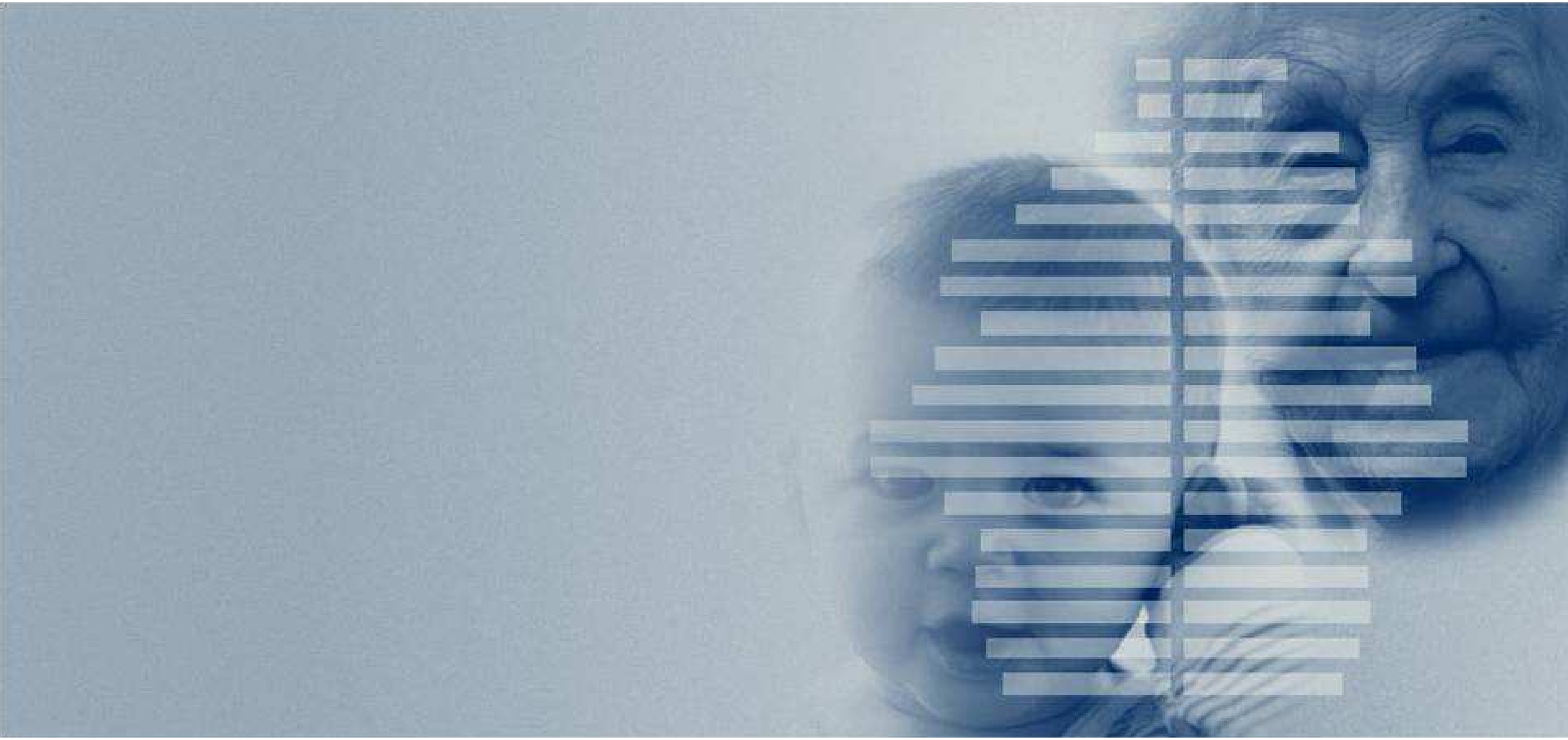

MAX PLANCK INSTITUTE
FOR DEMOGRAPHIC
RESEARCH

Decomposition perspectives on distributions of episode duration

Tim Riffe | HT C. Dudel & D. Schneider

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Some motivating observations:

1. Health *inequality* is multidimensional: episode duration important?
2. Dudel's expression for average episode count & duration: how about distributions?

