

Modelling of Heterogeneous Time Trends in Bayesian Age-Period-Cohort Models

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Most developed countries collect area-level incidence and mortality rates stratified by age and gender. To detect temporal patterns these epidemiological data can be analysed by age-period-cohort (APC) models according to three timescales: age, period (calendar period during which the incidence or mortality rates were observed) and cohort (time of birth). A joint analysis of data from different regions may borrow strength from shared age effects while possibly identify different period or cohort relative risks, thus overcoming the unidentifiability problem known for univariate APC models [1]. In this talk, we develop a multivariate Bayesian APC model to identify regional differences in disease rates. Inference is based on Markov chain Monte Carlo (MCMC) using either auxiliary mixture sampling [2, 3] or a Gaussian Markov random field (GMRF) approximation [4].

The methodology will be applied to data on chronic obstructive pulmonary disease (COPD) mortality in England and Wales, split into three areas: Greater London, metropolitan areas excluding Greater London and rural areas [5]. We were able to identify different period effects in the three areas, possibly related to different levels of air pollution.

References

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