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A Bayesian Approach to Measurement Error Problems in Epidemiology Using Conditional Independence Models

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Risk factors used in epidemiology are often measured with error which can seriously affect the assessment of the relation between risk factors and disease outcome. In this paper, a Bayesian perspective on measurement error problems in epidemiology is taken and it is shown how the information available in this setting can be structured in terms of conditional independence models. The modeling of common designs used in the presence of measurement error (validation group, repeated measures, ancillary data) is described. The authors indicate how Bayesian estimation can be carried out in these settings using Gibbs sampling, a sampling technique which is being increasingly referred to in statistical and biomedical applications. The method is illustrated by analyzing a design with two measuring instruments and no validation group. *Am J Epidemiol* 1993;138:430–42

biometry; Bayesian method; epidemiologic methods; Monte Carlo method