



fossil fuels

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## DISCUSSION & REVIEW QUESTIONS:

- Mr. Epstein explains that although our natural environment can be quite hazardous and extreme, “...we’ve been able to conquer all these environmental hazards... all of it in humanity’s incredibly successful effort to create a safer, cleaner, more habitable world. And we did most of this using machines running on cheap, plentiful, reliable energy from fossil fuels.” Do you think that humanity’s progress could have been achieved without the use of fossil fuel-driven machines? Why or why not? Just how important do you think that fossil fuel is to your comfort and well-being?
- Mr. Epstein acknowledges that in the past fossil fuel energy has created some problems, but that now, “...thanks to technology, we get better and better at minimizing and neutralizing those risks. Los Angeles was once smog city. Now its air is cleaner than it’s been in decades. London’s Thames River was once clogged with sewage; now it’s clean.” So now that humans have learned to minimize and even mitigate the negative by-products of using fossil fuel energy, do you think that we should continue to use and develop it? Why or why not?
- Considering that, “Many of the benefits of today’s environment are reflected in life-expectancy and population statistics: the average person lives longer, in better health, than ever before,” do you think that we should be, “...wracked with guilt over our industrial development” and “...made to feel bad for the impact that we have on land, on water, on plants, on animals?” Why or why not? Is any potential trade off cost to other species and/or their habitat worth it? Why or why not? Do you think a reasonable compromise has been made or can be made? Why or why not?
- Mr. Epstein concludes the video by stating, “In sum, human beings have made the Earth a far, far better place to live for ourselves,” and that, “It’s time to stop thinking about how to save the planet from human beings and resume thinking about how to improve the planet for human beings.” Should humans continue to transform their environment into a safer and healthier place for their species? Why or why not? Should humans continue to utilize fossil fuel technologies? Why or why not?

## EXTEND THE LEARNING:

### CASE STUDY: Los Angeles Air Pollution

INSTRUCTIONS: Read the article “LA environmental success story: cleaner air, healthier kids,” then answer the questions that follow.

- What is the ‘success story’ here? What were the primary contributors to cleaning up LA’s air? What were the benefits of cleaning up the air?
- How did fossil fuels and technology contribute to the success? What still needs to be done?
- From a quality of life standpoint, would you rather live in the Los Angeles of today or the Los Angeles of 200 years ago? Why? How do fossil fuels and their associated technology figure into your answer?



# QUIZ

## WHY YOU SHOULD LOVE FOSSIL FUEL

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1. Which of the following contributed to solving the problem of deadly indoor pollution?
  - a. Indoor plumbing.
  - b. Solar power.
  - c. Kerosene.
  - d. None of the above.
  
2. Data shows that fossil fuels pollute our environment and make our climate unlivable.
  - a. True
  - b. False
  
3. What effect has the rapid escalation of CO<sub>2</sub> emissions over the past eighty years had on the annual rate of climate-related deaths worldwide?
  - a. Climate-related deaths have also rapidly escalated.
  - b. Climate-related deaths have declined rapidly.
  - c. Climate-related deaths have not been significantly affected.
  - d. There is not enough reliable data to come to any conclusion.
  
4. What is the correlation between use of fossil fuels and access to clean water?
  - a. More fossil fuels, restricted clean water.
  - b. More fossil fuels, low air quality.
  - c. Less fossil fuel, more access to clean water.
  - d. Less fossil fuel, less access to clean water.
  
5. Anti-pollution technology is powered by – \_\_\_\_\_.
  - a. The sun
  - b. Fossil fuel
  - c. NASA
  - d. Nuclear Power



# QUIZ - ANSWER KEY

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<https://news.usc.edu/76761/las-environmental-success-story-cleaner-air-healthier-kids/>

## [USC News](#)

[HealthSocial Impact](#)

# LA environmental success story: cleaner air, healthier kids

**Children's lungs grew stronger as pollution declined in LA and throughout the basin over the past two decades**

BY [Carl Marzali](#)

March 4, 2015



Air quality has improved throughout the Los Angeles basin, resulting in health improvements for growing children.  
(Photo/[Nserrano](#))

