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### Research Interests

**Methodological:** Bayesian hierarchical modeling, Measurement error methods, Small area analysis, Spatial disease mapping, Statistical demography and population health, Dynamics and Projections, Health surveillance.  
**Collaborative:** Indigenous populations, Maternal health and mortality, Opioid use, Demographic component population estimation.

### Educational

- University of Massachusetts Amherst, Amherst, MA. 2019. **Doctor of Philosophy** in Biostatistics. Adviser: Dr. Leontine Alkema.
- Vanderbilt University, Nashville, TN. 2015. **Master of Science in Biostatistics**. Adviser: Dr. Tatsuki Koyama.
- Penn State University, Hershey, PA. 2013. **Master of Science in Public Health Sciences**. Adviser: Dr. Vernon Chinchilli.
- Davidson College, Davidson, NC. May 2006. **Bachelor of Science in Psychology**. With a research focus in Cognitive and Neuroscience Psychology.

### Appointments

- 2022-Present    **Research Assistant Professor of Biostatistics, Emory University.**  
                    Department of Biostatistics and Bioinformatics  
                    Rollins School of Public Health
- 2020-2022    **Post-Doctoral Fellow in Biostatistics, Emory University.**  
                    Department of Biostatistics and Bioinformatics  
                    Rollins School of Public Health
  - Advisor: Dr. Lance Waller
  - Fusing of disease mapping, small area estimation, and measurement error methodologies to assess impact of spatial patterns in population uncertainty (uncertainty in local sample sizes) and covariate and confounder uncertainty.
- 2015-2019    **Graduate Research Assistant, University of Massachusetts Amherst.**  
                    Department of Biostatistics and Epidemiology  
                    School of Public Health & Health Sciences
  - Advisor: Dr. Leontine Alkema
  - Bayesian hierarchical misclassification models to assess national trends of maternal mortality in data sparse contexts.

### Research Support

#### PENDING

- 2026-2028    *Bayesian Reconstruction of Under-Five Small Area Populations: Correcting for Undercount Bias and Source Uncertainty*
  - Funding: NICHD- R21
  - Role: PI

#### ONGOING

- 2025-2028    *Data Integration Methods to Improve Small-Area Mortality Estimation for Tribal and Rural Populations*
  - Funding: NIMHD- R01MD020144-01A1
  - Role: PI

2024-2026	<i>Development of an Advanced Data Science Workflow for Culturally Relevant Surveillance of Gestational Diabetes in Tribal Community and Associative Social Determinants of Health</i>
	<ul style="list-style-type: none"> <li>▪ Funding: Rollins School of Public Health Dean's Pilot Award</li> <li>▪ Role: PI</li> </ul>
2023-2025	<i>Substance Use in Pregnancy and the Morbidity Mortality Risk Environment (PROMISE)</i>
	<ul style="list-style-type: none"> <li>▪ Funding: NIH-NIDA R01DA059182-01A1</li> <li>▪ Role: Co-I</li> </ul>
2023-2025	<i>The SLEPR study: Sleep Effects on Post-stroke Rehabilitation</i>
	<ul style="list-style-type: none"> <li>▪ Funding: NIH-NINR 5R01NR018979-04 (PI Klingman)</li> <li>▪ Role: Statistical Support</li> </ul>
2023-2027	<i>HERCULES: Exposome Research Center</i>
	<ul style="list-style-type: none"> <li>▪ Funding: NIH-NIEHS 5P30ES019776-12 (PI Marsit)</li> <li>▪ Role: Statistical Support</li> </ul>
2023-2030	<i>U54 Maternal Health Research Center for Excellence</i>
	<ul style="list-style-type: none"> <li>▪ Funding: NIH-NIDA 1U54HD113292-01(Cooper, Hernandez)</li> <li>▪ Role: Statistical Support</li> </ul>

