Aastha Khatiwada

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Education

Doctor of Philosophy, Biostatistics — 2016-2021
Medical University of South Carolina (MUSC)
Co-mentors: Bethany Wolf, PhD and Dongjun Chung, PhD
Dissertation title: Statistical approach to prioritizing GWAS results and identifying combinations of functional annotations.

Master of Science, Mathematics (Statistics Concentration) — 2014-2016
East Tennessee State University (ETSU)
Mentor: Edith Seier, PhD
Thesis title: Multilevel models for longitudinal data.

Bachelor of Science, Mathematics (Actuarial Science Emphasis) — 2008-2012
Bachelor of Arts, Economics
Minnesota State University Moorhead (MSUM)

Academic Position

Assistant Professor, Division of Biostatistics and Bioinformatics, National Jewish Health — Sept 2021 – Present

Peer-reviewed Publications

Khatiwada A, Wolf BJ, Mulligan JK, Shary JR, Hewison M, Baatz JE, Newton DA, Hawrylowicz C, Hollis BW, Wagner CL. Effects of vitamin D supplementation on circulating concentrations of growth factors and immune-mediators in healthy women during pregnancy. *Pediatr Res*. 2020 Apr; 20:1-9. PMID: 32311700.

- Highlighted in the Editor's Focus for the February 2021 print issue of *Pediatr Res.*

Nam JH*, **Khatiwada A***, Matthews LJ, Schulte BA, Dubno JR, Chung D. Ranking subjects based on paired compositional data with application to age-related hearing loss subtyping. *Commun Stat Appl Methods*. 2020 Mar;27(2):225-239. PMID: 32566544; PMCID: PMC7304553 (*joint first authors).

Khatiwada A, Shoaibi A, Neelon B, Emond JA, Benjamin-Neelon SE. Household chaos during infancy and infant weight status at 12 months. *Pediatr Obes*. 2018 Oct;13(10):607-613. PMID: 30019385; PMCID: PMC6300983.

Master's Thesis

Khatiwada A. Multilevel Models for Longitudinal Data. *Electronic Theses and Dissertations*. 2016; Paper 3090.

- Downloaded over 1790 times.

Manuscripts under Review

Khatiwada A, Wolf BJ, Yilmaz AS, Ramos P, Pietrzak M, Lawson A, Hunt KJ, Kim, HJ, Chung D. GPA-Tree: Statistical approach for functional-annotation-tree-guided prioritization of GWAS results. Submitted to *Bioinformatics*.

Song NJ*, Allen C*, Vilgelm AE*, Riesenberg BP*, Weller KP, Reynolds K, Chakravarthy KB, Kumar A, **Khatiwada A**, Sun Z, Ma A, Chang Y, Yusuf M,Li A, Zeng C, Evans JP, Bucci D, Gunasena M, Xu M, Liyanage NPM, Bolyard C, Velegraki M, Liu SL, Ma Q, Devenport M, Liu Y, Zheng P, Malvestutto CD#, Chung D#, Li Z#. Immunological insights into the therapeutic roles of soluble CD24 against severe COVID-19. (*joint first authors, #joint senior authors). Submitted to *The New England Journal of Medicine*.

Ayoub I, Wolf BJ, Geng L, Song H, **Khatiwada A**, Tsao B, Oats J, Rovin B. Prediction models of treatment response in lupus nephritis. Submitted to *Kidney International*.

Richard MLL, Wirth JR, **Khatiwada A**, Chung D, Eudaly J, Gilkeson GS, Cunningham MA. Conditional knockout of ERα in CD11c+ cells, impact on survival and inflammatory cytokines in murine lupus. Submitted to *The Journal of Immunology*.

Software

GPATree (http://github.com/asthakhatiwada/GPATree)

- R package to implement the GPA-Tree method for genetic data analysis.
- R Shiny app (ShinyGPATree) to interactively implement association mapping and investigate functional annotation tree.

Research Experience

Graduate Research Assistant, Chung Lab, Department of Public Health Sciences, MUSC (*Chung Lab is now in the Department of Biomedical Informatics, The Ohio State University from January 2020*) 2017-2021
NIH/NIGMS R01 GM122078 (*PI: Dongjun Chung)*
Projects:

