



Testimony of Dr. George D. Thurston, Professor of Environmental Medicine and Population Health, NYU School of Medicine
before
The New York City Council Committee on Environmental Protection
September 23, 2019

Good Afternoon Chairperson Constantinides and all Council Members present. My name is Dr. George D. Thurston and I am a tenured Professor of Environmental Medicine and Population Health at the New York University (NYU) School of Medicine. My scientific research involves investigations of the human health effects of air pollution, and am presently the Director of the Program in Exposure Assessment and Health Effects in my department at the School of Medicine. Thank you for the opportunity to testify today and share my knowledge of the human health impacts of outdoor air pollution, and especially from fine particulate matter ("PM2.5") air pollution, as well as the health benefits to our children that can be achieved by improving the quality of the air we breathe.

The adverse human health consequences of breathing air pollution, even at levels below the current U.S. National Ambient Air Quality Standards (NAAQS), are serious and well documented. These effects include, but are not limited to:

- decreased lung function (a measure of our ability to breathe freely);
- more frequent asthma symptoms;
- increased numbers of asthma attacks;
- more frequent emergency department visits;
- additional hospital admissions, and;
- increased numbers of deaths.

Traffic is a major contributor to air pollution in New York City, and elsewhere in the United States. An increasing body of evidence indicates that traffic-related exposures and residential proximity to vehicular traffic are associated with increased respiratory conditions and symptoms in children, including increased prevalence of asthma, wheezing, recurrent respiratory illnesses, and hospital admissions for asthma. Cars, buses, trucks and other motorized vehicles are amongst the largest sources of air pollution that have been clearly linked to adverse health effects (e.g., see HEI, 2010). Most people are exposed to air pollution from road traffic on a daily basis, whether as a result of residing at homes located near highways, or driving, walking, or standing along busy streets. Vehicle engines are known to produce a number of air pollutants that pose risks to public health. When these engines burn fossil fuels, chemicals such as fine particulate matter, ultrafine particles (UFP), nitrogen oxides, carbon monoxide, volatile organic compounds (VOCs), and elemental carbon (EC) black carbon soot are all emitted.

My own research involving elementary school children in the South Bronx in New York City has shown that there is a statistically significant increase in children's asthma symptoms, as well as a reduction in their lung function, on days with elevated levels of elemental carbon soot (such as that emitted by diesel vehicles) (Spira-Cohen et al, 2011). As shown in the plots below, the impact of diesel traffic related elemental carbon (a marker for diesel pollution in urban areas) was larger and more significant than particles in general (PM_{2.5}).

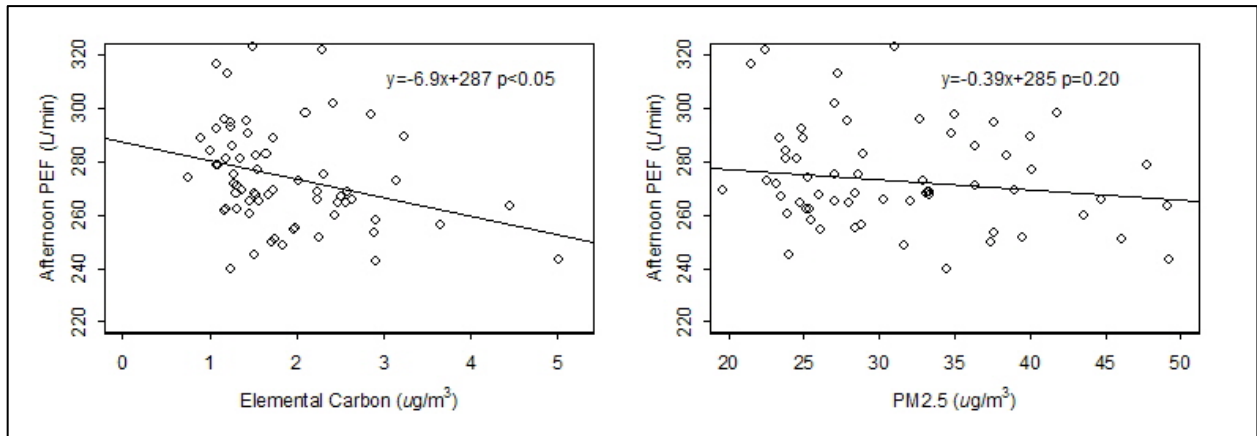


Figure 1. Lung Function in Children Decreases with Increasing Exposure to Traffic Related EC.

Moreover, as shown in Figure 2, the daily counts of shortness of breath and wheezing symptoms were also significantly associated with EC levels. These results document that elemental carbon soot is more strongly associated with adverse asthma symptoms than other PM_{2.5}, in general.

