

Yuanyuan Luan

ASSISTANT PROFESSOR
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Research Interests

Functional data analysis; measurement error and bias correction; mixed-effects and hierarchical models; device-measured physical activity and self-reported dietary intake; longitudinal data analysis; statistical computing and software development in R.

Teaching Interests

Introductory Biostatistics; Linear and Generalized Linear Models; Categorical Data Analysis; Survival Analysis; Longitudinal Data Analysis.

I also plan to develop new courses on *Measurement Error and Uncertainty in Biomedical Research*; *Functional Data Analysis*; and *Statistical Methods for Artificial Intelligence (AI)/Machine Learning (ML) in Health Applications*.

Research Summary

I am a biostatistician focused on functional data analysis and measurement error, especially for device-measured physical activity, continuous glucose monitoring, and self-reported nutrition data. I develop generalized functional regression methods with complex error structures and implement them in open-source R packages. I work closely with epidemiologists, nutrition scientists, and clinicians on obesity, diabetes, and cardiometabolic health research and contribute to grants, applied analyses, and methods papers in biostatistics and epidemiology.

Education

Indiana University, School of Public Health

Bloomington, IN

PH.D., EPIDEMIOLOGY (BIostatISTICS FOCUS)

- Advisor: Dr. Carmen D. Tekwe
- Dissertation: *Generalized functional linear regression models with function-valued and scalar-valued covariates measured with error*

Texas A&M University, School of Public Health

College Station, TX

M.P.H., BIostatISTICS

- Advisor: Dr. Carmen D. Tekwe

University of Minnesota, Department of Statistics

Minneapolis, MN

B.A., STATISTICS

Academic Positions and Research Experience

Assistant Professor in Biostatistics

WASHINGTON UNIVERSITY IN SAINT LOUIS BURSKY SCHOOL OF PUBLIC HEALTH
Saint Louis, MO

July 2026 - Present

- Established an independent research program in generalized functional regression with measurement error, with applications to device-measured physical activity and self-reported nutrition data.
- Developed R packages that implement measurement error-corrected scalar-on-function regression for broad use by applied researchers.
- Contributed to grant proposals as a methodological lead, including analytic plans for device-derived and high-dimensional data.
- Built and sustained collaborations with interdisciplinary teams of statisticians, epidemiologists, nutrition scientists, and clinicians.

Postdoctoral Fellow in Biostatistics

INDIANA UNIVERSITY, SCHOOL OF PUBLIC HEALTH
Bloomington, IN

Advisor: Dr. Carmen D. Tekwe

September 2024 - June 2026

- Led a growing research program on generalized functional regression with measurement error, focusing on methods for device-measured physical activity and self-reported nutrition data.
- Developed R packages that implement measurement error-corrected scalar-on-function regression for broad use by applied researchers.
- Contributed to grant proposals, including methodological sections and analytic plans for device-derived and high-dimensional data.
- Collaborated closely with an interdisciplinary team, including statisticians, epidemiologists, nutrition scientists, and clinicians.

Research Collaborator, Singapore Sports Institute Project

INDIANA UNIVERSITY, SCHOOL OF PUBLIC HEALTH
Bloomington, IN

September 2020 - August 2022

- Built prediction equations for body fat percentage in Asian athletes using regression models and internal validation.

Graduate Research Assistant

INDIANA UNIVERSITY, SCHOOL OF PUBLIC HEALTH
Bloomington, IN

Advisor: Dr. Carmen D. Tekwe

September 2019 - August 2024

- Developed new generalized functional regression methods that handle both scalar and functional covariates measured with complex error structures.
- Assisted with simulations, data analyses, and manuscripts.
- Assisted with grant proposals.
- Collaborated with other members of Dr. Tekwe's research team.

Graduate Research Assistant

TEXAS A&M UNIVERSITY - HEALTH AND KINESIOLOGY DEPARTMENT
College Station, TX

Advisor: Dr. Lei-Shih (Lace) Chen

May 2017 - May 2018

- Collected data for the Chinese/Taiwanese American Colorectal Cancer Prevention study.
- Built a database on colorectal cancer prevention and health behaviors.

