RACHEL C. NETHERY

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EDUCATION

Ph.D. in Biostatistics August 2017
University of North Carolina at Chapel Hill (UNC-CH)

A.B. in Mathematics and Government May 2012
Georgetown University
GPA: 3.76/4.00
Honors: *Magna cum laude*

PROFESSIONAL EXPERIENCE

Assistant Professor July 2019 - Present
Department of Biostatistics, Harvard T.H. Chan School of Public Health (HSPH)

Postdoctoral Research Fellow June 2017 - June 2019
Department of Biostatistics, HSPH
Mentor: Dr. Francesca Dominici

Statistical Research Assistant July 2015 - June 2017
Department of Biostatistics, UNC-CH
Mentor: Dr. Amy Herring

National Institutes of Health Summer Internship Program May 2016 - August 2016
Epidemiology Branch, National Institute of Environmental Health Sciences
Mentor: Dr. Richard Kwok

Statistical Trainee August 2012 - August 2015
Department of Biostatistics, UNC-CH
National Institute of Environmental Health Sciences Training Grant
Mentor: Dr. Amy Herring

Statistical Research Assistant August 2011 - August 2012
McDonough School of Business, Georgetown University
Mentor: Dr. Korok Ray

TEACHING EXPERIENCE

Instructor, BIOSTAT 232: Methods Fall 2022
Department of Biostatistics, HSPH

Instructor, BST 263: Statistical Learning Spring 2021, Spring 2022
Department of Biostatistics, HSPH

Tutor for Doctoral Applied Qualification Exam November 2014 - July 2015
Department of Biostatistics, UNC-CH

Grader, Causal Inference January 2015 - May 2015
Department of Biostatistics, UNC-CH

Grader, Principles of Statistical Inference (Online) August 2014 - December 2014
Department of Biostatistics, UNC-CH

Teaching Assistant, Principles of Statistical Inference August 2013 - December 2013
Department of Biostatistics, UNC-CH

Creator and Instructor of Online R Courseware May 2013 - August 2013
McDonough School of Business, Georgetown University

ACADEMIC AWARDS & HONORS

2017 American Statistical Association Student Paper Competition Winner
Government Statistics and Social Statistics Section

Special Commendation for Outstanding Qualifying Exam Performance
For receiving the top score on the applied qualifying exam in 2014
Department of Biostatistics, UNC-CH

Graduate Student Summer Intern Poster Competition Winner
National Institute of Environmental Health Sciences

Fryer Fellowship
Department of Biostatistics, UNC-CH

Pi Mu Epsilon National Honorary Mathematics Society
Department of Mathematics, Georgetown University

Outstanding First Year Math Student Award
Department of Mathematics, Georgetown College

Valedictorian
Anderson County High School, Lawrenceburg, Kentucky

PUBLICATIONS

† indicates co-first or co-senior authorship

Underline indicates a student or postdoctoral advisee

I. Journal Articles

1. **Nethery R.C.**, Josey K., Gandhi P., Kim J.H., Visaria A., Bates B., Schwartz J., Robinson D., Setoguchi S. Air Pollution and Cardiovascular and Thromboembolic Events in Older Adults with High-Risk Conditions. *In press, American Journal of Epidemiology.*

2. Josey K., deSouza P., Wu X., Braun D.†, **Nethery R.C.**† (2022). Estimating a causal exposure response function with a continuous error-prone exposure: A study of fine particulate matter and all-cause mortality. *In press, Journal of Agricultural, Biological, and Environmental Statistics.* Online: `https://arxiv.org/abs/2109.15264`

3. Li H., Hart J.E., Mahalingaiah S., **Nethery R.C.**, Bertone-Johnson E., Eliassen A.H., Laden F. (2022). Environmental exposures and anti-Mullerian hormone: a mixture analysis in the Nurses' Health Study II. *In press, Epidemiology.*

4. Gripper A., **Nethery R.C.**, White M.M., Kawachi I., Adamkiewicz G. (2022). Community solutions to food apartheid: A spatial analysis of community food-growing spaces and neighborhood demographics in Philadelphia. *In press, Social Science and Medicine.*

5. Parks R.M., Benavides J., Anderson G.B., **Nethery R.C.**, Navas-Acien A., Dominici F., Ezzati M., Kioumourtzoglou M.A. (2022). Tropical cyclones and cause-specific mortality in the United States. *JAMA 327(10)*: 946–955.

