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# Smoothing and projecting age-specific probabilities of death by TOPALS

By [Loop de Beer](#)

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## Abstract

**Background:** TOPALS is a new relational model for smoothing and projecting age schedules. The model is operationally simple, flexible, and transparent.

**Objective:** This article demonstrates how TOPALS can be used for both smoothing and projecting age-specific mortality for 26 European countries and compares the results of TOPALS with those of other smoothing and projection methods.

**Methods:** TOPALS uses a linear spline to describe the ratios between the age-specific death probabilities of a given country and a standard age schedule. For smoothing purposes I use the average of death probabilities over 15 Western European countries as standard, whereas for projection purposes I use an age schedule of 'best practice' mortality. A partial adjustment model projects how quickly the death probabilities move in the direction of the best-practice level of mortality.

**Results:** On average, TOPALS performs better than the Heligman-Pollard model and the Brass relational method in smoothing mortality age schedules. TOPALS can produce projections that are similar to those of the Lee-Carter method, but can easily be used to produce alternative scenarios as well. This article presents three projections of life expectancy at birth for the year 2060 for 26 European countries. The Baseline scenario assumes a continuation of the past trend in each country, the Convergence scenario assumes that there is a common trend across European countries, and the Acceleration scenario assumes that the future decline of death probabilities will exceed that in the past. The Baseline scenario projects that average European life expectancy at birth will increase to 80 years for men and 87 years for women in 2060, whereas the Acceleration scenario projects an increase to 90 and 93 years respectively.

**Conclusions:** TOPALS is a useful new tool for demographers for both smoothing age schedules and making scenarios.

## Author's Affiliation

[Joop de Beer](#) - Nederlands Interdisciplinair Demografisch Instituut (NIDI), Netherlands  
[\[Email\]](#)

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