



McGill

Department of
Epidemiology, Biostatistics
and Occupational Health

JOINT BIOSTATISTICS/EPIDEMIOLOGY SEMINAR

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Rollins School of Public Health
Emory University

Adjusting for Processing and Measurement Error in Regression with Exposure Levels Assessed on Pooled Biospecimens

Tuesday, 10 October 2017

3:30 pm – 4:30 pm – McIntyre Medical Building – Room 521 (5th Floor)

ALL ARE WELCOME

Abstract:

When laboratory assay costs are high, potential benefits associated with the pooling of biological specimens motivate statistical considerations to facilitate regression analysis involving group-level exposure measurements. However, the pooling of samples can introduce errors in measurement due to processing, possibly in addition to errors that may be present when the assay is applied to individual samples. We look into methods that might be applied to address this type of measurement error problem in common regression settings. As suggested by prior research addressing overall mean and variance estimation, hybrid designs consisting of individual as well as pooled samples facilitate the estimation of processing (or pooling) error, while further variation in pool sizes may be called for to identify a potential underlying measurement error variance. For continuous outcomes, one can consider maximum likelihood (ML) or approaches based on regression calibration in conjunction with ordinary or weighted least squares under hybrid designs. For binary outcomes, we assess the potential applicability of discriminant function analysis as an alternative to ML or approximate ML based on logistic regression. We summarize some simulation results based on these methods, and consider an example involving individual and pooled laboratory assays to assess cytokine levels in a substudy of the Collaborative Perinatal Project.

Bio:

Robert Lyles is a Professor in the Department of Biostatistics and Bioinformatics at the Rollins School of Public Health of Emory University, in Atlanta, GA. His interests are in statistical methods primarily motivated by epidemiologic studies. He is currently Director of a Biostatistical Core for the Emory Center for AIDS Research, and part of an Analysis Working Group for a study seeking to better understand causes of childhood mortality in developing countries.

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