#### COMPLETED

2023-2025	<i>Limited interaction cohort to identify determinants of viral suppression in MSM and transfeminine individuals living with HIV (D-LITE)</i>
	<ul style="list-style-type: none"> <li>▪ Funding NIH-NIEHS 1UG3AI176853-01 (PI Sullivan, Siegler)</li> <li>▪ Role: Statistical Support</li> </ul>
2023-2030	<i>Center to Advance Reproductive Justice and Behavioral Health among Black Pregnant/Postpartum Women and Birthing People (CORAL)</i>
	<ul style="list-style-type: none"> <li>▪ Funding NIH-NICHD 1U54HD113292-01 (PI Hernandez, Cooper, Dunlop)</li> <li>▪ Role: Statistical Support</li> </ul>
2018-2023	<i>Spatial Uncertainty in Small Area Population Inference from Survey &amp; Administrative Data</i>
	<ul style="list-style-type: none"> <li>▪ Funding NIH-NICHHD R01HD092580 (PI Waller)</li> <li>▪ Post-Doctoral Fellow &amp; Co-I</li> </ul>
2016-2020	<i>A Bayesian approach to estimate maternal mortality using national civil registration vital statistics data accounting for reporting errors</i>
	<ul style="list-style-type: none"> <li>▪ Funding: Independent Contract</li> <li>▪ Role: Sub-Award Principal Investigator</li> </ul>
2024-2024	<i>A data fusion approach to assess small area opioid use disorders rates in data sparse contexts</i>
	<ul style="list-style-type: none"> <li>▪ Funding sub-contract PJ 66368 (PI Yarbrough)</li> <li>▪ Role: Statistical Consult</li> </ul>

#### Honors

2025-2026 ASA StatsForward Fellowship, American Statistical Association — *National early-career fellowship recognizing leadership potential and contributions to statistics and data science*

#### Publications

\*First authored by student or post-doc for who I was their primary mentor.

- 1) **EN Peterson**, A Manatunga, KJ Klingman, GD Fulk. A Bayesian approach to modeling joint trends and dependencies in irregular multivariate time series. *Statistics in Medicine*. Submitted.
- 2) **EN Peterson**, A Edwards, M Wetzel, LA Waller, H Cooper, C Yarbrough. A Bayesian Spatio-Temporal Top-Down Framework for Opioid Use Disorder Risk Under Data Sparsity. *Bayesian Analysis*. Submitted to Bayesian Analysis. <https://arxiv.org/abs/2506.02303>
- 3) \*K Schrote, M Kramer, **EN Peterson**. A Bayesian Hierarchical Spatial Mapping Approach to Assess Gestational Diabetes Mellitus Risk Among Immigrant Populations in Georgia. *American Journal of Epidemiology*. Submitted.
- 4) \*Peterkin C, LA Waller, **EN Peterson**. A Bayesian spatio-temporal approach to assess small area trends in COVID-19 related excess opioid mortality among drug users in Georgia. *Journal of Royal Statistical Society Series A*. Submitted. Available on ArXiv at <https://arxiv.org/pdf/2503.07918.pdf>