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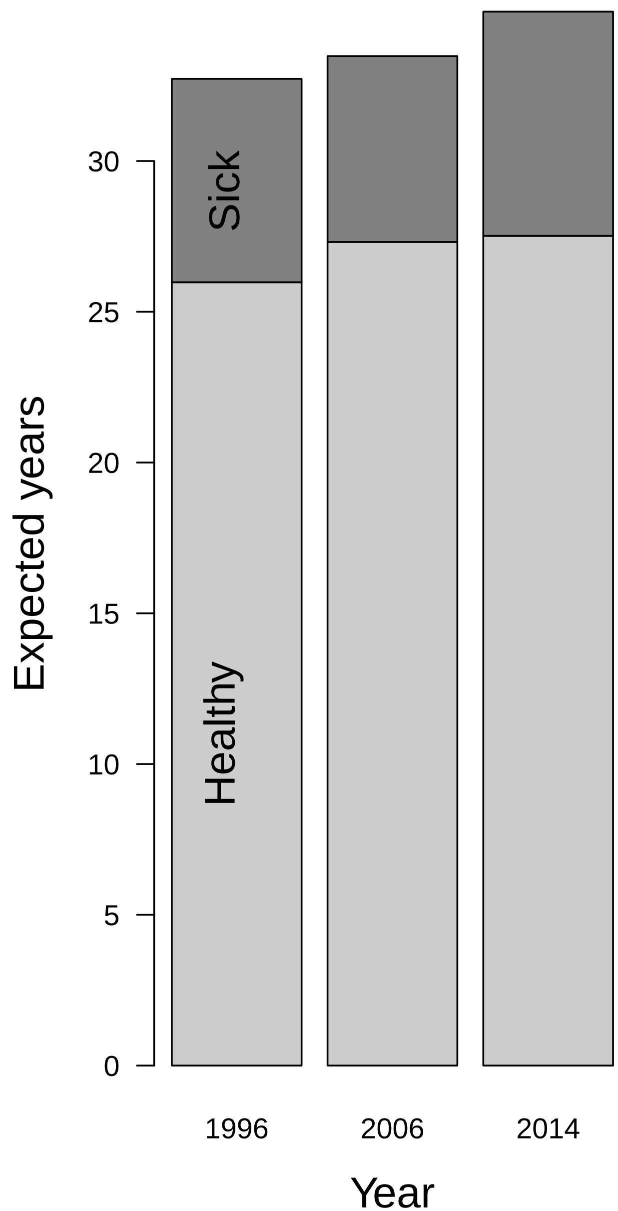
A common sight:



Motivating questions:

1. How do state expectancies break down by episode duration?
2. What is the age pattern of episode duration?
3. Extra 1: how much of a state expectancy is from terminal episodes?
4. Extra 2: how do transition probabilities determine episode distributions?

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Probability of a new episode ϵ in state s starting at age x:

$$\epsilon^{s,new}(x) = \pi^{-s}(x) \cdot p^{\rightarrow s}(x) \quad (1)$$

- $\epsilon^{s,new}$ new episode of s
- π^{-s} prevalence of not being in s
- $p^{\rightarrow s}$ probaility of transition to s

- Let $\mathbf{E}^s$ be a matrix with $\epsilon^{s,new}$ in the diagonal
- Let $\mathbf{U}^s$ be a matrix with $p^{s \to s}$ in the subdiagonal
- Let $\mathbf{N}^s = (\mathbf{I} - \mathbf{U}^s)^{-1}$
- Then the conditional elapsed time spent in s: $\mathcal{E}^s = \mathbf{N}^s\mathbf{E}^s$
- $\mathbb{E}(s, x) = \mathbf{e}'\mathcal{E}^s\mathbf{e} + p^s(x)\sum_{t=x}^{\omega}\prod_{i=t}^{\omega} p^{s \to s}(i)$
- The matrix $\mathcal{E}^s$ is a decomposition of $\mathbb{E}(s)$ by age and elapsed time in s

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An illustration

- Recycle transition probabilities from Riffe, Mehta, Schneider & Myrsklyä (in progress) (HRS data).
- 3 states: 0 ADLs, 1+ ADLs, dead.
- ages 50+, 2-year age groups