Graduate Research Assistant

TEXAS A&M UNIVERSITY - SCHOOL OF PUBLIC HEALTH
College Station, TX

Advisor: Dr. Carmen D. Tekwe

January 2017- May 2018

- Built nonlinear quantile mixed-effects models to relate school-day energy expenditure curves to age- and sex-adjusted BMI in elementary school children.
- Analyzed calorimetry and wearable device energy expenditure data.
- Applied functional and quantile mixed-effects models.

Funding and Proposals _____

CURRENT FUNDING

- **NIH AIM-AHEAD Training Fellowship** (2025) AIM-AHEAD Bridge2AI AI-READI Training Program (Cohort 2; Award 10T20D032581, December 2025–July 2026)

PENDING AND SUBMITTED GRANTS

- **NIH F31 Fellowship** (2024)
Function-on-function regression with measurement error with an application to sleep, physical activity, and dietary intake in type 2 diabetes research
Role: Principal Investigator. Fellowship not awarded.
- **NIH/NIDDK R01** (Submitted 2025)
Bias-adjustment methods for complex multilevel device-based biobehavioral measures and self-reported dietary intake data in obesity and type 2 diabetes studies
PI: Carmen D. Tekwe. Total costs: \$3,385,813.
Role: Postdoctoral Fellow.
- **NIH R01** (Submitted 2025)
Accurate and improved statistical and machine learning algorithms for predicting circadian rhythms
PI: Carmen D. Tekwe. Requested period: December 2025–November 2030. Total costs: \$9,005,717.
Role: Postdoctoral Fellow.

Publications

PEER-REVIEWED ARTICLES

- Mai, A., **Luan, Y.**, Loy, S.L., Qin, C., Ji, H., Obeng, A., Oladuti, M., Ejima, K., Mok, K.T., Kaur, S., Huo, C., Yang, J., Ou, Y., Khandpekar, O., Yu, X., Duah, A., Bidulescu, A., Abdalla, M., Zoh, R.S.*, & Tekwe, C.D.*. Reducing bias and enhancing equity in AI-enabled precision nutrition: addressing measurement error across wearables, 'omics, and dietary data. Submitted. *Front. Digit. Health* 8:1805704. doi: 10.3389/fdgh.2026.1805704
- Luan, Y.**, Zoh, R.S., Xue, L., & Tekwe, C.D. (2025). Generalized functional linear regression models with functional and scalar covariates prone to measurement error. *Statistics in Medicine*.
- Huo, C., **Luan, Y.**, Zoh, R.S., Gletsu-Miller, N., Carter, S.J., Frey, G., Lin, H.C., Bidulescu, A., Loy, S.L., Abdalla, M., & Tekwe, C.D. (2025). Comparison of two measurement error-correction approaches for assessing the association between choline intake and coronary heart disease prevalence among US community-dwelling adults. *Annals of Epidemiology*, 109, 65-72. <https://doi.org/10.1016/j.annepidem.2025.07.011>.
- Huang, L., Teo, C.J.H., **Luan, Y.**, Mok, K.T., Ejima, K., Kaur, S., & Loy, S.L. (2024). Predicting body fat percentage from anthropometric measurements in Asian athletes. *Journal of Science in Sport and Exercise*, 6, 368–377. <https://doi.org/10.1007/s42978-023-00231-2>.
- Zoh, R.S., **Luan, Y.**, Xue, L., Allison, D.B., & Tekwe, C.D. (2024). A Bayesian semi-parametric scalar-on-function regression with measurement error using instrumental variables. *Statistics in Medicine*, 43(21), 4043-4054. <https://doi.org/10.1002/sim.10165>.
- Chen, X., Ji, H., **Luan, Y.**, Zoh, R.S., Xue, L., Jadhav, S., & Tekwe, C.D. (2024). Adjusting for bias due to measurement error in functional quantile regression models with error-prone functional and scalar covariates. *Biostatistics Epidemiology*, 8(1), e2405439. <https://doi.org/10.1080/24709360.2024.2405439>.
- Tekwe, C.D., **Luan, Y.**, Meininger, C.J., Bazer, F.W., & Wu, G. (2023). Dietary supplementation with L-leucine reduces nitric oxide synthesis by endothelial cells of rats. *Experimental Biology and Medicine*, 248(18), 1537-1549. <https://doi.org/10.1177/15353702231199078>.
- Kim, H., **Luan, Y.**, Zoh, R.S., Wu, G., & Tekwe, C.D. (2023). Parametric and semiparametric approaches to analyzing device-based measures of energy expenditure in Zucker Diabetic Fatty rats. *Frontiers in Bioscience (Landmark Edition)*, 28(2), 30. <https://doi.org/10.31083/j.fbl2802030>.
- Jadhav, S., Tekwe, C.D., & **Luan, Y.** (2022). A function-based approach to model the measurement error in wearable devices. *Statistics in Medicine*, 41(24), 4886-4902. <https://doi.org/10.1002/sim.9542>.

