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A Robust Risk Score for Evaluating Evidence in Global Health

How strong is the relationship between (red meat, alcohol) and heart disease? (Sugar sweetened beverages, BMI) and diabetes? (Smoking, air pollution) and lung cancer? Each of these risk-outcome pairs has been the subject of numerous large studies. With results in hand, can we rate the evidence, and compare these risks to guide policy, and initiate further studies?

We present a new methodology to answer these questions. The methodology comprises modeling between-study disagreement, capturing nonlinear dose-response relationships, detecting outliers, and accounting for nonlinear observation mechanisms inherent in how studies report results. It is now used to analyze more than 470 risk-outcome pairs in the Global Burden of Disease study, conducted by IHME and collaborators. We present the main model, highlight the role of optimization, and include recent results for select risk-outcome pairs of interest.