

Howard H. Chang

- CONTACT INFORMATION [Department of Biostatistics and Bioinformatics](#)
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howard.chang@emory.edu
- EDUCATION
- 2009 Ph.D. in Biostatistics
 Johns Hopkins Bloomberg School of Public Health, Maryland, USA
 Primary advisor: Francesca Dominici; Co-advisor: Roger D. Peng
- 2004 B.Sc. in Statistics (Honours) and Microbiology & Immunology
 University of British Columbia, Vancouver, Canada
- PROFESSIONAL EXPERIENCE
- 2011 - Present Assistant Professor
 Department of Biostatistics and Bioinformatics
 Emory University
- 2009 - 2011 SAMSI Postdoctoral Fellow
 Duke University and North Carolina State University
- HONORS
- 2014 3rd prize of *IJERPH* 2014 Best Paper Award
 2012 ENAR Poster Award
 2009 ENAR Distinguished Student Paper Award
 2004 UBC Stanley W. Nash Medal in Statistics
 2003 UBC Undergraduate Scholar Program Scholarship
 2000-4 Dean's Honour List: Faculty of Science
 2002 NSERC Undergraduate Summer Research Scholarship
 1999 British Columbia Government Scholarship
- RESEARCH INTERESTS Environmental statistics, environmental epidemiology, climate change, hierarchical models, measurement error, spatial-temporal statistics, and Bayesian methods.
- PUBLICATIONS
1. Neelon B, **Chang HH**, Ling Q, Hastings SN. Flexible space-time hurdle models for zero-inflated count data: exploring spatiotemporal trends in emergency department visits. *Statistical Methods for Medical Research*.
 2. **Chang HH**, Hao H, Sarnat SE. [A statistical modeling framework for projecting future ambient ozone and its health impact due to climate change](#). *Atmospheric Environment*. doi:10.1016/j.atmosenv.2014.02.037.
 3. **Chang HH**, Hu X, Liu Y. [Calibrating MODIS aerosol optical depth for predicting daily PM_{2.5} concentrations via statistical downscaling](#). *Journal of Exposure Science and Environmental Epidemiology*. doi: 10.1038/jes.2013.90
 4. Balachandran S, **Chang HH**, Pach JE, Holmes HA, Mulholland JA, Russel AG. [Bayesian-based ensemble technique for source apportionment of PM_{2.5}](#). *Environmental Sciences & Technology*. doi: 10.1021/es4020647