6. Pham P., Sharma M., Kayembe P., **Nethery R.C.**, Vinck P. (2022). Gender and ebola in Eastern Democratic Republic of the Congo: Pathways to protective behavioral outcomes during the 2018-2020 Ebola outbreak. *JAMA Network Open 5(2)*: e2147462.

7. **Nethery R.C.**, Chen J.T., Krieger N., Waterman P.D., Peterson E., Waller L.A., Coull B.A. (2022). Statistical implications of endogeneity induced by residential segregation in small-area modelling of health inequities. *The American Statistician 76(2)*: 142-151.

8. **Nethery R.C.**†, Katz-Christy N.†, Kiomourtzglou M.A., Parks R., Schumacher A., Anderson G.B. (2021). Integrated causal-predictive machine learning models for tropical cyclone epidemiology. *Biostatistics*: kxab047.

9. Chen K.L., Henneman L.R.F., **Nethery R.C.** (2021). Differential impacts of COVID-19 lockdowns on $PM_{2.5}$ across the United States. *Environmental Advances 6*: 100122.

10. Kamai E.M., Villanger G.D., **Nethery R.C.**, Thomsen C., Sakhi A.K., Drover S.S.M., Hoppin J.A., Knudsen G.P., Reichborn-Kjennerud T., Zeiner P., Overgaard K., Herring A.H., Aase H., Engel S.M. (2021). Gestational Phthalate Exposure and Preschool Attention Deficit Hyperactivity Disorder in Norway. *Environmental Epidemiology 5(4)*: e161.

11. Li H., Hart J.E., Mahalingaiah S., **Nethery R.C.**, Bertone-Johnson E., Laden F. (2021). Ultraviolet radiation and age at natural menopause in a nationwide, prospective US female cohort. *Environmental Research 203*: 111929.

12. Braun L.M., Le H., Voulgaris C.T., **Nethery R.C.** (2021). Healthy for whom? Equity in the spatial distribution of cycling risks. *Journal of Transport & Health 23*: 101227.

13. Li H., Hart J.E., Mahalingaiah S., **Nethery R.C.**, James P., Bertone-Johnson E., Laden F. (2021). Associations of long-term exposure to environmental noise and outdoor light at night with age at natural menopause in a US women cohort. *Environment International 5(3)*: e154.

14. Choi G., Keil A.P., Villanger G.D., Richardson D.B., Daniels J.L., Hoffman K., Sakhi A.K., Thomsen C., Herring A.H., Drover S.S.M., **Nethery R.C.**, Aase H., Engel S.M. (2021). Pregnancy exposure to common-detect organophosphate esters and phthalates and maternal thyroid function. *Science of Total Environment 782*: 146709.

15. **Nethery R.C.**†, Rusovich T.†, Peterson E., Chen J., Waterman P., Krieger N., Waller L., Coull B. (2021). Comparing denominator sources for real-time disease incidence modeling: American Community Survey and WorldPop. *Social Science and Medicine- Population Health 14*: 100786.

16. Chao A., Picard M.H., Passeri J.J., Cui J., **Nethery R.C.**, Wasfy J.H. (2021). Effect of availability of transcatheter aortic-valve implantation on survival for all patients With severe aortic stenosis. *American Journal of Cardiology 149*: 72-77.

