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Health Hazards of Poor AQI

- Overall Statistics World Wide
- Most Polluted and Least Polluted
- Respiratory (Asthma, COPD)
- Cancer
- Heart Disease
- Obesity
- Auto Immune Disease
- Skin Effects
- Premature Birth and Low Birth Weight
- Low Sperm Counts
- Fatty Liver



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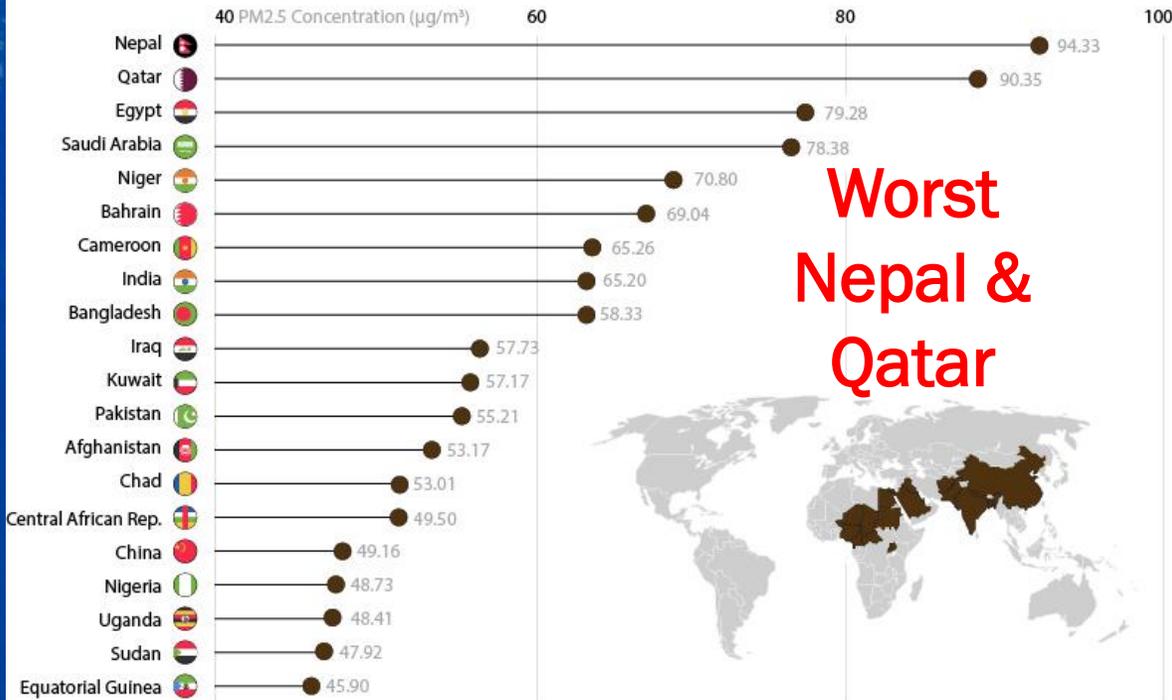
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Most & Least Polluted Air PM2.5

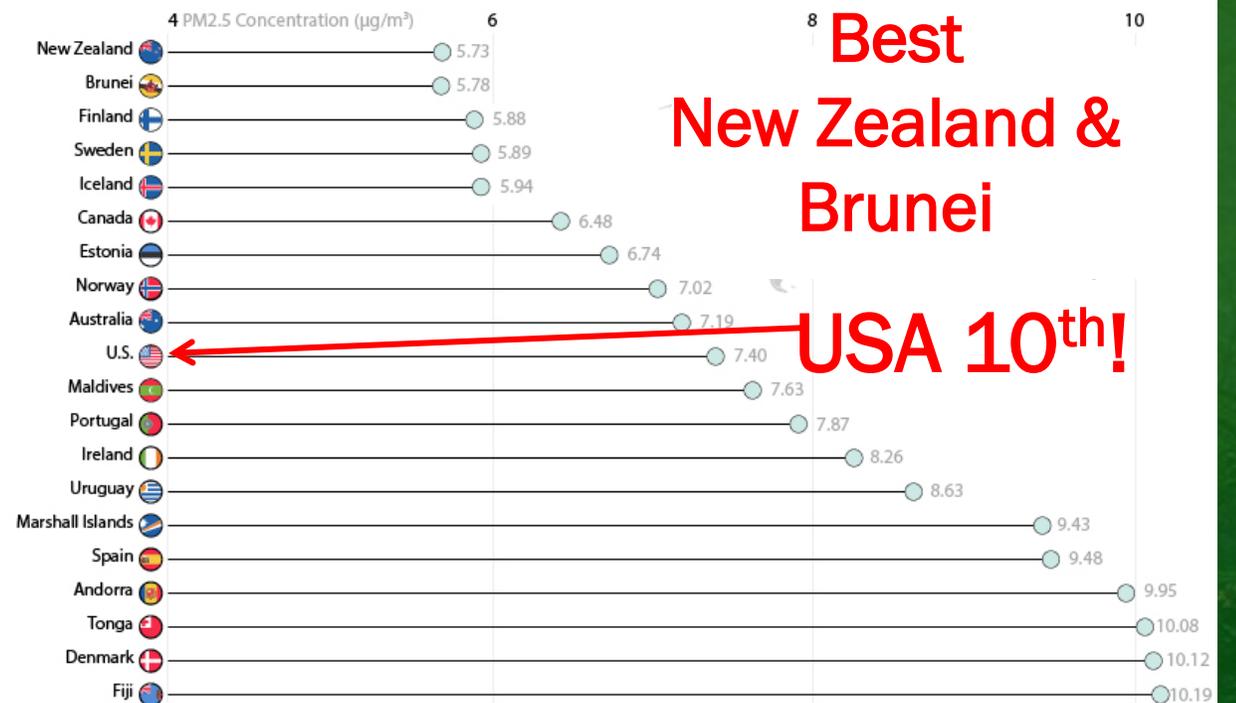
Over 90% of the world's population lives in areas where PM2.5 levels are above the WHO guideline for healthy air (10 µg/m³). *

