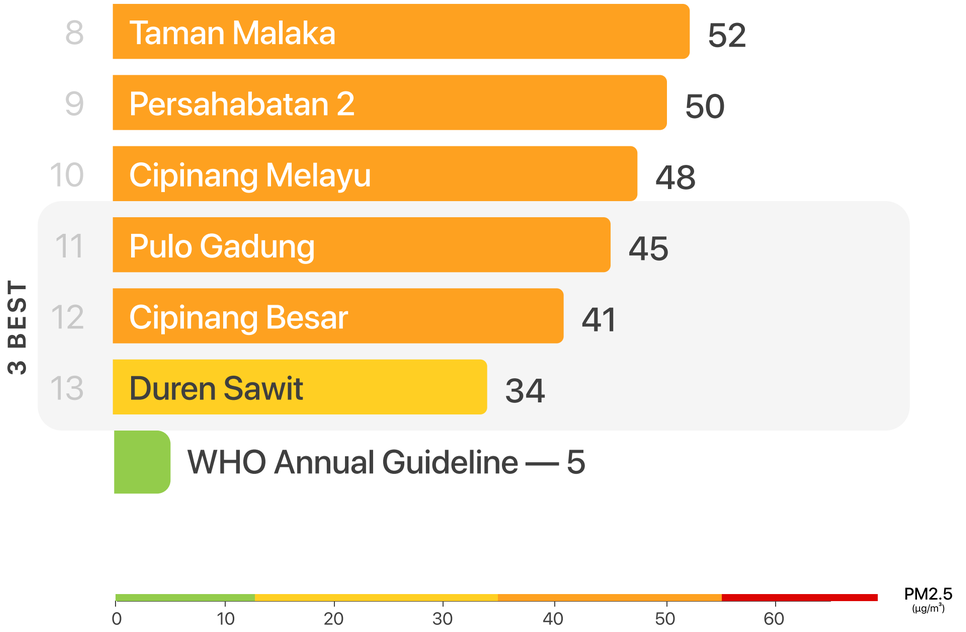
EAST JAKARTA VS DKI JAKARTA

9%

Worse than DKI Jakarta







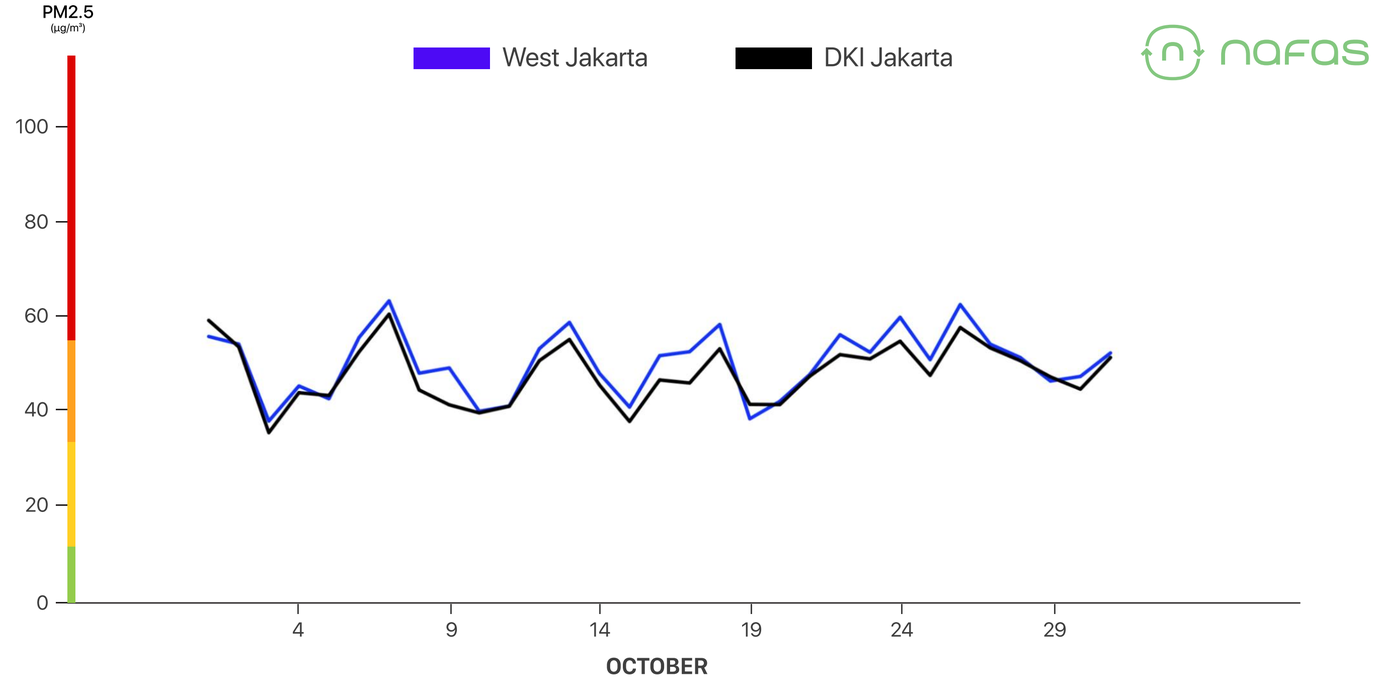
West Jakarta

October 2023

The level of air pollution in West Jakarta was observed to fluctuate throughout October. The air quality in all its areas was categorized as unhealthy.

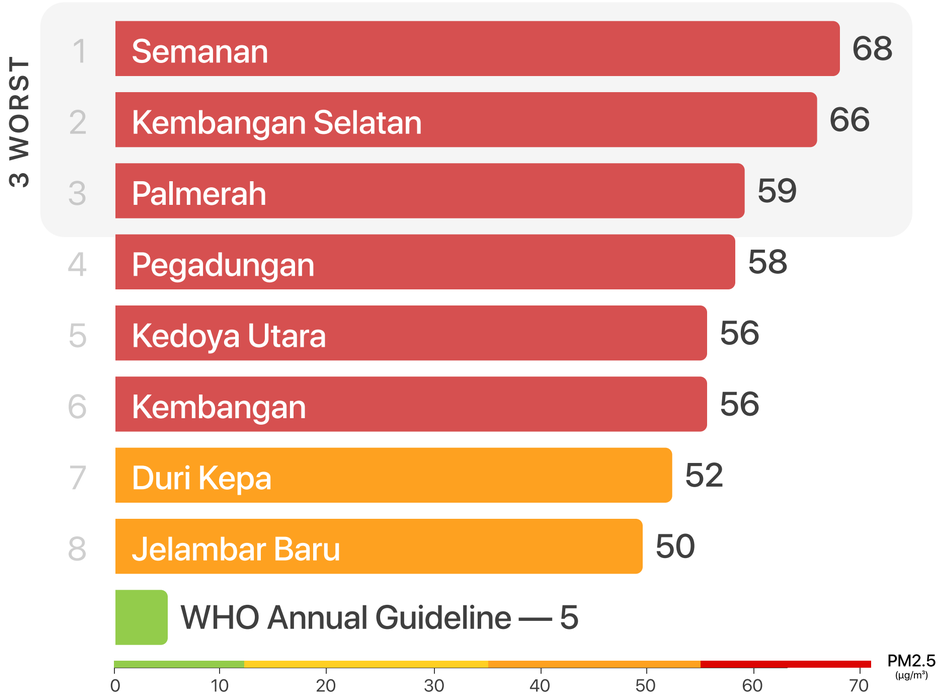
- Good
- Moderate
- Unhealthy for Sensitive Group
- Unhealthy

