



**Marburg  
University**

## RESEARCH SEMINAR

### *Distributional Regression for Lung Function of Cystic Fibrosis Patients with a Special Focus on Spatial and Random Effects*

Thursday, September 25<sup>th</sup> 2025, 11:30 am

**Marisa Lange, M. Sc.**  
University of Göttingen

#### **Abstract:**

Cystic fibrosis is a genetic disease affecting about 90,000 people worldwide, in which thick mucus leads to chronic organ damage, most prominently in the lungs. We present a modelling approach for lung function in affected patients using data from the German Cystic Fibrosis Registry. Applying Gaussian distributional regression via the gamboostLSS framework, we incorporate spatial effects through city-level triangulation with Voronoi polygons and Markov random fields. In addition, we compare this approach to alternative strategies, including nested random effects and continuous spatial modelling via Gaussian random fields, and discuss their relative advantages and limitations in the context of the data. The models reveal both meaningful covariate effects, such as the impact of modern modulator therapies, and regional disparities.

**Institute for Medical Biometry and Statistics (IMBS)**

Philipps University Marburg  
Hans-Meerwein-Straße 6  
35043 Marburg



[imbs@uni-marburg.de](mailto:imbs@uni-marburg.de)



[IMBS seminar room](#)

Room 04B11

