TESTIMONY OF LEONARDO TRASANDE, MD, MPP
ASSOCIATE PROFESSOR OF PEDIATRICS, ENVIRONMENTAL MEDICINE AND POPULATION HEALTH, NYU SCHOOL OF MEDICINE
ASSOCIATE PROFESSOR OF HEALTH POLICY, NYU WAGNER SCHOOL OF PUBLIC SERVICE
ASSOCIATE PROFESSOR, NYU STEINHARDT SCHOOL OF CULTURE, EDUCATION AND HUMAN DEVELOPMENT
US ENVIRONMENTAL PROTECTION AGENCY CLEAN AIR SCIENTIFIC ADVISORY COMMITTEE
26 MARCH 2014
I am grateful for the opportunity to speak to you today. My name is Leonardo Trasande; I am an Associate Professor of Pediatrics, Environmental Medicine and Population Health at NYU School of Medicine. I also hold faculty appointments at NYU’s Wagner School of Public Service, Steinhardt School of Education, Culture and Human Development, and its Global Institute for Public Health. I also serve on the Executive Committee of the Council for Environmental Health of the American Academy of Pediatrics.

I am here to speak today to the urgent need to protect children’s health by recommending an 8-hour average primary standard for ozone of 60 ppb or below.

Children have long been known to be uniquely vulnerable to the effects of air pollution. Alveolar growth expands from 24 million at birth to 257 million at age 4,\(^1\) and the greater permeability of the epithelial layer heightens the effect of air pollutant exposures.\(^2\) Their greater resting minute ventilation results in increased exposure compared with adults.\(^3\) In the lungs phagocytosis of particulate matter can produce alveolar inflammation. Air pollutants are known immunotoxicants,\(^4-6\) reducing immune clearance of lower respiratory tract infections, and adverse effects have been described on early lung development.\(^7\)

The evidence for ozone as a contributor to childhood respiratory disease is extremely strong. Ozone in particular has long been known to induce asthma exacerbations in children, and in one
well characterized population-based cohort study in California, exposure to ozone was associated
with the development of asthma. During the 1996 Atlanta Olympics, restrictions of vehicular
volume decreased peak morning traffic by 23%, reduced ozone levels by 28%, and emergency
visits for asthma in children decreased 42%. Emergency room visits for other conditions did not
reduce, suggesting the effect was highly specific.

Exposure at 60 ppb has been associated with pulmonary inflammation in healthy young adults.
Compared with a control group exposed to ozone free air, reductions in the forced expiratory
value within the first second were substantial and significant, and acute inflammation was noted
in the airways by measuring white blood cells in the sputum. Such a study cannot readily be
conducted in children due to the fact that they cannot produce sputum, and given the findings in
adults, repeating a study that might produce more than minimal risk would require stronger
justification for repeating the study in a vulnerable population, under the section of the Code for
Federal Regulations (45 CFR 46) that sets rules for review human subjects research.

Given the findings of this carefully conducted study in young adults, a 60 ppb threshold is at
minimum required to protect children from the health effects of air pollution. Given the known
biological bases for children’s vulnerability to air pollution, the effects of ozone on lung capacity
and inflammation in the lungs is likely to be stronger at 60 ppb, and the effects are likely to occur
at lower levels. Indeed, EPA’s own Integrated Science Assessment with respect to ozone
concludes that chronic ozone exposure is associated with childhood asthma hospital admissions
in multiple studies with mean annual 8-hour maximum ozone concentrations of less than 41 ppb.
The same report also notes that positive associations of acute ozone exposure with respiratory
symptoms have generally been documented with mean 8-hour maximum concentrations of less
than 69 ppb.\textsuperscript{11}

Much is made about the economic impact of lowering air pollution for industry, but little is
mentioned about the substantial economic benefits of pollution prevention in children. And so I
would like to focus the remainder of my testimony here. In 2011, we conducted an analysis of
the costs of pediatric disease attributable to environmental factors, and found that air pollution
contributed $2.2 billion in preventable costs (2008 dollars) related to exacerbations of asthma.
While the costs examined all outdoor air pollutants together, the major driver of these costs was
ozone. What is also striking was the comparison of these costs to an estimate of environmentally
attributable asthma costs in 1997. Adjusting the previous estimate for inflation, we found that air
pollution attributable costs were $3.0 billion, suggesting a substantial, 30\% drop in annual
costs.\textsuperscript{12} While asthma management changed in the interceding period from to emphasize less
expensive, outpatient care, the majority of this decrease can be attributed to more stringent
National Ambient Air Quality Standards and the 1990 Clean Air Act Amendments. The
economic benefits of these interventions will continue for generations to come, as new cohorts of
children are born and exposed to less ozone.

Ozone may also contribute to preventable health care utilization in the first days after birth. We
analyzed a large nationally representative sample of US births in 2000, 2003 and 2006 and
examined relationships between average of air pollutants in the month of birth and health care
utilization during the birth hospitalization. Despite the greater daily variability which could have
cloaked associations of ozone with utilization, a $964 increase in costs was found for each ppm
in ozone levels. No threshold of association was identified.\textsuperscript{13} While further study, with enhanced control for confounding, improved exposure assessment, and examination of exposures across multiple time windows in pregnancy, is needed, this study suggests substantial economic benefits to reduction in ozone levels at or below 60 parts per billion.

In summary, ozone contributes substantially to childhood disease and morbidity at current levels of exposure. Setting an NAAQS standard at or below 60 ppb would produce substantial health and economic benefits, for generations of children to come. Thank you for the opportunity to speak to you today.
References

10. Kim CS, Alexis NE, Rappold AG, et al. Lung Function and Inflammatory Responses in Healthy Young Adults Exposed to 0.06 ppm Ozone for 6.6 Hours. *American Journal of Respiratory and Critical Care Medicine.* 2011/05/01 2011;183(9):1215-1221.