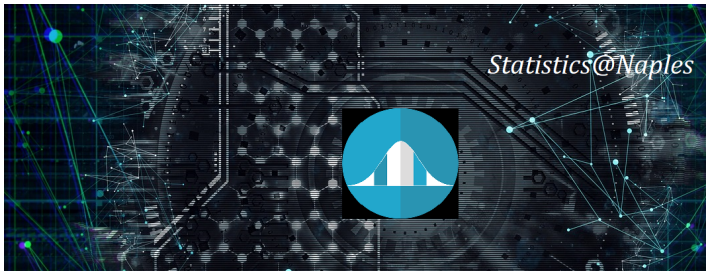

Contribution ID : **26** Type : **not specified**

Semiparametric regression for competing risks data with missing not at random cause of failure

Thursday, 29 June 2023 15:20 (20)

The cause of failure in cohort studies that involve competing risks is frequently incompletely observed. Failure to deal with this issue can lead to substantially biased estimates. To the best of our knowledge, all the methods that have addressed the issue in the context of semiparametric competing risks models rely on a missing at random (MAR) assumption. Nevertheless, the MAR assumption is not realistic in many real-world settings. In this work we relax the latter assumption by allowing for a class of missing not at random (MNAR) mechanisms, which contain the MAR mechanism as a special case. Due to the inherent non-identifiability issues under MNAR, we propose an approach for hypothesis testing that does not require the estimation of the non-estimable parameters. Using modern empirical process theory, we show that the proposed estimators are uniformly consistent under the assumed class of MNAR mechanisms. We also show that our estimators converge weakly to tight zero mean Gaussian processes and propose rigorous methodology for the computation of confidence intervals which achieve a coverage rate of at least 100*(1 - α)%, asymptotically, for the true unknown parameters of interest. The proposed methodology is applied to competing risks data from a large multicenter HIV study in sub-Saharan Africa where a substantial portion of causes of failure is missing not at random.

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Session Classification : Fifth Session