Countries with the Most Polluted Air



**Worst
Nepal &
Qatar**

Countries with the Cleanest Air



**Best
New Zealand &
Brunei**

USA 10th!

Air quality concentration is measured in terms of micrograms per cubic metre (µg/m³).
Source: World Health Organization, 2016 (Latest data available)

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<https://www.stateofglobalair.org/sites/default/files/documents/2020-10/soga-global-profile-factsheet.pdf>

<https://www.visualcapitalist.com/mapped-which-countries-have-the-worst-air-pollution/>

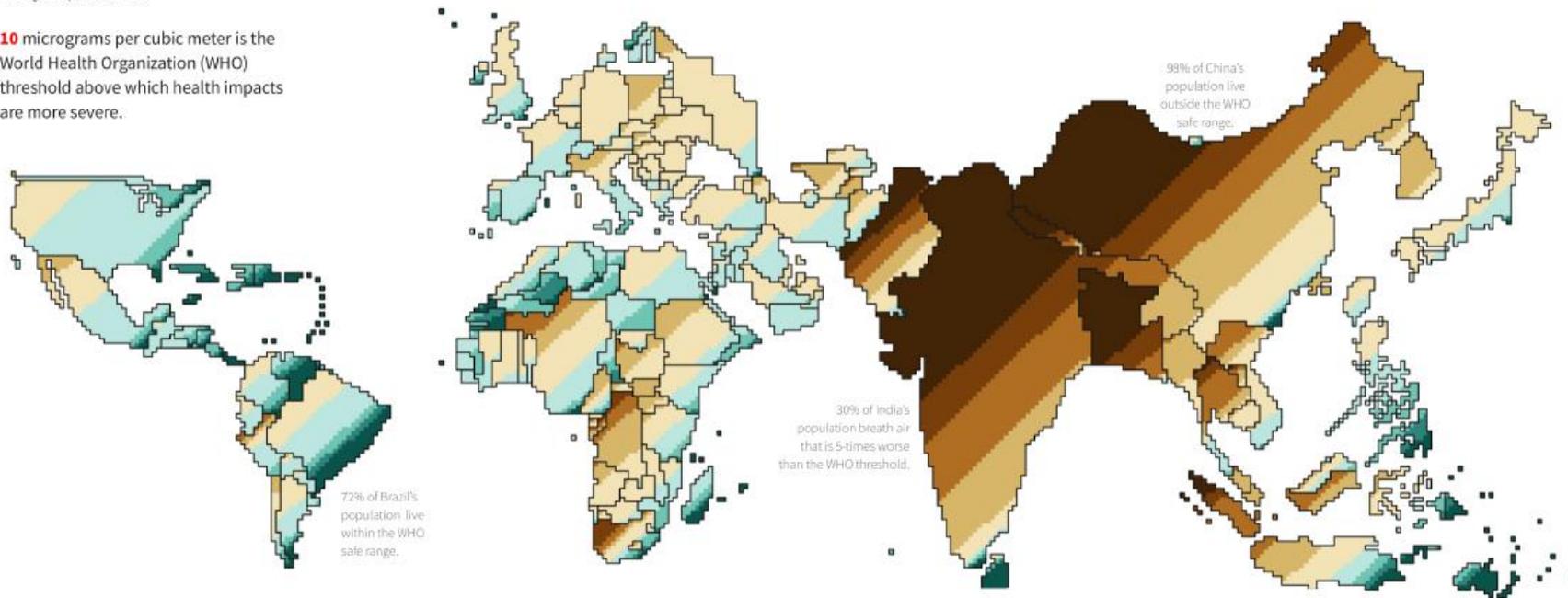
Most & Least Polluted Air PM2.5

Countries are resized according to their population to represent **people** rather than **land**

Fine Particulate Matter (PM2.5) Concentration with Dust and Sea-Salt Removed



10 micrograms per cubic meter is the World Health Organization (WHO) threshold above which health impacts are more severe.



