

Aastha Khatiwada

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Education

Doctor of Philosophy, Biostatistics Medical University of South Carolina (MUSC) <i>Co-mentors:</i> Bethany J. Wolf, PhD and Dongjun Chung, PhD <i>Dissertation title:</i> Statistical approach to prioritizing GWAS results and identifying combinations of functional annotations.	2016-2021
Master of Science, Mathematics (Statistics Concentration) East Tennessee State University (ETSU) <i>Mentor:</i> Edith Seier, PhD <i>Thesis title:</i> Multilevel models for longitudinal data.	2014-2016
Bachelor of Science, Mathematics (Actuarial Science Emphasis) Bachelor of Arts, Economics Minnesota State University Moorhead (MSUM)	2008-2012

Academic Position

<i>Primary appointment:</i> Assistant Professor, Division of Biostatistics and Bioinformatics, National Jewish Health	Sept 2021 – Present
<i>Secondary appointment:</i> Assistant Professor, Department of Biostatistics and Informatics, Colorado School of Public Health, University of Colorado Anschutz Medical Campus	Sept 2022 – Present

Research Funding

<i>Title:</i> Genetic Epidemiology of COPD – Data Coordinating Center. <i>Role:</i> Biostatistician. <i>Sponsor:</i> NIH/NHLBI UHL089897D-12. <i>PI:</i> James Crapo, MD.	2021-Present
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Title: Impact of TC CFTR Therapy on Sinus Disease in CF: Quantitative CT and PROs. 2021 - Present

Role: Co-Investigator.

Sponsor: Cystic Fibrosis Foundation.

PI: Jennifer Taylor-Cousar, PhD

Title: Application software development for COPD prediction modeling of mortality risk and longitudinal health outcomes 2022-Present

Role: Co-Investigator.

Sponsor: Advanced Industries Grant, Colorado Office of Economic Development & International Trade.

PI: Matthew Strand, PhD.

Title: Predictive Biomarkers for Disease Activity and Organ Damage in Patients with Lupus. 2021 - Present

Role: Co-Investigator.

Sponsor: NIH/NIAMS R01AR071947

PI: Betty Tsao, PhD

Peer-reviewed Publications

Gross LM, Nelson HS, **Khatiwada A**, Hoyte FC. Curcumin does not significantly affect immediate skin tests. *Allergy & Asthma Proceedings*. Volume 43, Number 6, 1 November 2022, pp. 543-545(3).

Strand M, **Khatiwada A**, Baraghoshi D, et al. Predicting COPD Progression in Current and Former Smokers Using a Joint Model for Forced Expiratory Volume in 1 Second and Forced Expiratory Volume in 1 Second to Forced Vital Capacity Ratio. *Chronic Obstr Pulm Dis*. 2022; 9(3): 439-453.

Richard MLL, Wirth JR, **Khatiwada A**, Chung D, Gilkeson GS, Cunningham MA. Conditional knockout of ER α in CD11c+ cells impacts female survival and inflammatory cytokine profile in murine lupus. *Immunology*. 2022; 0019-2805.

Burton JH, **Khatiwada A**, Chung D, Meissner EG. Association of Referral Source and Substance Use with Hepatitis C Virus Outcomes at a Southern Academic Medical Center. *Southern Medical Journal*. 2022 Jun;115(6):352-357. PMID: 35649518.

Beswick DM, Humphries SM, Miller JE, Balkissoon CD, **Khatiwada A**, Vladar EK, Ramakrishnan VR, Lynch DA, Taylor-Cousar JL Objective and patient-based measures of chronic rhinosinusitis in people with cystic fibrosis treated with highly effective modulator therapy. *International Forum of Allergy & Rhinology*. 2022 May 20. PMID: 35595546.

Song NJ, Allen C, Vilgelm AE, Riesenber g 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. *Journal of Hematology & Oncology*. 15, 5 (2022).

Khatiwada A, Wolf BJ, Yilmaz AS, Ramos PS, Pietrzak M, Lawson A, Hunt KJ, Kim HJ, Chung D. GPA-Tree: Statistical Approach for Functional-Annotation-Tree-Guided Prioritization of GWAS Results. *Bioinformatics* Volume 38, Issue 4, 15 February 2022, Pages 1067–1074. PMID: 34849578.

Beswick DM, Humphries SM, Balkissoon CD, Strand M, Miller J, **Khatiwada A**, Vladar EK, Lynch DA, Taylor-Cousar JL. Olfactory dysfunction in people with cystic fibrosis with at least one copy of F508del. *Int Forum Allergy Rhinol*. 2021 Dec 15. doi: 10.1002/alr.22946. Epub ahead of print. PMID: 34908251.

Ayoub I, Wolf BJ, Geng L, Song H, **Khatiwada A**, Tsao BP, Oates JC, Rovin BH. Prediction Models of Treatment Response in Lupus Nephritis. *Kidney Int*. 2021 Dec 3:S0085-2538(21)01079-6. Epub ahead of print. PMID: 34871620.

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 2300 times.

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.

multiGPATree (<http://github.com/asthakhatiwada/multiGPATree>)

- R package to implement the multi-GPA-Tree method for genetic data analysis.

trackCOPDPro (<https://aasthakhatiwada.shinyapps.io/software/>)

- R Shiny app to interactively implement linear mixed models to jointly model changes in FEV1 and FEV1/FVC, using important baseline predictors to better understand the factors that affect progression.

Research Experience

Graduate Research Assistant, Chung Lab, Department of Public Health

2017-2021

Sciences, MUSC (*Chung Lab is now in the Department of Biomedical*

Informatics, The Ohio State University from January 2020)

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 ER α 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 J. 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:

- assisted 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: 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: 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

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. CO/WY ASA Chapter Meeting. Fall 2022.

Khatiwada A, Wolf BJ, Chung D, GPA-Tree: a statistical approach to prioritizing GWAS results and identifying combinations of functional annotations. Invited talk, Bioinformatics Seminar Series, Colorado School of Public Health, Anschutz Medical Campus. September 2022.

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

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. Poster Presentation, Perry V. Halushka Student Research Day at MUSC. November 2018. Charleston, SC.

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. Poster Presentation, Pediatric Academic Society. April 2019, Baltimore, MD.

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 (ASA)	2017 - Present
Western North American Region of The International Biometric Society (WNAR)	2022 - Present

University Service

Admissions Committee, Colorado School of Public Health, Anschutz Medical Campus	2023
MS Preliminary Exam Committee, Colorado School of Public Health, Anschutz Medical Campus	2022
Student Advisory Committee, Department of Public Health Sciences, MUSC	2020-2021
Vice-President, International Student Association, MUSC	2017-2018

Date of last update: March 6, 2023