



McGill

Department of
Epidemiology, Biostatistics
and Occupational Health

Biostatistics Seminars

Winter 2020



Geneviève Lefebvre, PhD

Associate Professor,
Department of Mathematics,
University of Quebec, Montreal (UQAM)

Comparing Logistic and Log-Binomial Models for Causal Mediation Analyses of Binary Mediators and Rare Binary Outcomes: Moving Towards Exact Regression-Based Approaches

Wednesday, February 26, 2020

3:30 pm – 4:30 pm – Purvis Hall, 1020 Pine Ave. West, Room 24

All are Welcome

Abstract: In the binary outcome framework to causal mediation, standard expressions for the natural direct and indirect effect odds ratios (ORs) are established from a logistic model by invoking several approximations that hold under the rare-disease assumption. Such ORs are expected to be close to corresponding effects on the risk ratio (RR) scale based on a log-binomial model, but the robustness of interpretation to this assumption merits investigation. The objective is to report on mediation results from logistic and log-binomial models when the marginal probability of the outcome is $<10\%$. Standard (approximate) ORs and RRs were estimated using data on pregnant asthmatic women from Québec. Prematurity and low-birthweight were the mediator and outcome variables, respectively, and two binary exposure variables were considered: treatment to inhaled corticosteroids and placental abruption. Exact ORs were also derived and estimated using a contributed SAS macro. Simulations which mimicked our data were subsequently performed to replicate findings. Many approximate ORs and RRs estimated from our data did not closely agree. Approximate ORs were systematically observed farther from RRs in comparison with exact ORs. Exact OR estimates were very close to RR estimates for exposure to inhaled corticosteroids, but less so for placental abruption. Approximate OR estimators also exhibited important bias and undercoverage in simulated scenarios which featured a strong mediator-outcome relationship. These results pave the way for exact estimators that do not rely on the rare-disease assumption. *Joint work with Mariia Samoilenko (UQAM)*

Bio: Dr. Lefebvre is an Associate Professor in the Department of Mathematics at the University of Quebec at Montreal (UQAM) who has interest in biostatistics, statistical computing, and Bayesian statistics. Her recent contributions revolve around the application, evaluation and development of causal inference methods in health sciences. She is also engaged in collaborative works dealing with respiratory diseases, childhood cancers, and maternal/perinatal outcomes. <https://genevielefebvre.uqam.ca/>