@mattdzagan

Population data: Center for International Earth Science Information Network - CIESIN - Columbia University, 2018. Gridded Population of the World, Version 4 (GPW4): Population Count, Revision 11, Palisades, NY: NASA Socioeconomic Data and Applications Center (SEDAC).
Air quality data: van Donkelaar, A., et al., Martin, M., Brauer, A., et al., Hsu, Y., et al., Kahn, R., et al., Levy, A., Samrat, A., et al., Sayer, T., et al., 2018. Global Annual PM2.5 Gridded from MODIS, MISR and SeaWiFS Aerosol Optical Depth (AOD) v11r2018, 2000-2010, Palisades NY: NASA Socioeconomic Data and Applications Center (SEDAC).
Map: Max Roser (2018) - "The 400 we need if we want to DINK about how global living conditions are changing", Published online at OurWorldInData.org, Retrieved from: "https://ourworldindata.org/world-population-cartogram" [Date Retrieved]

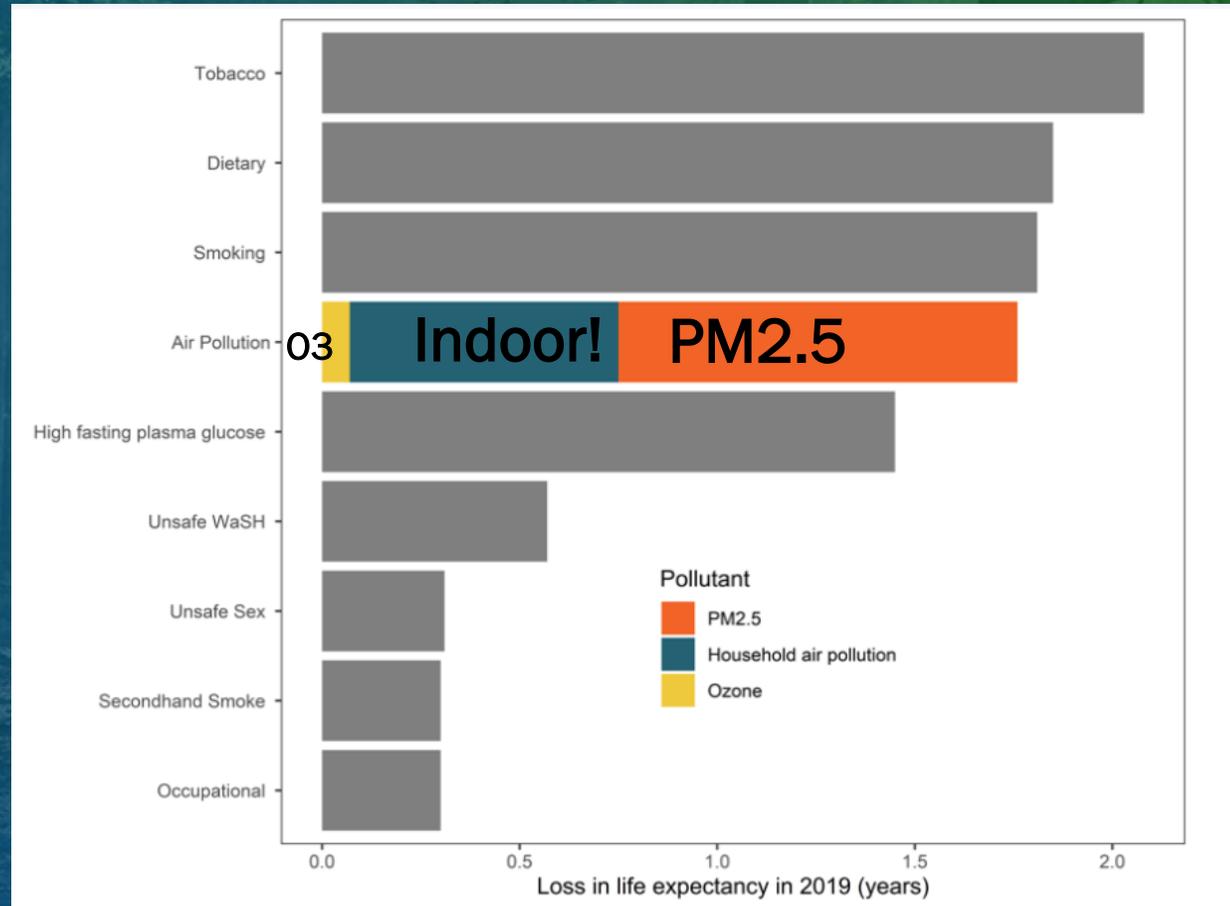
<https://www.visualcapitalist.com/mapped-which-countries-have-the-worst-air-pollution/>

“State of Global Air 2020”

The latest data
on air quality
and health
where you live
and around the
globe.

Impact of Air Pollution on Life Expectancy

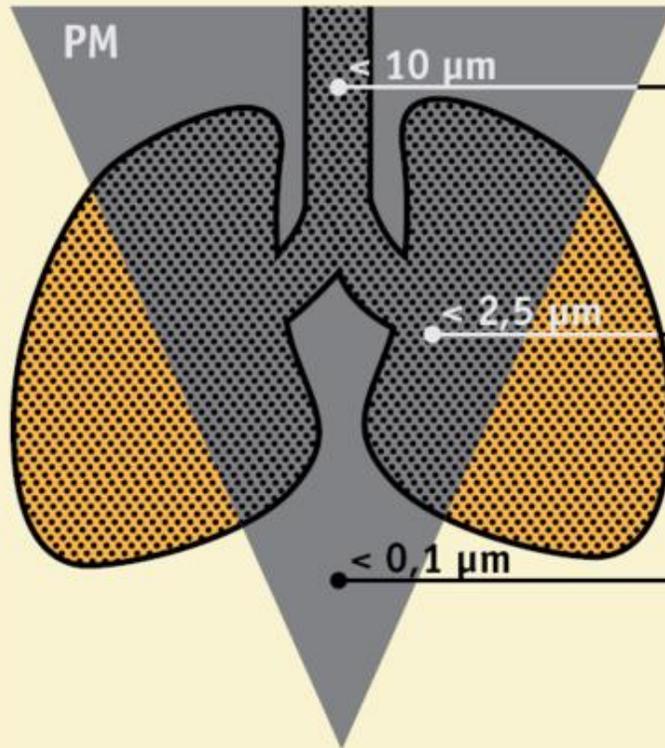
In 2019, air pollution shortened average life expectancy by 1 year and 8 months.



