

Madhav Sankaranarayanan

Curriculum Vitae

Cambridge, MA, USA

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Education

Program	Institution	Year
Doctor of Philosophy <i>Biostatistics</i> Advisor: Rajarshi Mukherjee	Harvard T.H. Chan School of Public Health <i>Boston, MA, USA</i>	September 2021-present
Masters of Statistics <i>Specialization: Theoretical Statistics</i>	Indian Statistical Institute <i>Kolkata, WB, India</i>	July 2019-May 2021
Bachelors of Statistics (Honours) <i>Major: Statistics</i>	Indian Statistical Institute <i>Kolkata, WB, India</i>	July 2016-May 2019

Research Interests

High Dimensional Inference • Random Matrix Theory • Causal Inference • Statistical Genetics

Current Projects

- **Asymptotic Inference in High Dimensional Instrumental Variable models** (in preparation)
Madhav Sankaranarayanan, Rajarshi Mukherjee
 - Study the estimation of signal-to-noise ratio in practical high dimensional IV models, such as Mendelian randomization models
 - Prove optimality of exact instrument recovery under a range of dimensional specifications
 - Improve the estimation of causal quantities under particular practically relevant sparsity conditions
- **Asymptotic Inference for Constrained Regression** (Submitting to *Biometrika*) [IISA Student Poster Award]
Madhav Sankaranarayanan, Rajarshi Mukherjee, Tamar Sofer, Yana Hrytsenko
 - Study the association of genetic determinants of proteins with glycemic traits
 - Improve the estimation of these associations using the estimated genetic correlation between proteins and traits
 - Construct provably optimal estimators and algorithms, and study polygenic risk scores for these traits
- **Minimax Detection of the Number of Spikes in Large Wigner Matrices** (in preparation)
Madhav Sankaranarayanan, Rajarshi Mukherjee, Soumendu Sundar Mukherjee
 - Test presence of structure in spiked Wigner matrices
 - Deal with the bounded and unbounded dimensionality of spike sparsity and strength
 - Investigate asymptotic properties of various tests
- **Effects of Discontinuation Patterns of Anti-Seizure Medications**
Madhav Sankaranarayanan, Maria Donahue, Shuo Sun, Julianne Brooks, Rebeka Bustamante Rocha, Joseph Newhouse, Sebastien Haneuse, Lidia Moura
 - Investigate the effect of initiation patterns of anti-seizure medications of adverse outcomes
 - Further look into related comorbidities in the Medicare dataset
 - Implement an emulated trial design to properly isolate the effect of discontinuity patterns

Publications

Preprints

1. **Sankaranarayanan, M.,** Hossain I., Chen, T.. 2024. "A Distribution-Free Mixed-Integer Optimization Approach to Hierarchical Modelling of Clustered and Longitudinal Data." Preprint, arXiv ([link](#))
2. **Sankaranarayanan, M.,** Rocha, R.B., Brooks, J.D., Donahue, M.A., Sun, S., Díaz, S.H., Tsai, A., Newhouse, J.P., Haneuse, S., & Moura, L.M.V.R. 2025. "Pain Treatment Strategy and Readmission Rates for Medicare Beneficiaries Post-Acute Ischemic Stroke." Preprint, medRxiv ([link](#))

3. Sun, S., Donahue, M.A., Rocha, R.B., **Sankaranarayanan, M.**, Newhouse, J.P., Díaz, S.H., Haneuse, S., Tsai, A., & Moura, L.M.V.R. 2025. "Gabapentin Treatment Patterns Among Older Patients After Hospital Discharge for Acute Ischemic Stroke." Preprint, medRxiv ([link](#))

Peer-reviewed Publications

1. Brooks, J.D., Medeiros, R.C.D., Sun, S., **Sankaranarayanan, M.**, Westover, M.B., Schwamm, L.H., Newhouse, J.P., Haneuse, S., & Moura, L.M.V.R. 2025. "Choice of Antiseizure Medications and Associated Outcomes in Medicare Beneficiaries after Acute Ischemic Stroke." *Epilepsia*, August 6, epi.18594. <https://doi.org/10.1111/epi.18594>.

2. Khorasanizadeh, M., Maroufi, S.F., Mukherjee, R., **Sankaranarayanan, M.**, Moore, J.M., & Ogilvy, C.S. 2023. "Middle Meningeal Artery Embolization in Adjunction to Surgical Evacuation for Treatment of Subdural Hematomas: A Nationwide Comparison of Outcomes with Isolated Surgical Evacuation." *Neurosurgery* 93 (5): 1082–89.

3. **Sankaranarayanan, M.**, Donahue, M.A., Sun, S., Brooks, J.D., Schwamm, L.H., Newhouse, J.P., Hsu, J., Blacker, D., Haneuse, S., & Moura, L.M.V.R. 2025. "Benzodiazepine Initiation Effect on Mortality Among Medicare Beneficiaries Post-Acute Ischemic Stroke." *Pharmacoepidemiology and Drug Safety* 34 (8): e70194. <https://doi.org/10.1002/pds.70194>.

