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New Delhi and Beijing are among the most polluted cities in the world. By some measures, New Delhi is more polluted than Beijing—the India Centre for Science and Environment placed New Delhi at the top of its list. And a 2014 study from the Environmental Performance Index also ranked India as worse than China. Many other reports have put Beijing in first place.

But what interests some air pollution experts more than the ever-shifting ranking is the type of pollution in these two places. Although the two cities are both infamous for poor air quality, the type of air pollution in New Delhi and in Beijing is different. Experts note that New Delhi and Beijing pose different challenges and health problems. New Delhi is high in dangerous particulates, and Beijing is higher in sulfur dioxide. Because of that, Beijing is potentially more hazardous to people's health.

"My experience from going to New Delhi was that the pollution there was primarily wood burning. In the U.S. and Beijing, on much higher levels, air pollution is mostly from industries, fossil fuel combustion, and dirty fossil fuels," said George Thurston of New York University's Langone Medical Center. "The particles are probably likely to be more toxic, especially from a cardiovascular point of view in China, than in India."

According to the EPA, sulfur dioxide is the greatest threat to human respiratory health. Short-term exposure to sulfur dioxide affects breathing, and aggravates existing cardiovascular and respiratory diseases. Asthma, bronchitis or emphysema can be exacerbated by sulfur dioxide pollution. According to a 2010 study in *Atmospheric Chemistry and Physics,* China is one of the largest sulfur dioxide generating countries in the world. China is responsible for one-fourth of the global emissions of the compound, and more than 90 percent of East Asian emissions since the 1990s.

Sulfur from sulfur dioxide can travel long distances. If produced in Beijing, it can disperse throughout the Northern Hemisphere. The global, local, and regional effects of sulfur dioxide also influence the environment. Sulfur dioxide can form acid rain, which acidifies lakes and streams, and damages trees, crops, historic buildings, and statues.

"The air pollution in Beijing is from coal-powered power plants and industries. New Delhi air pollution is more wood burning and biomass burning. It's not good, but it doesn't have the same health implications as fossil fuel particles," Thurston said. "We are still studying this. Coal-powered plants are much more toxic on a pound for pound basis than wood burning particles."

The average SO2 concentration in New York City during the winter of 2012 was 1.6 parts per billion. At three different sites in Beijing during 2012, the overall average

concentrations were 16.8 ppb, 14.8 ppb, and 7.5 ppb. New Delhi consistently did not exceed New York City levels.

Even so, Thurston says the air pollution situation in New Delhi remains grim because of particulates. Particulates come in different sizes, but the size of concern is PM 2.5 or particles less than 2.5 microns. These small particles are about one-thirtieth the size of a human hair, and can adversely affect the body's immune system. PM2.5 includes sulfates, nitrates, organic chemicals, metals, and soil or dust particles emitted by factories, power plants, cars, construction activity, fires and natural windblown dust. They damage lung tissue, contributing to cancer, and premature death. According to the Centre for Science and Environment in New Delhi, PM2.5 levels nearly doubled in November and the first week of December.

On April 17, 2014, NYC's PM 2.5 air quality index was 40, Beijing was 177, and New Delhi's was 193. Both Beijing and New Delhi's levels were "red," the most dangerous level of air quality for PM 2.5, and considered unhealthy, according to the Environmental Protection Agency's air quality index.

However, to the millions of New Delhi residents estimated to suffer from respiratory illnesses, addressing particle pollution is vital.

Shyam Biswal is a professor at John Hopkins University. Biswal is the Director of the Center for Global Clean Air at the Bloomberg School of Public Health. Biswal said if the problem in New Delhi is not addressed now it is only going to get worse.

Biswal said more than 30 percent of the outdoor air pollution is caused from indoor air pollution. People are using fuels such as wood and biomass for cooking—both of which contribute to New Delhi's PM 2.5 air pollution.

This phenomenon is graphically depicted in what experts call the Kuznets curve, after the scholar who developed the idea: economic growth is first accompanied by worse environmental conditions. But environmental conditions often improve over time. Most cities in developed countries went through this cycle; even New York was recently the site of many air pollution related deaths. According to a report in the *Archives of Environmental Health*, air pollution during the early months of 1963 caused an excess of 200 to 400 deaths.

"There has been a lot of improvement over the last 30 years and the improvement continues. Actually, the diesel engines in much of NYC are pretty clean now, particularly in the city buses and sanitation services," said Patrick Kinney, a professor of Environmental Health Sciences at Columbia University.

The U.S. has cleaner fuels and more efficient engines that emit less particle matter than fuels and vehicles used in developing cities like New Delhi, said Kinney.

What's happening in New Delhi is similar to what is taking place in a lot of developing countries, Kinney said.

Experts say if New Delhi doesn't regulate air pollution many more deaths could occur. The last big regulation came in 1985 when the Supreme Court of India mandated the use of compressed natural gas in public service vehicles in the city. Environmental agencies in New Delhi are now pushing for more regulation. The Centre for Science and Environment laid out a plan on that included reducing traffic on busy roads and increasing public transportation. Thurston reiterates that cities like New York went through the same pattern, but he said, he wished developing countries would learn more from our mistakes and not repeat them.

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Sources:

Dr. George Thurston- NYU Langone Medical Center
Dr. Patrick Kinney- Columbia University professor of environmental health sciences
Ogonnaya Dotson-Newman- Director of Environmental Health at We Act for Environmental Justice
Dr. Paul J. Lioy- Professor of Department of Environmental and Occupational Medicine.
Dr. Pamela Templer- Associate Professor, Department of Biology, Boston University Environmental Protection Agency National Institute of Environmental Health Sciences

http://www.cseindia.org/
http://scorecard.goodguide.com
http://www.atmos-chem-phys.net/10/6311/2010/acp-10-6311-2010.pdf
http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3612296/
http://www.epa.gov/ttnchie1/conference/ei19/session5/lu.pdf
Worldhealthorganization.com