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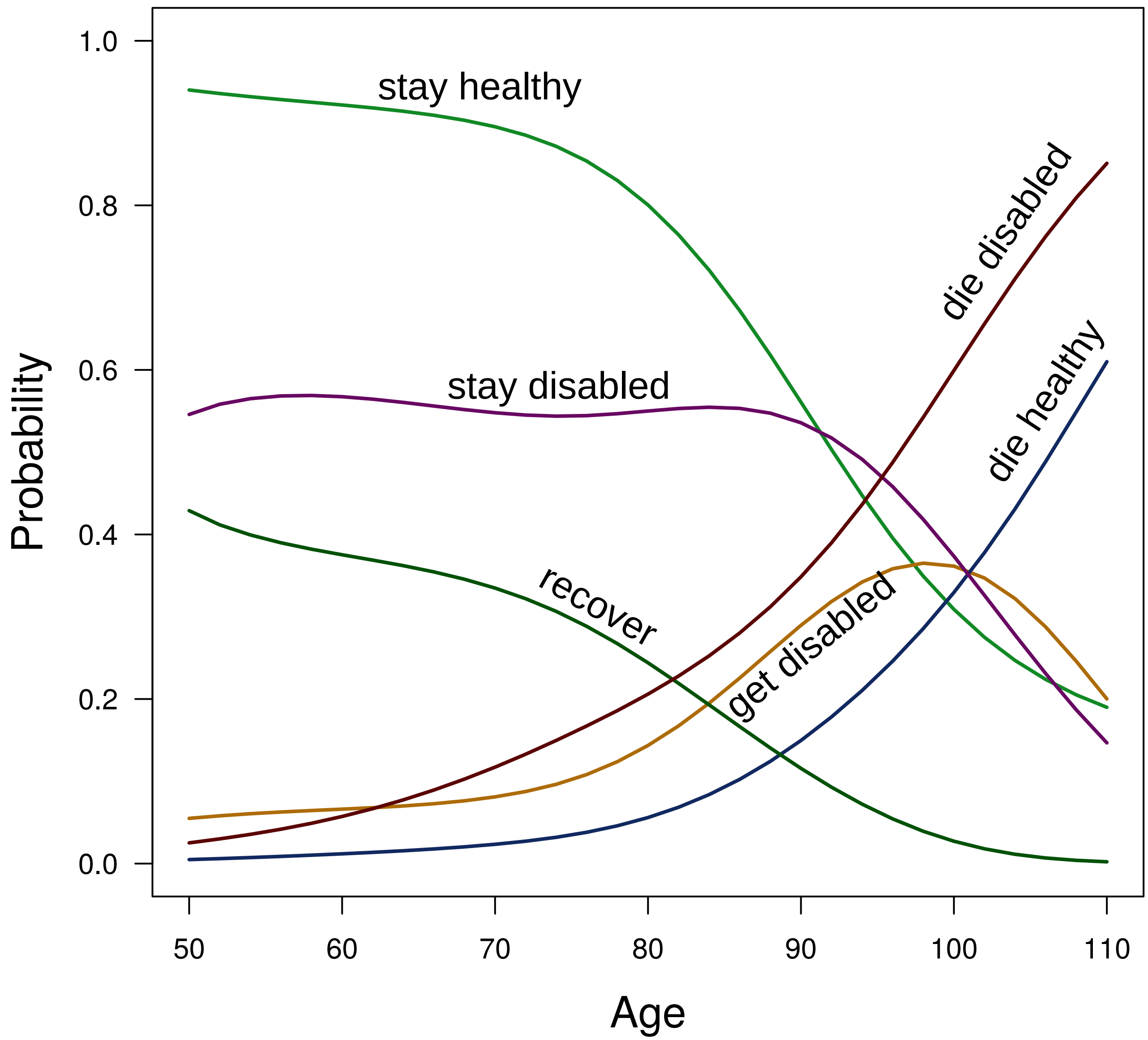