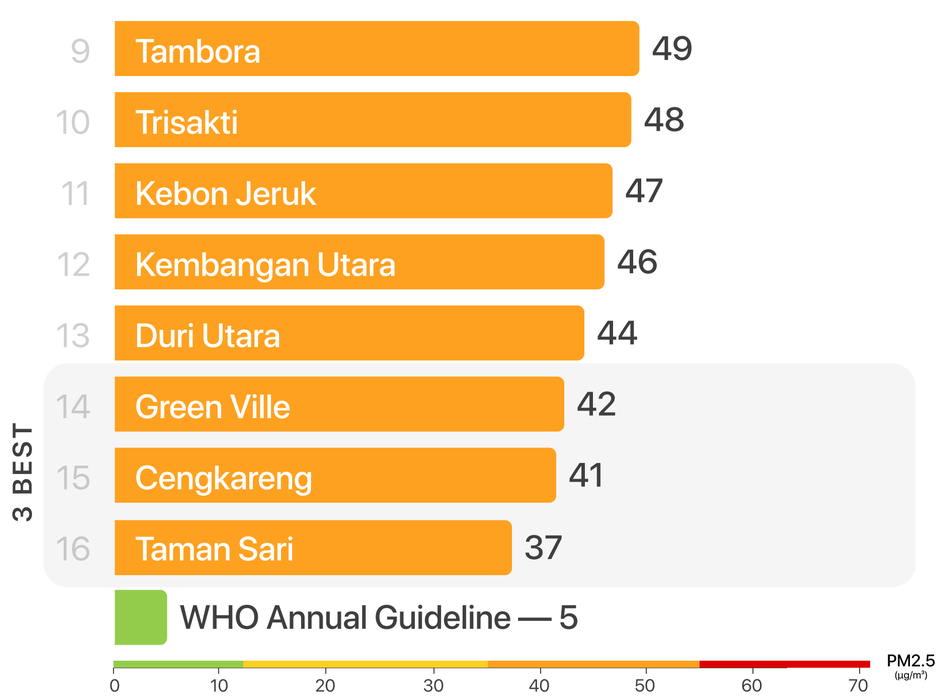
WEST JAKARTA VS DKI JAKARTA



4%

Worse than DKI Jakarta





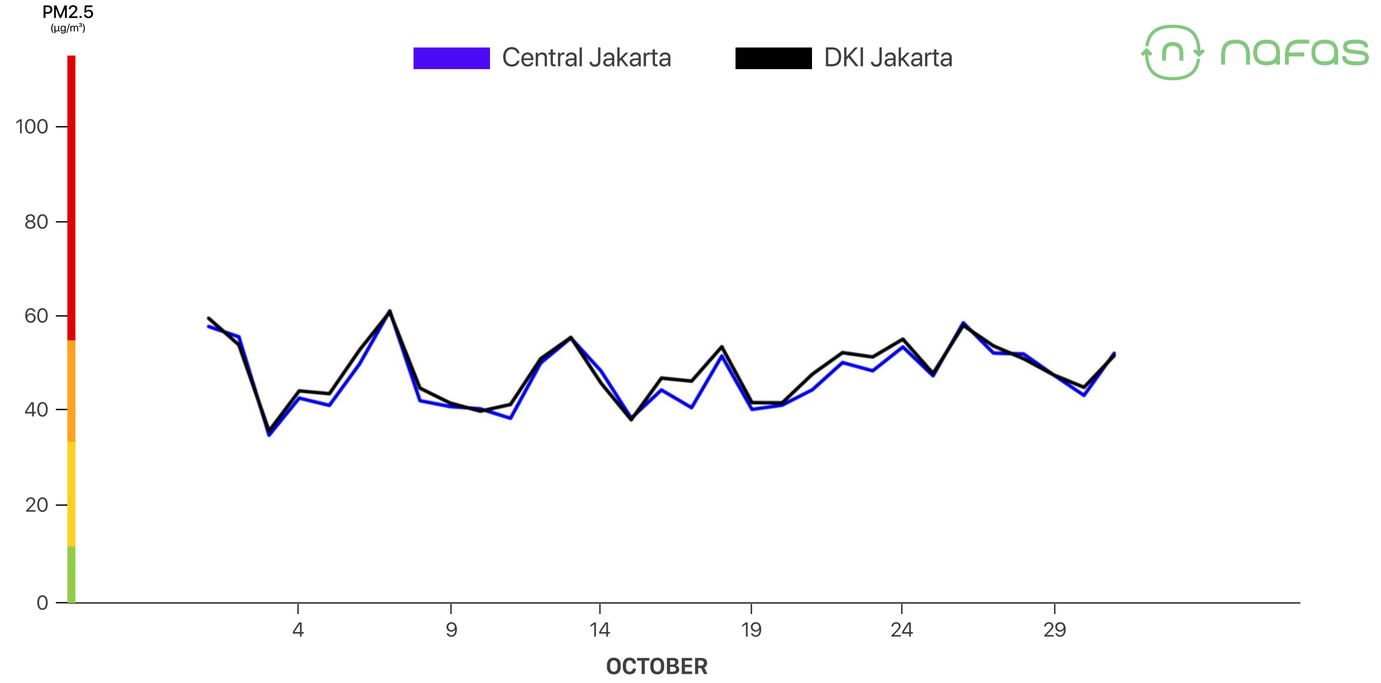
Central Jakarta

October 2023

Although the overall air quality in Central Jakarta in October was slightly better than the entire DKI Jakarta, the pollution level in all six areas monitored by the Nafas sensor network fell into the 'Unhealthy for Sensitive Groups' category.

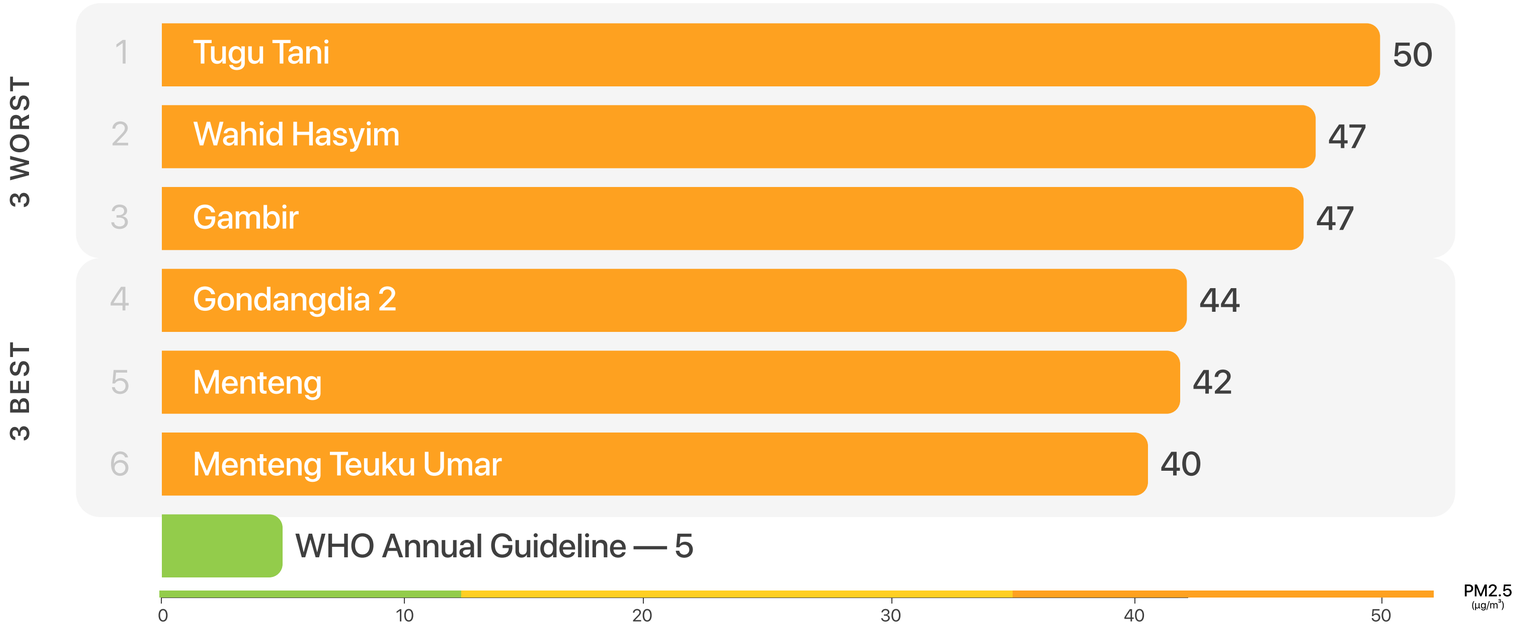
- Good
- Moderate
- Unhealthy for Sensitive Group
- Unhealthy

CENTRAL JAKARTA VS DKI JAKARTA



2%

Better than DKI Jakarta



South Jakarta

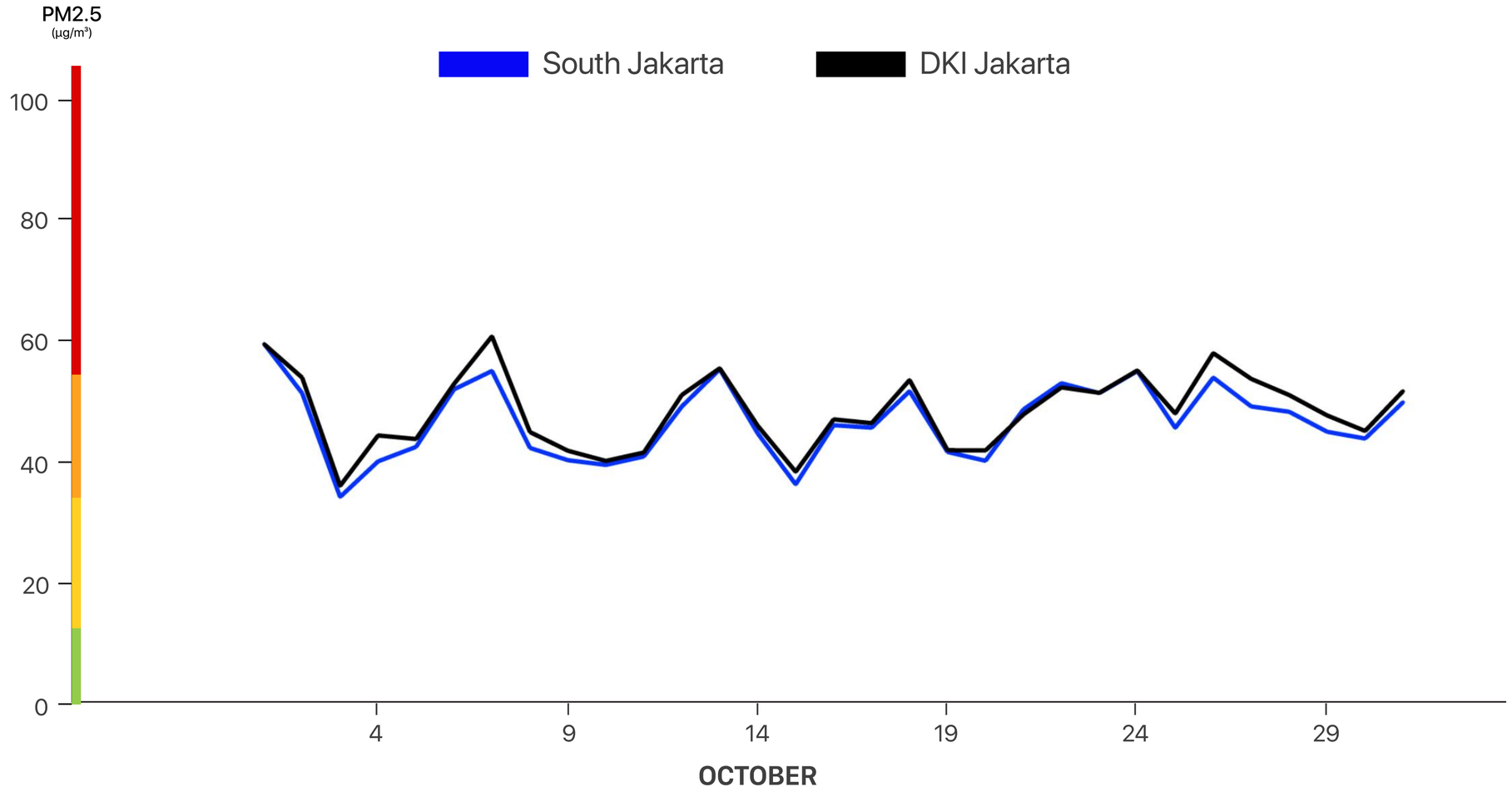
October 2023

Only a slight 3% improvement over the DKI Jakarta average, the air quality in South Jakarta was observed to fluctuate throughout October. Nearly all of the Nafas sensors located in South Jakarta recorded relatively high pollution levels.

