

Nicole Anne Swartwood

Phone: (931) 246-5170 • Email: nswartwood@hsph.harvard.edu

Education

Graduate Certificate Data Science, Harvard Extension School (2022)
MSPH, Environmental Health & Epidemiology, Emory University (2017)
BS Mathematics, University of Tennessee (2014)
BS Microbiology, University of Tennessee (2014)
BA Honors History, University of Tennessee (2014)
BA Honors Religious Studies, University of Tennessee (2014)
BA German Studies, University of Tennessee (2014)

Research experience

Senior Research Analyst (2023–Present)

Research Analyst (2017–2023)

Harvard T.H. Chan School of Public Health, Boston, MA

- Led the development and programming of a transmission dynamic model of tuberculosis in the United States. Applied this model to investigate the impact of COVID-19 on US TB epidemiology. Available on GitHub as an R package, *MITUS*.
- Initiated and led the development of reproducible economic methodology for evaluating the cost-effectiveness of tuberculosis interventions in the United States. Available on GitHub as an R package, *TubercuCost*.
- Developed and maintain online webtool, Tabby2, for real-time, state-level estimates of tuberculosis epidemiology and economic analyses. Provided training for local public health staff on how to use model to effectively plan for TB elimination. Tool available here: <https://ppmltools.org/tabby2/>; available on GitHub as an R package, *tabby2*.
- Collaborated on the development of a Bayesian nowcasting model of SARS-CoV-2 infections and associated webtool. Conducted validation assessments against wastewater viral measurements. Tool available here: <https://covidestim.org>
- Applied statistical models to estimate the potential health and economic burden of racial and ethnic disparities in TB among US-born persons. Contributed to the statistical design and manuscript development of 5 additional manuscripts on racial and ethnic disparities and TB.
- Analyzed the patterns of SARS-CoV-2 infections to quantitatively estimate the differences in infection wave speeds and spatial extent using a BYM2 model.
- Advised the development and execution of 3 systematic literature reviews. Advocated for reproducible approaches. Contributed to the development of protocols, extraction forms, and extraction. Currently completing the data cleaning and meta-analyses via Bayesian meta-regression for 2 of these reviews.
- Published 4 first-author peer-reviewed manuscripts, with 1 first-author further publication in/submitted for review. Contributed to 17 published, 1 submitted, and 1 accepted manuscript(s) as coauthor. Senior author for one manuscript in review.

Graduate Researcher (2016–2017)

Emory University, Eri Saikawa Lab, Atlanta, GA

- Led the development of a methodology to calculate of estimations of brick kiln emissions to particulate matter concentrations. Applied this methodology to produce country-level estimates for India, Nepal, and Bangladesh. Contributed these calculations to a chapter for World Bank publication.

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- Applied Weather Research and Forecasting model coupled with Chemistry (WRF-Chem) to investigate spatial, temporal models simulating the contribution of brick kiln emissions to air quality concentrations in Bangladesh.

Graduate Research Assistant, (2015–2016)

Emory University, Juan Leon Lab, Atlanta, GA

- Reviewed and revised previously developed quantitative microbial risk model (qmra) for Norovirus transmission on farms. Developed R code, checked mathematical reasoning and assumptions, and drafted manuscript for publication.
- Quantified GI and GII norovirus in produce wash samples through qPCR.
- Conducted systematic literature review in search of microbial indicators for Norovirus and Hepatitis A in an agricultural setting.
- Prepared NIH R01 grant materials, with focus on investigator bio-sketches and budget materials.
- Optimized protocol for qPCR quantification of Hepatitis A from environmental samples.
- Designed experiments to determine protocol for the use of Turnip Crinkle Virus as a process control for Norovirus qPCR quantification.

Graduate Research Assistant (2016–2017)

Georgia Institute of Technology, Center for Geographic Information Systems, Atlanta, GA

- Identified potential research questions from existing dataset on environmental conditions, demographics, and livability in relation to health outcomes in Fulton County, Atlanta.
- Aided in the creation of an online visualization platform of the health, socio-demographic, and environmental characteristics in Fulton County, Georgia. Performed user testing and feedback. Tool here: <https://geospatial.gatech.edu/PICH/>

Public Health Intern (2016)

American Cancer Society, Atlanta, GA

- Conducted large-scale literature review of over 20,000 articles to inform colorectal cancer screening recommendations. Developed protocol and extraction forms. Completed screening and extraction of articles.

