

Declining air pollution levels continue to improve life expectancy in US

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A new study led by researchers at Harvard School of Public Health (HSPH) has found an association between reductions in fine particulate matter and improved life expectancy in 545 counties in the U.S. from 2000 to 2007. It is the largest study to date to find beneficial effects to public health of continuing to reduce air pollution levels in the U.S.

The study appears in the December 3, 2012 online edition of the journal *Epidemiology*.

"Despite the fact that the U.S. population as a whole is exposed to much lower levels of [air pollution](#) than 30 years ago—because of great strides made to reduce people's exposure—it appears that further reductions in [air pollution levels](#) would continue to benefit public health," said lead author Andrew Correia, a PhD candidate in the Department of Biostatistics at HSPH.

The study looked at the effects on health of fine particulate matter, small particles of 2.5 micrometers or less in diameter—referred to as PM2.5. Numerous studies have shown associations between acute and chronic exposure to fine particle air pollution and cardiopulmonary disease and mortality. Studies have also shown that reductions in air pollution are associated with reductions in [adverse health effects](#) and improved life expectancy. Air pollution has been declining steadily in the U.S. since 1980, but the rate has slowed in the years since 2000. The HSPH researchers wanted to know whether the relatively smaller decreases in PM2.5 levels since 2000 are still improving life expectancy.

Controlling for socioeconomic status, smoking prevalence, and demographic characteristics, the results showed that a decrease of 10 micrograms per cubic meter ($10 \mu\text{g}/\text{m}^3$) in the concentration of PM_{2.5} during the period 2000 to 2007 was associated with an average increase in life expectancy of 0.35 years in 545 U.S. counties.

The research expanded on a 2009 study published in the [New England Journal of Medicine](#) by some of the same authors (Pope, Ezzati, and Dockery) that found that reduced air pollution was associated with increased life expectancy in 211 urban counties. This new study looked at more recent data, more than two-and-a-half times as many counties, and included both rural and urban areas. The findings showed that there's a stronger association between declining air pollution and increased life expectancy in more urban, densely populated areas than in rural areas. The results also suggested that reduced levels of air pollution may be more beneficial to women than to men.

As to why there was a stronger association between reductions in [fine particulate matter](#) and improvements in [life expectancy](#) in urban areas, the researchers speculated that the composition of the particulates there may be different from that in rural areas.

"Since the 1970s, enactment of increasingly stringent air quality controls has led to improvements in ambient air quality in the United States at costs that the U.S. Environmental Protection Agency has estimated as high as \$25 billion per year. However, the extent to which more recent regulatory actions have benefited [public health](#) remains in question. This study provides strong and compelling evidence that continuing to reduce ambient levels of PM_{2.5} prolongs life," said senior author Francesca Dominici, professor of biostatistics at HSPH.

More information: "The Effect of Air Pollution Control on Life Expectancy in the United States: An Analysis of 545 US Counties for

the Period 2000 to 2007," Andrew W. Correia, C. Arden Pope III, Douglas W. Dockery, Yun Wang, Majid Ezzati, Francesca Dominici, *Epidemiology*, December 3, 2012 online edition

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