17. Choi G., Villanger G.D., Drover S.M., Sakhi A.K., Thomsen C., **Nethery R.C.**, Hoppin J.A., Zeiner P., Knudsen G.P., Reichborn-Kjennerud T., Øvergaard K.R., Herring A.H., Skogan A.H., Biele G., Aase H., Engel S.M. (2021). Prenatal phthalate exposures and executive function in preschool children. *Environment International 149*: 106403.

18. Parks R.M., Anderson G.B., **Nethery R.C.**, Navas-Acien A., Dominici F., Kioumourtzoglou M.A. (2021). Tropical cyclone exposure is associated with increased hospitalization rates in older adults. *Nature Communications 12(1)*: 1-12.

19. Krieger N., **Nethery R.C.**, Chen J.T., Waterman P.D., Wright E., Rushovich T, Coull B. (2021). Impact of differential privacy and small numbers on the monitoring of health inequities using US census tract sources. *American Journal of Public Health 111 (2)*: 265-268.

20. Li H., Hart J.E., Mahalingaiah S., **Nethery R.C.**, Bertone-Johnson E., Laden F. (2020). Long-term exposure to particulate matter and roadway proximity with age at natural menopause in the Nurses' Health Study II Cohort. *Environmental Pollution 269*, 116216.

21. Yitshak Sade M., **Nethery R.C.**, Schwartz J.D., Mealli F., Dominici F., Di Q., Abu Awad Y., Ifergane G., Zanobetti A. (2020). The causal effect of PM2.5 exposure on hospital admissions among Medicare enrollees with chronic debilitating brain disorders: A national study. *Science of the Total Environment 755(2)*, 142524.

22. Wu X.†, **Nethery R.C.**†, Sabath M.B., Braun D., Dominici F. (2020). Air pollution and COVID-19 mortality in the United States: strengths and limitations of an ecological regression design. *Science Advances 6(45)*, eabd4049.

23. **Nethery R.C.**, Mealli F., Sacks J., Dominici F. (2020). Evaluation of the health impacts of the 1990 Clean Air Act Amendments using causal inference and machine learning. *Journal of the American Statistical Association*. DOI: 10.1080/01621459.2020.1803883

24. Yitshak Sade M., **Nethery R.C.**, Abu Awad Y., Mealli F., Dominici F., Zanobetti A. (2020). Lowering air pollution levels in Massachusetts may prevent cardiovascular hospital admissions. *Journal of the American College of Cardiology 75(20)*, 2642-2644.

25. **Nethery R.C.**, Yang Y., Brown A., Dominici F. (2020). A causal inference framework for cancer cluster investigations using publicly available data. *Journal of the Royal Statistical Society, Series A 183(3)*, 1253-1272.

26. Villanger G.D., Drover S., **Nethery R.C.**, Thomsen C., Sakhi A.K., Overgaard K.R., Zeiner P., Hoppin J., Reichborn-Kjennerud T., Aase H., Engel S.M. (2020). Associations between urine phthalate metabolites and thyroid function in pregnant women and the influence of iodine status. *Environment International 137*, 105509.

27. **Nethery R.C.**, Mealli F., Dominici F. (2019). Estimating population average causal effects in the presence of non-overlap: The effect of natural gas compressor station exposure on cancer mortality. *Annals of Applied Statistics 13(2)*, 1242-1267.

28. **Nethery R.C.**, Dominici F. (2019). Estimating pollution-attributable mortality at the regional and global scales: Challenges in uncertainty estimation and causal inference. *European Heart Journal 40(20)*, 1597-1599.