Download
Report .pdf

Penetration of PM2.5 Particles

Types and effects of particulate matter



Fine particulate inhalable

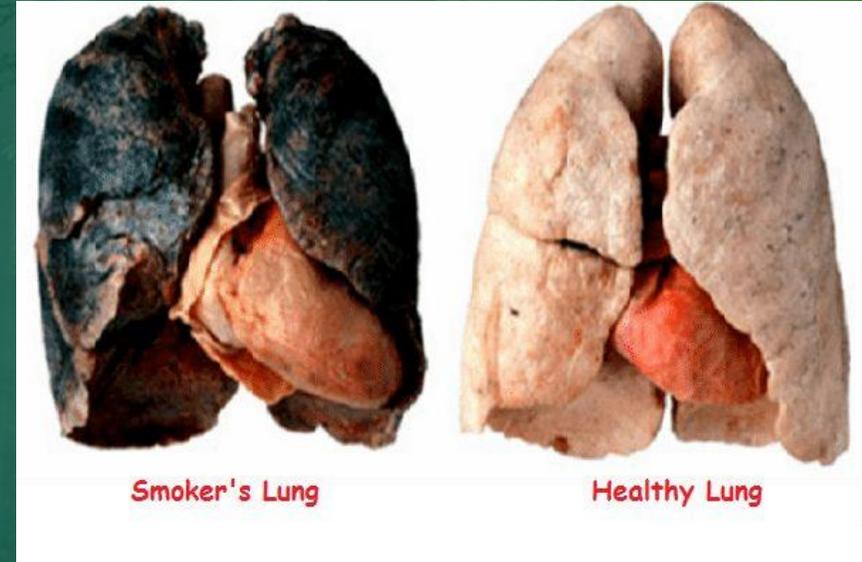
- Street dust, abrasion
» Respiratory ailment
» Decrease of pulmonary function

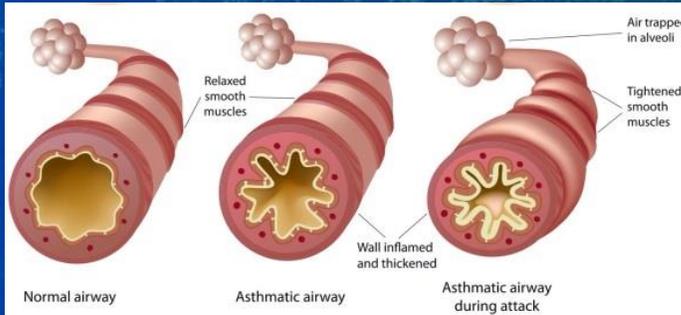
Fine particulate respirable

- Industrial dust, exhaust
» Dermatologic diseases
» Increased risk of lung cancer

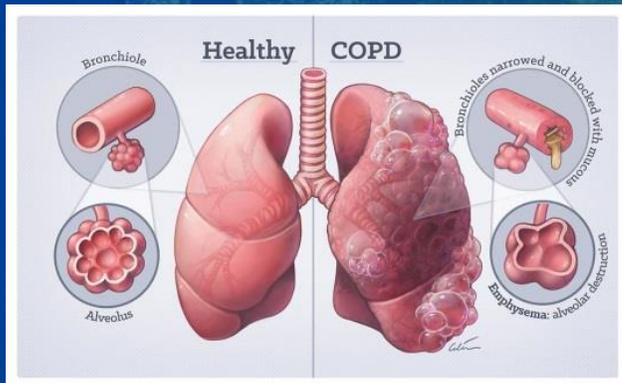
Ultra fine particles

- Diesel soot, exhaust
» Increased risk of heart attacks
» Increased risk of cancer





Asthma 2.3 million children and nearly 10 million adults with asthma live in counties that received an F for at least one pollutant. More than 320,000 children and 1.4 million adults with asthma live in counties failing all three measures.