4. Sun, S., Medeiros, R.C.D., Brooks, J.D., **Sankaranarayanan, M.**, Haneuse, S., & Moura, L.M.V.R. 2025. "Patterns of Discontinuation of Epilepsy Specific Anti-Seizure Medications in Medicare Beneficiaries (P1-9.011)." *Neurology* 104 (7_Supplement_1): 4650. <https://doi.org/10.1212/WNL.00000000000211821>.

Presentations

Conferences

- **Asymptotic Inference in High Dimensional Instrumental Variable Models**
Presentation at Joint Statistical Meetings 2025
- **Benzodiazepine Initiation Effect on Mortality Among Medicare Beneficiaries Post Acute Ischemic Stroke**
Poster Presentation at American Academy of Neurology Annual Meeting 2025
- **Asymptotic Inference in Genetic Association Studies using Genetic Correlations of Glycemic Traits**
Presentation at ENAR Spring Meeting 2025
- **Asymptotic Inference in Genetic Association Studies using Genetic Correlations of Glycemic Traits**
Poster Presentation at International Indian Statistical Association Conference 2024
- **Optimal Detection of the Number of Spikes with Application to Genetic Association Testing**
Presentation at Joint Statistical Meetings 2024
- **Asymptotic Inference in Genetic Association Studies using Genetic Correlations of Glycemic Traits**
Presentation at WNAR/IMS Meeting 2024
- **A Distribution-free MIO approach to Hierarchical Modelling of Clustered and Longitudinal data**
Presentation at New England Statistics Symposium 2024
- **Asymptotic Inference in Genetic Association Studies using Genetic Correlations of Glycemic Traits**
Presentation at Joint Statistical Meetings 2023
- **Quantitative Analysis of Polygenic Risk Scores in the Genes for Good Cohort**
Poster at Symposium on Big Data, Human Health and Statistics 2019

Seminars

- **Leveraging Instrumental Variables in High Dimensions**
UW Causal Inference & Missing Data Reading Group, Oct 2025
- Keynote Speaker at StatStart 2024, July 2024
- **Mortality Analysis of Benzodiazepine Initiation**
Harvard Biostatistics Student Seminar, Feb 2024
- **A Distribution-free MIO approach to Hierarchical Modelling of Clustered and Longitudinal Data**
Harvard Biostatistics Student Seminar, Apr 2023

Work Experience

Academic Positions

Center for Value-Based Health Care and Sciences, Mass General Hospital	Boston, MA, USA
<i>Research Assistant</i>	<i>July 2023 - Present</i>
Co-advised by Sebastien Haneuse and Lidia Moura	

University of Michigan School of Public Health

Summer Research Student

Part of the Big Data Science Initiative

Institute of Mathematical Sciences

Visiting Researcher

Advised by Gautam Menon

Ann Arbor, MI, USA

June 2019 - July 2019

Chennai, TN, India

May 2018 - July 2018

Additional Service.....

- Reviewer (Statistica Sinica)

Teaching and Mentoring Experience

- **Biostatistics Summer Preparatory Course** (August 2024)
 - Instructed classes in operational math (real analysis, linear algebra)
- **StatStart** (July 2023)
 - A one month summer intensive program intended for high school students from underrepresented backgrounds interested in data science and computing
 - Organized by the Department of Biostatistics, Harvard T.H. Chan School of Public Health
 - Instructed the Intro to Statistics and Probability classes
- **Summer Program in Biostatistics and Computational Biology** (June 2023 -July 2023)
 - A 6 week summer program, offering diverse undergraduate students a unique opportunity to learn about the use of quantitative methods for biological, environmental, and medical research alongside Harvard faculty, researchers, and graduate students.
 - Organized by the Department of Biostatistics, Harvard T.H. Chan School of Public Health
 - Mentored students as the Student Research Mentor for the research group advised by Rafael Irizarry
- **Qualifying Examination Preparation** (July 2023, July 2024)
 - Taught classes on probability (BIOSTAT 230) to Ph.D. students taking their qualifying exam
- **Teaching Assistant** (January 2023 - May 2023)
 - Statistical Inference 2 (BIOSTAT 241)
 - Instructed by Rajarshi Mukherjee
 - Received Certificate of Distinction in Teaching

Technical Skills

- Programming Language: R, Python, Julia
- Operating Systems: MacOS, Windows, Linux
- Tools: \LaTeX , Microsoft Excel, Microsoft Office, Photoshop

Achievements

- Received a Student Poster Award at International Indian Statistical Association Conference (2024)
- Received a Student Research Award at the New England Statistical Symposium (2024)
- Received Certificate of Distinction in Teaching from the Department of Biostatistics at Harvard T.H. Chan School of Public Health (2023)
- Recipient of Robert Balentine Reed Prize for Excellence in Biostatistical Science (2022)
- Secured Distinction in the B.Stat (Hons.) program at Indian Statistical Institute, Kolkata (2019)
- Awarded the Kishore Vaigyanik Protsahan Yojana scholarship (2017)

Others

- Hobbies: Puzzles, Quizzing, Badminton, Table Tennis, Dancing, Chess, Origami
- Languages: English, Tamil, Hindi, Bengali (working knowledge), Konkani (working knowledge)