29. **Nethery R.C.**, Sandler D.P., Zhao S., Engel L.S., Kwok R.K. (2019). A joint spatial factor analysis model to accommodate data from misaligned areal units with application to Louisiana social vulnerability. *Biostatistics 20(3)*: 468-484.*
    *** Winner of 2017 American Statistical Association Student Paper Competition**

30. Engel S.M., Villanger G.D., **Nethery R.C.**, Thomsen C., Sakhi A.K., Drover S., Hoppin J., Zeiner P., Knudsen G.P., Reichborn-Kjennerud T., Herring A.H., Aase H. (2018). Prenatal phthalates, maternal thyroid hormones, and risk of Attention-Deficit Hyperactivity Disorder in the Norwegian Mother and Child Cohort. *Environmental Health Perspectives 126(5).*

31. Grace M.R., Vladutiu C.J., **Nethery R.C.**, Siega-Riz A.M., Manuck T.A., Herring A.H., Savitz D., Thorp J.T. (2018). Lipoprotein particle concentration measured by nuclear magnetic resonance spectroscopy and preterm birth: A prospective cohort study. *BJOG: An International Journal of Obstetrics and Gynaecology 125*, 895-903.

32. Rowell T.R., Reeber S.L., Lee S.L., Harris R.A., **Nethery R.C.**, Herring A.H., Glish G.L., Tarran R. (2017). E-cigarette liquids reduce proliferation and viability in the CALU3 airway epithelial cell line. *American Journal of Physiology- Lung Cellular and Molecular Physiology 313(1)*, L52-L66.

33. Ghosh A., **Nethery R.C.**, Herring A.H., Tarran R. (2017). Flavored little cigar smoke induces cytotoxicity and apoptosis in airway epithelia. *Cell Death Discovery 3*: 17019. Published online 2017 April 24. doi:10.1038/cddiscovery.2017.19

34. **Nethery R.C.**, Warren J.L., Herring A.H., Moore K.A.B., Evenson K.R., Diez-Roux A.V. (2015). A common spatial factor analysis model for measured neighborhood-level characteristics: The Multi-Ethnic Study of Atherosclerosis. *Health & Place 36*, 35-46.

II. Conference Proceedings

35. **Nethery R.C.**, Truong, Y. (2018). On statistical inference for independent colored sources analysis. *ITISE 2018: International Conference on Time Series and Forecasting*, Granada, Spain.

SUBMITTED AND PRE-PRINT PAPERS

1. **Nethery R.C.**, Vega S., Frazier A.L., Laden F. Impacts of regulation-induced ambient benzene reductions on childhood and young adult leukemia and lymphoma incidence in Alaska: a quasi-experimental study.

2. Li Y., Coull B.A., Krieger N., Peterson E., Waller L.A., Chen J.T., **Nethery R.C.** Impacts of Census Differential Privacy for Small-Area Disease Mapping to Monitor Health Inequities. Online: `https://arxiv.org/abs/2209.04316`

3. Josey K., **Nethery R.C.**, Visaria A., Bates B., Gandhi P., Rua M., Robinson D., Setoguchi S. Effects of $PM_{2.5}$ and Corticosteroid Use on Cardiovascular and Thromboembolic Events Among Older Adults: Evidence of Drug-Environment Interaction.

4. Considine E.M., Braun D., Kamareddine L., **Nethery R.C.**, deSouza P. Investigating Use of Low-Cost Sensors to Increase Accuracy and Equity of Real-Time Air Quality Information. Online: `https://arxiv.org/abs/2205.03499`

5. Considine E.M., Hao J., deSouza P., Braun D., Reid C.E., **Nethery R.C.** Evaluation of Model-Based $PM_{2.5}$ Estimates for Exposure Assessment during Wildfire Smoke Episodes in the Western U.S. Online: `https://arxiv.org/abs/2209.01479`

6. Braun L.M., Le H., Voulgaris C.T., **Nethery R.C.** Who benefits from shifting metal to pedal? An equity-oriented health impact assessment for analyzing the health tradeoffs of cycling.

7. Peterson E.N., **Nethery R.C.**, Padellini T., Chen J.T., Coull B.A., Piel F.B., Wakefield J., Blangiardo M., Waller L.A. A Bayesian hierarchical small-area population model accounting for data source specific methodologies from American Community Survey, Population Estimates Program, and Decennial Census data. Online: `https://arxiv.org/abs/2112.09813`

8. Engel S.M., Villanger G.D., Herring A.H., **Nethery R.C.**, Drover S., Zoeller R.T., Meltzer H.M., Zeiner P., Knudsen G.P., Reichborn-Kjennerud T., Longnecker M.P., Aase H. Gestational thyroid hormone concentrations and risk of Attention-Deficit Hyperactivity Disorder in the Norwegian Mother and Child Cohort Study.