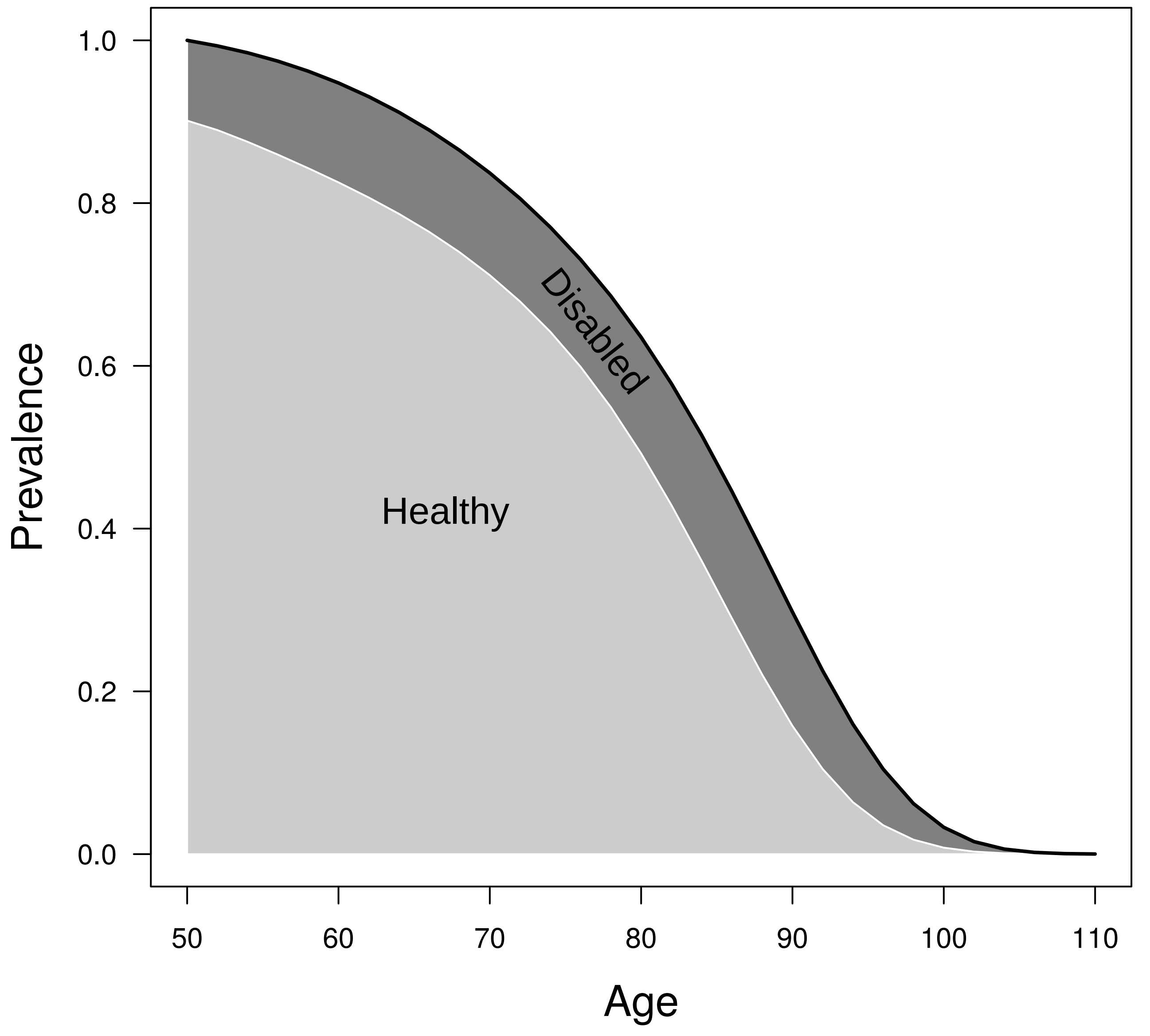
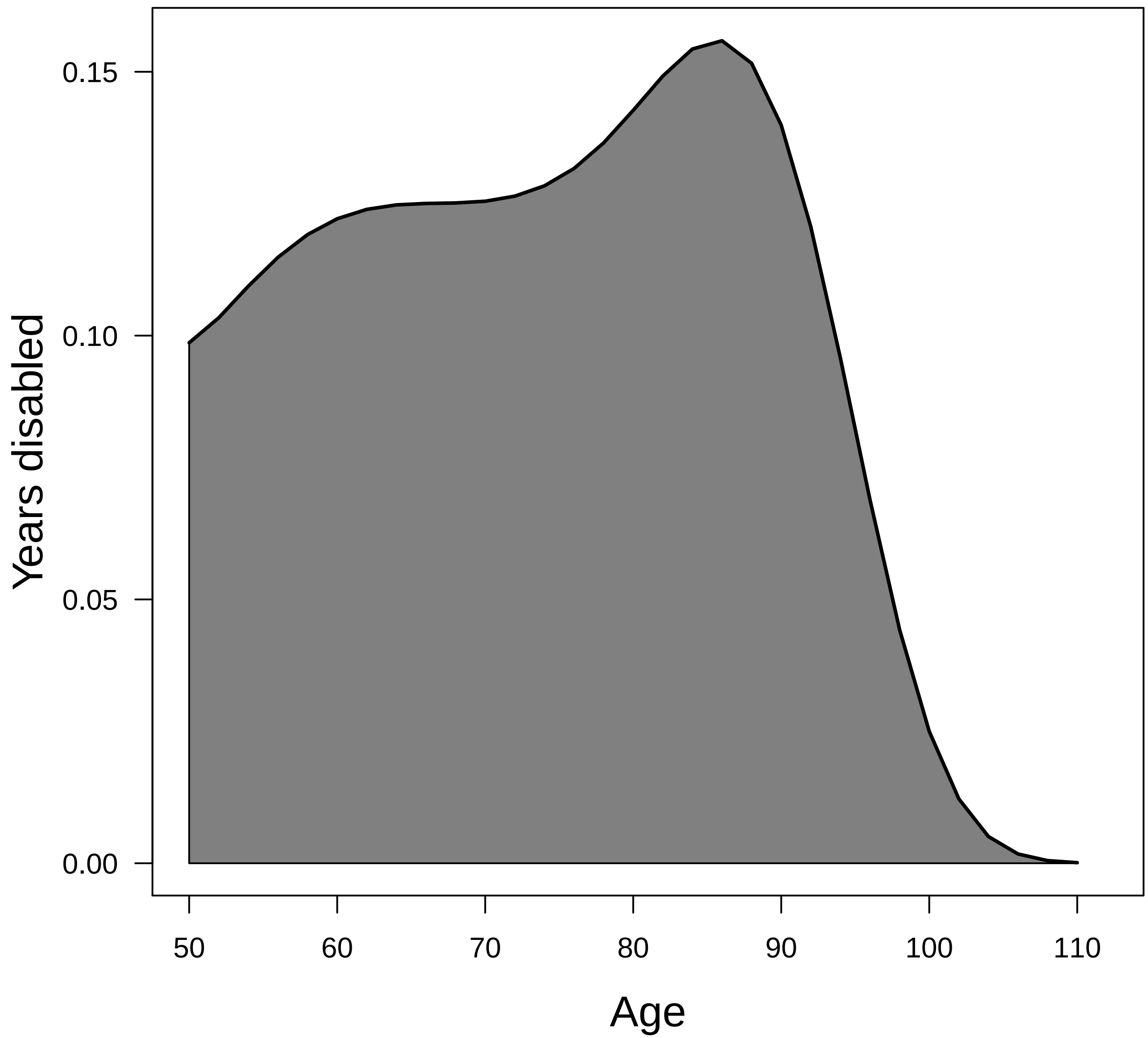
Transitions for 2006 females (all edu):