Researcher (2016)

Environment and Population Research Centre, Dhaka, Bangladesh

- Developed and implemented pilot study for air pollution and tuberculosis incidence.
- Designed epidemiological study to explore associations between ambient air pollution exposure and tuberculosis incidence, including literature review, survey development, case interview questionnaires, and training of survey administrators.
- Consulted and performed data analysis of evaluation of Community Led Total Sanitation program in 64 wards in Bangladesh.
- Completed data cleaning and analysis in SAS.

Field supervisor, 'Ayn Gharandal Archaeological Project (2015-2019)

University of Tennessee, Knoxville, TN

- Supervised a team of students and paid employees in the excavation of Roman fort, kept daily logs, and wrote final reports of key findings and geological evidence.
- Collected samples of calcium carbonate deposits from bathhouse. Analyzed these samples for mineral evidence of water pollution from a mine site in a neighboring wadi.

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Undergraduate Research Assistant – Mathematics (2014)

University of Tennessee, Knoxville, TN

- Designed and programmed an agent-based model to investigate the process of inhalation anthrax lethality using NETLOGO.

Teaching experience

Teaching Assistant, EPI 570. Infectious Disease Dynamics: Theory and Methods, Emory University (2017)

Mentorship/training experience

- Trained 5 new post-doctoral researchers and PhD students on effective cluster computing, with an emphasis on parallelization.
- Mentored master student through the development of her thesis investigating TB prevalence in low- and middle-income countries.

Manuscripts as lead author

- 1) **Swartwood NA**, Cohen T, Marks SM, Beeler Asay, GR, Self, J, Langer, A, Horsburgh Jr, CR, Salomon JA, Menzies NA. Estimating the potential impact of the COVID-19 pandemic on future tuberculosis in the United States. *Clinical Infectious Diseases*, 2025; <https://doi.org/10.1093/cid/ciaf092>
- 2) **Swartwood NA**, Haddad MB, Marks SM, Beeler Asay, Horsburgh Jr, CR, Cohen, T, Salomon JA, Menzies NA. Health impact and cost-effectiveness of testing and treatment of Mycobacterium tuberculosis infection among Asian and Hispanic persons with diagnosed diabetes in the United States. *Value in Health*. 2025 Apr 10; <https://doi.org/10.1016/j.jval.2025.03.009>
- 3) **Swartwood NA**, Li Y, Regan M, Marks SM, Barham T, Asay GR, Cohen T, Hill AN, Horsburgh CR, Khan AD, McCree DH. Estimated Health and Economic Outcomes of Racial and Ethnic Tuberculosis Disparities in US-Born Persons. *JAMA Network Open*. 2024 Sep 3;7(9):e2431988-
- 4) **Swartwood NA**, Testa C, Cohen T, Marks SM, Hill AN, Cochran J, Cranston K, Randall LM, Tibbs A, Salomon JA, Menzies NA. Tabby2: A User-Friendly Web Tool for Forecasting State-Level TB Outcomes in the United States. *BMC medicine*. 2023 Dec;21(1):1-3.
- 5) **Swartwood NA**. Air Quality and Morbidity in Dhaka City, Bangladesh: an estimation of the contribution of brick kilns to air quality & their potential to affect human health. 2017.

Manuscripts as contributing author

- 1) Fayette Klaassen, **Nicole A Swartwood**, Melanie H Chitwood, Rafael Lopes, Masahiko Haraguchi, Joshua A Salomon, Ted Cohen, Nicolas A Menzies, National- and state-level SARS-CoV-2 immunity trends from January 2020 to December 2023: a mathematical modeling analysis, *The Journal of Infectious Diseases*, 2025; jiaf532, <https://doi.org/10.1093/infdis/jiaf532>
- 2) Bronsard M, Sabety A, Rönn M, **Swartwood NA**, Salomon JA. Use of no-cost preventive services jeopardized by Kennedy v Braidwood. In *JAMA Health Forum* 2025 Apr 4 (Vol. 6, No. 4, pp. e251559-e251559). American Medical Association.
- 3) Menzies NA, Marks SM, Hsieh YL, **Swartwood NA**, Beeler Asay GR, Skarbinski J, Horsburgh CR, Cohen T. Contribution of post-TB sequelae to life-years and quality-adjusted life-years lost

