Disparities in ambient nitrogen dioxide pollution in the United States

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Ambient air pollution is one of the leading risks to human health. Nitrogen dioxide (NO2), an important traffic-related pollutant, has declined in average concentrations in the United States over time, but it still has strong spatial heterogeneity in distribution and lead to exposure disparities across races and socioeconomic status. We linked satellite-derived high-resolution NO2 concentration estimates from 2000 to 2016 to demographic, transportation, socioeconomic, and geographic environmental data for about 217,740 block groups across the U.S. to investigate the differences in NO2 exposure across social groups. We show that overall, the proportion of non-Hispanic Whites is negatively associated with NO2 exposure levels and that minorities are disproportionately exposed to higher levels of NO2. This situation is particularly acute in Asian communities, where Asians had an average exposure level 1.7 times higher than low-income Whites and 1.4 times higher than high-income Whites. Compared to Whites, Hispanics and Blacks had 56% (low-income Whites), 22% (high-income Whites), 43% (low-income Whites), and 12% (high-income Whites) higher average exposure, respectively, and the disparities was larger in high population areas than in low population areas. For most metropolitan statistical areas (MSAs), minorities are clustered in urban centers, less likely to commute by car, and are mainly exposed to pollution from suburban commuters. In addition to factors such as traffic, greenness and population density, low household income and high fossil fuel heating rates are associated with interracial NO2 disparity in some MSAs. Our analyses offer insight into policies aimed at reducing NO2 disparities among races and socioeconomic status.