Tekwe, C.D., Zhang, M., Carroll, R.J., **Luan, Y.**, Xue, L., Zoh, R.S., Carter, S.J., Allison, D.B., & Geraci, M. (2022). Estimation of sparse functional quantile regression with measurement error: a SIMEX approach. *Biostatistics*, 23(4), 1218–1241. <https://doi.org/10.1093/biostatistics/kxac017>.

Tekwe, C.D., Yao, K., Lei, J., Li, X., Gupta, A., **Luan, Y.**, Meininger, C.J., Bazer, F.W., & Wu, G. (2019). Oral administration of α -ketoglutarate enhances nitric oxide synthesis by endothelial cells and whole-body insulin sensitivity in diet-induced obese rats. *Experimental Biology and Medicine*, 244(13), 1081–1088. <https://doi.org/10.1177/1535370219865611>.

MANUSCRIPTS UNDER REVISION

Luan, Y., Zoh, R.S., Cui, E., Yu, X., Ji, H., Jadhav, S., & Tekwe, C.D. (2025). Scalable regression calibration approaches to correcting measurement error in multi-level generalized functional linear regression models with heteroscedastic measurement errors. *Biostatistics and Epidemiology*.

SUBMITTED AND ARCHIVED MANUSCRIPTS

Soukhavong, S., **Luan, Y.**, Mai, A., Xayavong, H., Phanthavong, T., Siengsounthone, L., Zoh, R.S., Loy, S.L., Kaur, S., Kamphouxay, K., Oula, R., Matthey-Mora, P.P., Shively, G.E., & Tekwe, C.D. (2026). Nutrition and health behaviors among urban and peri-urban adolescents: Cross-sectional evidence from public secondary schools in Lao PDR. Submitted to *BMJ Public Health*.

Luan, Y., Zoh, R.S., Xue, L., & Tekwe, C.D. (2025). Corrected score approach to estimating the generalized functional linear regression models with mixed measurement errors. Submitted.

Ji, H., Beyaztas, U., Escobar-Velasquez, N., **Luan, Y.**, Chen, X., Zhang, M., Lee, E.K., Carroll, R.J., Davis, C.C., & Tekwe, C.D. (2025). MECfda: An R package for bias correction due to measurement error in functional and scalar covariates in scalar-on-function regression models. *arXiv preprint arXiv:2510.21661*.

MANUSCRIPTS UNDER PREPARATION

Luan, Y., Qing, C., Mai, A., Tekwe, C.D., Xue, L., & Zoh, R.S. A review of measurement error and bias correction methods in functional data analysis.

Luan, Y., Tekwe, C.D., Ou, Y., & Zoh, R.S. Heterogeneous measurement error in heterogeneous functional linear Cox regression models.

Luan, Y., Zoh, R.S., & Tekwe, C.D. Measurement error and health disparities in physical activity and dietary assessments.

R PACKAGES

MECfda

MECfda is an R package for scalar-on-function regression with measurement error correction. It solves scalar-on-function linear models, including generalized linear mixed effect models and quantile linear regression models, and provides bias correction estimation methods for measurement error.

Oral and Poster Presentations

Luan Y. 2026. Generalized functional linear regression model with heterogeneous subgroup measurement error(Poster). Eastern North American Region of the International Biometric Society, Indianapolis, IN.

Luan Y. 2025. Diffusion models for survival analysis (Oral). Women in Statistics and Data Science (WSDS), Virtual.

Luan Y. 2025. Corrected score approach to estimating the generalized functional linear regression models with mixed measurement errors (Oral). Joint Statistical Meetings, Nashville, TN.

Luan Y. 2025. Corrected estimation framework for functional regression with mixed errors (Oral). Western North American Region of the International Biometric Society, Whistler, British Columbia, Canada.