- Good
- Moderate
- Unhealthy for Sensitive Group
- Unhealthy

SOUTH JAKARTA VS DKI JAKARTA

3% Better than DKI Jakarta



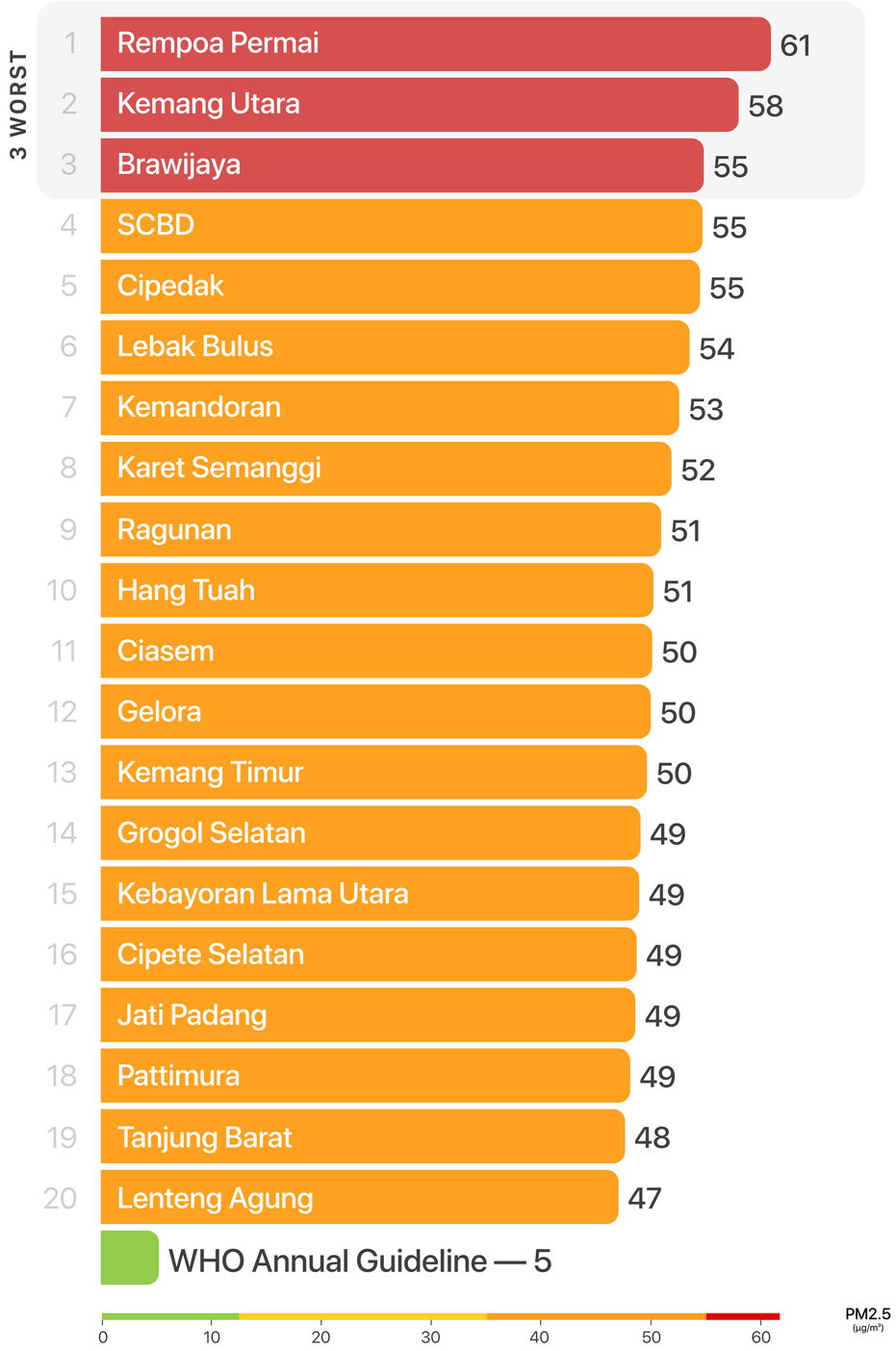
South Jakarta

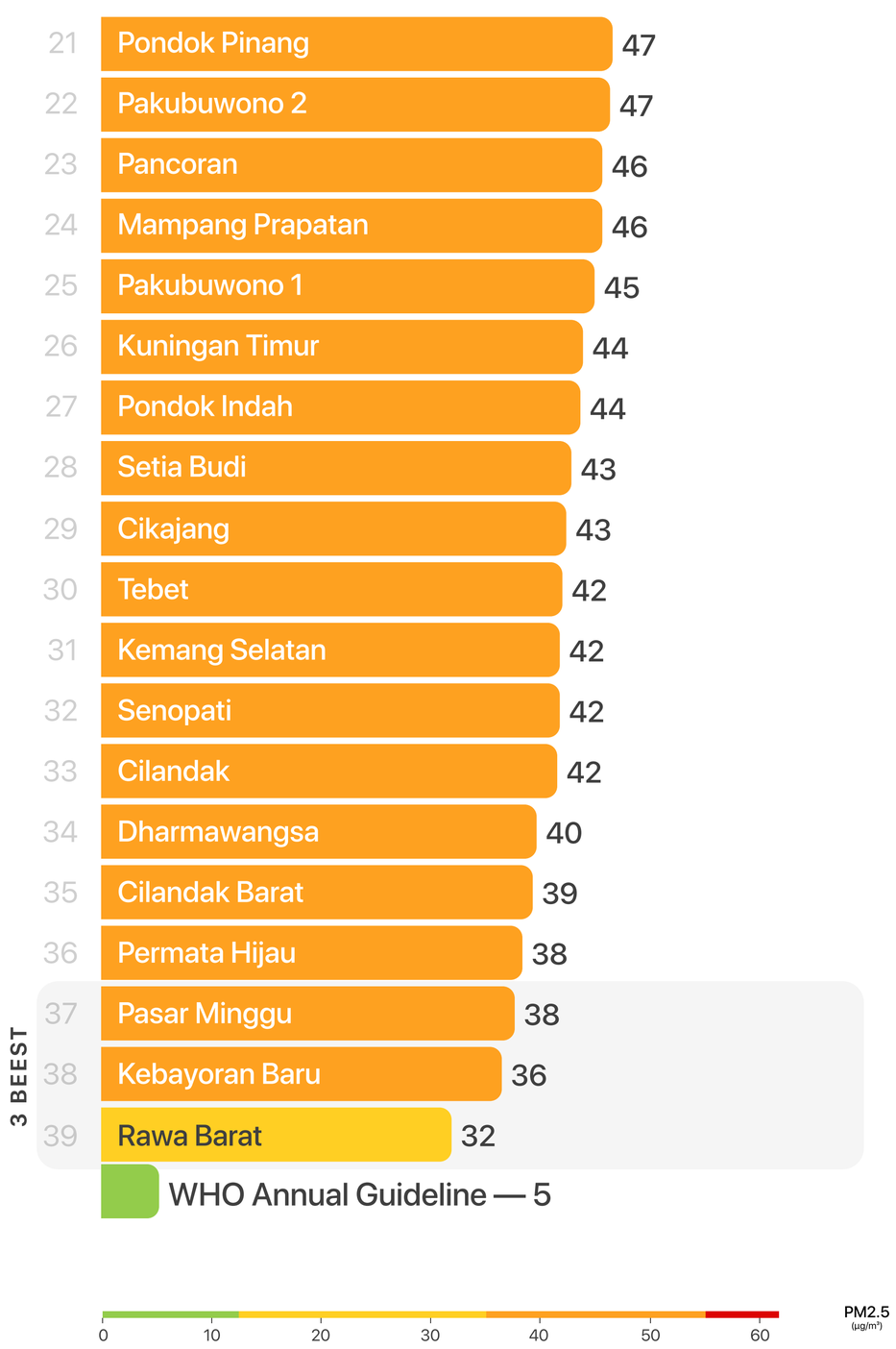
October 2023

Only a slight 3% improvement over the DKI Jakarta average, the air quality in South Jakarta was observed to fluctuate throughout October. Nearly all of the Nafas sensors located in South Jakarta recorded relatively high pollution levels.

nafas

- Good
- Moderate
- Unhealthy for Sensitive Group
- Unhealthy





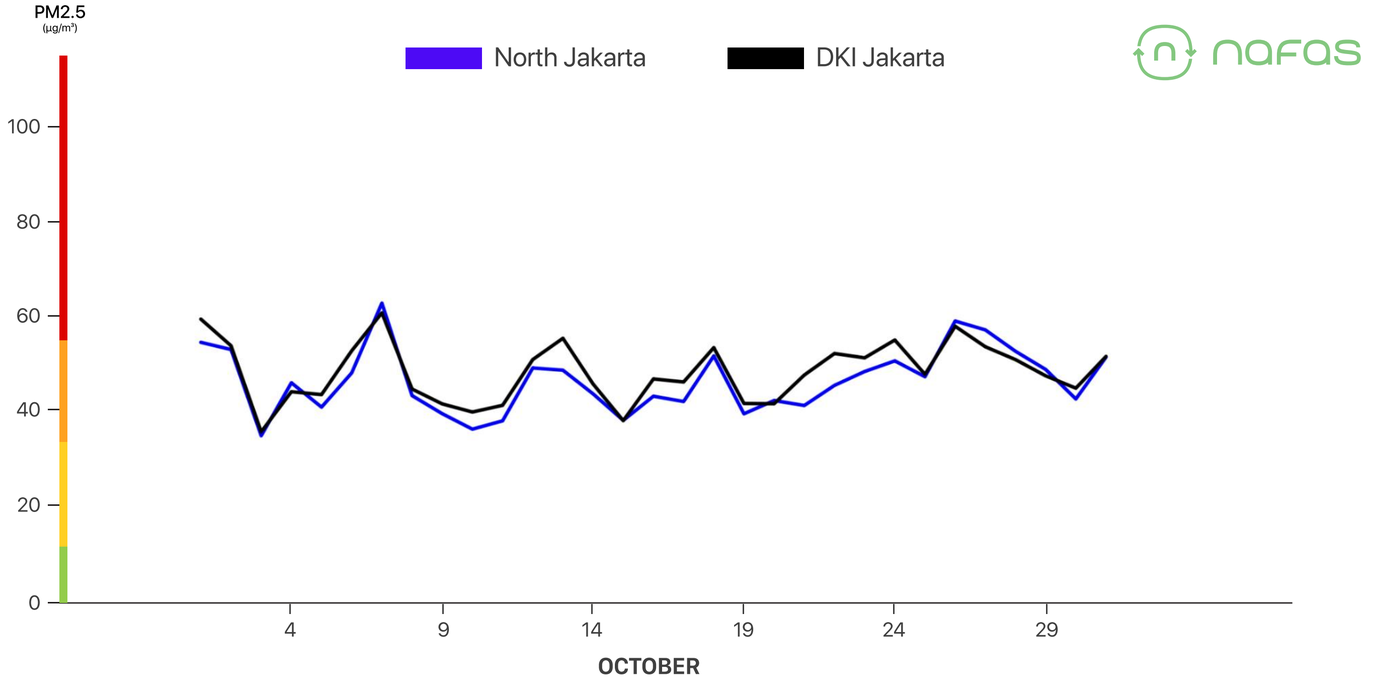
North Jakarta

October 2023

Even though it is the region with the best air quality in DKI Jakarta, pollution levels across the area are still observed to be high, ranging between 39-56 µg/m³.

