Increasing life expectancy and thus decreasing mortality rates constitute a global trend that can be observed in almost all countries worldwide. Estimating the current rate at which mortality rates decrease and modeling the future rate of decrease is important for e.g. demographers and actuaries. This task is commonly referred to as mortality trend modeling.

Recent work, e.g. by (Sweeting, 2011) or (Li, et al., 2011) has established that in many countries the mortality trend appears to be a piecewise linear function. This can be used in stochastic mortality models by implementing trend components that generate a (stochastic) piecewise linear trend and some kind of random fluctuation around this trend.

We show that previously discussed versions of this approach have several shortcomings. In particular we show that one needs to distinguish between two different mortality trends: The actual mortality trend (AMT) prevailing at a certain point in time and the estimated mortality trend (EMT) that an observer would estimate given the realized mortality up to that point in time. The difference between these two results from the fact that the AMT is not observable and moreover an observer would not always be able to distinguish between a recent change in the actual trend and a “normal” random fluctuation around the previous long term trend. Depending on the question at hand, the AMT or the EMT might be the relevant figure to use in analyses.

The paper provides a clear definition of and distinction between the actual mortality trend and the estimated mortality trend, discusses their connection, and explains which of the two is relevant for which kind of question. Moreover, a combined model for both trends including a stochastic start trend for the actual mortality trend is specified, and calibrated to mortality data.

Keywords: Stochastic mortality, Mortality trend risk, Longevity risk, Actual mortality trend, Estimated mortality trend