9. Visaria A., Robinson D., Read J., **Nethery R.C.**, Josey K., Gandhi P., Bates B., Rua M., Setoguchi S. Ambient Heat, Exogenous Insulin, and Risk of Hypoglycemia Among Older Medicare Beneficiaries with Diabetes.

TALKS

1. Integrated Causal-Predictive Machine Learning Models for Tropical Cyclone Epidemiology. CMStatistics, December 2021.
2. Integrated Causal-Predictive Machine Learning Models for Tropical Cyclone Epidemiology. International Society of Environmental Epidemiology, Climate Change and Health Webinar Series, December 2021.
3. Designing Studies and Assessing Evidence for Causality in Environmental Pharmacoepidemiology. International Conference on Pharmacoepidemiology & Therapeutic Risk Management (ICPE), August 2021.
4. Mid-term $PM_{2.5}$ Exposure and Cardiovascular and Thromboembolic Hospitalizations in Medicare Beneficiaries with High-Risk Chronic Conditions. Society for Epidemiologic Research Annual Meeting, June 2021.
5. Integrated Causal-Predictive Machine Learning Models for Tropical Cyclone Epidemiology. Climate Change, Hurricanes, and Health. Boston University, April 2021.
6. A Causal Machine Learning Model for Identification of Communities facing the Highest Health Risks from an Impending Tropical Storm. IMT Lucca Data Science for Impact Evaluation Webinar, July 2020.
7. A Causal Inference Framework for Cancer Cluster Investigations using Publicly Available Data. Eastern North American Region of the International Biometrics Society (ENAR), March 2020.
8. A Causal Inference Approach to Evaluate the Health Impacts of Air Quality Regulations: The Health Benefits of the 1990 Clean Air Act Amendments. Biostatistics – Biomedical Informatics – Big Data Seminar, October 2019.
9. A Causal Inference Approach to Evaluate the Health Impacts of Air Quality Regulations: The Health Benefits of the 1990 Clean Air Act Amendments. University of Florence Department of Statistics, Informatics, Applications, June 2019.
10. A Causal Inference Approach to Evaluate the Health Impacts of Air Quality Regulations: The Health Benefits of the 1990 Clean Air Act Amendments. Atlantic Causal Inference Conference, May 2019.
11. A Causal Inference Approach to Evaluate the Health Impacts of Air Quality Regulations: The Health Benefits of the 1990 Clean Air Act Amendments. Harvard National Studies of Air Pollution and Health Seminar, May 2019.
12. A Causal Inference Framework for Cancer Cluster Investigations using Publicly Available Data. Dana-Farber/Harvard Cancer Center Celebration of Early Career Investigators in Cancer Research, December 2018.
13. Estimating Population Average Causal Effects in the Presence of Non-Overlap. Harvard Data Science Initiative Conference, October 2018.
14. Estimating Population Average Causal Effects in the Presence of Non-Overlap: A Bayesian Approach. European Causal Inference Meeting, April 2018.
15. Estimating the Effect of Residential Greenspace Exposure on 30-Day Post-Stroke Outcomes in the Presence of Propensity Score Non-Overlap. Harvard National Studies of Air Pollution and Health Seminar, February 2018.

