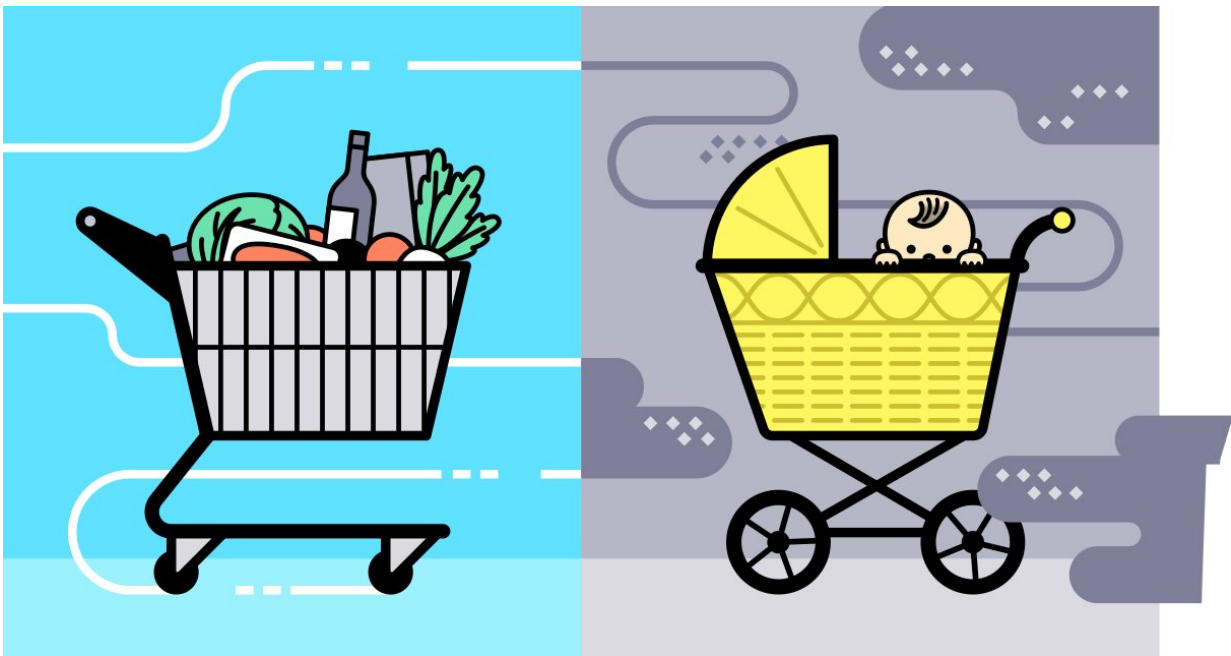


How particulate matter pollution is increasing infant death rates

November 2 2021



The consumption of G20 nations was responsible for 78 000 premature deaths of infants worldwide. Credit: NIES

The haze that blurs a blue sky or a beautiful skyline is caused by tiny particles known in climate research as $PM_{2.5}$. $PM_{2.5}$ describes particulate matter, often made from pollution, less than 2.5 microns wide. Despite its microscopic size, $PM_{2.5}$ is responsible for more than 4 million premature deaths every year. A new study in *Nature Communications* led by Japanese researchers shows that the pollution caused by consumption

in the world's biggest economies leads to half of those deaths.

The particles' very small size is what makes PM_{2.5} so dangerous. Easily inhalable, they accumulate inside the lungs, where they severely increase the risk of cancer and other deadly diseases. It is predominantly poor people who are especially vulnerable to PM_{2.5} and die prematurely.

"Most deaths are in developing countries, and without international coordination the situation will worsen," said Dr. Keisuke Nansai, Research Director at the Material Flow Innovation Research Program of the National Institute for Environmental Studies in Japan, who had been a visiting professor at ISA of the University of Sydney, and one of the lead authors of the study.

While most countries acknowledge they contribute to PM_{2.5} levels, there is little agreement on how much and thus their financial responsibility. In particular, far harder to measure than the direct production of PM_{2.5} by factories and cars is the amount caused by consumption.

This is a vital question to answer, says Nansai. Unlike direct production, which first affects the producing nation and then spreads across borders to neighboring nations, the PM_{2.5} caused by consumption may originate in distant nations and have negligible effects on the consuming [nation](#).

"Pollution in the form of production emissions creates a motive to implement joint PM_{2.5} reduction measures in neighboring countries. Such cooperation is unlikely among countries that are geographically distinct," said Nansai.

G20 members make up more than three quarters of international trade and the world's economic output. Therefore, Nansai and his colleagues reasoned, understanding the impact the consumption of these nations has on PM_{2.5} levels would provide a reliable benchmark.

Using Eora, a database made nearly a decade earlier to measure [global supply chains](#) around the world, the study mapped out the emissions made by consumption alone.

The study shows that consumption by the world's most consuming nations, such as the U.S. and U.K, causes a significant number of premature deaths in faraway nations, such as China and India, whereas the premature deaths caused by production habits are more common in neighboring nations like Mexico and Germany.

COVID-19, the pandemic that has changed the world, is a respiratory disease that is most lethal to the elderly. Similarly, the premature victims of PM_{2.5} are also mostly elderly. However, unlike COVID-19, the study found another group alarmingly susceptible to the PM_{2.5} produced by consumption.

"We found that the consumption of G20 nations was responsible for 78 000 premature deaths of infants [up to 5 years old] worldwide," noted Nansai.

The effect was not too great in most G20 nations, such that the average age of premature deaths was nearly 70 years old. However, in some countries, namely, South Africa and Saudi Arabia, premature infant death was so prevalent that the average age of premature deaths was under 60 years old. Similarly, the average age of [premature deaths](#) in India and Indonesia barely crossed this threshold.

Nansai and his colleagues stress that if consumption is not considered, then most countries will not think they should pay any penalty for these deaths.

"As long as responsibility for infant deaths due to production emissions is the only issue pursued, we can find no rationale for nations to confront

the mass death of infants [in faraway nations]," they write in the study.

Finally, to emphasize the impact that $PM_{2.5}$ levels from consumption level alone has on [human health](#), the study concluded that the lifetime [consumption](#) of 28 people in G20 nations will cause the premature [death](#) of one person worldwide.

More information: Keisuke Nansai et al, Consumption in the G20 nations causes particulate air pollution resulting in two million premature deaths annually, *Nature Communications* (2021). [DOI: 10.1038/s41467-021-26348-y](#)

Provided by National Institute for Environmental Studies

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