

# SARA DUBOWSKY ADAR

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## EDUCATION

**Massachusetts Institute of Technology**  
*Bachelor of Science, Environmental Engineering*

Cambridge, MA  
June 1996

**Johns Hopkins School of Public Health**  
*Master of Health Science, Environmental Health Science & Engineering*

Baltimore, MD  
January, 1998

Thesis: "The Contribution of Traffic to Indoor Levels of Polycyclic Aromatic Hydrocarbons"

Advisors: Timothy Buckley and Lance Wallace

**Harvard School of Public Health**  
*Doctor of Science, Environmental Health*

Boston, MA  
November 2005

Thesis: "Acute Cardiopulmonary Responses to Traffic-Related Particles in St. Louis Seniors"

Major Field: Environmental Epidemiology

Minor Fields: Exposure Assessment and Biostatistics

Thesis Committee: Helen Suh (advisor), Joel Schwartz, Diane Gold, Brent Coull, Eric Rimm

## PROFESSIONAL POSITIONS

**Department of Epidemiology, University of Washington**  
*Assistant Professor*

Seattle, WA  
April 2008 – Current

- *Multi-Ethnic Study of Atherosclerosis (MESA) Large Particle Air Pollution Study*  
*Principal Investigators: Sara Adar and Timothy Larson*  
Designed study and secured funding to characterize within-city spatial variation of coarse particles from natural and anthropogenic sources and examine associations with cardiovascular and respiratory disease. Study includes data collection in three American cities with varying degrees of commercial, industrial, residential, and agricultural land-use.
- *Multi-Ethnic Study of Atherosclerosis (MESA) Air Pollution Study*  
*Principal Investigator: Joel Kaufman*  
Performed epidemiological and exposure analyses within a large cohort study focused on the cardiovascular health effects of chronic air pollution exposures. Examined associations with subclinical cardiovascular disease and explored issues of geocoding accuracy. Assisted in scientific oversight of project and supervised MS students.
- *Diesel School Bus Study*  
*Principal Investigator: L.J. Sally Liu*  
Analyzed preliminary lung function, exhaled nitric oxide, and in-vehicle air pollution data for an investigation of the respiratory health effects of traffic-related pollution on diesel school buses. Provided scientific oversight on data management and supervised research staff.

**Department of Environmental & Occupational Health Sciences, University of Washington**  
*Senior Fellow*

Seattle, WA  
November 2005 – March 2008

- *Multi-Ethnic Study of Atherosclerosis (MESA) Air Pollution Study*  
*Principal Investigator: Joel Kaufman*  
Contributed to design and implementation of exposure assessment for multi-city cohort study. Developed spatially rich sampling to characterize small-scale spatial variation of traffic-related

pollution. Designed ancillary studies to supplement existing efforts, conducted preliminary health and exposure analyses, and mentored masters and undergraduate students.

- *Diesel School Bus Study*  
*Principal Investigator: L.J. Sally Liu*  
Analyzed preliminary in-vehicle pollution data resulting in a published manuscript. Trained and supervised data manager on quality control analyses of health, bus, and exposure data.
- *Traffic Noise and Air Pollution*  
*Principal Investigators: Sara Adar and Ryan Allen*  
Designed and implemented a pilot study in Chicago, IL and Riverside, CA to explore potential confounding of relationships between air pollution and cardiovascular disease by noise.
- *Erectile Dysfunction and Air Pollution*  
*Principal Investigators: Hunter Wessells and Christopher Saigal*  
Conducted exposure analysis and provided scientific guidance for a cross-sectional investigation of chronic air pollution exposures and erectile dysfunction in NHANES.

**Department of Environmental Health,  
Harvard School of Public Health**

*Graduate Research Assistant*

Boston, MA  
July 2001 – October 2005

- *St. Louis Bus Study*  
*Principal Investigators: Helen Suh and Petros Koutrakis*  
Designed and conducted semi-interventional panel study to investigate the cardiovascular and respiratory health effects of traffic-related pollution, including recruitment of 78 senior participants. Prepared and implemented sampling and quality assurance plans for collected data. Trained and supervised 20 field technicians in exposure and health assessment techniques. Compiled quality control datasets for statistical analysis, developed longitudinal mixed models to evaluate associations. Prepared written and oral presentation of findings.