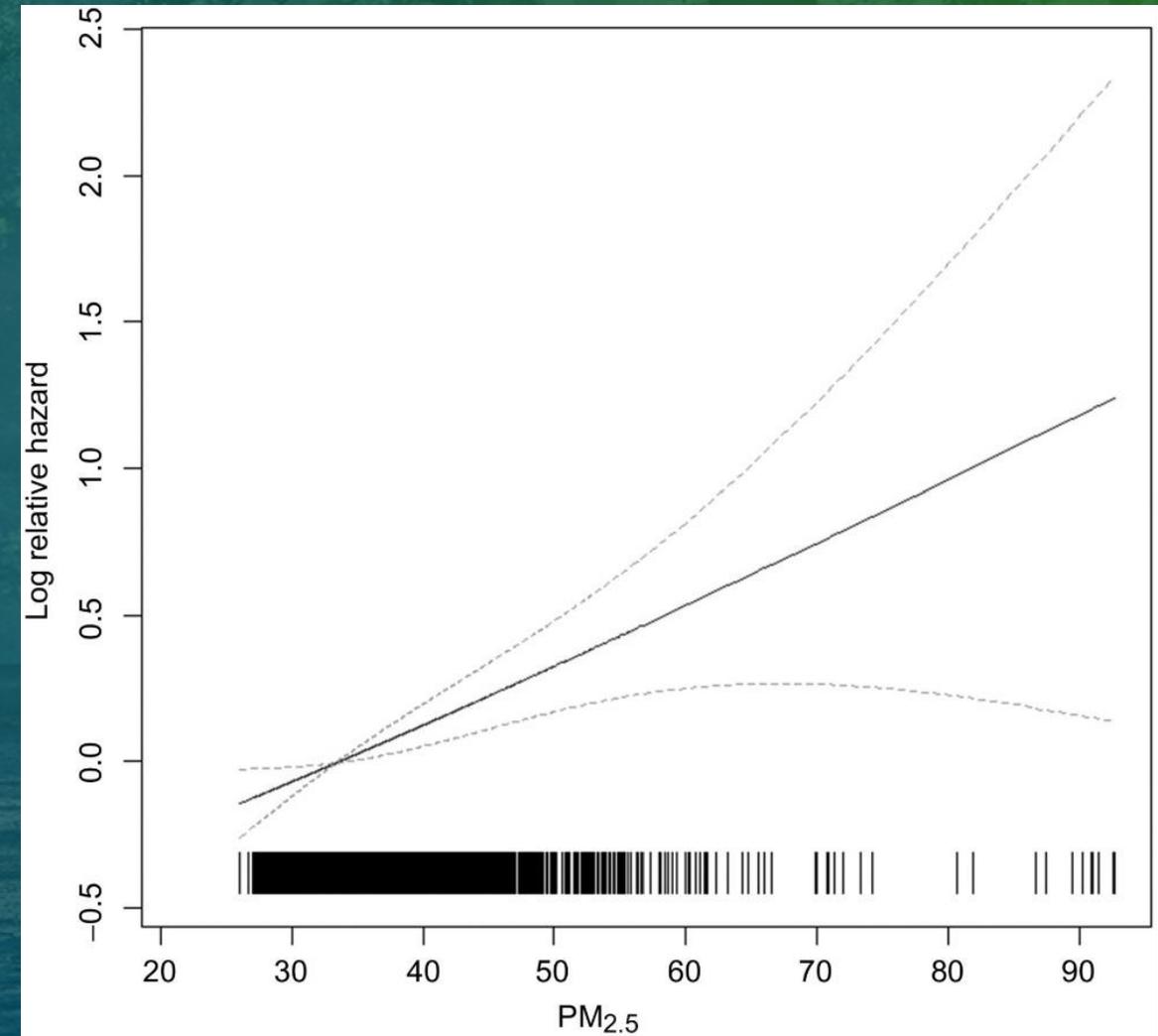
Chronic Obstructive Pulmonary Disease (COPD)—Over 6.1 million people with COPD live in counties that received an F for at least one pollutant. Almost 800,000 people with COPD live in counties failing all three measures.

Cancer Mortality Risks from Long-term Exposure to Ambient Fine Particle

Wong, Chit Ming et al American Association for Cancer Research May 2016

Results: $PM_{2.5}$ was associated with increased risk of mortality for all causes of cancer [HR, 1.22 (95% CI, 1.11–1.34)] and for specific cause of cancer in upper digestive tract [1.42 (1.06–1.89)], digestive accessory organs [1.35 (1.06–1.71)] in all subjects; breast [1.80 (1.26–2.55)] in females; and lung [1.36 (1.05–1.77)] in males.

