
Title

Differences in Birth Weight Associated with the 2008 Beijing Olympics Air Pollution Reduction: Results from a Natural Experiment

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Abstract

Background

Several studies have shown that increased maternal exposure to air pollutants during pregnancy is associated with decreased birth weight in infants. However, specific prenatal period(s) with the most consistent associations had not yet been clearly identified. Low birth weight (under 5 pounds, 8 ounces) infants can be at increased risk for infections and respiratory and heart problems, among other health complications, and they are also at increased risk for delayed motor and social development or learning disabilities. According to the March of Dimes, approximately 1 out of 12 babies born in the U.S. have low birth weight.

Objective

To evaluate whether specific months of pregnancy (1st - 8th) occurring during a period of significantly improved ambient air quality are associated with larger birth weights in comparison with pregnancies occurring during periods of higher levels of air pollution.

Methods

The study population consisted of over 83,000 single, live births of infants--who had reached at least 28 weeks of gestation--to mothers living in four urban districts in Beijing. Birth weights associated with having individual months of pregnancy during the 2008 Olympics, a period of substantially improved air quality in Beijing, were compared with birth weights associated with having individual months of pregnancy during the same dates in 2007 and 2009. The study also estimated differences in birth weights associated with interquartile range increases in average concentrations of particulate matter (PM_{2.5}), carbon monoxide (CO), sulfur dioxide (SO₂), and nitrogen dioxide (NO₂) during each pregnancy month.

Results

Babies whose 8th month of gestation occurred during the 2008 Olympics were, on average, 23g larger than babies whose 8th month *in utero* occurred during the same dates in 2007 or 2009. Interquartile increases in PM_{2.5}, CO, SO₂, NO₂, and concentrations during the 8th month of gestation were associated with an 18g, 17g, 23g, and 34g, decrease in birth weight, respectively. There were no significant associations for months 1-7.

Conclusion

Short term decreases in air pollution late in pregnancy in Beijing during the 2008 Olympics were associated with higher birth weights.

Policy Implications

The U.S. Environmental Protection Agency's (EPA) National Ambient Air Quality Standards (NAAQS), established under the Clean Air Act, set limits on CO, lead, NO₂, ozone, particle pollution (PM_{2.5} and PM₁₀), and SO₂. The Agency is required to review the NAAQS every 5 years, and in October 2015, it strengthened the limit on ground level ozone to 70 parts per billion (ppb), down from 75 ppb. However, several health advocacy groups have stated that even this stricter standard falls short of safeguarding the health of vulnerable populations such as children. In addition, the establishment of tighter standards does not immediately result in cleaner, safer air. Many states must adopt new, cleaner technologies and stricter regulations in order to be in compliance. Improved monitoring networks and enforcement of the standards are also necessary. Despite the existence of NAAQS, nearly half of U.S. residents live in counties that have unhealthy levels of either ozone or particle pollution¹. Underserved populations such as low income communities or communities of color are often more likely to inhabit these areas of nonattainment, making this an issue of environmental justice as well.

Reference

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Keyword(s)

[Low birth weight](#), [healthy air](#), [National Ambient Air Quality Standards](#)

¹ American Lung Association. State of the Air 2015. Accessed on 12/22/15 from <http://www.stateoftheair.org/2015/key-findings/>.