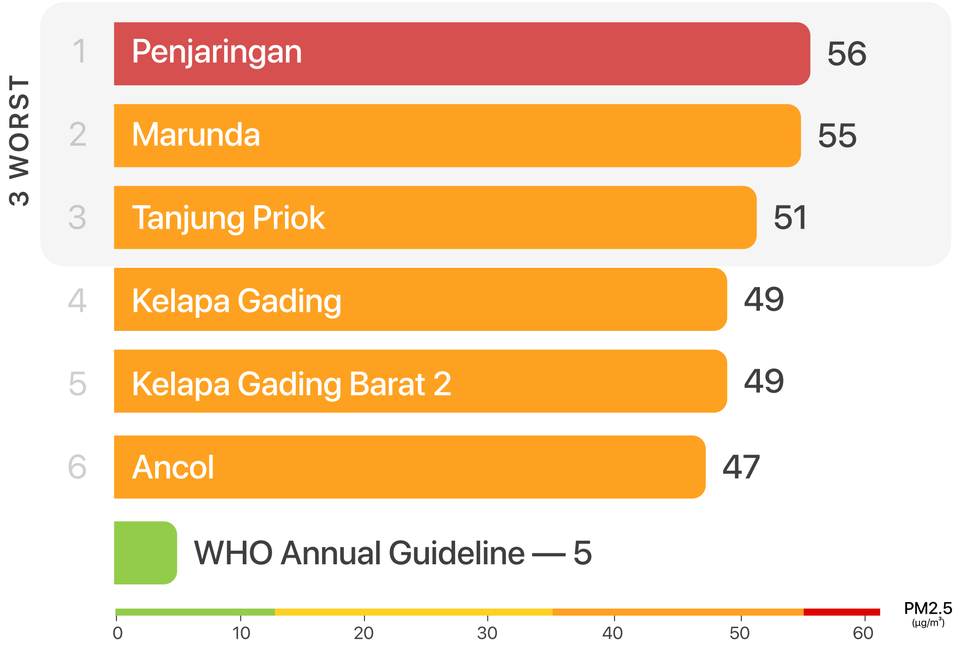
- Good
- Moderate
- Unhealthy for Sensitive Group
- Unhealthy

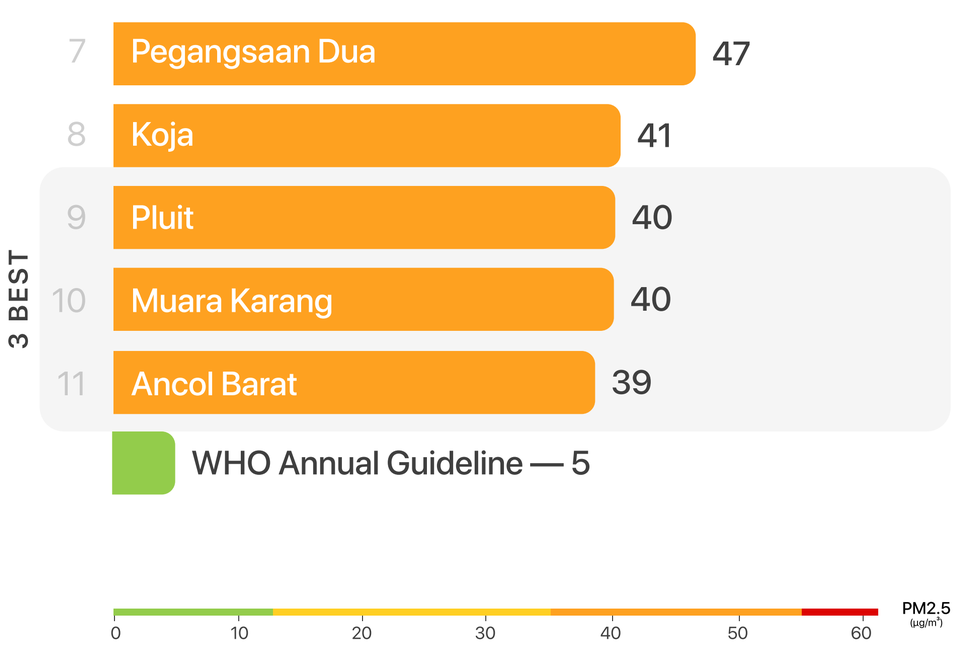
NORTH JAKARTA VS DKI JAKARTA



4%

Better than DKI Jakarta





Greater Malang

October 2023

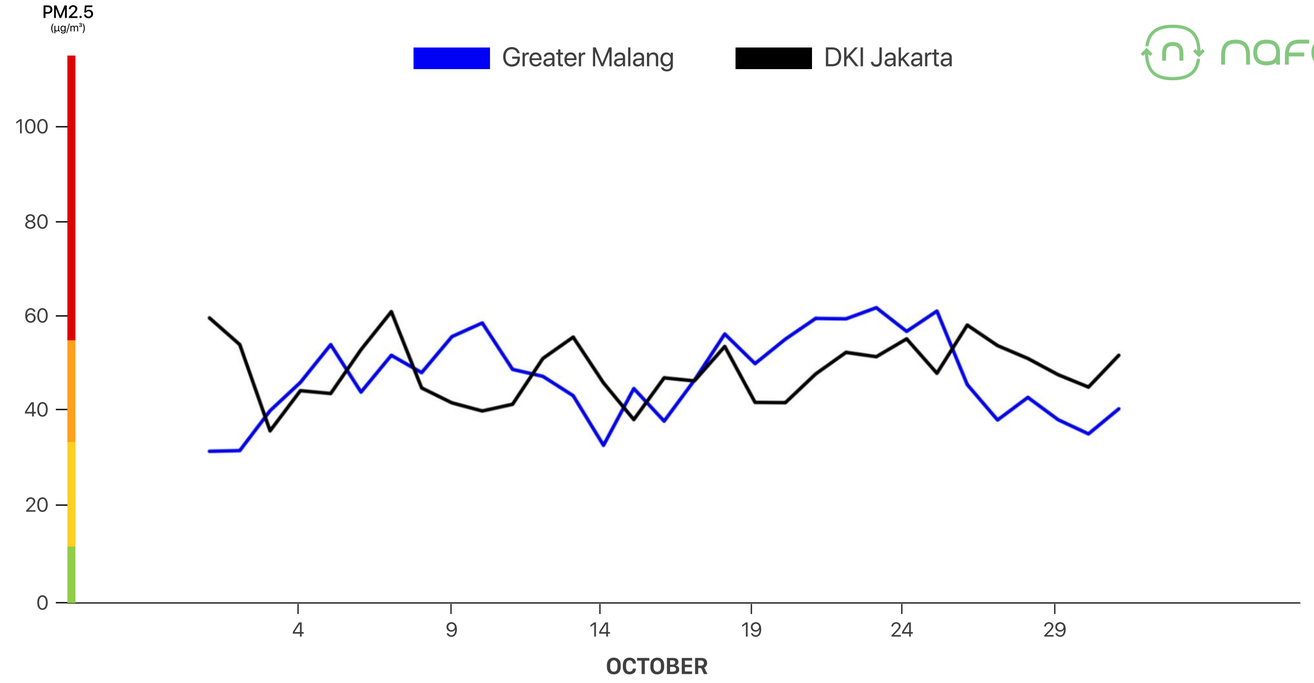
The air pollution levels in Malang Raya fluctuated throughout October, with an average air quality that was 3% better than that of DKI Jakarta. Sekarpuro was noted as the most polluted area, with PM2.5 levels reaching 60 µg/m³.

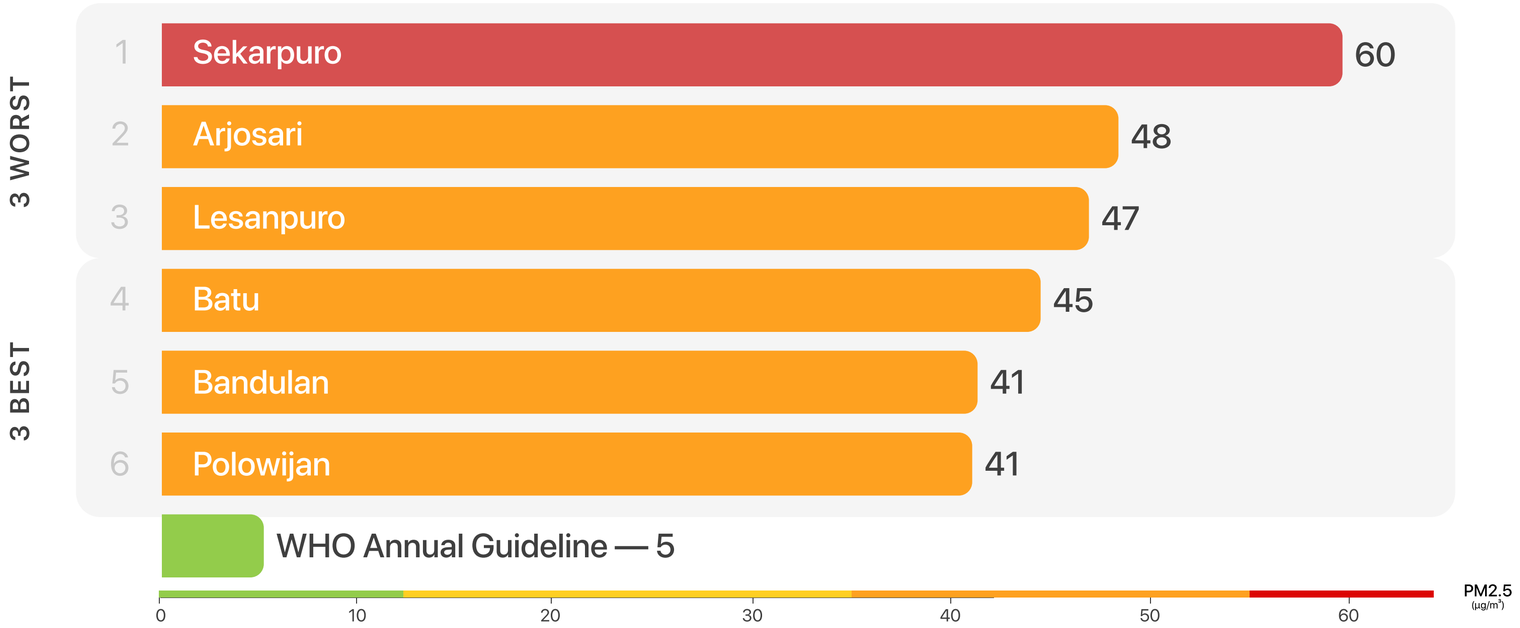
- Good
- Moderate
- Unhealthy for Sensitive Group
- Unhealthy

