



**IPS181: Advancements in Capture-Recapture Methods with Application in Social sciences and Humanitarian Crisis**

**Estimation of population size with heterogeneous catchability and behavioural dependence: applications to air and water borne disease surveillance**

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**Abstract:**

Population size estimation based on the capture-recapture experiment is an interesting problem in various fields including epidemiology, criminology, demography, etc. In many real-life scenarios, there exists inherent heterogeneity among the individuals and dependency between capture and recapture attempts. A novel trivariate Bernoulli model is considered to incorporate these features, and the Bayesian estimation of the model parameters is suggested using data augmentation. Simulation results show robustness under model misspecification and the superiority of the performance of the proposed method over existing competitors. The method is applied to analyse real case studies on epidemiological surveillance. The results provide interesting insights on the heterogeneity and dependence involved in the capture-recapture mechanism. The methodology proposed can assist in effective decision-making and policy formulation.

**Keywords:**

COVID-19; Gibbs sampling; Hepatitis A; List dependence; Multiple systems estimation