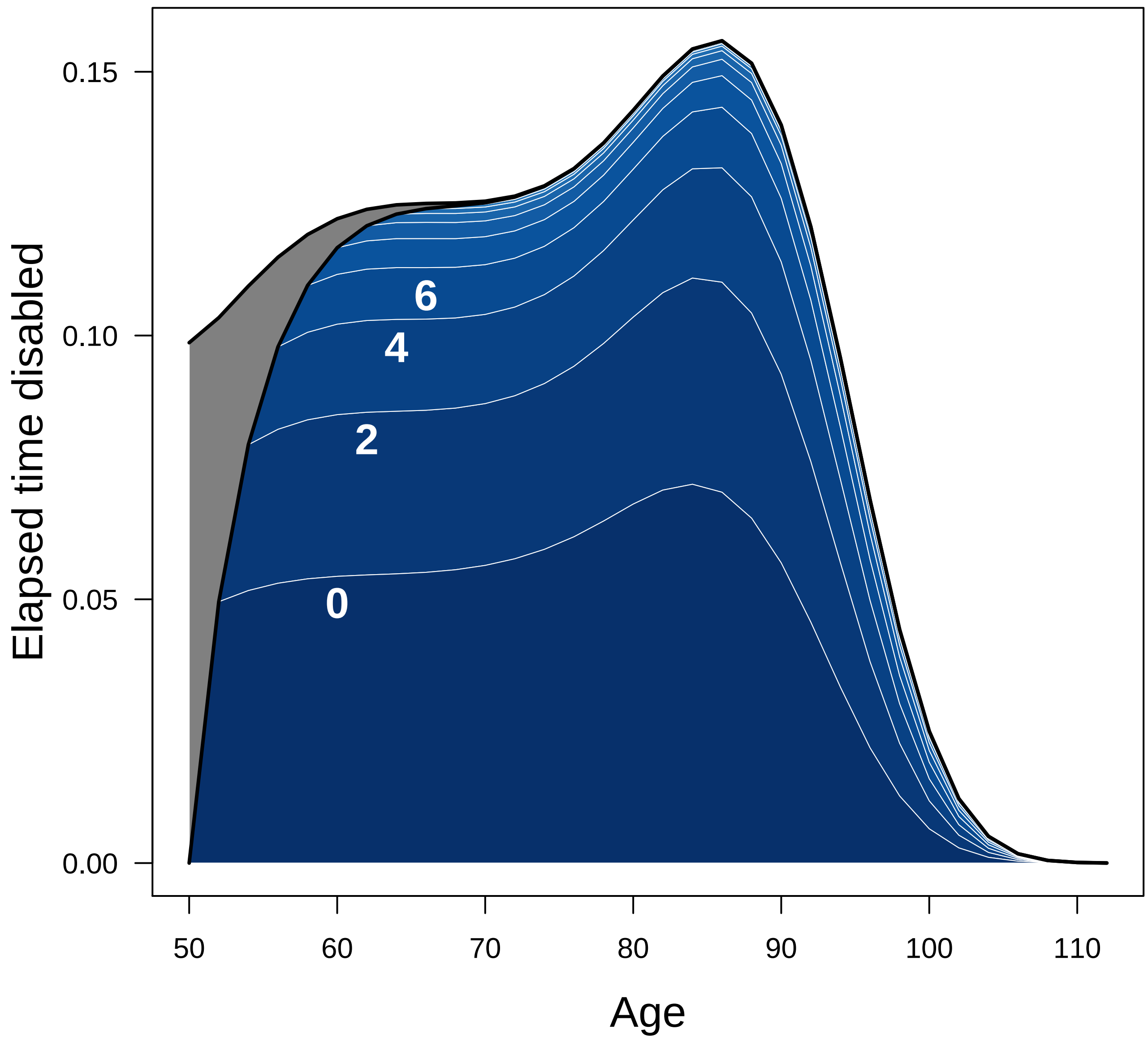
Prevalence for 2006 females (all edu):



