Coherent cause-specific mortality forecasting via constrained penalized regression models

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Overall mortality trends are the summation of cause-specific mortality experiences. Consequently modelling and forecasting changes in cause of death patterns allows us to recognize the drivers of all-cause mortality and identify emerging health challenges. When dealing with cause-specific mortality, we need to ensure that cause specific deaths must sum to the total number of deaths. We propose a simple and fast method to obtain coherent cause-specific mortality trajectories based on Lagrange multipliers and penalized splines. We apply the method proposed to fit and forecast mortality of males in the USA for the five leading causes of death.

Keywords: Cause of death; Constraints; Forecasting; Mortality; Penalized Likelihood.