Semi-parametric spatial joint modeling of HIV and HSV-2 among women in kenya with spatially varying coefficients

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Abstract

Human immunodeficiency virus (HIV) is a pandemic that continues to spread even with concerted efforts that have been put in place to help curb it. There are a number of factors that contribute to this spread, among them is the Herpes simplex-2 virus (HSV-2), which is incurable and is associated with a two- to three-fold increased risk of HIV acquisition and an up to five-fold increased risk of HIV transmission per-sexual act, and may account for 40% to 60% of new HIV infections in populations where HSV-2 has a high prevalence. HIV and HSV-2 share common risk factors and modeling their outcomes jointly within a spatial statistical context may provide more insight on the interaction of diseases both at individual and at regional level. The multivariate conditional autoregressive and the multivariate normal distribution approaches are used for spatial joint modeling among women while relaxing the limiting assumptions of linearity and stationarity. We allow some covariates to have nonlinear effect on the response variable by the penalized regression spline and relax the stationarity assumption by allowing the rest of the covariates to vary spatially by the spatially varying coefficients (SVC) model. The women data used in this study were derived from the 2007 Kenya AIDS indicator survey where women aged 15-49 years were surveyed. There was a strong positive correlation between the effect of age at first sex, education, place of residence, STI in the last one year on HIV and HSV-2. HIV and HSV-2 were also found to be strongly associated with a strong positive correlation of 0.812289.