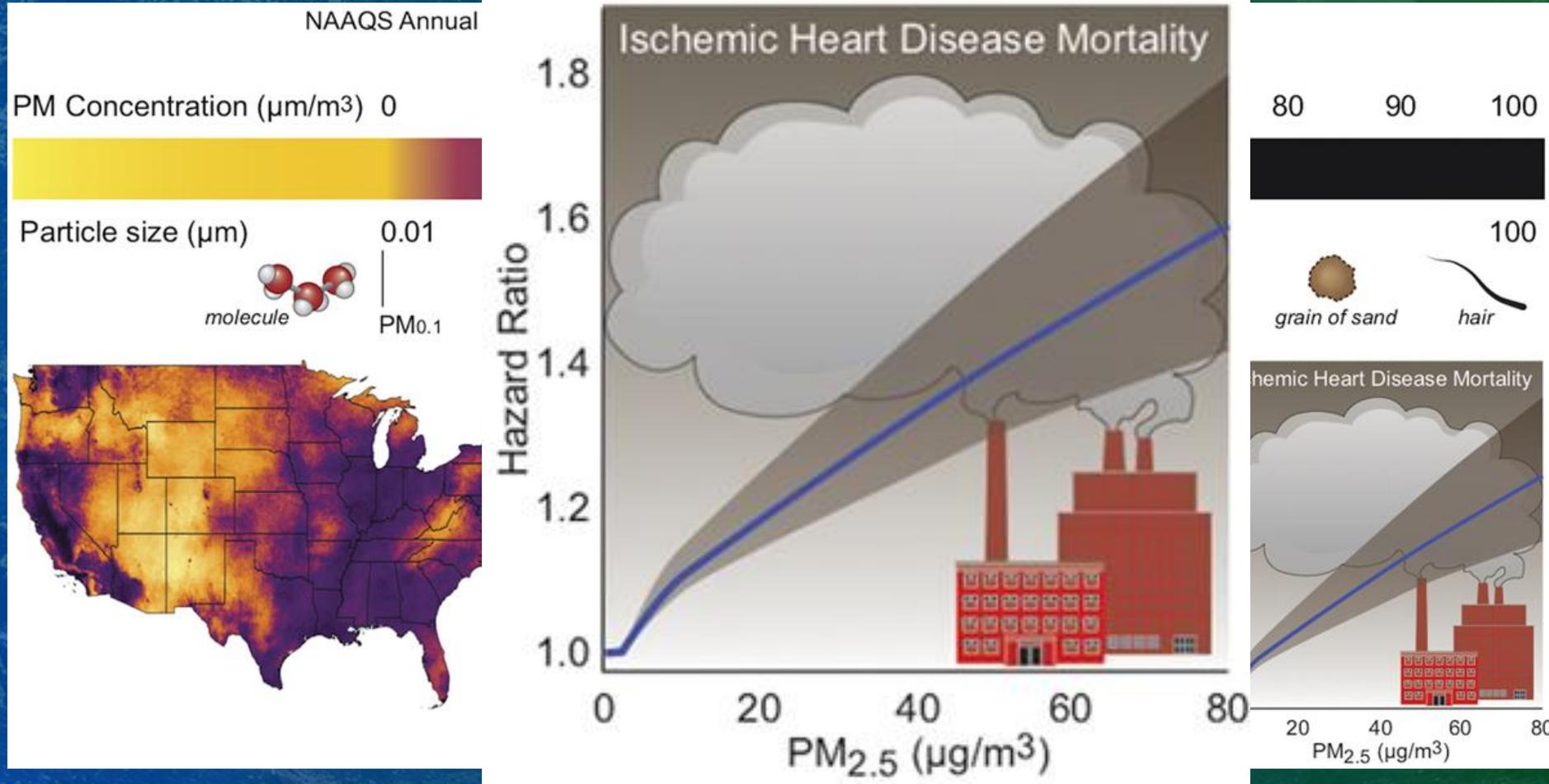
Conclusions: Long-term exposures to $PM_{2.5}$ are associated with elevated risks of cancer in various organs.



Ambient Air Pollution and Atherosclerosis

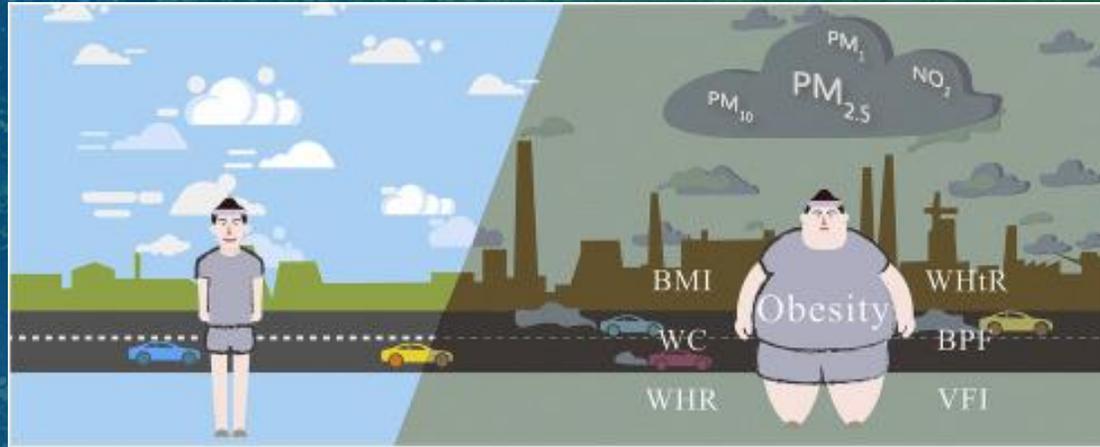
Insights Into Dose, Time, and Mechanisms

Beven GH et al Arteriosclerosis, Thrombosis, and Vascular Biology 2021;41:628-637



<https://www.ahajournals.org/doi/10.1161/ATVBAHA.120.315219>

Does air pollution cause weight gain?



Indoor air pollution and heavy metals linked to child obesity

An international study finds that where a child lives and what they breathe may play an important role in their weight gain.

Chemicals in everyday products are spurring obesity, warns a new review

Exposure to **obesogens**, which are “pretty much everywhere,” is in part driving the obesity epidemic, according to scientists.

