China's coal burning cutting lives short by years

Historical study links higher levels of pollution to higher mortality.

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In the same northern areas of China where government used to provide free coal for heating, particulate matter in the air was 55% higher — and respiratory ailments shortened life expectancy by five years.

High levels of particulates from coal burning in China's highly polluted north may have cut more than five years from life expectancy for the 500 million people who lived there in the 1990s, scientists report today in *Proceedings of the National Academy of Sciences*[1]. The study can help to forecast the health effects of pollution in present-day China — where air quality has only gotten worse — as well as in other countries.

Chinese air pollution made global headlines during the 2008 Beijing Olympics and again this winter, when particulate levels in Beijing exceeded 700 micrograms per cubic metre — more than 50 times higher than those allowed by US air-quality standards.

But prior efforts to quantify the long-term risks of living in such conditions have been problematic, says Michael Greenstone, an environmental economist at the Massachusetts Institute of Technology in Cambridge and a co-author of the latest study. That's because earlier studies attempted to extrapolate health effects from US data, where even in the most polluted cities particulate levels are an order of magnitude lower than those found in China. Data for the health effects of high pollution levels are scarce, he says.

Clear view

To fill the gap, Greenstone and his colleagues looked into the effects of a Chinese government policy that from 1950 to 1980 provided free coal for heating to people in the region north of the Huai River and the Qinling mountain range, a fairly traditional demarcation between northern and southern China.

The goal of the Huai River Policy was to provide a minimum of heating resources to those who most needed them. But in the process it accidentally provided an unintended experiment in which people north of the river were exposed to air particulate levels 55% higher than those to the south, with reported levels reaching 550 micrograms per cubic meter.

Adding to the impact was that during this period, Chinese citizens tended to stay in one city, breathing the same air, rather than moving

away. “There was not a lot of migration,” Greenstone says. “In fact, it was restricted by law.” Furthermore, the policy left a legacy of higher coal use north of the dividing line, where to this day homes are more likely to have coal-fired heating built decades ago.

Comparing Chinese air pollution and health data, Greenstone and colleagues found a marked jump not only in death rates, but in a single air-pollution variable — particulates — right at the Huai River line. Even more strikingly, the increased death rate north of the line was entirely due to cardiorespiratory illnesses.

Even though the study was based on data from two decades ago, the researchers say it can help to predict the health effects of the current levels of atmospheric pollution, which are even higher than in the 1990s. The finding, Greenstone says, is useful information to developing countries trying to find the balance between economic growth and environmental health. But it could also play a role in global climate-change debates.

“This study highlights that reducing the use of fossil fuels, especially coal, can have immediate benefits completely separate from climate,” Greenstone says. “This is a good argument [to the Chinese] for reducing reliance on coal not only to appease the US and Europeans, but to improve the health and wellbeing of their citizens.”

Jonathan Samet, director of the University of Southern California’s Institute for Global Health in Los Angeles, applauds the study as a very “straightforward” piece of research, though he notes that a “minor” problem is that the Chinese air-pollution data used in it measured total suspended particulates, rather than the now-preferred PM2.5 measure of lung-penetrating particulates smaller than 2.5 micrometers.

Still, he notes, the paper clearly shows that China faces “an enormous air-pollution burden” requiring “vigorous action.”

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References

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