

# Life expectancy under a stationary population composition according to observed heterogeneity

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## Abstract

Compositional differences between a period life-table synthetic cohort and a stationary population result in life expectancy (LE) differences under current rates versus current conditions. Vaupel's (2002) distinction between the two LEs accounts for differences in composition due to unobserved heterogeneity. We examine the effect of observed heterogeneity on mortality statistics to contribute to the discussion of compositional differences between the period life-table synthetic cohort and a stationary population. We propose formulas to adjust the force of mortality and life table statistics to suppress heterogeneity imposed by the lagged composition of synthetic life table cohorts according to observed population characteristics. We also give formulas to decompose the difference between two LEs under stationary composition into compositional differences and the difference in LE of subgroups. We illustrate the lagged compositional effect using the example of educational attainment strata in Denmark in 1991-1995 and 2011-2015. The example of educational attainment illustrates the importance of adjusting the LE for a stationary composition: The gap between the two LEs is up to 1.9 years, and at least as large as the gap between LE and LE under current mortality conditions under the assumption of small frailty variation at the initial life-table age. The shift in population composition due to educational expansion in the study years contributed to the increase in LE under stationary composition, which benefited women more than men. We show that the adjustment of mortality statistics for stationary population composition is essential for an understanding of mortality under current conditions.

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