Prevalence disabled 2006 females (all edu):



Disability decomposed 2006 females (all edu):



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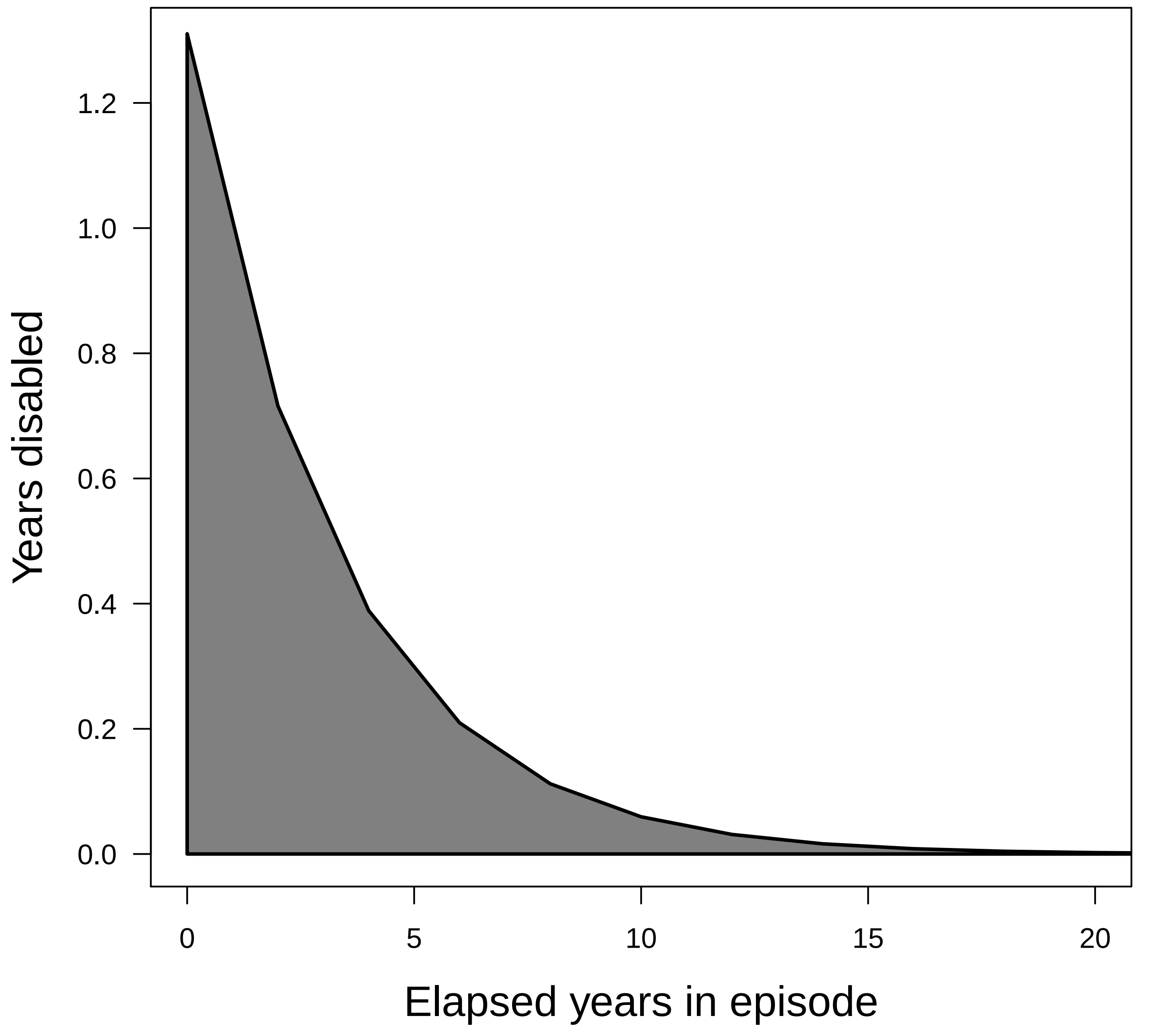