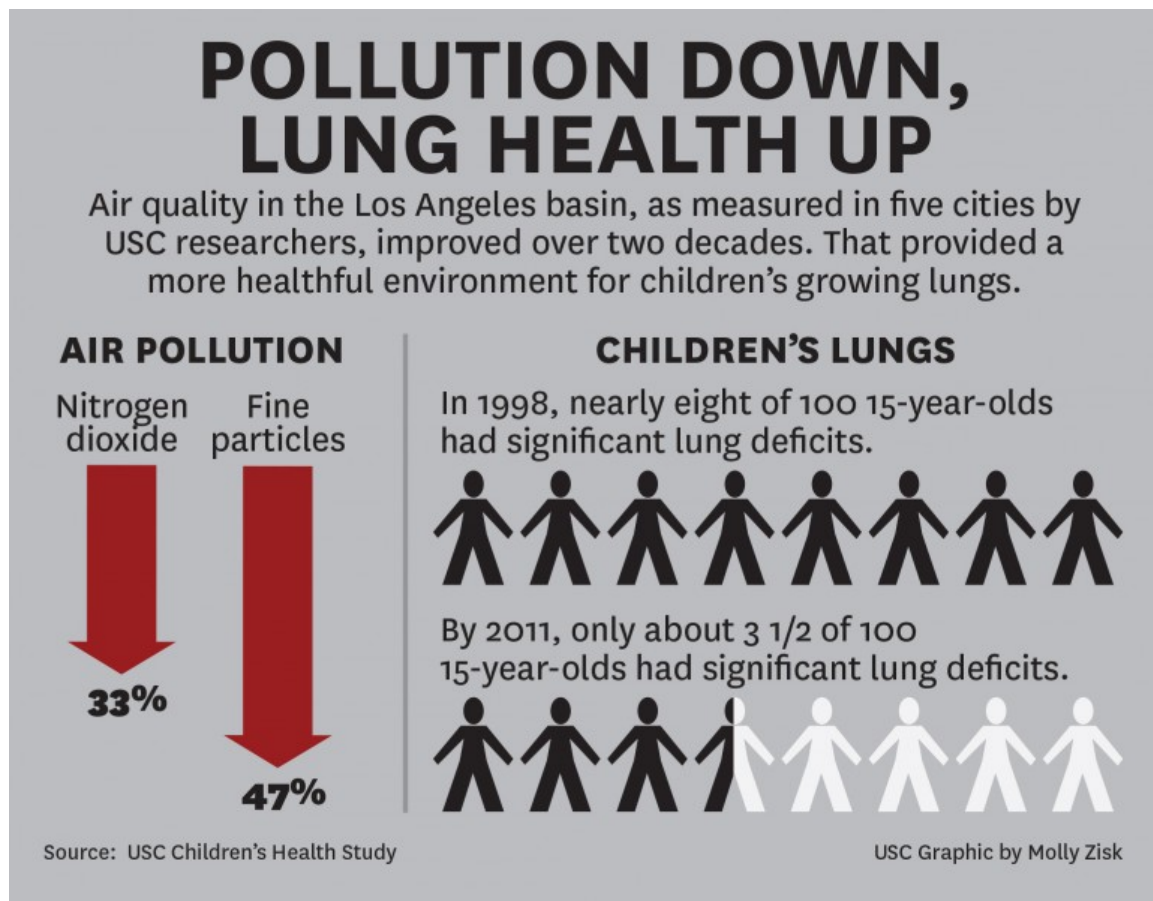
A 20-year study finds that millennial children in Southern California breathe easier than youngsters who came of age in the '90s, for a reason as clear as the air in Los Angeles today.

[The USC Children's Health Study](#) measured lung development between the ages of 11 and 15 and found large gains for children studied from 2007 to 2011, compared to children of the same age in the same communities from 1994-98 and 1997-2001.

The gains in lung function paralleled improving air quality in the communities studied and across the Los Angeles basin, as policies to fight pollution took hold.

The research appears in the March 5 issue of the [New England Journal of Medicine](#).

Many studies have measured the health effects of pollution by comparing locations with different air quality. The challenge lies in ruling out other factors that may account for health differences among communities.



By following more than 2,000 children in the same locations over two decades and adjusting for age, gender, ethnicity, height, respiratory illness and other variations, the study provides stronger evidence that improved air quality by itself brings health benefits — the kind that last a lifetime for children breathing cleaner air during their critical growing years.

“We saw pretty substantial improvements in lung function development in our most recent cohort of children,” said lead author [W. James Gauderman](#), professor of preventive medicine at the Keck School of Medicine of USC, noting this was the first good news from the long-running study.

“It’s strange to be reporting positive numbers instead of negative numbers after 20 years,” he said.

Widely covered previous findings from the study showed an increase in [stunted lung development](#) for children in areas with heavy air pollution, as well as a [higher risk of asthma](#) for children living near busy roadways.

## Deep breaths

Combined exposure to two harmful pollutants, nitrogen dioxide (NO<sub>2</sub>) and particulate matter of diameter under 2.5 microns (PM<sub>2.5</sub>) fell approximately 40 percent for the third cohort of 2007-11 compared to the first cohort of 1994-98. The study followed children from Long Beach, Mira Loma, Riverside, San Dimas and Upland.

Children's lungs grew faster as air quality improved. Lung growth from age 11 to 15 was more than 10 percent greater for children breathing the lower levels of NO<sub>2</sub> from 2007 to 2011 compared to those breathing higher levels from 1994-98.