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- due to TB disease in the United States, 2015-2019. *American Journal of Respiratory and Critical Care Medicine*. 2025.
- 4) Li Y, Marks SM, Beeler Asay GR, Winston CA, Pepin D, McClure S, **Swartwood NA**, Cohen T, Horsburgh CR, Jr, Salomon JA, Menzies NA. Effectiveness and cost-effectiveness of expanded targeted testing and treatment of latent tuberculosis infection among the Medicare population in 2022. *Annals of Internal Medicine*. 2025.
 - 5) Regan M, Barham T, Li Y, **Swartwood NA**, Asay GR, Cohen T, Horsburgh CR, Khan A, Marks SM, Myles RL, Salomon JA, Menzies NA. Risk factors underlying racial and ethnic disparities in tuberculosis diagnosis and treatment outcomes, 2011–19: a multiple mediation analysis of national surveillance data. *The Lancet Public Health*. 2024 Aug 1;9(8):e564-72.
 - 6) Menzies NA, **Swartwood NA**, Cohen T, Marks SM, Maloney SA, Chappelle C, Miller JW, Asay GR, Date AA, Horsburgh CR, Salomon JA. The long-term effects of domestic and international tuberculosis service improvements on tuberculosis trends within the USA: a mathematical modelling study. *The Lancet Public Health*. 2024 Aug 1;9(8):e573-82.
 - 7) Lopes R, Pham K, Klaassen F, Chitwood MH, Hahn AM, Redmond S, **Swartwood NA**, Salomon JA, Menzies NA, Cohen T, Grubaugh ND. Combining genomic data and infection estimates to characterize the complex dynamics of SARS-CoV-2 Omicron variants in the US. *Cell Reports*. 2024 Jul 23;43(7).
 - 8) Li Y, Regan M, **Swartwood NA**, Barham T, Beeler Asay GR, Cohen T, Hill AN, Horsburgh Jr CR, Khan A, Marks SM, Myles RL, Salomon JA, Menzies NA. Disparities in Tuberculosis Incidence by Race and Ethnicity Among the US-Born Population in the United States, 2011 to 2021: An Analysis of National Disease Registry Data. *Annals of Internal Medicine*. 2024 Apr;177(4):418-27.
 - 9) Ekramnia M, Li Y, Haddad MB, Marks SM, Kammerer JS, **Swartwood NA**, Cohen T, Miller JW, Horsburgh CR, Salomon JA, Menzies NA. Estimated rates of progression to tuberculosis disease for persons infected with *Mycobacterium tuberculosis* in the United States. *Epidemiology*. 2024 Mar 1;35(2):164-73
 - 10) Conte MN, Gordon M, **Swartwood NA**, Wilwerding R, Yu CA. Observational studies generate misleading results about the health effects of air pollution: Evidence from chronic air pollution and COVID-19 outcomes. *Plos one*. 2024 Jan 2;19(1):e0296154
 - 11) Regan M, Li Y, **Swartwood NA**, Barham T, Asay GR, Cohen T, Hill AN, Horsburgh CR, Khan A, Marks SM, Myles RL. Racial and ethnic disparities in diagnosis and treatment outcomes among US-born people diagnosed with tuberculosis, 2003–19: an analysis of national surveillance data. *The Lancet Public Health*. 2024 Jan 1;9(1):e47-56
 - 12) Klaassen F, Chitwood MH, Cohen T, Pitzer VE, Russi M, **Swartwood NA**, Salomon JA, Menzies NA. Changes in Population Immunity Against Infection and Severe Disease from Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2) Omicron Variants in the United States Between December 2021 and November 2022. *Clinical Infectious Diseases*. 2023 Apr 19:ciad210.
 - 13) Klaassen F, Chitwood MH, Cohen T, Pitzer VE, Russi M, **Swartwood NA**, Salomon JA, Menzies NA. Population immunity to pre-Omicron and Omicron severe acute respiratory syndrome coronavirus 2 variants in US states and counties through 1 December 2021. *Clinical Infectious Diseases*. 2023 Feb 1;76(3):e350-9.
 - 14) Chitwood MH, Russi M, Gunasekera K, Havumaki J, Klaassen F, Pitzer VE, Salomon JA, **Swartwood NA**, Warren JL, Weinberger DM, Cohen T. Reconstructing the course of the COVID-19 epidemic over 2020 for US states and counties: Results of a Bayesian evidence synthesis model. *PLoS Computational Biology*. 2022 Aug 30;18(8):e1010465.