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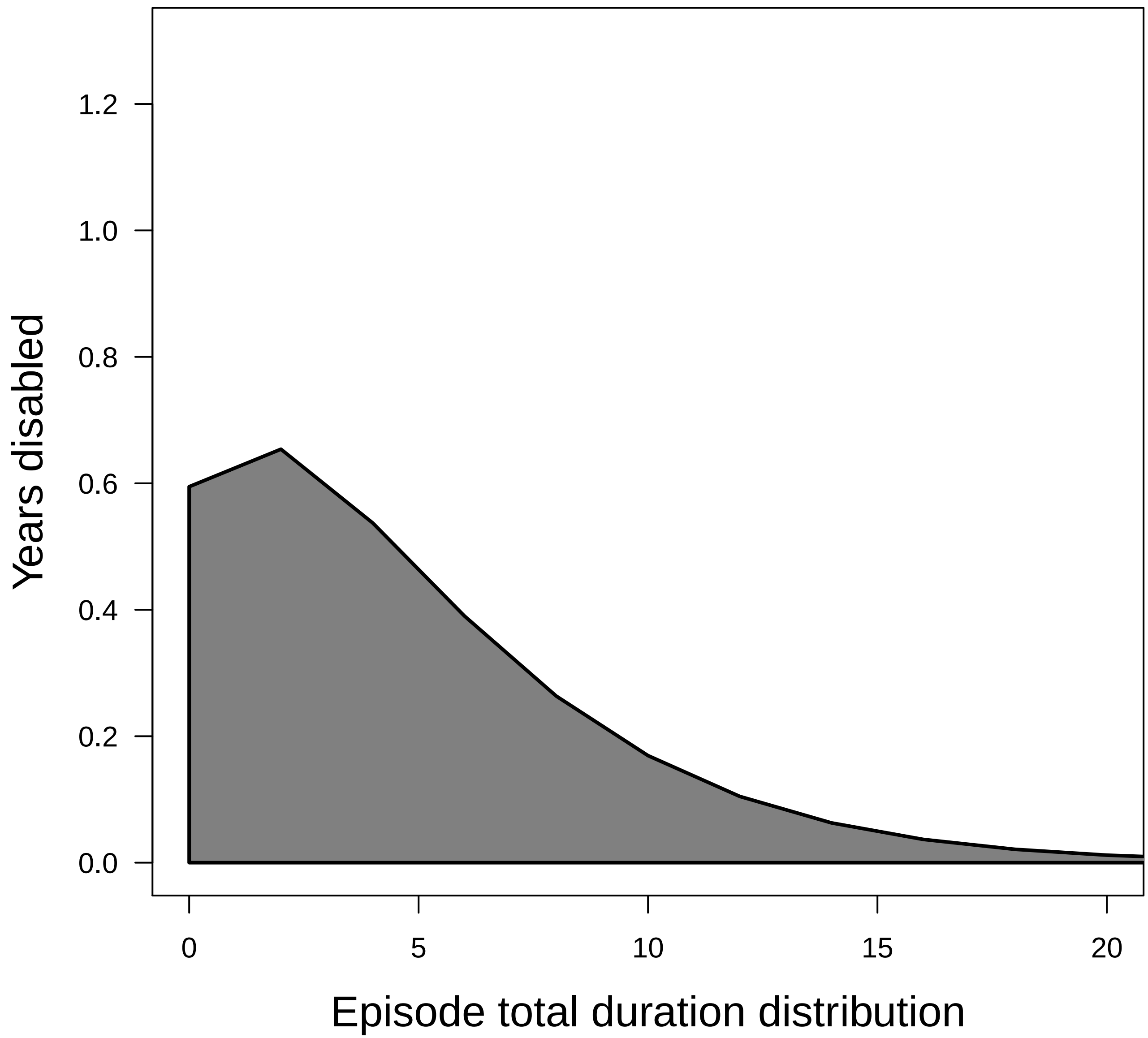

Are the contents of such decompositions relevant to health inequality?