The percentage of children in the study with abnormally low lung function at age 15 dropped from nearly 8 percent for the 1994-98 cohort to 6.3 percent in 1997-2001 and to just 3.6 percent for children followed between 2007 and 2011.

That compares to 2.5 percent by age 18 for children from the first two cohorts who lived in cities with cleaner air, such as Lompoc and Santa Maria. Cuts in federal funding forced the researchers to exclude those cities in the last cohort and focus only on areas with heavier air pollution.

"Reduced lung function in adulthood has been strongly associated with increased risks of respiratory disease, cardiovascular disease and premature death," Gauderman said. "Improved air quality over the past 20 years has helped reduce the gap in lung health for kids inside, versus outside, the LA basin."

The growing years are critical for lung development. The researchers are monitoring lung function in a group of adults who participated in the study as adolescents. So far they have not found evidence of a rebound after the teenage years.

"Their lungs may have lost the opportunity to grow any more," Gauderman suggested.

## Broad benefits from better air

Lung development measured by the study improved across the board, regardless of education, ethnicity, tobacco exposure, pet ownership and other factors.

Across all five communities, lung development for children with asthma improved roughly twice as much as for other children. But even children without asthma showed significant improvements in their lung capacity, suggesting that all youngsters benefit from improved air quality.

"We expect that our results are relevant for areas outside Southern California, since the pollutants we found most strongly linked to improved health — nitrogen dioxide and particulate matter — are elevated in any urban environment," Gauderman said.

The incidence of asthma did not change significantly over the three cohorts. Previous research by the Children's Health Study showed that the risk of asthma increases with proximity to busy roadways.

Lung function testing took place in school at least three times for each cohort, when the children were approximately 11, 13, and 15 years old. Students were asked to blow into a spirometer, an instrument that



measures lung size and strength. The spirometer reads total lung volume as well as the amount of air that a person is able to blow out in one second.

Air quality monitoring stations in the five communities took continuous readings of key pollutants over the study period, which the researchers averaged to examine the exposures for each cohort.

## **Southern California cleans up**

Local, state and federal [regulations](#) have achieved large reductions in pollutants in the Los Angeles basin.

In 2011, the concentration of NO<sub>2</sub> was below the federal standard throughout the basin. PM<sub>2.5</sub> was below the federal standard over most of the basin and near the standard in a small area straddling Riverside and San Bernardino counties. However, the federal standard was lowered in 2012, leaving the five communities in the study at or slightly above the new standard.

Ozone was below the federal eight-hour standard for most of Los Angeles and the coastal basin and exceeded the standard fewer than 20 days a year in the valleys, although parts of San Bernardino and Riverside counties continued to exceed the federal standard 40 to 80 or more days per year.

Visibility also has improved, according to the study, with Southern California locations [surpassing their 2018 state goals by 2012](#).

“It’s an environmental success story. The air has gotten much cleaner than it was in the past. I grew up here in the ’70s. Even from Pasadena you couldn’t see the San Gabriel Mountains on a typical summer day,” Gauderman said.

## **Gains not guaranteed**

Gauderman cautioned: “We can’t get complacent because not surprisingly the number of vehicles on our roads is continually increasing. Also, the activities at the ports of LA and Long Beach, which are our biggest polluting sources, are projected to increase. That means more trucks on the road, more trains carrying cargo.”

“These gains really aren’t fixed,” added senior author Frank Gilliland, Hastings Professor of preventive medicine at the Keck School of Medicine. “We have to maintain the same sort of level of effort to keep the levels of air pollution down. Just because we’ve succeeded now doesn’t mean that without continued effort we’re going to succeed in the future.”

Gilliland noted that the state’s historic drought is expected to raise particulate pollution.

The study’s third cohort of 2007-11 also came of age at a fortunate time for respiratory, if not financial health. The economy shrank and emissions fell during the Great Recession.

But the study also shows that air pollution and growth can coexist over the long term. The economy and population in the basin have grown since the cohort of 1994-98.

“Our results suggest that better air quality in the future will lead to even better lung health,” Gauderman said.

The study’s co-authors were Robert Urman, Edward Avol, Kiros Berhane, Rob McConnell, Edward Rappaport and Roger Chang, all from the Department of Preventive Medicine at the Keck School, and Fred Lurmann of Sonoma Technology Inc.

The authors dedicated their paper to the late [John Peters](#) of the Keck School's Department of Preventive Medicine, who conceived the Children's Health Study and directed it over most of its 20 years.

The study was funded by the Health Effects Institute, a partnership of the auto industry and the federal government; the California Air Resources Board; the Hastings Foundation; and the National Institute of Environmental Health Sciences (grants ES011627, ES07048 and ES022719).