GREATER MALANG VS DKI JAKARTA

3%

Better than DKI Jakarta





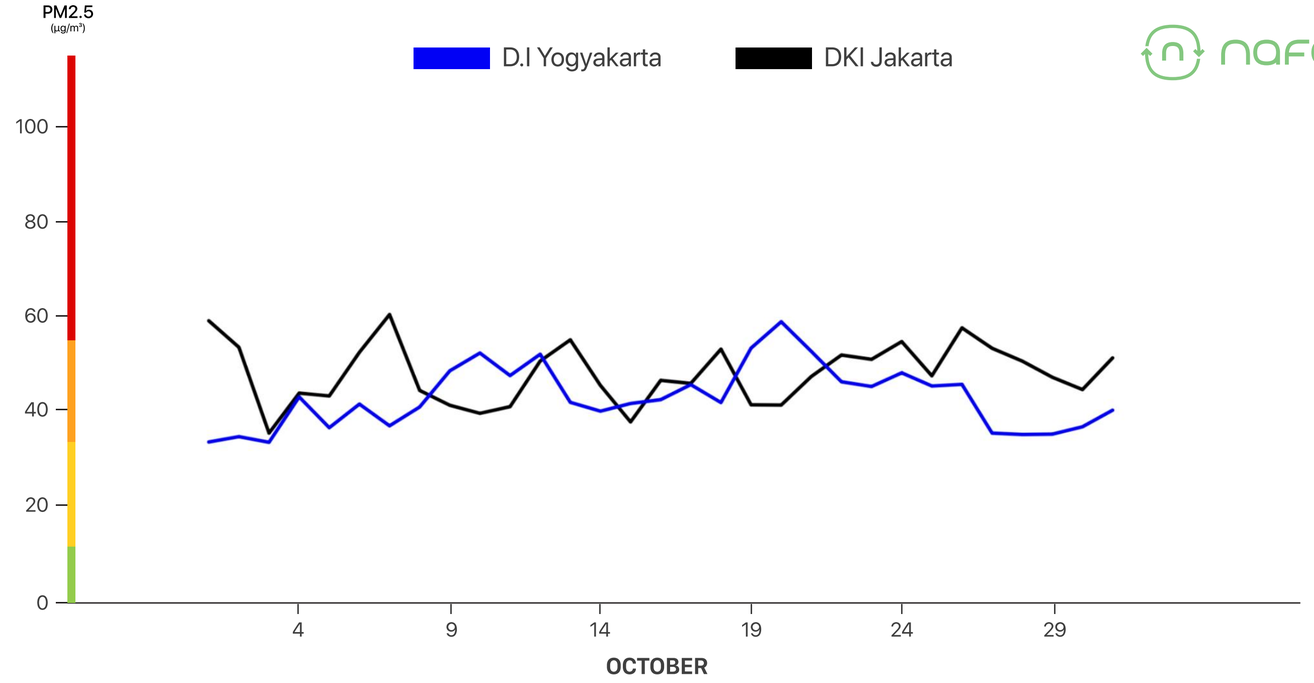
Daerah Istimewa Yogyakarta

October 2023

Sayidan, at 56 µg/m³, and Papringan, at 32 µg/m³, were recorded respectively as the areas with the worst and the best air quality in D.I. Yogyakarta last October.

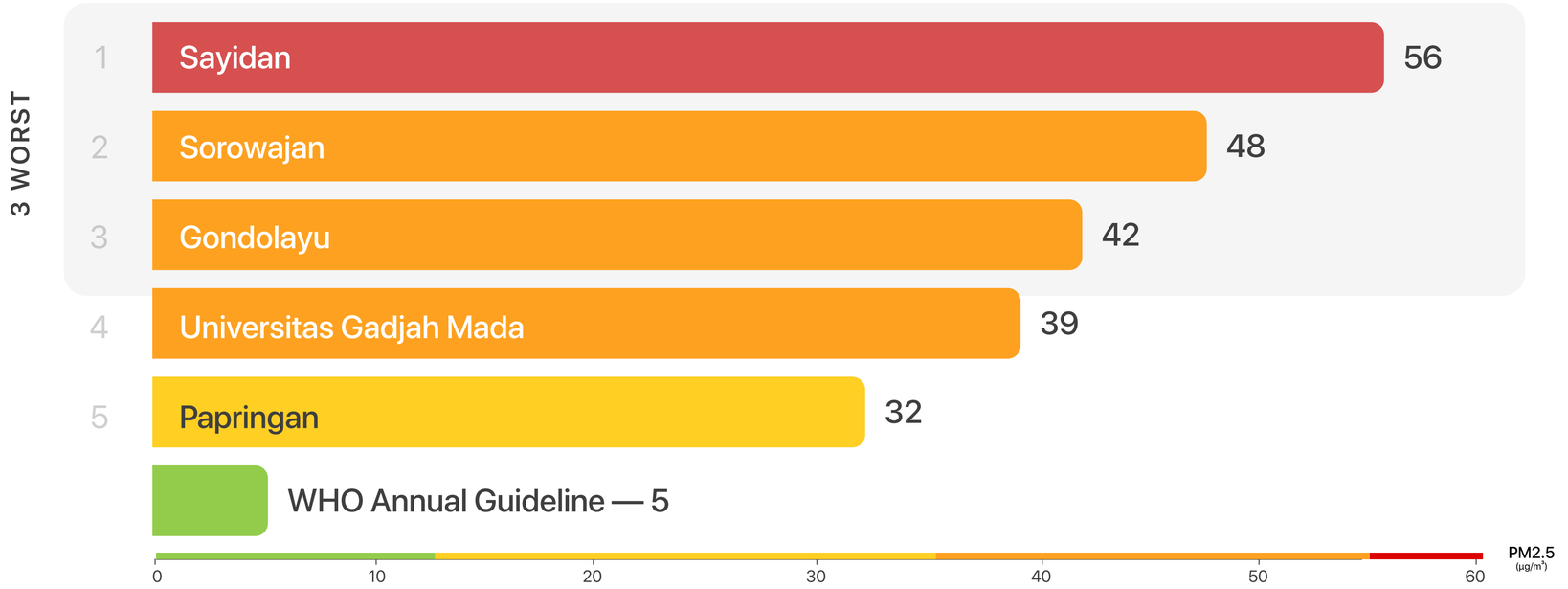
- Good
- Moderate
- Unhealthy for Sensitive Group
- Unhealthy