5. Reich BJ, **Chang HH**, Strickland MJ. [Spatial health effects analysis with uncertain residential locations](#). *Statistical Methods for Medical Research*. doi:10.1177/0962280212447151
6. Dhingra R, Jimenez V, **Chang HH**, Gambhir M, Liu Y, Remais, JV (2013). [Spatially-explicit simulation modeling of ecological response to climate change: methodological considerations in predicting shifting population dynamics of infectious disease vectors](#). *International Journal of Geo-Information*. 2(3), 645-664.
7. Sarnat SE, Sarnat JA, Mulholland J, Isakov V, Ozkaynak H, **Chang HH**, Klein M, Tolbert PE (2013). [Application of alternative spatiotemporal metrics of ambient air pollution exposure in a time-series epidemiological study in Atlanta](#). *Journal of Exposure Science and Environmental Epidemiology*, 23, 593-605.
8. Sarnat JA, Sarnat SE, Flanders WD, **Chang HH**, Mulholland J, Baxter L, Isakov V, Ozkaynak H (2013). [Spatiotemporally-resolved air exchange rate as a modifier of acute air pollution-related morbidity in Atlanta](#). *Journal of Exposure Science and Environmental Epidemiology*. 23, 606-615.
9. **Chang HH**, Reich BJ, and Miranda ML (2013). [A spatial time-to-event approach for estimating associations between air pollution and preterm birth](#). *Journal of the Royal Statistical Society Series C*. 62(2), 167-179.
10. Miranda ML, Edwards SE, **Chang HH**, Auten R (2013). [Proximity to roadways and pregnancy outcomes](#). *Journal of Exposure Science and Environmental Epidemiology*. 23(1), 32-38.
11. Zhou J, **Chang HH**, Fuentes M (2012). [Estimating the health impacts of climate change with calibrated model output](#). *Journal of Agricultural, Biological, and Environmental Statistics*. 17(3), 377-394.
12. **Chang HH**, Fuentes M, and Frey HC (2012). [Time series analysis of personal exposure to ambient PM_{2.5} and mortality using an exposure simulator](#). *Journal of Exposure Science and Environmental Epidemiology*. 22(5), 483-488.
13. **Chang HH**, Reich BJ, and Miranda ML (2012). [Response to Dr. Zeger: Epidemiologic studies of the health associations of environmental exposures with preterm birth](#). *American Journal of Epidemiology*. 175(2): 111-112.
14. **Chang HH**, Reich BJ, and Miranda ML (2012). [Time-to-event analysis of fine particle air pollution and preterm birth: results from North Carolina, 2001-2005 \(with invited commentary\)](#). *American Journal of Epidemiology*. 175(2): 91-98.
15. **Chang HH**, Peng RD, and Dominici F (2011). [Estimating the acute health effects of coarse particulate matter accounting for exposure measurement error](#). *Biostatistics*. 12(4):637-653.
16. **Chang HH**, Zhou J, and Fuentes M (2010). [Impact of climate change on ambient ozone level and mortality in Southeastern United States](#). *International Journal of Environmental Research and Public Health*. 7(7):2866-2880.
17. Gallicchio L, **Chang HH**, Christo D, Huang H, Strickland P, Ruczinski I, Hoffman SC, and Helzlsouer K (2009). [Single nucleotide polymorphisms in obesity-related genes and all-cause and cause-specific mortality](#). *BMC Medical Genetics*. 10(1):103
18. Lieschen, QH, **Chang HH**, Blomquist JL, Okoh YK, and Handa HL (2009). [Scheduled cesarean delivery: maternal and neonatal risks in a community hospital setting](#). *American Journal of Perinatology*. 26(4): 271-277

19. Peng, RD, **Chang HH**, Bell ML, McDermott A, Zeger SL, Samet JM, and Dominici F (2008). [Coarse particulate matter and emergency hospital admissions for cardiovascular and respiratory diseases: results for 108 US counties, 1999-2005](#). *Journal of the American Medical Association* 299(18): 2172-9.
20. Handa VL, Cundiff G, **Chang HH**, Helzlsouer KJ (2008). [Female sexual function and pelvic floor disorders](#). *American Journal of Obstetrics and Gynecology* 111(5): 1045-52.
21. Gallicchio L, **Chang HH**, Christo D, Huang H, Strickland P, Ruczinski I, Hoffman SC, and Helzlsouer K (2008). [Single nucleotide polymorphisms in inflammation-related genes and mortality in a community-based cohort in Washington County, Maryland](#). *American Journal of Epidemiology* 167(7): 807-13.
22. **Chang H**, Fu A, Le ND, and Zidek, JV (2006). [Designing environmental monitoring networks to measure extremes](#). *Environmental and Ecological Statistics* 14(3): 201-21.
23. Sundin OH, Broman KW, **Chang HH**, Vito EC, Stark WJ, and Gottsch JD (2006). [A common locus for late-onset Fuchs corneal dystrophy maps to 18q21.2-q21.32](#). *Invest Ophthalmol Vis Sci* 47(9):3919-26.
24. Boyce KJ, **Chang H**, Kronstad JW (2005) [An *Ustilago maydis* septin is required for filamentous growth in culture and for full symptom development on maize](#). *Eukaryot Cell* 4(12):2044-56.

SUBMITTED
MANUSCRIPT

Strickland MJ, Klein M, Flanders WD, **Chang HH**, JA Mulholland, PE Tolbert, LA Darrow. Associations between outdoor air pollutant concentrations and emergency department visits for pediatric asthma: stratification by potentially susceptible subpopulations.

