

## **G36 – Research Fellows Meeting**

### **Presenter's Abstract**

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#### **Using Population Groups for Replicate Variance Estimation**

In official statistics, replicate methods are often used to estimate the variance of sample estimates as they are flexible and can protect confidentiality. Typically, replicate estimates are generated by taking replicate sub-samples from the main sample and re-weighting each sub-sample. Replicate weighting generalises this by considering a stochastic scheme where each instance is an  $n$  by  $R$  matrix of replicate weights. For exchangeable replicate weighting schemes, which are applicable when the main sampling scheme is Simple Random Sampling, expressions are obtained for the expectation and variance of the variance estimator in the case of a linear estimator, and an optimality condition derived. This can be applied to general sample designs.

$G$  population groups are assigned to a sequence of populations evolving over time so that a continuing unit stays in the same group. A  $G$  by  $R$  replication scheme is applied to the population, inherited by any sample and transformed in ways suggested by the general analysis. This enables replicate variance estimation for functions of estimates from any number of time points and surveys as there are corresponding sets of replicate weights. Comparable results on expectation, variance and optimality are obtained. Bias in the estimate of movement variance is explored.