- *Statistical models for genetic studies using network and integrative analysis (methodology)*
  NIH/NIGMS R01 GM122078 (*PI: Dongjun Chung*)
  - developed statistical methodologies utilizing machine learning techniques to integrate genetic and functional annotation data.
  - developed an R package and an R shiny app to implement the methods.
  - worked with large scale genomic data sources including but not limited to the GWAS Catalog (GWAS summary statistics), GTEx project (eQTL) and the Roadmap Epigenomics Consortium (epigenetic marks).
  - application to complex diseases, including systemic lupus erythematosus, rheumatoid arthritis, ulcerative colitis, and Crohn's disease.
  - one first-authored manuscript is now under review in *Bioinformatics*.
  - another first-authored manuscript is in preparation.
- *CD24Fc as a non-antiviral immunomodulator in COVID-19 treatment (clinical trial)*
  - The Ohio State University is one of ten participating sites in the nation-wide Phase III clinical trial for CD24Fc, a new COVID-19 immunotherapy, funded by Merck.
  - worked as part of the data science team for the clinical trial data and implemented statistical analysis of clinical data, cytokine data, and viral neutralization data, utilizing generalized linear mixed model (GLMM) and principal component analysis (PCA).
  - engaged with clinicians and translational researchers to refine research questions/goals and presented results during weekly meetings.
  - manuscript is now under review in *The New England Journal of Medicine*.
- *Impact of deletion of ERα expression in CD11c+ cells (animal model)*
  - implemented differential expression analysis and gene set enrichment analysis (GSEA) to identify pathways associated with cytokine signaling.
  - collaborated with clinicians and basic science researchers.
  - manuscript is now under review in *The Journal of Immunology*.
- *Phenotype subtyping of age-related hearing loss in patients (longitudinal cohort)*
  - analyzed paired compositional data to rank patients for phenotyping of extreme discordant phenotype design for genetic studies, which aim to identify genetic variants associated with age-related hearing loss.
  - integrated penalized multinomial logistic regression with compositional data analysis approaches for phenotype subtyping.
  - published the co-first-authored paper in *Commun Stat Appl Methods*.
- *Hepatitis C cascade of care (observational cohort)*
  - utilized logistic, multinomial and ordinal regression analysis to identify factors associated with patient retention during treatment.
  - worked with clinicians to define outcomes and develop research questions.

- manuscript in preparation.

Software used: R, R Shiny, R markdown, Rcpp

Graduate Research Assistant, Statistical Methodology Core, 2020-2021
Core Center for Clinical Research (CCCR), MUSC
NIH/NIAMS P30 AR072582 (*PI: Paul Nietert, Bethany Wolf*)
Projects:

- *Exploring correlations between nailfold capillary parameters and myositis specific antibodies in newly diagnosed juvenile dermatomyositis patients* (retrospective cross-sectional cohort)
  - worked with clinicians to develop research questions, performed correlative analysis and prepared statistical reports.
  - manuscript in preparation.

Grant review:

- *a*ssisted in CCCR's internal grant review process by providing feedback on statistical portions of grants (2021).

Software used: R, R Markdown, SAS

Graduate Research Assistant, Predictive biomarkers for disease activity 2020-2021
and organ damage in patients with lupus
NIH/NIAMS R01 AR071947 (*PI: Betty Tsao*)
Projects:

- building prediction models of treatment response in Lupus Nephritis (LN) patients.
  - manuscript is now under review in *Kidney International*.
- predicting renal flare in LN patients using select urine and serum biomarkers.
  - developing research questions alongside clinicians and translational researchers, implementing generalized estimating equation (GEE) models for correlated data and preparing statistical reports.
- establishing genetic predisposition profiles of LN patients to identify those at risk for renal damage.
  - implementing QC and preprocessing of genotype data using PLINK.
  - calculating genetic risk scores (GRS) to establish genetic risk in LN patients.

Software used: R, R markdown, PLINK, IMPUTE

Graduate Student Researcher, DPHS, MUSC
Additional Projects:

- *Vitamin D supplementation in healthy women during pregnancy (clinical trial, Kellogg Foundation grant, PI: Dr. Carol Wagner)*
  - collaboration effort sponsored by MUSC's Clinical and Translational Award (SCTR).
  - performed statistical analysis to evaluate the effects of vitamin D supplementation on circulating concentrations of growth factors and immune mediators in healthy pregnant women.
  - published the first-authored paper in *Pediatric Research*.

- paper selected for highlight in the Editor's Focus for the February 2021 print issue of *Pediatric Research*.

- *Nurture study (longitudinal cohort, PI: Dr. Sara Benjamin-Neelon)*
  - The Nurture study is a longitudinal cohort designed to investigate different factors associated with infant adiposity and weight trajectories.
  - worked with epidemiologists to develop research hypothesis and performed mediation analysis to examine the association between household chaos and screen time during infancy and infant weight status at 12 months.
  - published the first-authored paper in *Pediatric Obesity* (October 2018).

Software used: R, R Markdown, SAS

Research Funding

Predictive biomarkers for disease activity and organ damage in patients with Lupus. 2020-2021
Role: Graduate research assistant.
NIH/NIAMS R01 AR071947.
PI: Betty Tsao.

Improving minority health in rheumatic diseases. 2020-2021
Role: Graduate research assistant.
NIH/NIAMS P30 AR072582.
Methodologic Core PI: Paul Nietert, Bethany Wolf.

Statistical models for genetic studies using network and integrative analysis. 2017-2020
Role: Graduate research assistant.
NIH/NIGMS R01 GM122078.
PI: Dongjun Chung.