Gass K, Klein M, **Chang HH**, Flanders WD, Strickland MJ. Classification and regression trees for epidemiologic research.

Dionisio KL, Baxter LK, **Chang HH**. A comparison of measurement error and between-pollutant relationships from alternative exposure assessment approaches for use in epidemiology studies.

Tian S, **Chang HH**, Jiang J, Wang X, Suarez-Farinas M, Niu J. Multi-TGDR identifies the metabolic profiles of hepatocellular carcinoma and cirrhosis infected with hepatitis B or hepatitis C virus.

Pearce JL, Waller LA, **Chang HH**, Klein M, Mulholland J, Sarnat J, Sarnat SE, Strickland M, Tolbert P. Profiling environmental mixtures with self-organizing maps: potential for epidemiological research.

Tian S, Jiang J, Orange D, **Chang HH**, Darnell R, Gu Jingkai, Suarez-Farinas Mayte. The versatile applications of local polynomial smoother.

Reich BJ, **Chang HH**, Foley K. Spectral methods for spatial downscaling.

Chang HH, Warren J, Darrow LA, Reich BJ, Waller LA. A distributed exposure time-to-event model for estimating associations between air pollution and preterm birth.

Lorenz A, Dhingra R, **Chang HH**, Bisanzio D, Liu Y, Remains JV. Intermodel comparison of the landscape determinants of vector-borne disease: implications for epidemiological and entomological risk modeling.

Chang HH, Dominici F, and Peng, RD. Bayesian model averaging for grouped data.

PRESENTATIONS (INVITED) *Time series analysis of air pollution and health accounting for spatial exposure uncertainty.* JSM, 2013, Montreal, QC, Canada.

Time series analysis of air pollution and health accounting for spatial exposure uncertainty. ENAR, 2013, Orlando, FL.

Spatial exposure uncertainties in air pollution and health studies. Spatial Statistics Conference, 2012, Miami, FL.

Time series analysis of personal exposure to ambient PM_{2.5} and mortality using an exposure simulator. GeoMedical Systems International Conference, 2011, Victoria, BC, Canada.

Challenges in exposure estimation for studies of air pollution and health. Department of Epidemiology and Biostatistics, Drexel University, March 2011. Philadelphia, PA.

Challenges in exposure estimation for studies of air pollution and health. Public Health Program, Brown University, March 2011. Providence, RI.

Time-to-event analysis of preterm birth and fine particulate matter. Department of Preventive Medicine, Keck School of Medicine, University of Southern California. February, 2011. Los Angeles CA.

Challenges in exposure estimation for studies of air pollution and health. Department of Biostatistics, Emory University, February, 2011. Atlanta GA.

Impact of climate change on ambient ozone level and mortality in Southeastern United States. SAMSI Spatial Program Transition Workshop, Oct 2010. Durham, NC

Time-to-event analysis of preterm birth and fine particulate matter. Summer Research Conference, Southern Regional Council on Statistics, June 2010. Virginia Beach VA.

Impact of climate change on ambient ozone level and mortality in Southeastern United States. SAMSI Workshop on Statistical Aspects of Environmental Risk, April, 2010. Research Triangle Park, NC

Statistical methods for estimating the health effects of coarse particulate matter. Department of Preventive Medicine, Keck School of Medicine, University of Southern California. March, 2009. Los Angeles CA.

PRESENTATIONS (PEER-REVIEWED) *Time series analysis of personal exposure to ambient PM_{2.5} and mortality using an exposure simulator.* International Society for Environmental Epidemiology Annual Conference, 2012, Columbia, South Carolina, 2012.

Fine particle air pollution and preterm birth: results from North Carolina, 2001-2005. Congress of Epidemiology, 2011, Montreal, QC, Canada.

