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Youth in Action: Local Teens Help Assess Chemical Exposures from Household Cleaning Products

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Household cleaning products can expose people to many potentially hazardous chemicals, including volatile organic compounds, carcinogens such as chloroform, and endocrine-disrupting chemicals such as phthalates, cyclosiloxanes, and synthetic fragrances.[1,2,3] In a new study published in *Environmental Health Perspectives*, a team of researchers worked with local youth in Salinas, California, to characterize chemical exposures of Latina women when they used both conventional and "green" household cleaning products.[4]

The Lifting Up Communities with Interventions and Research (LUCIR) study[5] was designed in collaboration with the Center for the Health Assessment of Mothers and Children of Salinas (CHAMACOS) Youth Council, a group of high school students who work on environmental justice, health literacy, and research projects. Ten Youth Council members, ages 14–19, served as research assistants for the new study. The team recruited 50 Latina women and gave them backpack-mounted personal air quality monitors to wear while cleaning their kitchens and bathrooms.

During the first of two home visits, the participants spent 30 minutes cleaning with conventional products they already used. A week later, they spent 30 minutes cleaning with a selection of "green" products provided by the LUCIR study. The Youth Council members chose national-brand replacement cleaners that marketed themselves as having fewer harmful chemicals, which the teens corroborated by reviewing product labels and consulting consumer databases (such as the Environmental Working Group's Guide to Healthy Cleaning[6]).

The researchers quantified air concentrations for 110 unique semivolatile and volatile organic compounds in personal air samples collected while the women cleaned. The researchers limited their analyses to 40 suspected carcinogens, reproductive toxicants, and endocrine disruptors that were present in at least 60% of samples.

Using "green" products resulted in significant concentration decreases for 17 compounds, including 1,4-dioxane, chloroform, benzene, naphthalene, toluene, and hexane. However, using these products increased the women's exposures to three fragrance chemicals: β-myrcene, celestolide, and galaxolide. This finding suggests that exposures could be reduced even further by using products specified as "fragrance-free." Products labeled "unscented"

Members of the CHAMACOS Youth Council played a large role in conducting the study, from recruiting participants, to conducting interviews, to analyzing samples and data. Three of the council members coauthored the new report. Images: Courtesy the LUCIR study.

may still contain fragrance chemicals to neutralize the smell of other ingredients.[7]

"It was really heartening to see that the 'green' products had lower levels of many of the classic chemicals we associate with cleaning products, such as halogenated hydrocarbons, benzene derivatives, and aldehydes," says lead author Kim Harley, an associate adjunct professor of maternal, child, and adolescent health at the University of California, Berkeley, School of Public Health. "I find it surprising that products that label themselves as 'green' still rely on synthetic fragrance compounds. But it suggests that maybe the companies are focusing on using safer cleaning agents and not thinking about the fragrance aspect. [This] is an area of concern that we have recently started paying more attention to."

"This [study] may be particularly relevant during the COVID-19 pandemic when people likely increased their cleaning frequency and used more bleach and other harsh conventional cleaners," says Robin Dodson, a research scientist with Silent Spring Institute. "Although conducted within a Latinx community, the findings are likely generalizable to a broader community." Dodson, who was not involved in the research, notes that a few participants' exposures exceeded acute health-based thresholds. She says this finding suggests that professional house cleaners, who use conventional cleaners repeatedly throughout the day, may be exposed to potentially toxic chemicals at levels that may harm their health.

"The same set of women were involved in both phases of the study, which attempts to control for potential variability in indoor air concentrations and behaviors," adds Dodson. "Many of these chemicals are found in other consumer products and even building materials in the home, but these sources and their impact on background concentrations in the home were not [previously] well-characterized."

Ami Zota, an associate professor of environmental and occupational health at George Washington University who also was not involved in the study, says, "I was particularly impressed by the level of engagement from the Youth Council, and how the youth were involved in key aspects of developing the research question and implementing the study." Zota adds that although the research team recommended the women in the study choose fragrance-free cleaners after the study ended, such products were difficult to find in Salinas. "It is unclear whether these study results will empower women in the local community to make changes to their product use if many 'green' products are not easily available or affordable," Zota says.

"This study showed there are multiple chemicals of concern in the breathing zone just when you clean your own house—not to mention for janitors or professional cleaners," says Harley. One solution is to make homemade products with "green" ingredients, but as Harley notes, some people prefer scented cleaners and may not have the time or inclination to make their own. Importantly, though, she adds, the findings show that "if you read labels and look for products [with fewer chemicals], you can reduce your exposure."

Wendee Nicole has written for *Discover*, *Scientific American*, and other publications.

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