

Workshop: Statistical Challenges and Opportunities in HIV/AIDS Research in the Era of Getting-to-Zero HIV Infections

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“Nonparametric and semiparametric inference for the cascade of HIV care under incomplete death ascertainment.”

Abstract:

Estimation of the cascade of HIV care is essential for evaluating care and treatment programs, informing policy makers and assessing targets such as 90-90-90. A critical obstacle to obtaining valid estimates of the care cascade in resource-limited settings, such as those found in sub-Saharan Africa, is the significant death under-reporting. An approach to partially recover information on unreported deaths is double-sampling where a small subset of individuals lost to clinic is intensively outreached in the community to actively ascertain vital status. This approach has been adopted in several programs within the East Africa regional IeDEA consortium.

Based on data from such double-sampling designs, we propose both pseudolikelihood-based and inverse probability weighted nonparametric and semiparametric estimators of the probabilities of key care cascade states after antiretroviral treatment initiation. These estimators are shown to provide valid estimates of the care cascade probabilities in settings with incomplete death recording under a set of realistic assumptions. Importantly, our estimators are consistent even for non-Markov cascade of care processes. Variability estimation is based on the empirical versions of the influence functions, and correctly reflects all the sources of uncertainty including missing information and potential model misspecification. The methodology is applied to electronic health record data from East Africa IeDEA consortium to estimate HIV care cascade. Using these data, we also show that naive analyses, such as complete case analysis, can provide severely biased estimates.

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Dr. Giorgos Bakoyannis is an Assistant Professor of Biostatistics in the Department of Biostatistics at the Indiana University Fairbanks School of Public Health. His methodological research is focused on the nonparametric and semiparametric analysis of survival and more complex event history data, with a special emphasis on issues commonly arising in biomedical and clinical research, such as missing data, outcome misclassification and interval censoring.

The motivation for his past and current methodological research came from various collaborative research projects in which he participated as a biostatistician, mainly in the field of HIV/AIDS epidemiology. Dr. Bakoyannis has served as a technical advisor for the Reference Group on Estimates, Modelling and Projections of the Joint United Nations Programme on HIV/AIDS (UNAIDS) on issues related to estimation of mortality under misclassification due to death under-reporting.