checkup

by Christina Elston

Smog 101: What You and the Kids Breathe

Eight weeks without food. Five days without water. Three minutes without air. In the world of survival math, breathing is at the top of almost every equation. But here in the L.A. Basin, we inhale much more than life-sustaining oxygen, drawing in a mix of ozone, carbon monoxide, nitrogen dioxide, sulfur dioxide, lead and airborne particles.

Researchers decades ago pegged ozone as the major culprit behind short-term smog troubles like acute asthma attacks and shortness of breath, and suspected it also caused long-term health effects like heart disease and lung cancer. But about 10 years ago, the venerable Children's Health Study, launched in 1992 to find out more about how air pollution affects kids, began to focus more attention on traffic-related pollutants. During the past four years, they have zeroed in on the health effects of particulate matter, especially the smallest particles.

Other researchers are now carefully piecing together a road map that could prove these particles as the cause, not just an aggravator, of asthma – a connection that could finally account for growing rates of the disease.

The Environmental Protection Agency (EPA) regulates PM10s, which are smaller than 10 microns in diameter, and PM2.5s, particles smaller than 2.5 microns. (For comparison, a human hair is 50-70 microns.) These are stirred up by cars and construction, spewed from truck tailpipes and industry, and also created in the atmosphere.

"Area-wide pollution" shows up throughout the basin when wind blowing from the ocean drives emissions inland, explains Suzanne Paulson, Ph.D., vice chair of the UCLA department of Atmospheric and Oceanic Sciences. As the air travels, the sun shining from above forms a high-pressure system that traps the emissions near the land and "brews" them into photo-chemical smog. The farther east the air moves, the more time it has had in the sun, and the stronger the brew. "By the time the air that was on the ocean in the morning reaches San Bernardino, it's had time to react," says Paulson. This explains the haze that often hangs over the Inland Empire on sunny afternoons.

IN THE AIR

About This Series

"In the Air" is being produced as a project for The California Endowment Health Journalism Fellowships, a program of USC's Annenberg School for Communication & Journalism.

January: In Utero, how air pollution affects babies in the womb.

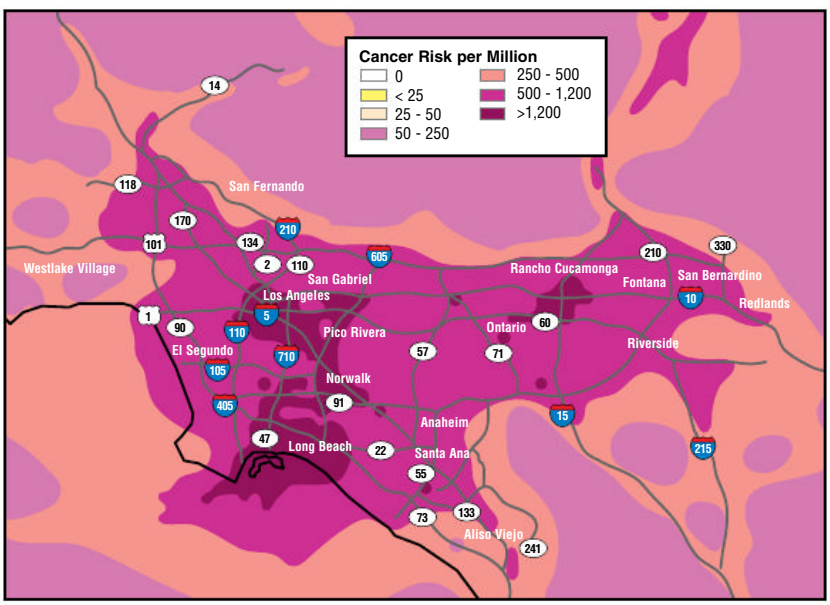
February: The Kids Aren't Alright, rising asthma rates among children.

March: Teenage Lungs, the long-term effects of breathing smog.

April: Clearing the Air, efforts at change and what you can do.

"Direct emissions" refers to pollution that hangs out near where it was created. The map below offers one view of direct emissions, detailing the risk of getting cancer from a lifetime of exposure in different parts of the Basin. Note the sinister dark blotches near the ports, and where major freeways converge. The government's Multiple Air Toxics Exposure Study III (MATES III) research, which produced the map, didn't include ultrafine particles, but these are also most concentrated near freeways.

"If you are on a freeway, you have about 500,000 ultrafine particles in an area the size of a sugar cube," says John Froines, Ph.D., who studies the particles as director of the Center for Occupational and Environmental Health at UCLA. Not currently monitored or regulated by the government, ultrafines are 0.1 microns in diameter, small enough to burrow deep into our cells, releasing toxic chemicals that come along for the ride. "It's not just the ports that are affected," Froines says. "When you start to think about these trucks traveling across all these freeways, it affects the entire Los Angeles Basin."



And it affects us throughout our lives – and especially our children. As we learn more about this threat, medical societies, public health groups and others have begun to clamor for stricter government regulation. Over the coming months this series will examine the impact of the air we breathe on our unborn babies, children and teens, and look at what is being done to turn the tide and clear the air. Visit LAParent.com for more pollution maps, and a glossary of pollutants. And look for future articles in L.A. Parent, plus updates on our website and via Facebook and Twitter.

Got a question or a story to tell? Contact me at Christina.Elston@Parenthood.com.