

# Social Inequalities in Mortality and Life-Course Social Disadvantage Across Birth Cohorts in Germany, 1996–2023

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## Abstract

**Background:** Social inequalities in mortality remain a public health concern in Germany despite rising overall life expectancy and universal health coverage. While existing research documents persistent survival gaps, comprehensive longitudinal evidence integrating life-course dynamics and cohort variation remains limited. We examine whether socioeconomic status (SES) inequalities in all-cause mortality have widened over the study period and across birth cohorts, and whether cumulative exposure to low SES intensifies mortality risk across the life course.

**Method:** Using longitudinal SOEP data (1996–2023), we conducted a cohort-sequential survival analysis of 112,037 individuals (660,480 person-years; 4,974 deaths). Four birth cohorts (1920–1984) were defined. SES was measured multidimensionally and modelled as a time-varying exposure. Mortality was ascertained via year of death. Cox proportional hazards models, using attained age as time scale and adjusting for sex, migration background & marital status, estimated adjusted hazard ratios (aHRs) with 95% CI. Alternative models, diagnostic tests, and sensitivity analyses were performed.

**Results:** Overall mortality declined substantially across periods and generations. However, relative inequalities persisted and were strongest in early adulthood. The mortality risk of low versus high SES was aHR 1.81 (95% CI: 1.31–2.50) in 1996–2005 and 2.41 (1.74–3.37) in 2015–2023 and was more pronounced in later-born cohorts (1970–1984) (aHR 3.66; 95% CI: 1.36–9.82) compared with cohorts (1920–1939) (aHR 1.66; 95% CI: 1.23–2.24), although interaction tests did not confirm overall changes. Life-course analyses indicated significant cumulative disadvantage: each additional year spent in low SES increased mortality hazard by 14% at age 50 (HR 1.14; 95% CI: 1.09–1.20), with modest attenuation at older ages.

**Conclusions and Implications:** Survival gains in Germany have not translated into equity gains. Relative social inequalities in mortality persist across social strata and cohorts. Targeted policies addressing early and sustained social disadvantage are essential to reduce inequalities in survival chances across generations.