Cap and invest policy could pay dividends for children's health

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A cap-and-invest strategy to cut transportation-related carbon emissions could provide substantial health benefits to children in New York City, with greater benefits among Black and Hispanic children. The results of the study by researchers at Columbia University Mailman School of

Public Health are published in *Environmental Research*.

Cap-and-invest describes a policy approach that sets a certain percentage reduction in carbon emissions along with new investments in green transit based on revenues generated from auctions of emissions allowances. The approaches evaluated in this study were developed under the regional Transportation & Climate Initiative.

The researchers estimated changes in ambient fine particulate matter ($PM_{2.5}$) and nitrogen dioxide (NO_2) concentrations associated with on-road emissions under nine different pre-defined cap-and-invest scenarios over the first year of their implementation. These scenarios include combinations of three CO_2 caps of 20%, 22%, and 25% applied to three different investment strategies, including those that give equal or more weight to improving public transit and active mobility vs. electrifying vehicles and switching to cleaner fuel. They estimated health outcomes, including adverse birth, respiratory, and neurodevelopmental outcomes, as well as related reductions in health costs.

They found that for a 25% reduction in carbon emissions from 2022 to 2032 and a strategy prioritizing public transit investments, the city would have an estimated 48 fewer medical visits for childhood asthma, 13,000 avoided asthma exacerbations not requiring medical visits, 640 fewer respiratory illnesses not related to asthma, and 9 avoided adverse birth outcomes in 2032. The total estimated avoided costs are $22 million. Black and Hispanic children would experience about 1.7 times the health benefits per 100,000 children than white and non-Hispanic white children, respectively. Under the same scenario, the neighborhoods experiencing the highest poverty rates in NYC would experience about 2.5 times the health benefits per 100,000 children than the lowest poverty neighborhoods.

The scenario prioritizing investments in public transit offered 45% more

benefits than the scenario prioritizing vehicle electrification and 15% more monetized benefits than the scenario giving equal weight to both investments. The public transit strategy also resulted in proportionately greater benefits across racial/ethnic and low-income communities.

"We found the most effective strategy was the one that would do most to expand and repair urban and intercity public transit, as well as to reduce the number of vehicles on the road through alternate shared transportation options," says first author Kaitlyn E. Coomes, formerly a project coordinator at the Columbia University Center for Children's Environmental Health, Columbia University Mailman School of Public Health.

"These findings of substantial health benefits for children are relevant to future decisions regarding green transportation and electrification policies under consideration in New York City and elsewhere," says study senior author Frederica Perera, director of translational research at Columbia University Center for Children's Environmental Health and professor of environmental health sciences at Columbia University Mailman School of Public Health.

Co-authors include Alique Berberian at Columbia Mailman School; Jonathan J. Buonocore, Jonathan I. Levy, and Laura Buckley at Boston University; Calvin Arter and Saravanan Arunachalam at University of North Carolina; and Jonathan Gunasti at Emory University.

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