Teaching Experience

Teaching Assistant, Department of Public Health Sciences, MUSC Fall 2020

- *Class*: BMTRY 702 – Advanced ANOVA and Regression (graduate course)
- *Topics covered*: advanced ANOVA and regression topics such as block designs, repeated measures design, mixed effects models, analysis of missing data and model diagnostics.
- *Student group:* MS/PhD biostatistics students.
- *Responsibilities*: graded homework, provided course-related support (lecture and SAS programming), conducted tutorials.

Teaching Assistant, Department of Public Health Sciences, MUSC Summer 2019

- *Class: BMTRY 722 – Analysis of Survival Data (graduate course)*

- *Topics covered:* introductory course in theory and application of analytic methods for time-to-event data, including nonparametric, parametric, and semi-parametric (Cox model) approaches, different types of censoring, sample size and power estimation.
- *Student group*: MS/PhD biostatistics/epidemiology students.
- *Responsibilities*: guest lectured on hypothesis testing and confidence interval calculation for survival outcomes; graded homework; provided homework and R programming support.

Teaching Assistant, Department of Public Health Sciences, MUSC Fall 2018

- *Class: BMTRY 701 – Biostatistical Methods II (graduate course)*
- *Topics covered:* simple and multiple linear regression, logistic regression, hypothesis testing, diagnostics, model building and variable selection.
- *Student group*: clinical, basic science, MPH, MS/PhD biostatistics/epidemiology students.
- *Responsibilities*: provided statistical programming lectures (lab class for SAS and R) to support implementation of statistical methodologies discussed in the course; created and graded lab homework; graded class project.

Teaching Associate, Department of Mathematics and Statistics, ETSU 2015-2016

- *Class*: MATH 1530 – Probability and Statistics (undergraduate course)
- *Topics covered*: probability rules, experimental data collection and analysis, sampling and survey techniques, statistical inference, hypothesis testing.
- *Student group*: freshmen/sophomore undergraduate students with limited prior math/statistics training.
- *Responsibilities*: lectured, created and graded homework, conducted quizzes and exams, graded final student project, designed and implemented learning techniques helpful for students with special academic needs.

Resident Adviser, Upward Bound, ETSU 2015-2016

- *Class*: College Math Prep
- *Responsibilities*: prepared high school students for college-level math courses.

Math and Statistics Tutor, Center for Academic Achievement, ETSU 2014-2016

- *Responsibilities*: assisted undergraduate students through individual tutoring sessions in undergraduate-level math/statistics course work; helped students devise learning strategies to promote independent learning and avenues to succeed academically.

Math and Statistics Tutor, Math Department, MSUM 2010-2012

- *Responsibilities*: tutored students in undergraduate-level math and statistics courses.

Presentations

Khatiwada A, Wolf BJ, Chung D, GPA-Tree: a statistical approach to prioritizing GWAS results and identifying combinations of functional annotations. DPHS, MUSC (April 2020, Charleston, SC). Brown-Bag Seminar.

Khatiwada A, Wolf BJ, Mulligan J, Wagner C. Evaluation of the association between serum 25-hydroxy-vitamin D (25(OD)D) and inflammatory cytokines in pregnant women. Perry V. Halushka Student Research Day at MUSC (November 2018, Charleston, SC). Poster Presentation.

Khatiwada A, Wolf BJ, Mulligan J, Wagner C, Evaluation of the association between serum 25-hydroxy-vitamin D (25(OD)D) and inflammatory cytokines in pregnant women. Pediatric Academic Society (April 2019, Baltimore, MD). Poster Presentation.

Computing Skills

Proficient in R, R Markdown, R Shiny, SAS, LaTeX
Experienced with Rcpp, Python, SQL
Proficient in working on Unix/Linux, Mac OS, and Windows platforms, and computing clusters.

Honors/Awards

Graduate Assistantship, Mathematics and Statistics Department, ETSU	2014-2016
Outstanding Math Senior, Mathematics Department, MSUM	2012
Upper Class Scholarship, MSUM	2009-2012
Dean's List, MSUM	2008-2012

Professional Memberships

American Statistical Association	2017-2018, 2021

University Service

Student Advisory Committee, Department of Public Health Sciences, MUSC	2020-2021
Committee member, Asian Student Association, MUSC	2017-2021
Committee member, International Student Association, MUSC	2016-2021
Volunteer, MUSC Urban Farm	2017-2021
Vice-President, International Student Association, MUSC	2017-2018
Committee member, Student Government Association, MUSC	2017-2018
Committee member, Math and Stats Club, ETSU	2014-2016

Committee member, Mathematics and Statistics Club, MSUM	2010-2014
Committee member, Abstract Algebra Club, MSUM	2011-2012
Committee member, Nepali Student Association, MSUM	2008-2012

Date of last update: September 28, 2021