Nonstationary Markov transition models for computing the probability of dementia before death

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We consider a nonstationary Markov chain to model the flow of subjects through the transient states cognitively intact, mild cognitive impairment, and global impairment to one of two competing absorbing states: dementia and death. The chain is nonstationary since the single most important risk factor is the time dependent covariate age. The goal is to estimate the probability that an individual who is cognitively intact at baseline becomes demented before dying as a function of age, education, and genetic status A likelihood function is defined in terms of a product of one step transition probabilities which are polytomous logistic models sharing a common random effect. The effect of baseline and order of the chain are investigated. The results will be illustrated by data from the longitudinal Nun Study, a cohort of participants 75+ years of age at baseline with an average of 6.7 assessments per participant.