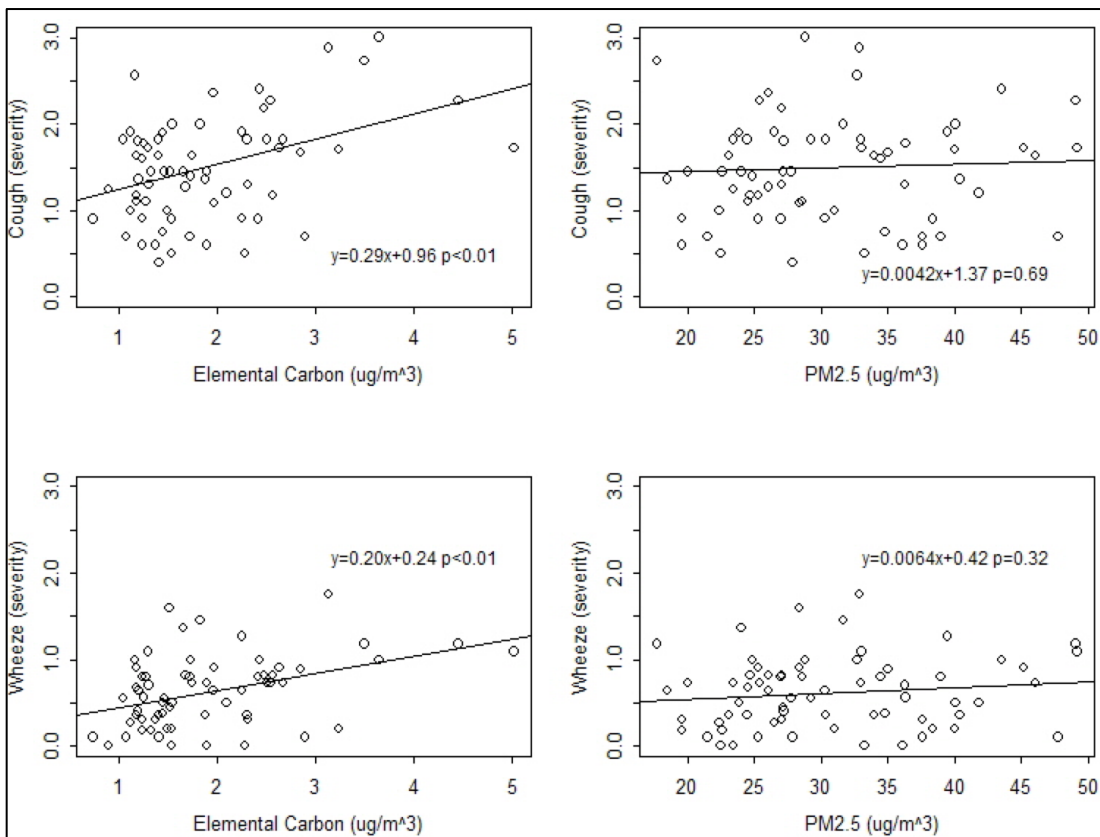


Figure 2. Cough and wheeze symptoms in the 40 children were more closely associated with EC than with PM_{2.5} mass in S. Bronx elementary children with asthma.

This particular research even led to an article on the effects of diesel pollution on children with asthma in the New York Times (October 29, 2006) entitled "A Study Links Trucks' Exhaust to

Schoolchildren's Asthma", and to a subsequent New York Times editorial (11/19/06) entitled "Black Soot and Asthma," in which the editors called upon policymakers to reduce this problem by "declaring war on poisonous diesel fumes." (<https://www.nytimes.com/2006/11/19/opinion/nyregionopinions/black-soot-and-asthma.html>). To my knowledge, insufficient action has been taken on the reforms recommended more than a decade ago for our city's trash handling and commercial traffic burden.

Studies, including my own, have found that the poor and the underserved minorities in our city are the most affected by air pollution and other environmental insults: in part because they are exposed to more pollution, but also because they are more vulnerable to the effects of pollution.

More recently, a variety of studies have shown that air pollution exposure can also lead to an increased risk of a child developing asthma in the first place. *But on a hopeful note*, one recent study, about which I wrote an invited editorial in the Journal of the American Medical Association (JAMA) (Thurston and Rice, 2019), has shown that declining air pollution levels in Southern California over the past decade have led to a 20 percent decrease in the number of children developing asthma (Garcia et al, 2019).

Another problem I have studied in New York City is air pollution in our subways. This pollution is derived from decades of brake wear and diesel emissions from service trains that operate in the subway system (Vilcassim et al., 2014). I've read that the MTA is about to spend billions on upgrading our subway system, but I have not read anything about improvements in the ventilation, or in adding air filtration systems, for our subways.

Thus, urban air pollution, and especially air pollution from diesel-powered vehicles, have been shown to cause children with asthma to have more breathing problems, and to cause children to develop asthma in the first place. Importantly, however, new research has also documented that *improving air quality can reduce the number of children who get asthma. It is therefore possible for the City of New York to improve the health of our children, as well as of adults, by acting to achieve cleaner air for us all to breathe.*

Thank you for the opportunity to testify. We welcome any additional questions the Committees may have. (Please contact Konstantine Tettonis, NYU Government Affairs, kt1249@nyu.edu)

References:

- Garcia E, Berhane KT, Islam T, McConnell R, Urman R, Chen Z, Gilliland FD. Association of Changes in Air Quality With Incident Asthma in Children in California, 1993-2014. JAMA. 2019 May 21;321(19):1906-1915. doi: 10.1001/jama.2019.5357.
- Health Effects Institute (HEI) (2010). Traffic-Related Air Pollution: A Critical Review of the Literature on Emissions, Exposure, and Health Effects. Special Report 17. January, 2010. Boston, MA.
- Spira-Cohen A, Chen LC, Kendall M, Lall R, Thurston GD. Personal Exposures to Traffic-Related Air Pollution and Acute Respiratory Health Among Bronx School Children with Asthma. Environ Health Perspect. 2011 Apr;119(4):559-65.
- Thurston GD, Rice MB. Air Pollution Exposure and Asthma Incidence in Children: Demonstrating the Value of Air Quality Standards. JAMA. 2019 May 21;321(19):1875-1877.
- Vilcassim MJ, Thurston GD, Peltier RE, Gordon T. Black Carbon and Particulate Matter (PM2.5) Concentrations in New York City's Subway Stations. Environ Sci Technol. 2014 Dec 16;48(24):14738-45.