TEACHING *Thesis Advisees*

Brooke Hixon Ph.D. Biostatistics (2011-present)

Bruce Ling Ph.D. Biostatistics (2011-present)

Qunna Li MSPH Biostatistics 2014

Erin Hulland MPH Biostatistics 2014

Meilin Huang MSPH Biostatistics 2013

Committee Member/Thesis Reader

Qian An Ph.D. Biostatistics

Pallavi Mishra Ph.D. Biostatistics

Yize Zhou Ph.D. Biostatistics

Katie Gass Ph.D. Epidemiology

Cassandra O'Lenick Ph.D. Environmental Health

Heather Strosnider Ph.D. Environmental Health

Cesunica Ivey Ph.D. Environmental Engineering (GA Tech)

Chang Liu MPH Biostatistics 2014

Jie Chen MPH Biostatistics 2013

Hua Hao MPH Epidemiology 2013

Course Instructor (class size)

Emory 2012-13 BIOS 526 Modern Regression Analysis (16)

 2013-14 BIOS 526 Modern Regression Analysis (20)

 BIOS 560R Applied Bayesian Analysis (24)

Duke 2010-11 STAT 103 Probability and Statistical Inference (125)

Guest Lectures/Mentoring

2013 SAMSI Industrial Math/Stat Modeling Workshop

2010 SAMSI Undergraduate Modeling Workshop

2009 SAMSI Two-day Undergraduate Workshop

 SAMSI Spatial Epidemiology (6 lectures on times series analysis)

PROFESSIONAL *Journal Referee*
SERVICES

American Journal of Epidemiology (10)

Annals of Applied Statistics

Annals of Epidemiology

Atmospheric Environment (3)

Biometrics

Biostatistics (3)

Climate Research

Environmental and Ecological Statistics

Environmental Health Perspectives (5)

Environmental Research (3)

Environmental Health (2)

Environmental Science & Technology (3)

Environmetrics (2)

Epidemiology (2)

Geographical Analysis

Journal of the American Statistical Association

Journal of Agricultural, Biological, and Environmental Statistics (3)
 Journal of Exposure Science and Environmental Epidemiology (5)
 PLoS ONE (3)
 Spatial and Spatial-temporal Epidemiology (7)
 Statistics in Medicine (3)

Ad hoc Grant Reviewer

- NIH Neurological, Aging and Musculoskeletal Epidemiology (NAME) Study Section, June 2013.
- Israel Science Foundation, February 2014.

Panel Member

- Panelist, Expert Consultation to Evaluate Statistical Approaches for Use in Multi-pollutant Analysis, US Environmental Protection Agency, April 2012

PROFESSIONAL MEMBERSHIPS International Biometric Society (ENAR), American Statistical Association, Society for Epidemiologic Research

GRANT SUPPORT

Current

2011-2005	EPA Clear Air Research Center Source: US EPA R834799 PI: P Tolbert.
2012-2016	Spatial and Temporal Modeling of PM _{2.5} and Infant Morbidity Source: University of California, Irvine (Subcontract) 5R01ES019897. PI: M Strickland.
2012-2016	Environmental Approaches to Prevention Pacific Institute for Research and Evaluation (Subcontract). PI: L Waller.
2012-2014	Monitoring and Evaluation framework of the Dubai Cares' WASH in School Initiative Source: Dubai Cares. PI: M Freeman.
2013-2015	Climate Change and Heat-Related Morbidity Among Vulnerable Populations in Atlanta Source: NIH NIEHS ES023763. PI: S Sarnat.
2014-2016	Statistical Methods for Exposure Uncertainty in Air Pollution and Health Study Source: NIH NIEHS ES022795 PI: H Chang.
2014-2016	Dorm Room Inhalation to Vehicle Emissions (DRIVE) Study Source: Health Effects Institute PI: J Sarnat.

Completed

- 2013-2015 The Influence of Environmental Change on Parasite Diffusion through Human, Invertebrate and Environmental Pathways
Source: University of California, Berkeley (Subcontract).
PI: J Remais
- 2009-2012 Enhancing Environmental Public Health Tracking with Satellite Driven Particle Exposure Modeling and Epidemiology.
Source: NASA
PI: Y Liu.