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- 15) Menzies, N.A., **Swartwood, NA.**, Testa, C., Malyuta, Y., Hill, A.N., Marks, S.M., Cohen, T. and Salomon, J.A., 2021. Time Since Infection and Risks of Future Disease for Individuals with Mycobacterium tuberculosis Infection in the United States. *Epidemiology (Cambridge, Mass.)*, 32(1), p.70.
- 16) Menzies, NA, Bellerose, M, Testa, C, **Swartwood, NA**, Malyuta, Y, Cohen, T, Marks, SM, Hill, AN, Date, AA, Maloney, SA and Bowden, SE, 2020. Impact of Effective Global Tuberculosis Control on Health and Economic Outcomes in the United States. *American Journal of Respiratory and Critical Care Medicine*.
- 17) Bilinski A, Fitzpatrick M, Sheffield S, **Swartwood NA**, Williamson A, York A. Strict physical distancing may be more efficient: A mathematical argument for making lockdowns count. medRxiv. 2020 May 26:2020-05.

Submitted manuscripts

- 1) Singh N*, **Swartwood NA***, Mortazavi A, Can MH, Hening C, Horton K, MacPherson P, Menzies NA. Sex Stratified relationships of Tuberculosis Prevalence and Notification in Low and Middle-income Countries: A Systematic Review and Meta-analysis. *shared first authorship. Submitted to PLOS Medicine.
- 2) Regan M, Cui H, **Swartwood NA**, Li Y, Barham T, Asay GR, Cohen T, Horsburgh CR, Khan A, Marks SM, Myles RL, Salomon JA, Menzies NA. The potential impact of a geographically focused intervention to improve TB outcomes among structurally marginalized racial-ethnic populations in the United States. In revision at Lancet Public Health.
- 3) Lopes R, Lan Y, Chitwood MH, Klaassen F, Salomon JA, Warren JL, Grubaugh ND, Menzies NA, Cohen T, **Swartwood NA***. Quantifying the spatiotemporal dynamics of the first two epidemic waves of SARS-CoV-2 infections in the United States. 2024. Submitted to Emerging Infectious Diseases. In revision at PLOS Computational Biology. *senior author
- 4) Dankwa EA, Cavalli L, Balasubramanian R, Jia K, Can MH, Ofori SK, **Swartwood NA**, Li Y, Cui H, Wade C, Buckee CO, Imai-Eaton JW, Menzies NA. Calibration conduct and reporting in infectious disease dynamic transmission models: a scoping review and reporting framework. Accepted at PLOS Computational Biology.

Working papers

- 1) **Swartwood NA**, Testa C, Cohen T, Marks SM, Hill AN, Salomon JA, Menzies NA. The contribution of latent TB treatment to TB prevention in the United States: results of a transmission dynamic model.
- 2) **Swartwood NA**, Klaassen F, Chitwood MH, Lopes R, Salomon JA, Cohen T, Menzies NA. Trends in United States long-COVID incidence and prevalence from January 2020 to December 2023: a Bayesian modeling analysis.
- 3) YL Hsieh, C Phares, SM Marks, GR Beeler Asay, B Maskery, SA Maloney, **NA Swartwood**, A Date, T Cohen, NA Menzies Cost-effectiveness of pre-departure tuberculosis infection testing and tuberculosis preventive treatment for United States-bound refugees.
- 4) Li Y, Regan M, **Swartwood NA**, Barham T, Beeler Asay GR, Cohen T, Hill AN, Horsburgh Jr CR, Khan A, Marks SM, Myles RL, Salomon JA, Menzies NA. Risk factors underlying racial/ethnic disparities in tuberculosis incidence rates among the U.S.-born population in the United States, 2012-2019.

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- 5) Puente T, Lorenzo X, **Swartwood NA**, Salomon JA. How does cost-sharing impact the use of preventive services? A narrative review, 2020 – 2024.

