

Low Birthweight and Water Disinfection Byproducts: A Multiple-Bias Modelling Approach

Nuoo-Ting (Jassy) Molitor, Nicky Best, Sylvia Richardson
Imperial College London, UK

Data in the social, behavioural and health fields tend to come from observational studies instead of well-designed experiments. Hence, in addition to random errors, observational data are filled with different sources of uncertainty such as missing values, unmeasured confounders, and selection biases. Also, due to the complicated nature of the research question, a single data set may not provide all the necessary information. As a result, multiple data sources are increasingly being used to inform about different aspects of the problem. However, standard analyses of each data source may fail to capture uncertainty other than simple random errors and thus may produce misleading results. It is also necessary to link together the different sub-models for each source in a comprehensive way. Our Bayesian graphical model provides a coherent way to connect a series of local sub-models based on different datasets into a global unified analysis. Hence, our model will account for multiple biases simultaneously and provides for more accurate parameter estimations. We illustrate our model by analyzing data obtained from a case study of the water disinfection byproducts and adverse birth outcomes in the U.K.

[Nuoo-Ting (Jassy) Molitor, 27 Sawyers Lawn London W130JP, UK; jassy.molitor@imperial.ac.uk]