The Correlation of Autism Birth Rates and Surface Ozone in the United States.

Susan Dougherty, Stamford High School, Stamford, Connecticut

NASA Mentors: Dr. Margaret Pippin, Charles Stephen Haggard, Simone Hyater-Adams

NASA Langley Research Center Hampton, Virginia

Background

Autism Spectrum Disorder (ASD), is a set of developmental disorders that includes Autism, Asperger’s Syndrome and Pervasive Developmental Disorder not otherwise specified (PDD-NOS). ASD symptoms range from mild to severe and include problems in social behavior, communication, language development, and unrestricted interests or repetitive behaviors.

Autism rates climbed nearly 30% between 2008 and 2010 and have more than doubled since the turn of the century, according to a new study from the U.S. Centers for Disease Control and Prevention. The condition is now believed to affect one of every 68 8-year-olds—up from one in 82 just two years earlier.

Economic Costs

It is estimated to cost at least $17,000 more per year to care for a child with ASD compared to a child without ASD. Costs include health care, education, ASD-related therapy, family-coordinated services, and caregiver time. For a child with more severe ASD, costs per year increase to over $21,000. Taken together, it is estimated that total societal costs of caring for children with ASD exceed $4,110-6,200 per year. On average, medical expenditures for children and adolescents with ASD were 4.1-6.2 times greater than for those without ASD.

In 2005, the average annual medical costs for Medicaid-eligible children with ASD were $10,709 per child, which was about six times higher than costs for children without ASD ($1,812).

In addition to medical costs, intensive behavioral interventions for children with ASD cost $40,000 to $60,000 per child per year.

In June 2014, a new study from the Harvard School of Public Health concluded that women in the United States exposed to high levels of air pollution while pregnant were up to twice as likely to have a child with autism as women who lived in areas with low pollution. It is the first large national study to examine links between autism and air pollution across the U.S., looking at associations between autism and levels of pollutants at the time and place of birth. They used air pollution data from the U.S. Environmental Protection Agency (EPA) to estimate women’s exposure to pollutants while pregnant, specifically diesel particulates, mercury in the air, lead, manganese, methlychioride, and combined metal exposure. Also using data from the EPA’s AQI database, this study begins to look for a similar correlation between autism prevalence and trophospheric ozone concentration.


ADDMP Network Data

Addm Data

Nine Month Ozone Averages

Study Focus Area

Student Engagement

Acknowledgements

This work was supported by the long term Engagement in Authentic Research with NASA (LEARN) project with funding provided through a NASA WISH (P1002) grant.

Additional support was provided through the Scrivner-Mende and Dr. Margaret Pippin for her guidance, internal support, and patience. This is a follow-up. In addition, we would like to thank the LEARN program for providing important feedback that guided our effort to work at my highest level to produce a quality product.