

Almost all adolescents in an economically disadvantaged urban population exposed to tobacco smoke

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Ninety-four percent of adolescents ages 13 to 19 in an economically disadvantaged, largely minority population in San Francisco had measurable levels of a biomarker specific for exposure to tobacco smoke (NNAL).

The study is published in *Cancer Epidemiology, Biomarkers & Prevention*, a journal of the American Association for Cancer Research, by Neal L. Benowitz, MD, professor of Medicine and Bioengineering & Therapeutic Sciences, and chief of the Division of Clinical Pharmacology at the University of California, San Francisco (UCSF).

Benowitz explained that [exposure](#) of adolescents to secondhand smoke poses a public health challenge because it increases risk for respiratory infections, aggravates asthma, and is linked to an increased likelihood of becoming an active smoker.

In a prior study, Benowitz and colleagues showed that 87 percent of adolescents in an economically disadvantaged population had evidence of exposure to nicotine, as defined by the presence of cotinine in [urine samples](#).

In this study, they set out to assess [tobacco smoke](#) exposure in this population by measuring levels of NNAL in urine samples. Benowitz explained that NNAL is detectable in urine for much longer periods

after [tobacco exposure](#) compared with cotinine and that it is present only in the urine of people exposed to tobacco. He and his colleagues, therefore, investigated whether NNAL would be a more sensitive biomarker of exposure to secondhand smoke compared with cotinine, more likely to identify adolescents only intermittently exposed.

The researchers measured levels of cotinine and NNAL in urine samples from 465 adolescents who received pediatric care at the Children's Health Center at Zuckerberg San Francisco General Hospital. Among these adolescents, 91 percent had public health insurance and 8 percent had no health insurance; 53 percent were Latino, 22 percent African-American, 11 percent Asian, and 3 percent white.

Overall, 94 percent of the adolescents had detectable levels of NNAL, compared with 87 percent for cotinine. Thus, using the NNAL biomarker indicated a higher prevalence of tobacco exposure in this population compared with cotinine.

Using a level of more than 30 ng of cotinine per ml of urine as a biomarker of active smoking, which is consistent with prior research, 12 percent of the adolescents were identified as active smokers. Eighty-two percent of the adolescents were identified as nonsmokers who had been exposed to secondhand smoke because they had detectable levels of NNAL but did not have cotinine levels above 30 ng per ml of urine.

The percentage of individuals who were identified as active smokers was highest among the African-American adolescents, 32 percent. In addition, the level of NNAL in the urine of nonsmokers was highest among African-American nonsmokers, suggesting higher levels of [secondhand smoke](#) exposure.

"Now, using the tobacco-specific biomarker and lung carcinogen NNAL, we find an even higher prevalence of tobacco exposure, which

eliminates the possibility that the [prior] result with cotinine was due to consumption of nicotine-containing products such as tomatoes, potatoes, eggplant, and black tea," said Benowitz

"Our data show nearly ubiquitous exposure to tobacco smoke in this population of economically disadvantaged adolescents, which highlights the need for new public health initiatives to reduce exposure," he added. "It also suggests that routine urine screening for NNAL or cotinine, with counseling intervention in those screening positive for exposure, could help address this [public health](#) challenge."

According to Benowitz, the main limitations of the study are that it was conducted at a single hospital and that ethnic minorities comprised the majority of the study population, both of which mean the results might not be generalizable to all urban adolescents.

More information: *Cancer Epidemiology, Biomarkers & Prevention* (2018). [DOI: 10.1158/1055-9965.EPI-17-0671](https://doi.org/10.1158/1055-9965.EPI-17-0671)

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