16. Estimating Population Average Causal Effects in the Presence of Non-Overlap: A Bayesian Approach. Harvard Biostatistics Environmental Statistics Seminar, January 2018.
17. Bootstrapping Measures of Uncertainty for EEG Resting State Connectivity Studies using Independent Component Analysis. Harvard Biostatistics Neuro-Statistics Working Group Seminar, November 2017.
18. A Joint Spatial Factor Analysis Model to Accommodate Data from Misaligned Nested Areal Units with Application to Louisiana Social Vulnerability. Joint Statistical Meetings, August 2017.
19. A Joint Spatial Factor Analysis Model to Accommodate Data from Misaligned Nested Areal Units with Application to Louisiana Social Vulnerability. National Institute of Environmental Health Sciences, Biostatistics and Computational Biology Branch Weekly Seminar Series, January 2017.
20. Bootstrap-Based Measures of Uncertainty for EEG Artifact Detection Using Independent Component Analysis with Colored Sources. International Chinese Statistical Association, Applied Statistics Symposium, June 2016.

ADVISING

I. Postdoc Advising

Kevin Josey (2020 –)

Jie (Kate) Hu (2021 –)

II. PhD Advising

Sarika Aggarwal (2021 –)

Nick Link (2022 –)

Sofia Vega (2021 –)

Ellen Considine (2021 –)

Kevin Chen (2020 –)

Jenny Lee (2019 – 2022)

II. Master's Advising

Rindala Fayyad (2022 –)

Yanran Li (2021 –)

Jiayuan Hao (2021 – 2022)

David Hong (2020 – 2021)

Carol Wei (2020)

Yue Yang (2018 – 2019)

III. Undergraduate Advising

Nina Katz-Christy (2020 – 2022)

Anna (Jo) Brown (2018)

IV. Doctoral Committee Membership

Current

Christina Howe, Biostatistics, HSPH

Ilkania Chowdhury-Paulino, Epidemiology, HSPH

Tamara Rushovich, Social and Behavioral Sciences, HSPH

William Borchert, Environmental Health, HSPH

Former

Ashley Gripper (2022), Population Health Sciences, HSPH

Melissa Fiffer (2022), Environmental Health, HSPH

Tori Cowger (2021), Population Health Sciences, HSPH

Huichu Li (2021), Environmental Health, HSPH

Falco Bargagli Stoffi (2020), Data Science and Economics, IMT School for Advanced Studies

PROFESSIONAL AND SERVICE ACTIVITIES

Service Activities, Department of Biostatistics, HSPH

Doctoral Qualifying Exam Committee

PhD Admissions Committee

Master's Executive Committee

Faculty Mentor, Summer Program in Biostatistics & Computational Biology

Faculty Chair, Mental Health Working Group

Postdoc Committee

Environmental Statistics Seminar Organizer

External Service Activities

NIH Infectious Diseases, Reproductive Health, Asthma and Pulmonary Conditions (IRAP) Study Section Reviewer

ENAR Regional Advisory Board

Briefing of the House Select Committee on the Climate Crisis regarding research on the link between air pollution and COVID-19 mortality

Briefing of the UK All-Party Parliamentary Group on Air Pollution regarding research on the link between air pollution and COVID-19 mortality

Byar Award Review Committee, Biometrics Section, American Statistical Association

Harvard Data Science Initiative Postdoctoral Fellowship Application Review Committee

Harvard Chan-NIEHS Center for Environmental Health Pilot Project Application Review Committee

Women in Data Science Cambridge, Advisory Committee

Session Organizer, "Continuous/Multivariate Exposures or Mediators in Causal Inference", Atlantic Causal Inference Conference 2019

Session Co-organizer, "Causal Inference and Harmful Exposures", ENAR 2020

Journal Peer Reviewer
Annals of Applied Statistics, Journal of the Royal Statistical Society Series A (Statistics in Society), Journal of Causal Inference, Statistics in Medicine, Environment International, Environmental Science & Technology, JAMA Network Open, Environmental Health Perspectives, Circulation: Cardiovascular Quality and Outcomes, Patterns, Communications Medicine, BMJ Open

TECHNICAL SKILLS

Statistical Software	R, SAS, MATLAB
Other Software	Linux computing systems, Github, Markdown, Latex, Microsoft Office