**ENVIRON International Corporation**

*Senior Associate*

Emeryville, CA  
April 1998 – June 2001

- *Supervisor: Robert Scofield*  
Conducted human health risk assessments for exposures to air, water (ground and surface), soil, and consumer products. Modeled volatilization and characterized chemical toxicity. Designed and implemented studies to quantify chemical exposures from consumer products. Prepared and presented reports to clients and the public. Trained and supervised new employees.

**United States Environmental Protection Agency**

*Environmental Scientist*

Reston, VA  
Summer 1997

- *Supervisor: Lance Wallace*  
Designed and implemented a field study to assess the impact of local traffic on particle bound PAHs in indoor air. Evaluated concentration differences between an urban, semi-urban, and suburban home and examined temporal variability. Characterized and quantified indoor sources such as candle burning and cooking.

Sloan Engine Laboratory, MIT

*Undergraduate Researcher*

Cambridge, MA  
Summer 1995 and 1996

- *Advisor: Simone Hochgreb*  
Assembled sampling apparatus to evaluate tail-pipe emissions by FTIR spectroscopy.

**AWARDS**

NIOSH Fellowship Award, Johns Hopkins School of Public Health, 1996 – 1998

## PROFESSIONAL ACTIVITIES

### *Ad-Hoc Reviewer*

- Manuscripts for Environmental Health Perspectives, American Journal of Epidemiology, Journal of Exposure Science and Environmental Epidemiology, Inhalation Toxicology, Journal of the Air and Waste Management Association, and Environmental Research.
- EPA STAR Grant Graduate Fellowship Program, 2008.
- Draft NCEA Integrated Science Assessment for the National Ambient Air Quality Standard for particulate matter, 2008
- Broad Medical Research Foundation Grant Application, 2007.

### *Professional Memberships*

- International Society of Environmental Epidemiology, International Society of Exposure Science, and the Society for Epidemiologic Research

### *Invited Panelist*

- Meeting on the draft NCEA Integrated Science Assessment for the National Ambient Air Quality Standard for particulate matter, 2008
- EPA Ambient Air Quality Monitoring and Health Research Workshop, 2008
- World Health Organization (WHO) European Center for Environment and Health, Workshop on the health relevance of particulate matter from various sources, 2007

## BIBLIOGRAPHY

### REFEREED RESEARCH ARTICLES

- 1) Cohen MA, **Adar SD**, Allen RW, Avol E, Gould T, Hardie D, Ho A, Kinney P, Larson TV, Sampson P, Sheppard L, Swan SS, Liu LJS, Kaufman JD. Exposure Assessment Methods of the Multi-Ethnic Study of Atherosclerosis and Air Pollution (MESA Air). (*in press at Environ Sci Technol*)
- 2) Allen RW, Davies H, Cohen MA, Mallach G, Kaufman J, **Adar SD**. The relationship between traffic-generated air pollution and noise in 2 US Cities. *Environ Res*. 2009. E-pub ahead of print. Feb.
- 3) Van Hee VC, **Adar SD**, Szpiro A, Sheppard L, Roux AD, Barr RG, Bluemke DA, Gill EA, Kaufman J. Air pollution exposure and left ventricular mass and function: The Multi-Ethnic Study of Atherosclerosis. *Am J Resp Crit Care Med*. 2009. E-pub ahead of print. January.
- 4) **Adar SD**, Davey ME, Sullivan JR, Compher M, and Liu LJS. Predicting airborne particulate levels aboard Washington school buses. *Atmos Environ*. 2008. 42(33): 7590-7599. Oct.
- 5) Bielinski SJ, Pankow JS, Li N, Chi-Hsu F, **Adar SD**, Jenny NS, Bowden DW, Arnett D. ICAM1 and VCAM1 polymorphisms, coronary artery calcium, and circulating levels of soluble ICAM1: The Multi-Ethnic Study of Atherosclerosis (MESA). *Atherosclerosis*. 2008. E-pub ahead of print. Online March.
- 6) Peretz A, Kaufman JD, Trenga CA, Allen J, Carlste C, Aulet MR, **Adar SD**, Sullivan JH. Effects of diesel exhaust inhalation on heart rate variability in human volunteers. *Environ Res*. 2008. 107: 178-184. June.
- 7) **Adar SD** and Kaufman J. Cardiovascular disease and air pollutants: Evaluating and improving epidemiological data implicating traffic exposure. *Inhal Toxicol*. 2007. 19 (Suppl 1): 135-149. Sept.
- 8) **Adar SD**, Adamkiewicz G, Gold DR, Schwartz J, Coull BA, and Suh H. Impacts of ambient and micro-environmental particles on exhaled nitric oxide before and after a group bus trip. *Environ Health Perspect*. 2007. 115(4): 507-512. Apr.
- 9) **Adar SD**, Suh H, Schwartz J, Coull BA, Stone P, and Gold DR. Focused exposures to airborne particulates from traffic and heart rate variability in the elderly. *Epidemiol*. 2007. 18(1):95-103. Jan.