- 5) **Peterson, EN**, Nethery, R. C., Chen, J. T., Krieger, N., Waterman, P. D., Coull B.A., Waller, L. A., (2025). A Bayesian Spatial Berkson error approach to estimate small area opioid mortality rates accounting for population-at-risk uncertainty. *Accepted Spatial and Spatio-Temporal Epidemiology*.
- 6) **Peterson, E. N.**, Guranich, G., Cresswell, J. A., & Alkema, L. (2024). A Bayesian approach to estimate maternal mortality globally using national civil registration vital statistics data accounting for reporting errors. *Statistics and Public Policy*, 11(1), 2286313.
- 7) **Peterson, E. N.**, Nethery, R. C., Padellini, T., Chen, J. T., Coull, B. A., Piel, F. B. & Waller, L. A. (2024). A Bayesian hierarchical small area population model accounting for data source specific methodologies from American Community Survey, Population Estimates Program, and Decennial census data. *The Annals of Applied Statistics*, 18(2), 1565-1595.
- 8) Varghese, J. S., **Peterson, E. N.**, Ali, M. K., & Tandon, N. (2024). Advancing diabetes surveillance ecosystems: a case study of India. *The Lancet Diabetes & Endocrinology*.
- 9) GD Fulk., EN Peterson, and KJ Klingman. "Abstract TP93: A Bayesian Hierarchical Time Series Model to Forecast Patient Recovery Outcomes After an Acute Stroke When Activity Monitor Data is Incomplete." *Stroke* 55. Suppl\_1 (2024): ATP93-ATP93.
- 10) Li, Y., Coull, B. A., Krieger, N., **Peterson, E.**, Waller, L. A., Chen, J. T., & Nethery, R. C. (2023). Impacts of census differential privacy for small-area disease mapping to monitor health inequities. *Science Advances*, 9(33), eade8888.
- 11) Kempker, J. A., Stearns, E., **Peterson, E. N.**, & Waller, L. A. (2023). US Adult Critical Care Beds Per Capita: A 2021 County-Level Cross-Sectional Study. *Critical Care Explorations*, 5(3), e0868.
- 12) EN Peterson, AB Moller, A Gemmill, D Chou, L Alkema. A Bayesian temporal hierarchical model to assess levels of misclassification error in national vital registration maternal mortality data. *Statistics in Medicine*. 41.14 (2022): 2483-2496.
- 13) 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 modeling of health inequities. *The American Statistician*, 76(2), 142-151.
- 14) 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 modeling of health inequities. *The American Statistician*, 76(2), 142-151.
- 15) NB Jain, JE Kuhn, GD Ayers, A Song, EN Peterson. Geographical Variation in Rates of Shoulder and Knee Arthroscopy in U.S. States and Relationship to Orthopedist Density in Surgeon Volume. *JAMA*. 2019. 11; 2(12). doi: [10.1001/jamanetworkopen.2019.17315](https://doi.org/10.1001/jamanetworkopen.2019.17315)
- 16) NB Jain, GD Ayers, EN Peterson, MB Harris, L Morse, KC O'Connor, E Garshick. Traumatic spinal cord injury in the United States, 1993-2012. *JAMA*. 2015. 9;313(22). 2236-43.
- 17) A Morandi, LM Solberg, R Habermann, P Cleeton, EN Peterson, EW Ely, J Schnelle. Documentation and Management of Words Associated with Delirium Among Elderly Patients in Postacute Care: A Pilot Investigation. *JAMDA*. 2009. 34-339.
- 18) SF Simmons, EN Peterson, C You. The Accuracy of Monthly Weight Assessments in Nursing Homes: Implications for the Identification of Weight Loss. *Journal of Nutrition, Health and Aging*. 2009. 13, 3, 284-288.
- 19) JF Schnelle, SF Simmons, L Beuscher, EN Peterson, R Habermann, F Leung. Prevalence of Constipation Symptoms in Nursing Home Residents. *Journal of Gerontology*. 2009.

#### Guest Lectures and Invited Conference presentations

- Spatial Statistics 2025: “A Bayesian spatial reconstruction of the Net-Migrant population.” Oral Presentation.
- United States Census Bureau 2025: “A Bayesian hierarchical small area population model accounting for data source specific methodologies from U.S. Census data.” Invited talk.
- ISBA 2024: “A Bayesian hierarchical small area population model accounting for data source specific methodologies from American Community Survey, Population Estimates Program, and Decennial Census Data”
- SAE 2024: “Incorporating heterogenous types of uncertainty in small area estimates from multiple demographic data sources”
- PAA 2023 Session Chair to the Bayesian Methods Section.

- PAA 2023: “A Bayesian Spatial Berkson Error approach to estimate small area disease rates accounting for population-at-risk uncertainty.” Oral presentation to be given to the “Incorporating Concepts of Space into Mortality Analyses” Section.
- Southern Regional Council on Statistics 2022: “Bayesian methods for the assessment of measurement errors with the use of multiple data sources with application to small area estimation.”
- PAA 2022: “A Bayesian hierarchical small area population model accounting for data source specific methodologies from U.S. Census data.” Oral presentation given to the “Statistical Methods for Measurement Error and Small Area Estimation” Section.
- Maynooth University Biostatistics Seminars: “A Bayesian hierarchical model framework to estimate measurement error in data sparse settings: Application in maternal mortality and U.S. Census data.”
- University of Massachusetts Bayesian Working Group: “A Bayesian hierarchical small area population model accounting for data source specific methodologies from U.S. Census data.”
- University of Massachusetts Bayesian Working Group: “Incorporating population-at-risk uncertainty into spatial disease mapping models.”
- NESS 2019 Student Paper Competition: “A Bayesian temporal hierarchical model for the assessment of misclassification errors in maternal mortality count data: Application in sparse data settings”
- JSM 2018 Poster: “Counting Maternal Deaths? You Better Bayes It! A systematic assessment of underreporting and misclassification in registration of maternal deaths in high- and middle-income countries using a Bayesian modeling approach”
- PAA 2018 Poster: “Counting Maternal Deaths? You Better Bayes It! A systematic assessment of underreporting and misclassification in registration of maternal deaths in high- and middle-income countries using a Bayesian modeling approach”
- NESS 2018 Poster: A Bayesian approach to modeling CRVS reporting errors of maternal mortality”
- UMASS SPH Environmental Health Science research day Poster: “Counting Maternal Deaths? You Better Bayes It! A Bayesian Approach to modeling incorrect reporting of maternal deaths”
- World Health Organization Maternal Mortality Interagency Group (WHO-MMEIG). Report on estimation of reporting errors of vital registration (VR) maternal mortality data.