<https://www.ehn.org/air-pollution-and-obesity-2646254033.html>

<https://www.iqair.com/us/blog/health-and-wellness/air-pollution-may-lead-to-weight-gain/>

Auto Immune Diseases



Autoimmunity Reviews

Volume 18, Issue 6, June 2019, Pages 607-614



Emerging role of air pollution in autoimmune diseases

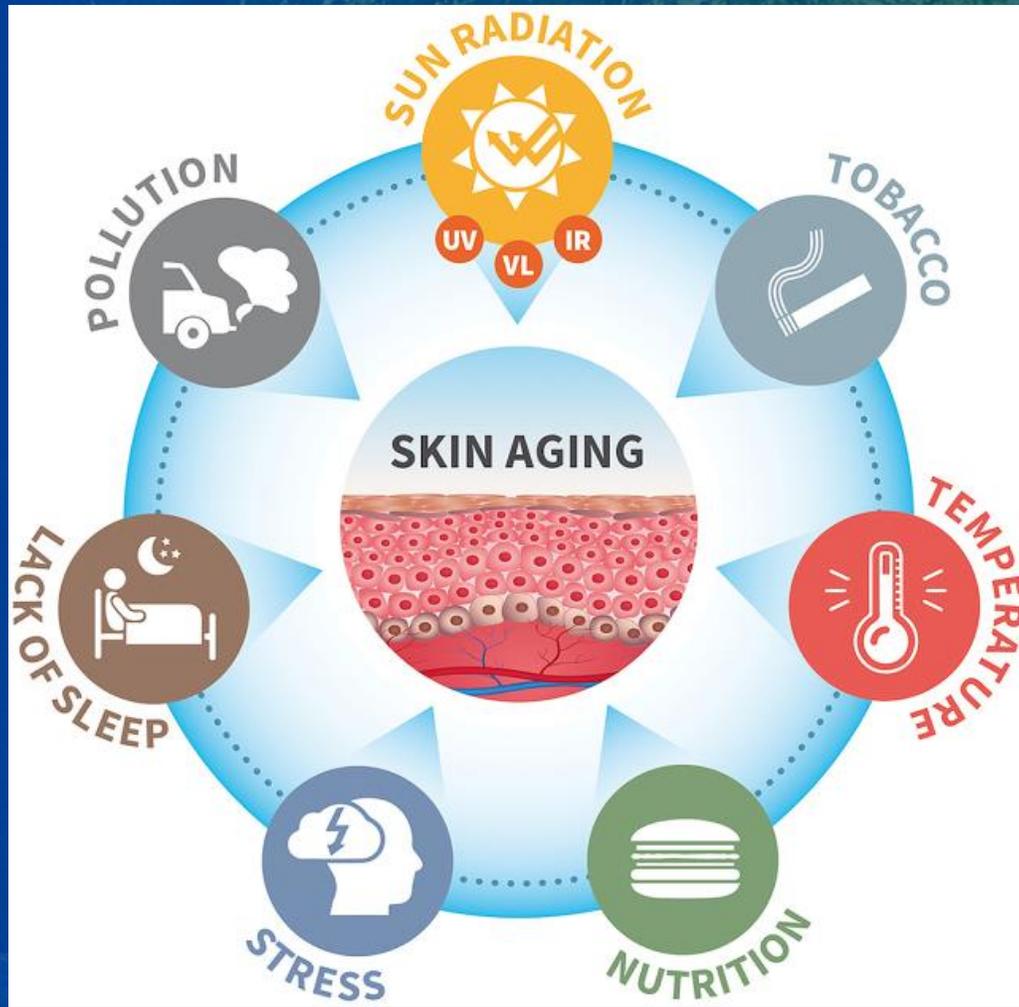
Systemic lupus erythematosus (SLE),
Rheumatoid arthritis (RA),
Multiple sclerosis (MS),
Type 1 diabetes mellitus (T1DM), etc.

*Related again to
Inflammation from
Air Pollution!!*

<https://www.sciencedirect.com/science/article/pii/S1568997219300886>

Oxidative contribution of air pollution to extrinsic skin ageing due to Ozone!!

Fussell, JC & Kelly, FJ Free Radical Biology & Medicine. 2020; 111-122



Ground level Ozone reacts with our skin producing free radicals which damage our Collagen and cause wrinkles and skin aging.
Topical Vitamin C Helps with this!!