- 10) **Dubowsky SD**, Suh H, Schwartz J, Coull BA, and Gold DR. Diabetes, obesity, and hypertension may enhance the acute inflammatory response to air pollution. *Environ Health Perspect.* 2006. 114(7): 992-998. July.
- 11) **Dubowsky S**, Buckley T, and Wallace L. The contribution of traffic on indoor concentrations of polycyclic aromatic hydrocarbons. *J Expo Anal Environ Epidemiol.* 1999. 9:312-321. July-Aug.

#### RESEARCH ARTICLES IN PREPARATION

- 1) Szpiro AA, Sampson PD, Sheppard L, Lumley T, **Adar SD**, Kaufman J. Predicting intra-urban variation in air pollution concentrations with complex spatio-temporal interactions. 2008. (*submitted to Environmetrics and published in UW Biostatistics Working Paper Series. Working Paper 337. Nov. <http://www.bepress.com/uwbiostat/paper337>.*)
- 2) Malloy EJ, Coull BA, Morris JS, **Adar SD**, Suh HH. Bayesian smoothing in functional linear mixed models using wavelet shrinkage. (*in submission*)
- 3) **Adar SD**, Klein R, Klein BEK, Cotch MF, Wong T, O'Neill MS, Shrager S, Siscovick D, Daviglius M, Sampson P, Kaufman J. Long-term exposures to air pollution and micro-vascular abnormalities: The multi-ethnic study of atherosclerosis (MESA). (*in preparation*)

#### NON-REFEREED SCHOLARLY PUBLICATIONS

- 1) Health relevance of particulate matter from various sources. Report on a WHO Workshop. Bonn, Germany, 26-27 March 2007. EU/07/5067587

#### FUNDING HISTORY

##### **Spatial investigation of sources, composition, and long-term health effects of coarse particulate matter (PM<sub>10-2.5</sub>) in the Multi-Ethnic Study of Atherosclerosis (MESA) cohort** *Co-Principal Investigator (March 2008 – March 2011)*

Secured funding (\$1,200,000 over 3 years) from the US Environmental Protection Agency to characterize the spatial variability of coarse particles from natural and anthropogenic sources and examine associations with chronic cardiovascular and respiratory disease.

##### **Long-term exposures to air pollution and sudden cardiac arrest**

*Principal Investigator*

Applied for \$42,000 from the Medic One Foundation to explore gene-environment interactions of the relationships between residential traffic exposures and out-of-hospital sudden cardiac arrest.