### **Academic Instruction**

- “Modern Regression Methods”. Emory University. BIOS 526. Fall 2024, 2025. [4 credits]
- “Advanced Geographic Information Systems”. Emory University. DATA 532. Spring 2024. [2 credits]
- “Advanced Geographic Information Systems”. Emory University. INFO 532. Fall 2023. [2 credits]
- “Introduction to Geographic Information Systems”. Emory University. INFO 530. Spring 2023. [2 credits]
- “Advanced Geographic Information Systems”. Emory University. INFO 532. Spring 2023. [2 credits]
- “Introduction to Geographic Information Systems”. Emory University. INFO 530. Fall 2021. [2 credits]
- “Advanced Geographic Information Systems”. Emory University. INFO 532. Fall 2021. [2 credits]
- “Introduction to Bayesian Statistics”. University of Massachusetts. BIOS 697. Spring 2017. [3 credits]
- “Introduction to Biostatistics”. University of Massachusetts. BIOSTATS 540. Spring 2016. [3 credits]

### **Faculty Advisor**

- Dissertation Advisory Committee
  - Delante Moore, PhD 2025
- Thesis/ Capstone Advisor
  - Julianna Chapman, MSPH 2025
  - Kaitlin Schrote, MSPH 2025- Nominee for RSPH Shepherd’s Thesis Award
  - Yujia Dou, MSPH 2025
  - Cyen Peterkin, MSPH 2024- Nominee for RSPH Shepherd’s Thesis Award
  - Yixiang Hong, MSPH 2024- Winner of BIOS Shepherd’s Capstone Award
  - Sarah Savariyar, MSPH 2024
  - Wenchao Ma, MSPH 2024

### **Professional Experience**

Research Assistant Professor- Department of Biostatistics, Emory University, Atlanta, GA. Jul 2022-Present

- Developing a Bayesian spatial small area disease risk estimation model accounting for uncertainty in population at risk estimates. In collaboration with Harvard T.H.Chan School of Public Health, and UK Small Area Health Statistics Unit
- Developing Bayesian small area disease mapping methods to assess small area variations in opioid mortality, and associated driving factors across marginalized populations.
- Developing a Bayesian hierarchical small area misclassification model to account for misreporting errors in Pregnancy Mortality Surveillance Systems. In collaboration with the CDC Maternal Mortality Prevention Team.
- Evaluation of the efficacy of NICU Care Intervention Program on maternal health outcomes in Georgia. In collaboration with NICU Cares and Emory Department of Epidemiology.
- Statistical Support Supervisor. Training Core for the Center of Excellence. Emory University. In collaboration with Moorhouse School of Medicine.
- Statistical Support Supervisor. Training Core for the HERCULES Center at Emory.

Post-Doctoral Fellow- Department of Biostatistics, Emory University, Atlanta, GA. Feb 2020-Jun 2022

- Developed a Bayesian hierarchical small area misclassification model to estimate extent of misclassification errors of maternal mortality by U.S. Pregnancy Mortality Surveillance Systems. In collaboration with CDC Maternal Mortality Surveillance Group and Michael Kramer at Emory University Epidemiology Department.
- Developed Bayesian methods to estimate reporting errors in the reporting of age-cohort specific adult survival probabilities in sibling survival histories using a two stage approach. In collaboration with University of Massachusetts Amherst and Stephane Helleringer at New York University Abu Dhabi Social Research and Public Policy Department.
- Developed Bayesian spatial-temporal methods to estimate population size of blue whales using multiple data sources, accounting for data source specific biases. In collaboration with Oregon State Marine Mammal Institute.
- Developed a Bayesian hierarchical small area population model to estimate true population size accounting for data source specific methodologies in U.S. Census data. In collaboration with Harvard T.H.Chan School of Public Health, and UK Small Area Health Statistics Unit (corresponding publication listed).
- Developed a Bayesian approach to estimate maternal mortality using national civil registration vital statistics data accounting for reporting errors. In collaboration with the World Health Organization.