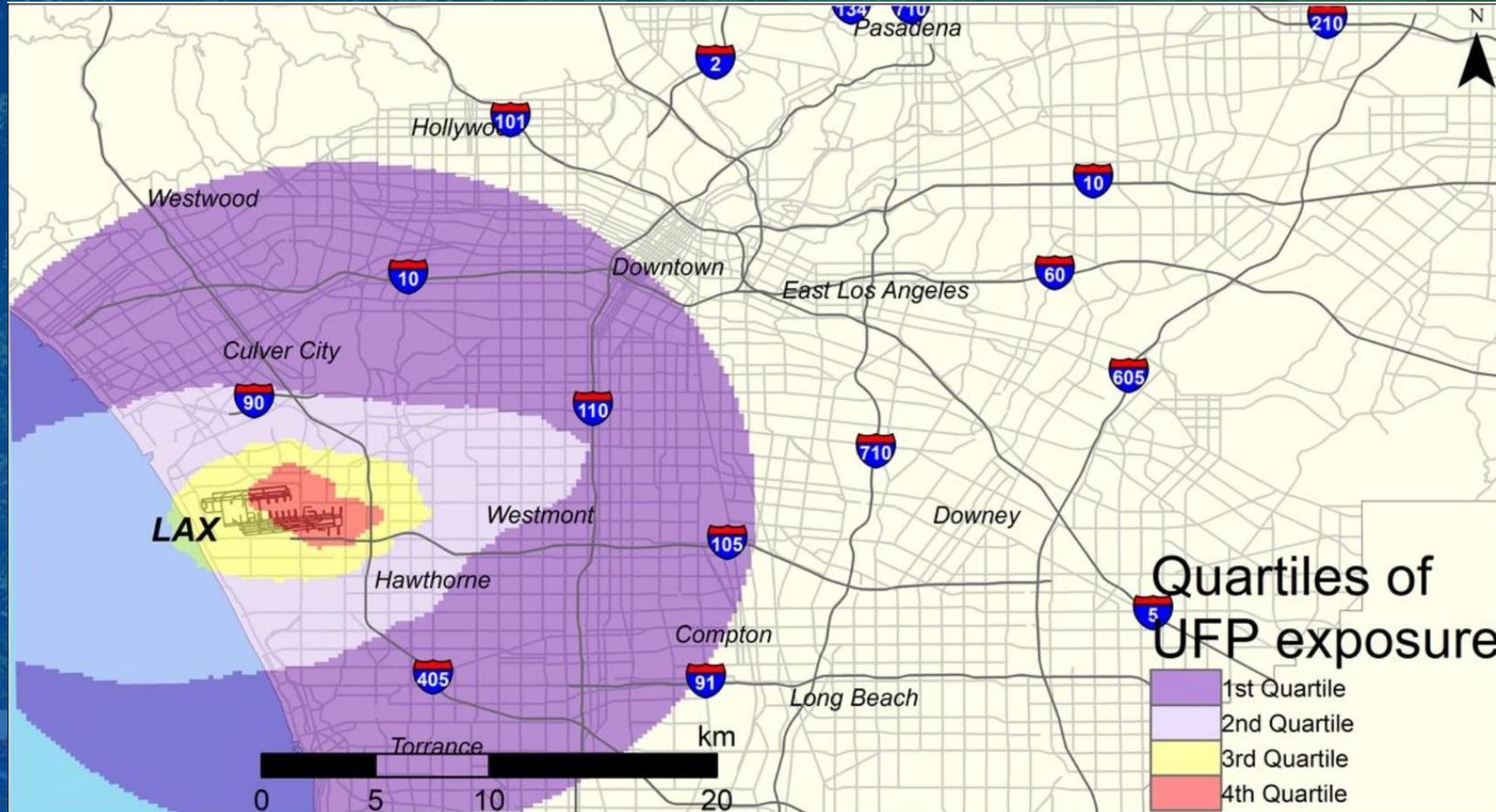
Vitamin C
Serums



<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7322554/>

Jet aircraft exhaust linked to preterm births, low birth weight!

Smith, Brad, UCLA Health and Behavior. July 2020



<https://newsroom.ucla.edu/releases/jet-aircraft-exhaust-linked-to-preterm-births>

Sperm Motility



Air pollution can lead to reduced sperm motility.

The smaller the size of the polluting particles in the air, the greater the link with poor semen quality.

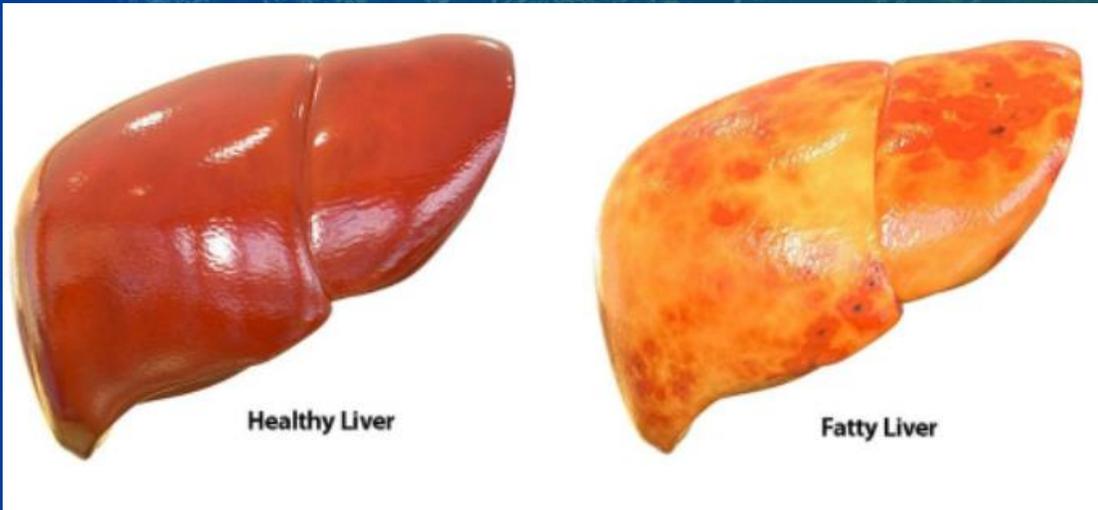
<https://jamanetwork.com/journals/jamanetworkopen/fullarticle/2789132>

<https://www.theguardian.com/environment/2022/feb/17/air-pollution-may-affect-sperm-quality-says-study>



American Liver Foundation
Your Liver. Your Life.

Fatty Liver!!



Several animal models have provided strong evidence that air pollutants can induce liver toxicity and act to accelerate liver inflammation and steatosis.

<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4112066/>