#### CONFERENCES AND SYMPOSIUMS

##### **REFEREED ORAL PRESENTATIONS** (*Student advisees starred*)

- 1) **Adar SD**, Klein R, Klein BEK, Cotch MF, Wong T, O'Neill MS, Shrager S, Siscovick D, Daviglius M, Sampson P, Kaufman J. Long-term exposures to air pollution and micro-vascular abnormalities: The multi-ethnic study of atherosclerosis (MESA). Joint Conference of the International Societies of Exposure Science and Environmental Epidemiology. Oct 2008.
- 2) Stamper EE\*, **Adar SD**, Auchincloss A, Pearson A, Roux AD, Yi M\*, Kaufman J. Characterizing the spatial accuracy of geocoding for exposure assessment: The multi-ethnic study of atherosclerosis and air pollution (MESA Air). Joint Conference of the International Societies of Exposure Science and Environmental Epidemiology. Oct 2008.
- 3) Van Hee VC, **Adar SD**, Szpiro A, Sheppard L, Roux AD, Barr RG, Bluemke DA, Gill EA, Kaufman J. Genetic polymorphisms, proximity to traffic, and left ventricular mass: The Multi-ethnic study of atherosclerosis and air pollution. Joint Conference of the International Societies of Exposure Science and Environmental Epidemiology. Oct 2008.
- 4) Szpiro AA, Sampson PD, Sheppard L, Wilton D, Larson T, Lumley T, **Adar SD**, Kaufman J. Spatio-temporal modeling to predict intra-urban variation in air pollution levels. Joint Conference of the International Societies of Exposure Science and Environmental Epidemiology. Oct 2008.

- 5) Sturek JM, Hedrick CC, Mauldin JP, Huang CC, Carr J, Swords-Jenny N, Goodarzi MO, Taylor K, Rotter JI, **Adar SD**, Kao WHL, Post WR, Daniel KR, Rich SS. ABCG1 SNPs, diabetes, and variation in lipid levels in the Multi-Ethnic Study of Atherosclerosis. American Heart Association Cardiovascular Disease Epidemiology and Prevention Conference. March 2008.
- 6) **Adar SD**, Spziro A, Davies H, Allen RW. Predicting spatial variation in community-level noise. International Society of Exposure Analysis Conference. Oct 2007.
- 7) Allen RW, Mallach G, Davies H, Cohen M, Kaufman J, **Adar SD**. The relationship between traffic-generated air pollution and noise in 2 US cities. International Society of Exposure Analysis Conference. Oct 2007.
- 8) Van Hee VC, **Adar S**, Sheppard L, Diez-Rox A, Barr RG, Bluemke D, Gill E, Kaufman J. Proximity to major roadways and left ventricular mass and function in a multi-ethnic cohort. International Society of Environmental Epidemiology Conference. Sept 2007.
- 9) Spziro A, Sampson P, Sheppard L, Lumley T, **Adar S**, Kaufman J. Methods of spatio-temporal modeling of outdoor pollutant concentrations to estimate long-term exposures for the MESA Air cohort. International Environmetrics Society Meeting. June 2007.
- 10) **Adar SD**, Davey ME, and Liu SJ. Modeling children's exposures to diesel exhaust from commuting by diesel school buses before and after engine retrofits. Joint Conference of the International Societies of Exposure Science and Environmental Epidemiology. Sept 2006.
- 11) **Dubowsky SD**, Suh H, Schwartz J, Coull BA, Stone P, and Gold DR. The effects of focused exposures to traffic-related particles on heart rate variability in the elderly. American Thoracic Society Conference. May 2006.
- 12) Malloy EJ, Coull BA, Morris JS, Anderson MD, **Dubowsky SD**, Suh HH. Adaptive Bayesian smoothing of functional predictors in linear mixed models using wavelet shrinkage. International Biometric Society Eastern North American Region. March 2006.
- 13) Oliver D, **Dubowsky S**, and Lu E. Effect of the building slab on indoor air for risk-based closures. Battelle's Second International Conference on Remediation of Chlorinated and Recalcitrant Compounds. May 2000.
- 14) **Dubowsky S**, Buckley T, and Wallace L. The effect of traffic on indoor concentrations of polycyclic aromatic hydrocarbons. Joint Conference of the International Societies of Exposure Science and Environmental Epidemiology. Aug 1998.

#### REFEREED SYMPOSIUMS

- 1) Co-organizer of symposium on Community Noise and Air Pollution, International Societies of Exposure Science and Environmental Epidemiology Conference, Oct 2008.