Luan Y. 2024. Scalable approaches to adjusting for biases due to measurement error in multi-level generalized functional linear regression models with heteroscedastic measurement errors (Oral). Joint Statistical Meetings, Portland, OR.

Luan Y. 2023. Generalized functional linear regression model with a mixture of heterogeneous measurement error in covariates (Oral). Western North American Region of the International Biometric Society, Student Paper Competition, Anchorage, AK.

Luan Y. 2022. Generalized functional linear regression model with functional and scalar covariates measured with measurement error (Oral). Joint Statistical Meetings, Washington, DC.

Luan Y. 2022. Generalized functional linear regression model with functional and scalar covariates measured with measurement error (Oral). American Public Health Association, Boston, MA.

Luan Y. 2022. Statistical methods for measurement error correction methods to evaluate the roles of device-based physical activity and self-reported total caloric intake on the risks of type 2 diabetes among U.S. adults (Poster). SPH Research Day Competition, Indiana University, Bloomington, IN.

Luan Y. 2020. An empirical approach to the comparison of the SIMEX and generalized methods of moments approaches to estimating the functional linear regression model with classical measurement error (Oral). Indiana University Bloomington Three Minute Thesis Competition, Indiana University, Bloomington, IN.

Luan Y. 2018. A linear quantile mixed model assessing the relationship between daily energy expenditure and sex-adjusted BMI among elementary school students (Poster). Student Research Week, Texas A&M University, College Station, TX.

Luan Y. 2018. Effect of ionizing radiation on survival time among female nuclear workers at 10 different nuclear weapon facilities (Poster). SPH Annual Student Poster Contest, Texas A&M University, College Station, TX.

Teaching and Professional Service

Fall 2022	LONGITUDINAL DATA ANALYSIS , Teaching Assistant, Indiana University Bloomington	
Fall 2023	LONGITUDINAL DATA ANALYSIS , Co-instructor, Indiana University Bloomington	
Fall 2024	LONGITUDINAL DATA ANALYSIS , Co-instructor, Indiana University Bloomington	
Fall 2025	LONGITUDINAL DATA ANALYSIS , Guest lecturer, Indiana University Bloomington	
August 2024	Statistical Computing in the Biological Sciences and Public Health , Joint Statistical Meetings	Session Chair, Portland, OR
March, 2026	Statistical Methods for Biopharmaceutical Research and Biomarker Evaluation , Eastern North American Region of the International Biometric Society,	Session Chair, Indianapolis, IN
2024–Present	Journal Reviewer for , <i>Statistics in Medicine</i> , <i>The Indian Journal of Statistics</i>	

Professional Development

CONTINUING EDUCATION COURSES AND WORKSHOPS

Advanced Statistics Summer Workshop (Summer, 2025), Indiana University, Bloomington, IN), Introduction to advanced statistical topics commonly encountered in medical research, including advanced study design, advanced statistical models, and high-dimensional data analysis.

Nonparametric and Semiparametric Statistics (Spring, 2023. Statistical Horizons), Introduction to nonparametric and semiparametric regression for cross-sectional and longitudinal (panel) data models.

Introduction to Bayesian Methods for Clinical Trials (Spring, 2022. Eastern North American Region of the International Biometric Society (ENAR), Houston, TX), Introduction to Bayesian methods and their application in clinical trials.

Introduction to High-Performance Computing (Spring, 2022. Indiana University, Bloomington, IN), Introduction to high-performance computing and the resources and technologies available at Indiana University to empower research.

Reproducible Workflow in R: Ready To Share (Spring, 2022. ENAR, Houston, TX), Introduction to reproducible workflows in academic research using R.

Incorporating Functional Data into Statistical Models (Spring, 2022. ENAR, Houston, TX), Introduction to functional data analysis methods, including visualization, dimension reduction, and regression models of functional data.

Spatial Disease Modeling & Visualization Using INLA & R (Spring, 2022. ENAR, Houston, TX), Introduction to visualization of spatial modeling using R.

Strengthening Causal Inference in Behavioral Obesity Research (Fall, 2021), Indiana University, Bloomington, IN), Introduction to the underlying and fundamental principles of causal inference in obesity research and tailored approaches to specific and varying situations in obesity research.

PROFESSIONAL MEMBERSHIPS

Eastern North American Region of the International Biometric Society
American Statistical Association