

# JPSM/MPSM

## Survey Methodology Seminar Series

### Empirical and Constrained Empirical Bayes Variance Estimation for Stratified Cluster Sampling with One PSU per Stratum

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#### Presenter

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**Monday, May 4, 2015**

**4:00-5:00pm**

Speakers will be at the University of Maryland  
Video Room 368 - ISR South Basement  
Room 1208 LeFrak Hall- Maryland

#### **Abstract**

A single primary sampling unit (PSU) per stratum design is a popular design for estimating the parameter of interest. Although, the point estimator of the design is unbiased and efficient, an unbiased variance estimator does not exist. A common method for variance estimation for a 1 PSU per stratum design is based on collapsing or combining two adjacent strata, but the attained estimator of variance is not design-unbiased, and the bias increases as the population means of collapsed strata become more different. If in some situations an unbiased estimator of variance is needed, the 1 PSU per stratum design with collapsed stratum variance estimator cannot be a good choice, and some statisticians prefer a design in which 2 PSUs per stratum are selected. First we compare a 1 PSU per stratum design to a 2 PSUs per stratum design. Then, we propose an empirical Bayes estimator of the variance of a 1 PSU per stratum design. Using a simulation study, we show that the empirical Bayes method outperforms the classical collapsed stratum variance method. But the empirical Bayes estimator over-shrinks toward the prior. To protect this over-shrinking, we investigate the potential of the constrained empirical Bayes estimator.