The University of Chicago
Department of Statistics

Statistics Colloquium

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Bayesian Inference for Two-Phase Studies

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133 Eckhart Hall, 5734 S. University Avenue
Refreshments following the seminar in Eckhart 110.

ABSTRACT

Two-phase studies have a long history beginning with Neymann (1938). At phase I, a sample is taken from a population either via simple random or case-control sampling. These phase I data are then cross-classified with respect to the binary outcome variable and to strata of confounder variables z. At phase II, individuals are sampled within the cells of the cross-classified data, with additional data collected on exposure variables x. The benefit of the two-phase design is that large efficiency gains are possible by judicial choice of the phase I confounder variables and the phase II sample sizes. In this talk, I will consider a Bayesian approach to two-phase sampling in the situation in which all covariates are categorical. The methods are applied to data collected on Wilms tumour and to an illustrative simulated dataset. The benefits of a Bayesian approach include relaxation of the reliance on asymptotic inference, particularly in sparse data situations and the potential to model data with complex dependencies, for example, via the introduction of random effects. A number of likelihood-based methods have been developed for the analysis of two-phase data, and these have the advantage of not requiring a model for the x by z data. Time permitting, I will discuss more general disadvantages of Bayesian modeling in related situations, such as in the analysis of complex surveys.

This is joint work with Michelle Ross.

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