D.I YOGYAKARTA VS DKI JAKARTA



10%

Better than DKI Jakarta

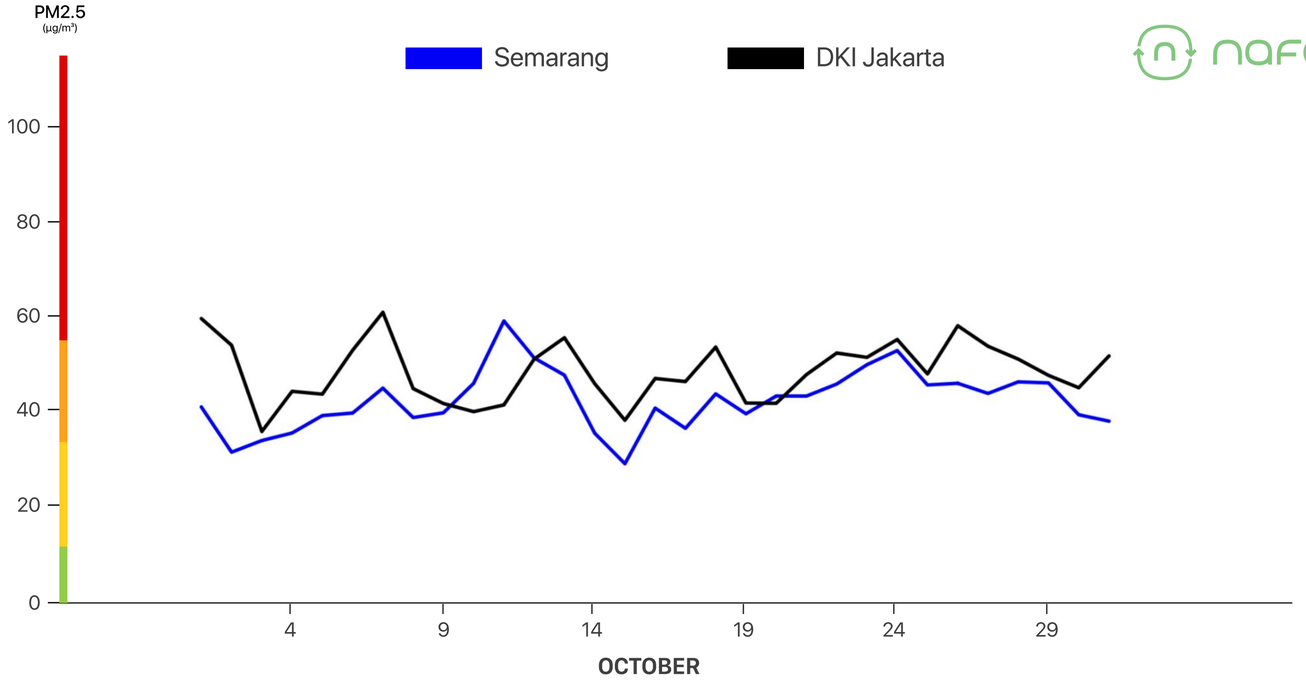


Semarang

October 2023

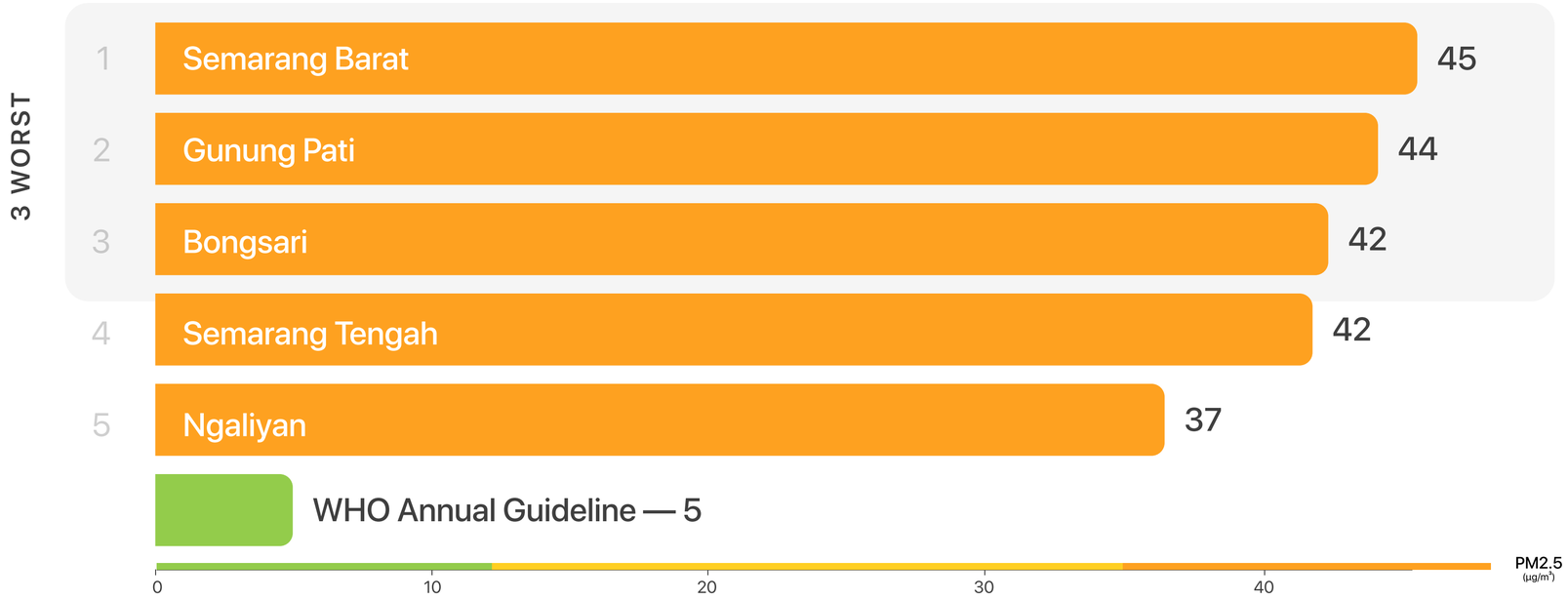
In general, the air quality in Semarang is better than in DKI Jakarta, although all areas monitored by the Nafas sensor network are categorized as 'Unhealthy for Sensitive Groups'.

SEMARANG VS DKI JAKARTA



13%

Better than DKI Jakarta



- Good
- Moderate
- Unhealthy for Sensitive Group
- Unhealthy

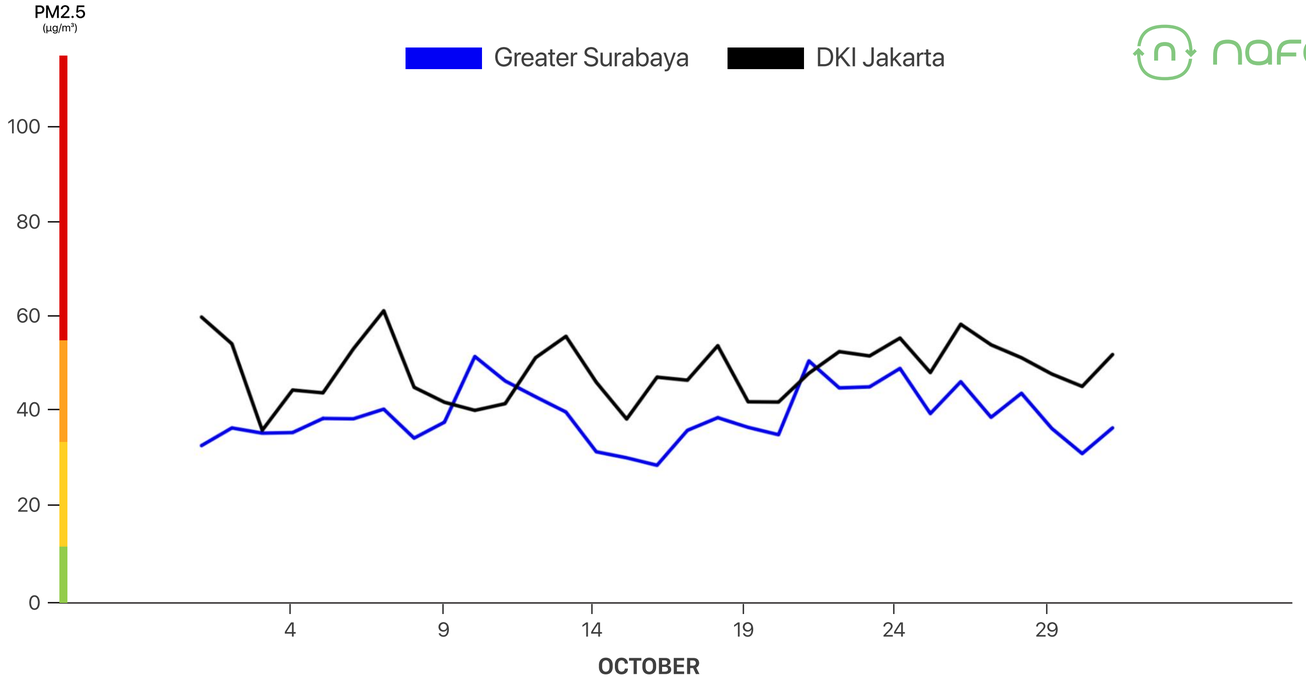
Greater Surabaya

Oktober 2023

Overall, the pollution level in Greater Surabaya is noted to be 20% lower than that of DKI Jakarta. Nevertheless, the majority of areas within Surabaya still have air quality categorized as 'Unhealthy' for both sensitive groups and the general public.

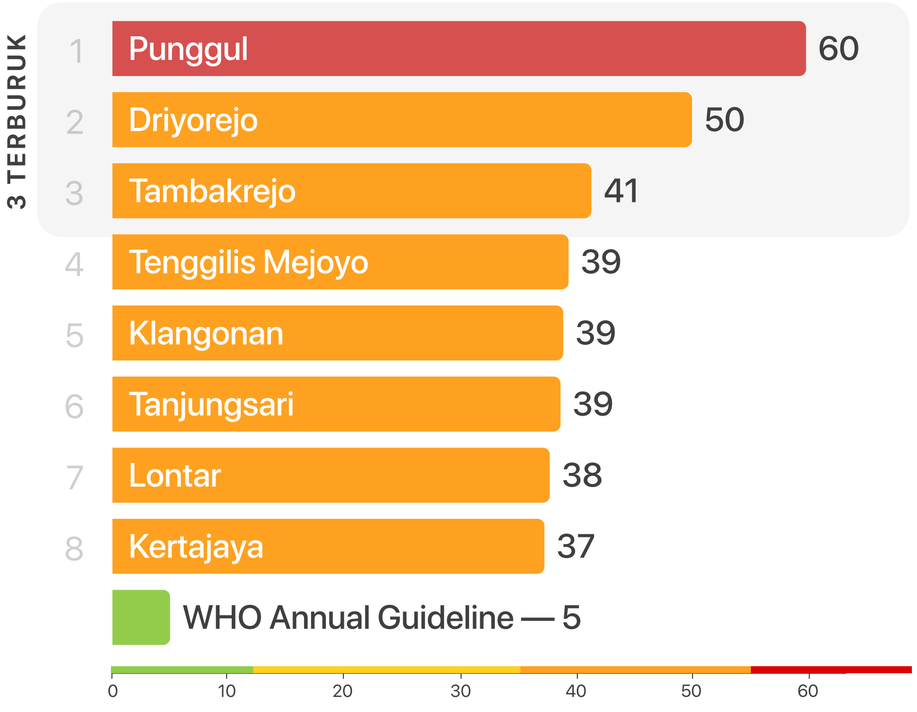
- Good
- Moderate
- Unhealthy for Sensitive Group
- Unhealthy