Conference presentations

- 1) Trends in United States long-COVID incidence and prevalence from January 2020 to December 2023: a Bayesian modeling analysis. Oral abstract presentation at Society for Medical Decision Making Annual Meeting, June 17, 2025.
- 2) Investigating the impact of closing disparities in TB incidence and case fatality rates across U.S.-born race-ethnicities in the United States. Oral abstract presentation at North American Regional Meeting of International Union for Tuberculosis and Lung Disease. February 23, 2023.
- 3) Estimating the potential impact of the COVID-19 pandemic on future TB in the United States. Oral abstract presentation at the National Tuberculosis Conference. May 24, 2022.
- 4) The contribution of latent TB treatment to TB prevention in the United States: results of a transmission dynamic model. Oral poster presentation presented at the main meeting of the International Union for Tuberculosis and Lung Disease. October 21, 2021.
- 5) Modeling the Population Effects of Testing & Treating for Latent TB in Clinically Recommended Populations. Poster presented at National TB Controllers Association meeting; October 2, 2020; Virtual.
- 6) MITUS (Modeling interventions for TB in the United States): a flexible framework for modelling TB epidemiology and policy efforts. Poster presented at National TB Controllers Association meeting; April 23-24, 2019; Atlanta, GA.
- 7) Tabby2: A user-friendly tool for comparing state-level B intervention options. Poster presented at National TB Controllers Association meeting; April 23-24, 2019; Atlanta, GA.
- 8) Water Pollution and Public Health: A Geochemical Study of ‘Ayn Gharandal. Oral presentation given at the American Schools of Oriental Research meeting; November 2015. Atlanta, GA.

Invited presentations

- 1) Investigation of racial and ethnic disparities in tuberculosis in the United States. Leadership meeting of Society of Epidemiology for Tuberculosis Control. November 2024; Virtual.
- 2) Effect of the COVID-19 epidemic on TB epidemiology and outcomes in the United States: a Bayesian analysis. CDC Division of Tuberculosis Elimination Brown Bag. May 2024; Virtual.
- 3) Impact of targeted testing and treatment of Mtb infection among Asian and Hispanic persons with diabetes in the United States. CDC Division of Tuberculosis Elimination Brown Bag. June 2024; Virtual.
- 4) Tabby 2: Modeling TB Epidemiology. CDC Project Officer/Program Consultant quarterly presentation. October 2022; Virtual.
- 5) Planning for TB Elimination with Tabby2. CDC’s Division of Tuberculosis Elimination’s (DTBE). Data Management, Statistics and Evaluation Branch. September 2021; Virtual.
- 6) Tabby2: A User Friendly Web Tool for Exploring Future State-Level TB Outcomes for User-Specified Scenarios. Massachusetts’ Medical Advisory Committee for the Elimination of Tuberculosis. October 2019.

Awards

Best Poster Award National TB Conference (2019)

National Institute of Occupational Safety and Health Trainee Grantee (2015-2017)

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President of Beta, Beta, Beta Biological Honor Society (2013)
Member of Delta Phi Alpha German Honor Society (2011-2014)
Fern and Manfred Steinfeld Scholarship for Judaic Studies (2013)
John L. and Elsbeth V. Kind Memorial Scholarship for German Studies (2013)
Summer Research Stipend from UT History Department (2013)
Center for International Education Scholarship (2013)
Fern and Manfred Steinfeld Scholarship for Judaic Studies (2011)
John Osbourne Fellowship in German Studies (2011)

Technical skills

General: Mathematical modeling; bayesian inference; statistical analysis; meta-analyses; data analysis & visualization; systematic review

Programming & markup languages: R, Python, C++, LaTeX, SQL, Netlogo, SAS

Software: RStudio, Visual Studio Code, OverLeaf, Covidence, Git, GitHub; SLURM

Activities and leadership

Co-founder and organizer (2021 – Present)

R User Group

- Arrange for R developers to discuss novel projects and methods with our organization.
- Lead tutorials on specific interest topics, such as GitHub for R or data cleaning methods.
- YouTube of our sessions here: <https://www.youtube.com/@rusergroupharvarddatasci7232>

Poster session chair & program committee member (2022, 2024)

UseR! conference

- Designed and organized virtual (2022) and in-person (2024) poster sessions from call for proposals, ranking of proposals, and day-of event coordination.
- Collaborated on development of conference programming schedule.
- Overhauled the poster award process to reduce bias across reviewers and improve equity among submissions.

Research interests

bayesian inference, mathematical models, agent-based models, tuberculosis, influenza, spatial models, respiratory disease and infection, infectious disease, air pollution, sustainability, public health, atmospheric chemistry, environmental epidemiology, climate change and health, refugee health, history of public health