

Consumer products and indoor air in the northern California study

Article Title: Semivolatile endocrine disrupting compounds in paired indoor and outdoor air in two northern California communities.

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Journal: *Environmental Science & Technology*. (Published online: August 3, 2010)

There is concern about the potential health effects of the myriad consumer-product chemicals identified as potential endocrine-disrupting compounds (EDCs), but little is known about exposure sources and levels. In this study, we measured concentrations of 104 chemicals—including 70 identified as potential EDCs—in indoor and outdoor air sampled from 50 homes in two communities. Some of the compounds come from sources outside the home such as industry and transportation, while most come from consumer products and building materials found inside the home. We found phthalates, parabens, PBDE flame retardants, PCBs, and pesticides, all widely used in homes. Though the two communities were demographically different, the typical concentrations of many chemicals were similar in both locations. This is the first comprehensive study of endocrine disruptors in low-income, minority homes and the first to test for large numbers of EDCs outdoors.

What is an endocrine disrupting compound?

Chemicals identified as potential endocrine disrupting compounds can mimic or disrupt our bodies' hormone systems. This means they can interfere with cell growth and development. Endocrine disrupting chemicals are being studied to see how they affect child development, reproduction, and hormonal cancers like breast and prostate cancer.

Where did the study take place?

The study took place in Northern California. It included 40 non-smoker homes in Richmond, California, and 10 in Bolinas, California. Richmond is an urban, low-income, minority community close to a large oil refinery, other industry, and major transportation corridors, and Bolinas is a rural, affluent, coastal community without much local industry or transportation.

What types of chemicals did you find and where do they come from?

We detected 39 chemicals outdoors and 63 in air inside the homes, including phthalates, parabens, PBDE flame retardants, PCBs, and pesticides. Many of these chemicals are produced in large quantities and used in consumer items such as plastics, detergents, furniture, carpets, electronic equipment, pesticides, building materials, and cosmetics. For most chemicals, indoor levels were not correlated with outdoor levels, indicating primarily indoor sources. Other chemicals we found—such as PAHs—come partly from sources outside the home, such as industry and transportation. Phthalates were present at the highest concentrations, and along with several phenols and PAHs, were present in every home. Further research might tell us more about where these chemicals came from.

Were chemical concentrations higher indoors or outdoors?

Most chemical levels were higher in indoor air than in outdoor air. Thirty-two compounds were found at higher levels in indoor air, while only two compounds (a PAH and 4-nitrophenol) were higher

outdoors. Concentrations can be high indoors because the chemicals come from consumer products, and there is limited ventilation and degradation.

Are chemical concentrations similar in the two communities?

Indoor and outdoor levels of industrial and transportation pollutants and pesticides tend to vary a lot geographically. For example, we found significantly higher levels of PAHs from industry and transportation in Richmond than Bolinas, and higher outdoor levels lead to higher indoor levels. In contrast, typical levels of most consumer product chemicals were similar across the two communities, suggesting that they are ubiquitous and do not vary widely geographically or demographically. We were especially interested in findings suggesting that there are some urban or industrial sources of a few phthalates, which are thought of as consumer product chemicals but were detected at higher levels in Richmond than Bolinas outdoor air. Overall, higher indoor and outdoor air pollutant levels in Richmond add to environmental justice concerns about disproportionate health effects in this community.

Are the findings consistent with previous studies?

The findings related to PAHs in the two communities are consistent with a previous analysis, published in [American Journal of Public Health](#), that showed higher pollutant levels in Richmond, including markers of heavy oil combustion associated with the nearby oil refinery and marine port. Consumer product chemicals were generally present at levels similar to those from a [similar study in 120 Cape Cod homes](#).

What are the public health implications of these findings?

This study demonstrates that chemicals from consumer products affect indoor air quality and exposures are ubiquitous. A few studies have shown adverse health effects from typical exposure levels, for example to phthalates, flame retardants, and PAHs, but many questions remain, including how chemical mixtures may affect health. By studying how people are exposed to these compounds, we will identify opportunities to reduce health risks by reducing exposure, and prioritize chemicals with high exposures for more rigorous health effects testing. These findings also support increased focus on consumer product chemicals, which are less-studied than industrial and transportation pollutants.

Why are EDCs in consumer products?

Laws governing consumer product chemicals are outdated and do not require adequate safety evaluation. Also, scientists are still learning how to identify EDCs and predict their health effects.

How can I reduce exposure to these chemicals?

Support new policies that would increase study of chemical health effects and possible exposure before the chemicals are approved for consumer product use. Use fewer products and choose less toxic alternatives. Additional suggestions can be found on our [web site](#).

What additional analyses of these data are underway?

We are analyzing data on concentrations of these compounds in house dust in the same communities to get more information about how to measure chemicals in people's homes. We are also analyzing the relationship between people's activities and the levels of compounds in their home. Finally, we are identifying commonly occurring mixtures of chemicals.

Who funded the study?

The National Institute of Environmental Health Sciences (NIEHS) and The New York Community Trust funded the study.

How can I get more information?

Additional information, including a link to the article, is found on our web site at <http://silentspring.org/our-research/research-updates/consumer-products-indoor-air>. For more information, please contact Silent Spring Institute, 617-332-4288, info@silentspring.org.