Extra 1: terminal vs other states.

Deaths by age and elapsed time of terminated episode

$$\mathbf{D}^s = diag(\mathbf{p}^{s \rightarrow \dagger})\mathcal{E}^s$$

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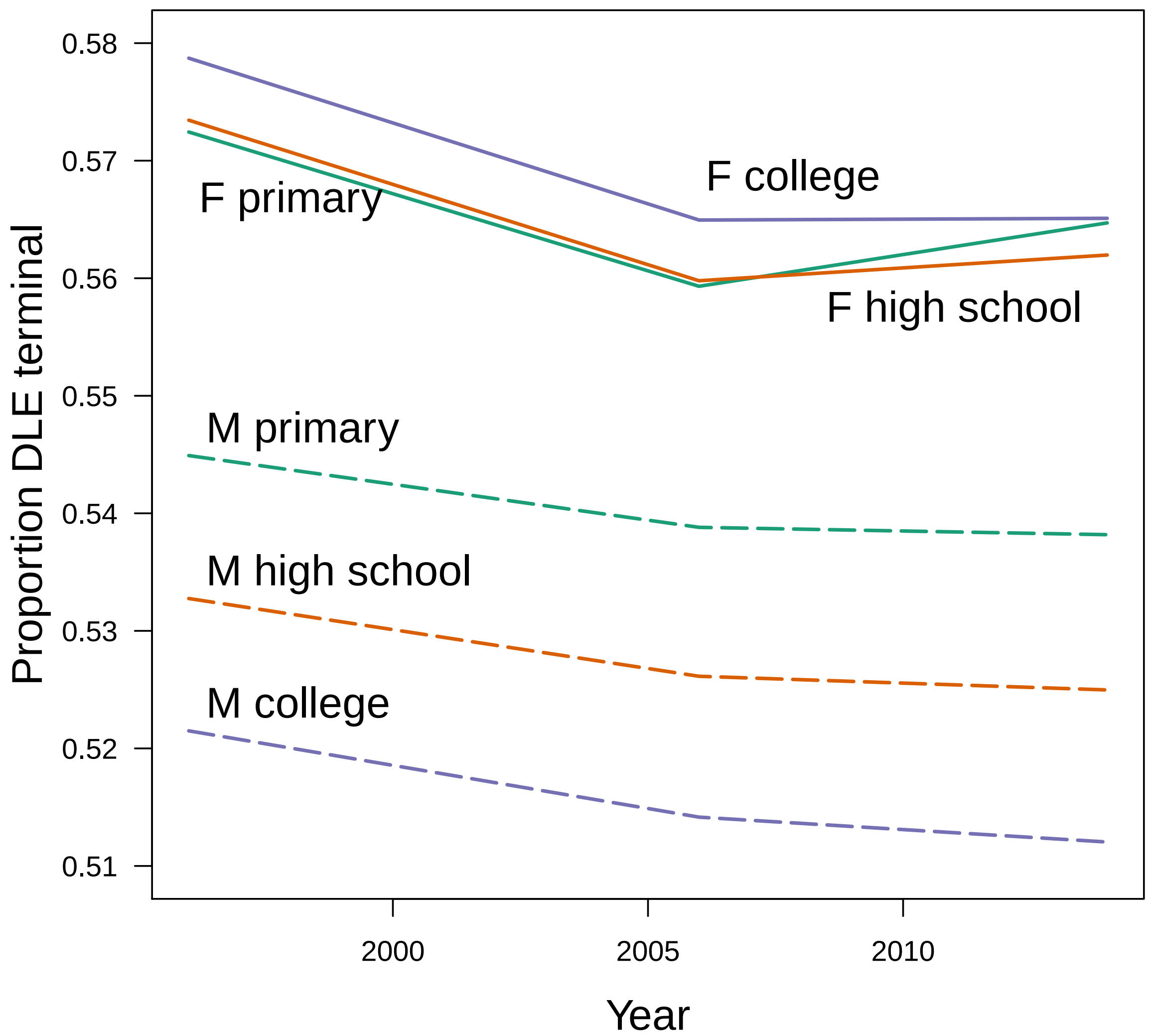
Proportion of DLE composed of terminal episodes, by sex and education:



Extra 2: everything is a function of transition probabilities

Use general decomposition method, such as Horiuchi et. al. (2008) in `R` package `DemoDecomp`

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Episode decomposition and healthy inequality
What are your thoughts?

Thanks!

Photo by Willian Justen de Vasconcelos