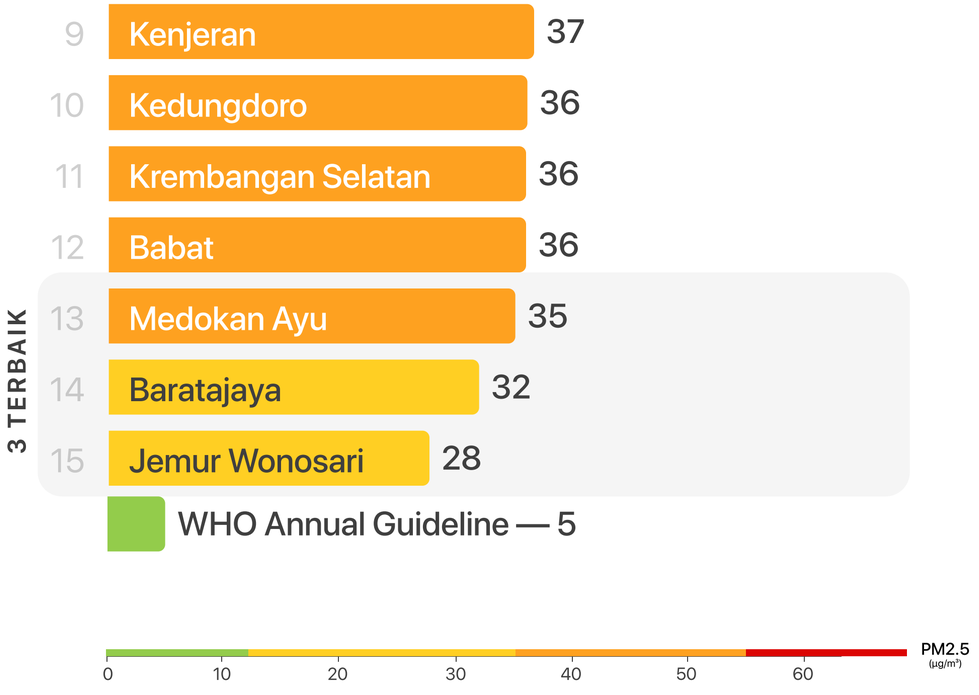
GREATER SURABAYA VS DKI JAKARTA



20%

Better than DKI Jakarta





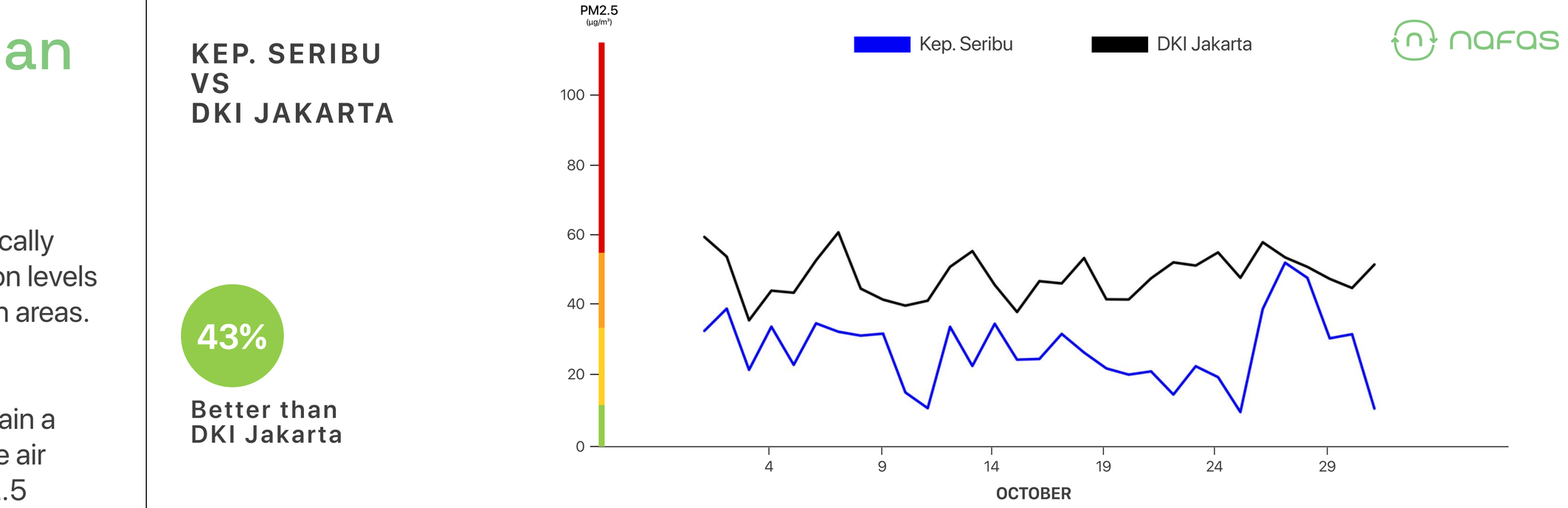
Kepulauan Seribu

Oktober 2023

Island regions typically have lower pollution levels compared to urban areas. This October, the Thousand Islands managed to maintain a fairly good average air quality with a PM2.5 concentration of 28 µg/m³.

- Good
- Moderate
- Unhealthy for Sensitive Group
- Unhealthy

KEP. SERIBU VS DKI JAKARTA



43%

Better than DKI Jakarta

1 Desa Laguna 28

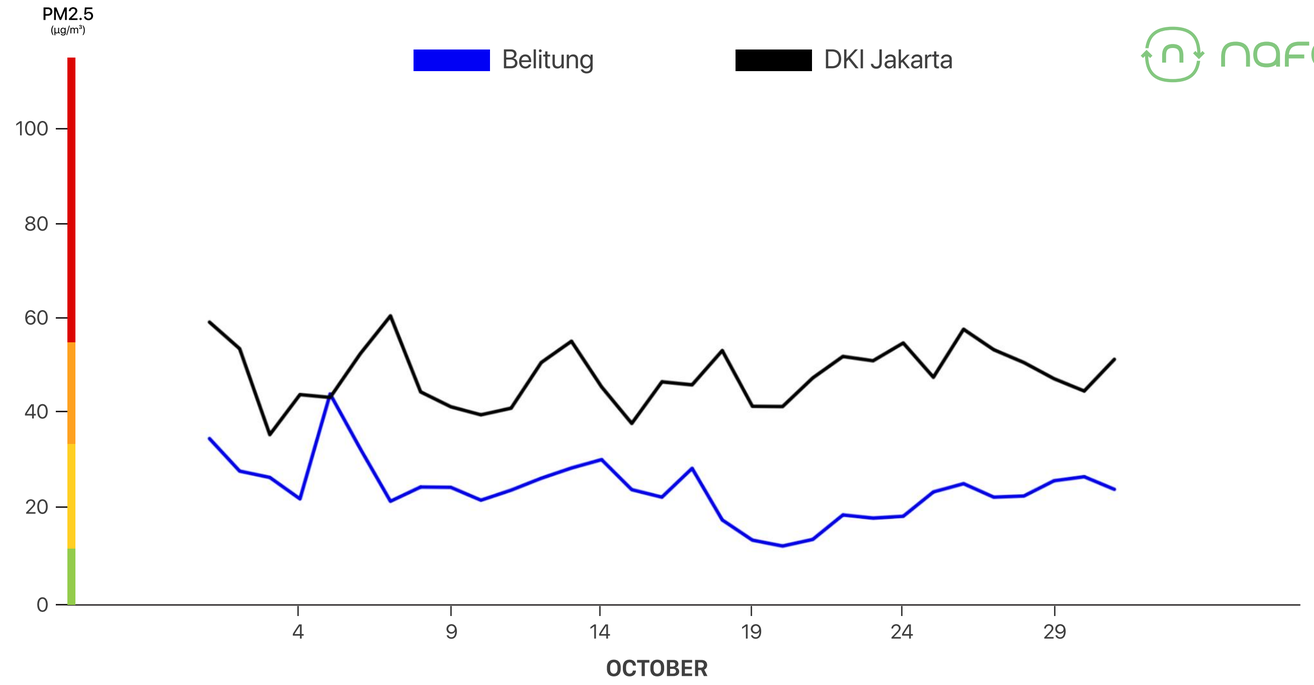
WHO Annual Guideline — 5

Belitung

October 2023

The Belitung Islands had to concede the title of the region with the best air quality to Bali this October. Nevertheless, its pollution levels remain much lower compared to DKI Jakarta.

