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Direct Questioning of Sensitive Topics in Public Health Studies: A Simulation Study

Jessica K. Fox¹, Evrim Oral^{1,*}¹*LSU Health Sciences Center, School of Public Health, Biostatistics Program, New Orleans, LA 70112*

eoral@lsuhsc.edu

In health related research, researchers often study sensitive topics such as sexually transmitted diseases, medical compliance, mental health, or drug and alcohol abuse. When such questions are asked directly, respondents show a tendency of answering questions in a socially acceptable fashion rather than answering them truthfully, causing bias in estimates. Several indirect surveying methodologies have been developed to increase the respondents' confidentiality and obtain honest responses. The most commonly used one is the Warner's randomized response technique (RRT), which asks the sensitive question by providing respondents a randomization device with two statements that appear on it with known probabilities θ and $1 - \theta$. Although Warner's RRT leads to unbiased estimates of the sensitive characteristic of interest, its theoretical variance is larger than the one from the direct questioning technique (DQT). However, to our knowledge, the empirical mean square error (MSE) from DQT has not been studied under different scenarios where cheating proportion in the population varies. We show that under some situations the empirical MSE from Warner's RRT becomes smaller than the MSE from DQT using an extensive Monte Carlo simulation study. We also provide some real life applications of RRTs where the estimates are compared to the ones from DQT, including a study on injection drug users.