Research Assistant - Department of Biostatistics, University of Massachusetts Amherst, Amherst, MA. Sep 2015-Dec 2019.

- Developed a Bayesian hierarchical model to estimate the extent of reporting errors of maternal mortality by national vital registration systems. (Corresponding publication listed)
- Developed and implemented a data extraction framework for a large-scale systematic search of scientific literature related to misclassification of maternal deaths within countries, which is currently used by the WHO Maternal Mortality Interagency Group.
- Developed R packages to automate the data collection, cleaning, and compilation processes of maternal mortality data from article reviews, and WHO published surveys.
- Completed coursework in the following:
  - Bayesian Methodology and Theory
  - Machine Learning
  - Modern Applied Methods
  - Probability Theory and Statistical Inference
  - Longitudinal and Mixed Models
  - Time Series Analysis
  - Causal Inference
  - Spatio-Temporal Modeling
  - Survival Analysis
  - Clinical Trials
  - Population Research and Demography
  - Advanced R

- Completed workshops
  - STAN NESS 2018 led by Michael Betancourt

Research Associate- Department of Biostatistics, Vanderbilt University Medical Center, Nashville, TN. Jan 2014-Aug 2015.

- Data Analyst for Physical Medicine and Rehabilitation of Rotator Cuff Tears in older populations
- Performed exploratory and regression analyses to compare surgical and non-surgical treatment outcomes of rotator cuff tears
- Developed methods on the use of propensity scores with over-parametrized regression models
- Worked as data analyst and research assistant for ROW Outcomes Study
- Managed Vanderbilt REDcap data collection for rotator cuff tear surveys
- Created mock data for testing error checks.
- Prepared statistical analysis plan for subsequent studies on treatment efficacy.

### Independent Contracts

- Consulted on work sponsored by the WHO on maternal mortality misclassification methods. Dec 2020-current.
  - Provide expert input on specifications for data inputs for the maternal mortality database of specialized studies to ensure it aligns and functions well with the R code package.
  - Publication of journal article that makes substantive contribution toward improving misclassification of maternal mortality within vital statistics systems.
- Consulted on work sponsored by the WHO on global maternal mortality estimation. Apr -Sept 2016-2019.
  - Developed an R package for maternal mortality specialized study data compilation.
  - Developed a framework for data collection and compilation of studies reporting on national levels of maternal mortality.
  - Reported and presented statistical methods for measuring data quality metrics of vital statistics reporting of maternal mortality.

### Committee Memberships

- Member of the Faculty Advisory Council at RSPH 2025-2028.
- Member of the RSPH Maternal Mortality and Morbidity Working Group, Rollins School of Public Health, Emory University 2022-Present
- Member of the PhD Admission Committee, Department of Biostatistics and Bioinformatics, Rollins School of Public Health, Emory University 2022-Present
- Member of the Biostatistics Diversity, Equity, and Inclusion Committee, Department of Biostatistics and Bioinformatics, Rollins School of Public Health, Emory University 2022-Present
- Member of Rollins School of Public Health Diversity, Equity, and Inclusion Committee, Rollins School of Public Health, Emory University 2023-Present

### Memberships

- 2016-Present Member of Population Association of America
- 2015-Present Member of the American Statistical Association
- 2017-Present Member Society of Epidemiologic Research
- 2018-Present Member of ENAR

### Reviewer Work

- Annals of Epidemiology
- Journal of Survey Statistics and Methodology
- Population of Health Metrics
- Ecology
- Epidemiology
- Spatial and Spatio-Temporal Epidemiology

- Annals of Applied Statistics
- The American Statistical Association
- Journal of the Royal Statistical Society Series A

#### **Other Academic Experience**

- Leader of the Interdisciplinary Bayesian Spatial Working Group, Emory University
- Member of weekly Spatial statistics working group with Lance Waller's Lab, Emory University
- Member of weekly Bayesian Statistics Working Group with Leontine Alkema's Lab at University of Massachusetts Amherst
- Member of weekly Statistics reading club at Vanderbilt University
- Proficient in ArcGIS, R, RShiny, Nimble, STAN, INLA, JAGS, STATA statistical analyses and database design.