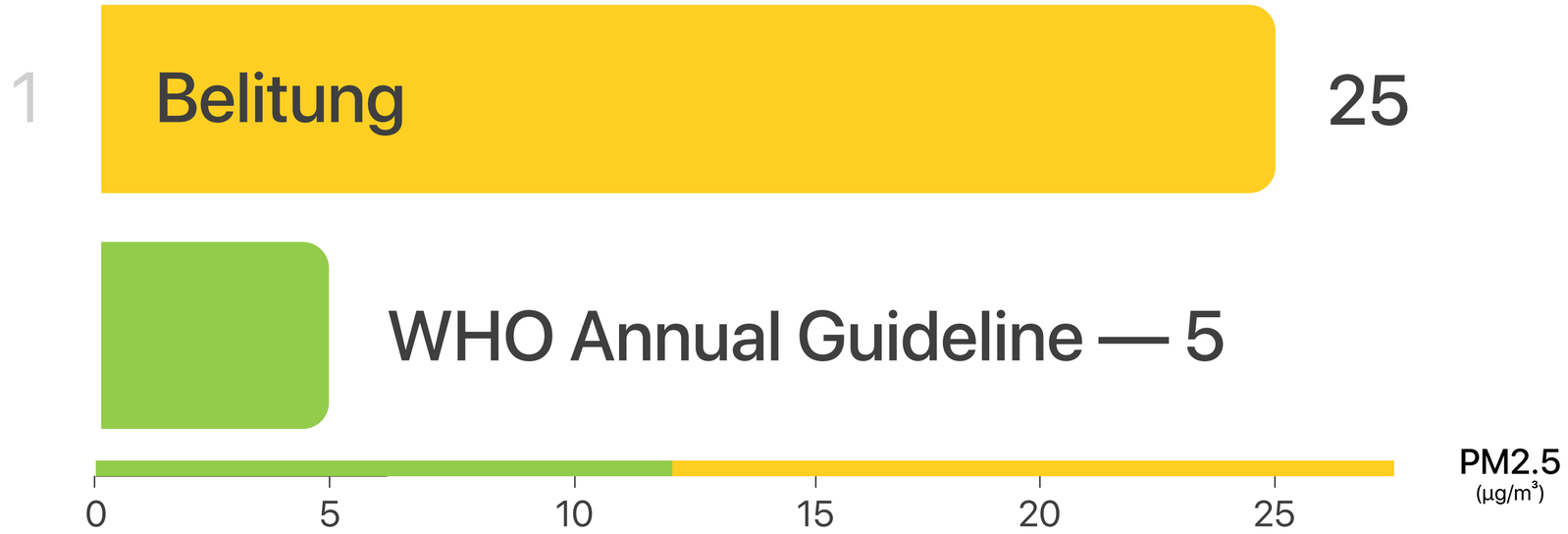
BELITUNG VS DKI JAKARTA



49%

Better than DKI Jakarta

- Good
- Moderate
- Unhealthy for Sensitive Group
- Unhealthy

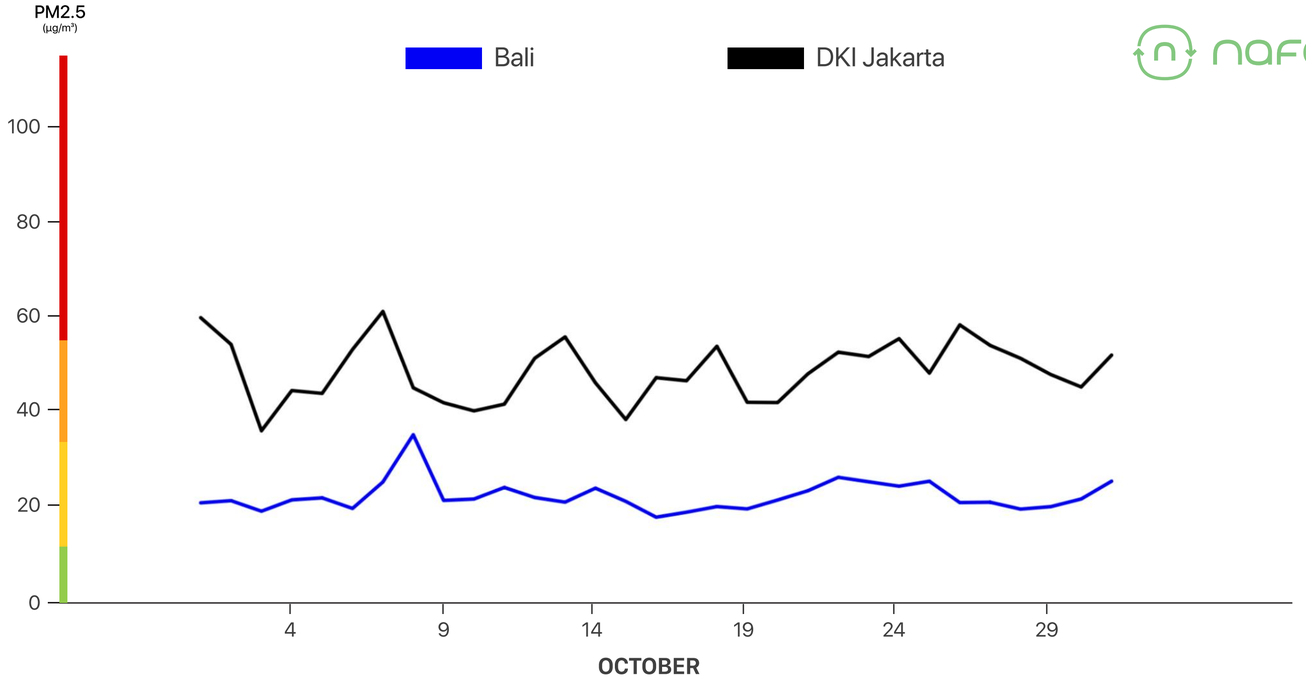


Bali

October 2023

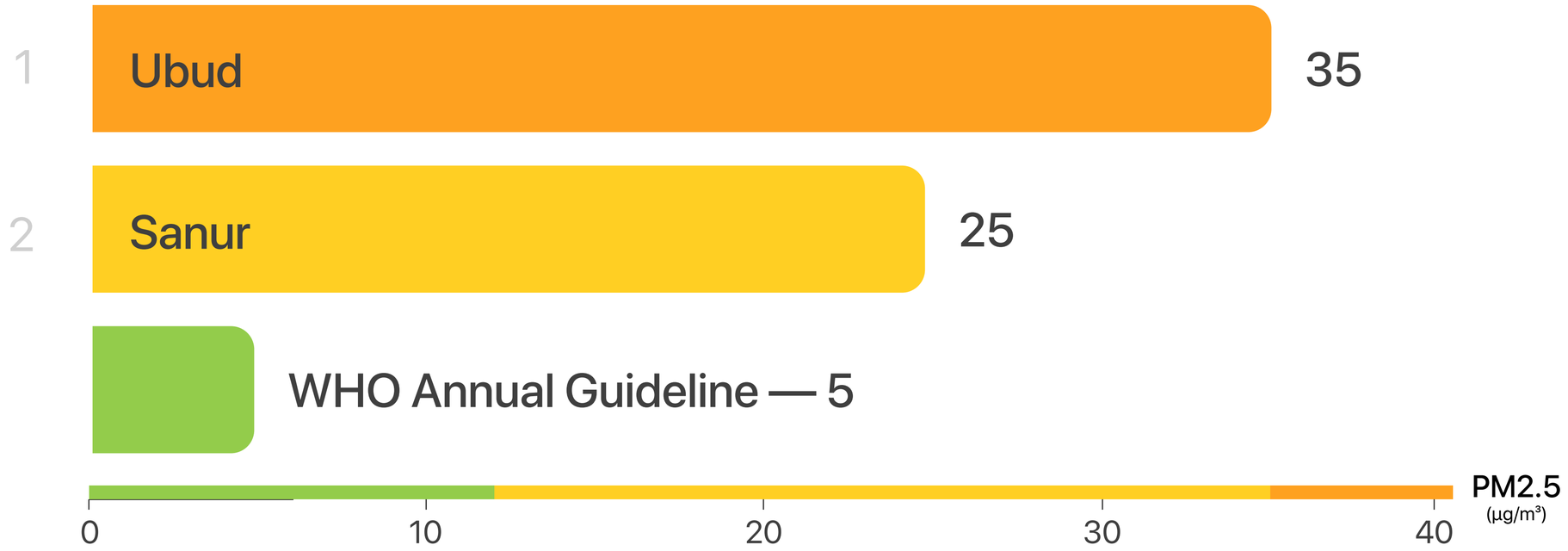
Congratulations to Bali for achieving the status of the region with the best air quality in the Nafas sensor network this October! Keep up the good work 🙌🏻

BALI VS DKI JAKARTA



54%

Better than DKI Jakarta

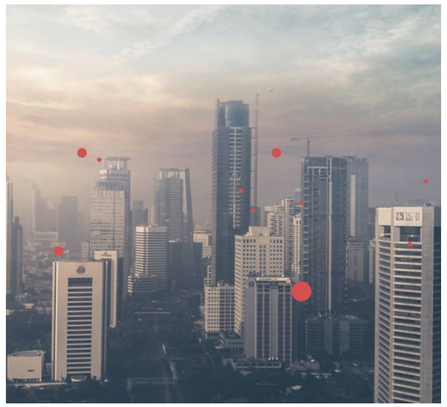


- Good
- Moderate
- Unhealthy for Sensitive Group
- Unhealthy

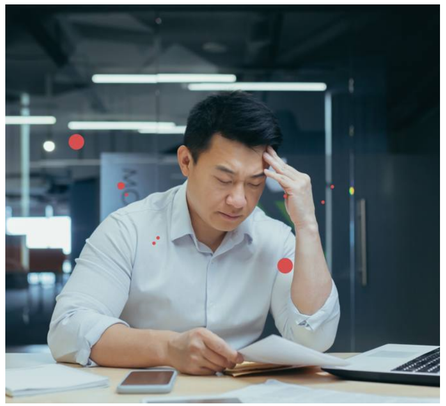
Almost All Outdoor Air Pollution Can Penetrate Indoors

Given the tiny dimensions of PM2.5 particles, they can easily seep through doors and windows in homes, schools, and campuses. In office buildings, pollutants might infiltrate through malfunctioning central air conditioning systems, causing us to breathe air that's nearly as polluted as the outside atmosphere.

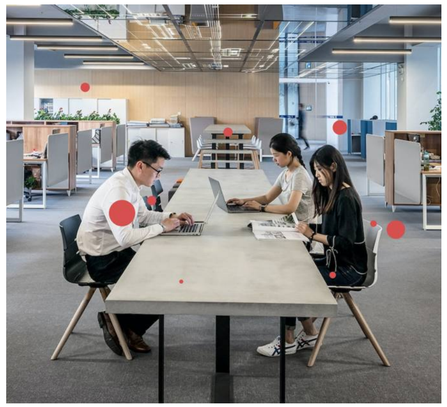
Browse the articles below for a deeper understanding of indoor air quality and its implications for our health.



OurBuildings are Broken



How Indoor Air Pollution Impacts Us in Offices



How Much Pollution Gets Inside Our Offices

Clean Air at the Office: Just a Benefit or Should It be a Standard

How Indoor Pollution Impacts Our Children in Schools

Implementing Clean Air Zones: A Proven Solution for Enhancing Office Air Quality

CAZ Stories is a series of articles that spotlight the significant impact of Clean Air Zones on diagnosing and improving indoor air quality issues for businesses in Indonesia.

Browse the articles below to read some of the inspiring CAZ Stories.

CAZ Stories: Nafas Improved Indoor Air Quality by 89% at Mighty Minds Preschool

CAZ Stories: How Nafas Reduced Indoor Pollution by 70% at AC Ventures Office

CAZ Stories: A Threefold Improvement in Indoor Air Quality at Pace Performance

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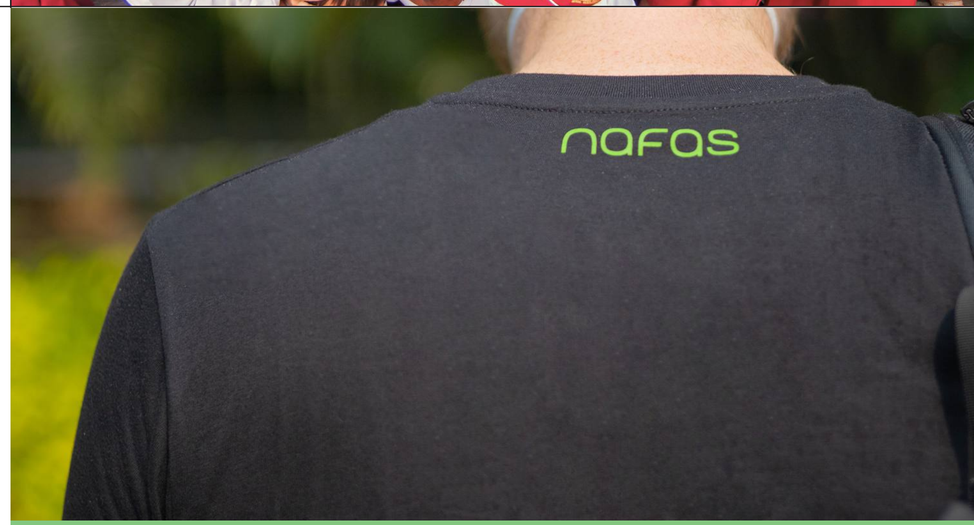

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