#### REFEREED POSTER PRESENTATIONS

- 1) Liu L, **Adar SD**, Hallstrand T. Respiratory effects of exposures to diesel exhaust among children bus riders before and after the diesel bus engine retrofit. Joint Conference of the International Societies of Exposure Science and Environmental Epidemiology. Oct 2008.
- 2) Curl CL, **Adar SD**, Cohen M, Stukovsky KH, Allen R, Mancera-Cuevas K, Nunn C, Castro C, Avol E, Kaufman JD. An evaluation of time-location data: The multi-ethnic study of atherosclerosis and air pollution (MESA Air). Joint Conference of the International Societies of Exposure Science and Environmental Epidemiology. Oct 2008.
- 3) **Adar SD**, Gold DR, Schwartz J, Coull B, Stone P, Adamkiewicz G, and Suh H. The St. Louis Bus Study: A Summary of Methods and Findings. Joint Conference of the International Societies of Exposure Science and Environmental Epidemiology. Sept 2006.
- 4) Sheppard L, Sampson P, **Adar SD**, Larson T, Ho A, and Kaufman J. Air Pollution Concentration Sampling Design in MESA Air. Joint Conference of the International Societies of Exposure Science and Environmental Epidemiology. Sept 2006.
- 5) **Dubowsky SD**, Gold DR, Schwartz J, Coull B, and Suh H. Air pollution and inflammatory markers in the blood. International Society for Environmental Epidemiology Conference. Abstract published in *Epidemiology* 15(4): S23-S23. July 2004.

- 6) **Dubowsky SD**, Adamkiewicz G, Schwartz J, Suh H, and Gold DR. Associations between traffic-related PM<sub>2.5</sub> concentrations and exhaled nitric oxide in a panel of older adults. International Society for Environmental Epidemiology Conference. Abstract published in *Epidemiol* 15(4): S63-S63. July 2004.

### INVITED PRESENTATIONS

- 1) Exploring the health effects of traffic-related pollution. University of Washington Department of Environmental and Occupational Health Sciences. March 2009.
- 2) Spatial Investigation of Sources, Composition, and Long-Term Health Effects of Coarse PM. Environmental Protection Agency. February and May 2008.
- 3) Air pollution and cardiovascular disease: Getting to the heart of the particulate matter. University of Washington Department of Epidemiology. Aug 2007.
- 4) Source characterization in the MESA Air and WHI cohorts. World Health Organization Health Relevance of PM from Various Sources workshop. March 2007.
- 5) Acute cardiopulmonary health effects of traffic-related particles in St. Louis seniors. University of Washington Department of Environmental and Occupational Health Sciences seminar. March 2007.

### PROFESSIONAL-RELATED COMMUNITY SERVICE

- Organizer of Air Pollution Epidemiology Seminar, University of Washington, 2007-current.
- Mentored local high school student for science project on air pollution, 2008.
- Hosted open-houses for local elementary school children and their families to present information and answer questions about air pollution onboard diesel school buses, 2008.
- Student representative to the Environmental Health Faculty Committee on Academic Training, Harvard School of Public Health, 2003-2005.
- Co-Organizer of the Exposure, Epidemiology, and Risk Work in Progress Seminar, Harvard School of Public Health, 2004-2005.
- Organizer of the Exposure, Epidemiology, and Risk Student Seminar, Harvard School of Public Health, 2002-2005.
- Elected Student Council representative, Harvard School of Public Health, 2003-2004.

### TEACHING

- Guest lecturer in Quantitative Occupational Exposure Analysis course (UW ENV556, February 24 and 26, 2009), Environmental and Occupational Epidemiology (UW ENV570, April 14 and 16, 2009), Environmental Health Seminar (UW ENV580, March 29, 2007 and March 12, 2009).
- Participant in week-long Faculty Fellows teaching program, University of Washington 2008.
- Teaching assistant for Analytical Methodology and Exposure Assessment class (12 students), Harvard School of Public Health, 2002.

### ADVISING AND MENTORING

#### *Mentored Scientists and Post-Docs:*

Ranjini Krishnan (2008-current), Senior Fellow and Masters Student

James Sullivan (2007-current), Staff Scientist

#### *Masters Thesis Committees (Non-Chair):*

Phyllis Reed (2008-current)

#### *Other Mentoring:*

Erin Stamper (2007-2008), Masters Student in DEOHS

Max Yi (2008), Undergraduate Biology researcher

Tanya Brooks (2007), Undergraduate DEOHS summer research intern