ECHO
Environmental influences on Child Health Outcomes
A program supported by the NIH

Study Summary

Can multiple studies combine their results when their confounder adjustment sets are different?*

Author(s): Ghassan B. Hamra, Bryan Lau, Catherine Lesko, Jessie Buckley, Daniel Tancredi, Irva Hertz-Picciotto, Elizabeth Jensen

*Confounders are factors in a study that can lead to bias. These factors must be adjusted so researchers can accurately understand the information.

Who sponsored this study?

This research was supported by the Environmental influences on Child Health Outcomes (ECHO) program, Office of The Director, National Institutes of Health.

Why was this study needed?

A type of graph, called Directed Acyclic Graphs (DAG), guide decisions on choosing confounders that need to be adjusted. These graphs also suggest how to get unconfounded (unbiased) effect estimates. These estimates are based on different statistical models and do not always provide the same actual numeric values. The research team explored when they do and do not correspond.

Who was involved?

Researchers from the John Hopkins University Data Analysis Center (JHU DAC), Wake Forest University, and University of California Davis joined together to explore this problem.

What happened during the study?

All study data are simulated, and Dr. Hamra at the JHU DAC built all of the models. Dr. Hamra also looked at all of the information.

What were the study results?

Most of the time, the estimators showed similar numeric values of the estimates. The exception is when using a model known as logistic regression, which did not give similar estimates. Logistic regression provides an odds ratio, which is a non-collapsible quantity, or one that cannot be reliably combined.

Impact

This study can help researchers understand and combine information across ECHO groups. When the same confounders are not available, or when study designs are different, researchers should avoid logistic regression. Other estimators provide estimates that can be reliably combined.

What happens next?

Researchers can make more models to explore other forms of bias that could make combining information across studies difficult.

Where can I learn more?

Researchers can get the modeling code to look into this issue if they choose to in the journal article, titled "Combining Effect Estimates Across Cohorts and Sufficient Adjustment Sets for Collaborative Research: A Simulation Study" in *Epidemiology*.

The content is the responsibility of the authors and does not necessarily represent the views of the National Institutes of Health.