

# Assignment 1

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1. Register at <http://www.mortality.org/>.
2. Download single year, single period death counts and exposures for a country of your choice.
3. *For each year in the data* (and a single sex of your choice, i.e. “female”, “male” or “total”), calculate life expectancy at birth (see [1], p. 49, Box 3.1) and the coefficient of variation of the life-table distribution of deaths.

You can calculate the coefficient of variation for a life-table as

$$\widehat{CV} = \frac{\sqrt{\sum_{x=0}^{\omega} {}_n d_x (\bar{x} - e_0)^2}}{e_0} = \frac{\sqrt{\sum_{x=0}^{\omega} {}_n d_x (x + {}_n a_x - e_0)^2}}{e_0},$$

with  ${}_n a_x \approx 0.5n_x$ .

(Bored? How about fitting a spline to the  $\ell_x$  values of the life-table using `splinefun()` and use the continuous formula 7 in [2] with the fitted spline and numerical integration (`integrate()`) to calculate the Gini coefficient? No pressure though.)

4. Show the relationship among life-expectancy and the coefficient of variation of the life-table distribution of deaths. What do you see? If you have an explanation for the relationship I would be interested in reading about it.

## References

- [1] Preston, S. H., Heuveline, P., & Guillot, M. (2001). Demography. Oxford, UK: Blackwell.
- [2] Shkolnikov, V., Andreev, E., & Begun, A. Z. (2003). Gini coefficient as a life table function. Demographic Research, 8(17), 305–358. <https://doi.org/10.4054/DemRes.2003.8.11>.