

Correction for Measurement Error of Dichotomized Mismeasured Continuous Predictors

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Epidemiologic research focuses on estimating exposure-disease associations. In certain circumstances a continuous exposure (e.g., intake of dietary fat) may be dichotomized (e.g., fat intake $>$ than or \leq to 30% of calories) if threshold levels of the predictor are of primary public health interest. Errors in exposure variables are known to yield biased regression coefficients in exposure-disease models [1]. Methods for bias-correction with continuous mismeasured exposures have been extensively discussed [1], and are often based on *validation substudies* where the “true” and imprecise exposures are observed on a small subsample. In this paper, we focus on biases associated with dichotomization of a mismeasured continuous exposure [2]. The amount of bias in relation to measurement error in the imprecise continuous predictor, and choice of dichotomization cut-point will be discussed. Measurement error correction methods will be developed for this scenario in the validation substudy setting, and compared to naively using the dichotomized mismeasured predictor in exposure-disease models. Properties of the measurement error correction methods (i.e., bias, mean-squared error) will be presented. The proposed methods will be applied to data from an ongoing nutrition-cancer study.

References

- [1] Carroll RJ, Ruppert D, Stefanski LA (1995) Measurement Error in Nonlinear Models. Monographs on Statistics and Applied Probability 63, Chapman & Hall/CRC
- [2] Gustafson P, Le ND (2002) Comparing the Effects of Continuous and Discrete Covariate Mismeasurement, with Emphasis on Dichotomization of Mismeasured Predictors. *Biometrics* 58:878-887