Sample Size Requirements For Stratified Random Sampling of Agricultural Run Off Pollutants in Pond Water With Cost Considerations Using a Bayesian Methodology

A.A. Bartolucci, Ph. D., Professor
Department of Biostatistics, University of Alabama at Birmingham, Birmingham, AL 35294-0022, USA
Email: Albartol@uab.edu, Tel: 205-934-4906, FAX: 205-975-2540

S.J. Bae, Ph.D., Assistant Professor
Department of Biostatistics, School of Public Health, University of Texas Health Science Center at Forth Worth, Forth Worth, Texas 76107-2699, USA
Email: sbae@hsc.unt.edui , Tel: 817-735-5162, FAX: 817-735-2314

B. Galvan, MPH, Associate Dean
School of Public Health, University of Texas Health Science Center at Forth Worth, Forth Worth, Texas 76107-2699, USA
Email: bgalvan@hsc.unt.edui , Tel: 817-735-2372, FAX: 817-735-2314

K.P. Singh, Ph.D., Professor and Chair
Department of Biostatistics, School of Public Health, University of Texas Health Science Center at Forth Worth, Forth Worth, Texas 76107-2699, USA
Email: ksingh@hsc.unt.edui , Tel: 817-735-0490, FAX: 817-735-2314

Abstract: Estimating average environmental pollution concentrations from fertilization components and their variance is a fairly straight forward task in stratified random sampling. A more challenging concept is the introduction of the cost factor into this environmental model. Traditional statistical techniques have incorporated costs from sampling within a stratum as well as stratum weights to determine the stratum size and overall required sample size. Information in the form of informative prior distributions to determine a more coherent variance in the system yield a more precise Bayesian approach to the sample size and cost calculations. This approach results in a more efficient sampling strategy in terms of cost when considering a pre specified margin of error for the sampling mean as well as the more complicated situation of correlation among the strata samples.

K*eywords:* *Stratified; random sampling; cost; Bayesian*