

KOSTAT-UNFPA Summer Seminar on Population

Workshop 1: Demographic Analysis: Methods and Tools in R

1 July, 2024

Instructor: Tim Riffe

Assistant: Inchan Hwang



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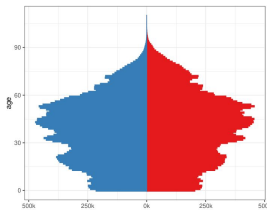


Statistics
Korea



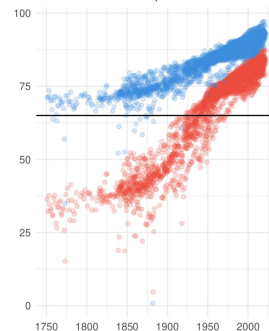
Objectives

- (1) Fundamental demographic concepts and measures



$$nq_x = \frac{n \cdot {}_nM_x}{1 + (n - {}_nA_x) \cdot {}_nM_x}$$

$$r = \frac{\ln\left(\frac{N(T)}{N(0)}\right)}{T}$$



- (2) Basic R coding skills for demographic data analysis and visualization

```
KOR2014 |>
  filter(sex == "total") |>
  mutate(nMx = deaths / exposure,
         nAx = if_else(age == 0, .1, .5),
         n = 1,
         nqx = calc_nqx(nMx = nMx, nAx = nAx, n = n),
         lx = calc_lx(nqx = nqx)) |>
  ggplot(aes(x = age, y = lx)) +
  geom_line() +
  ylim(0,1) +
  labs(title = "lx Korea, 2014",
       subtitle = "Data: HMD") +
  theme_minimal()
```

Workshop plan, 1-5 July, 2024

- | | |
|--------------|-----------------------------|
| 1: Monday | Intro concepts, and R setup |
| 2: Tuesday | Mortality and fertility |
| 3: Wednesday | Structure |
| 4: Thursday | Growth |
| 5: Friday | Projection |

Materials

Open course repository:

https://github.com/timriffe/KOSTAT_Workshop1

- [xx_presentation.pdf](#)
- [xx_handout.pdf](#)
- [xx_session.Rmd](#) (R markdown file)

Google Doc for code snippets, questions, etc:

<https://tinyurl.com/6ec2zfy>

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Basic Data and Concepts

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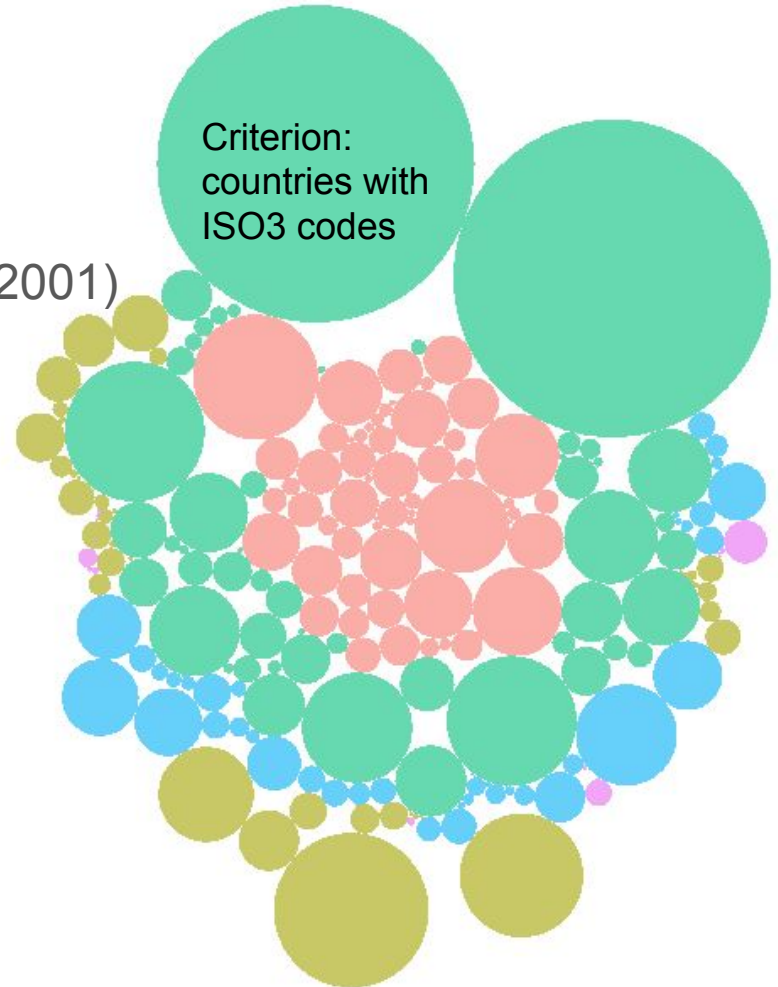
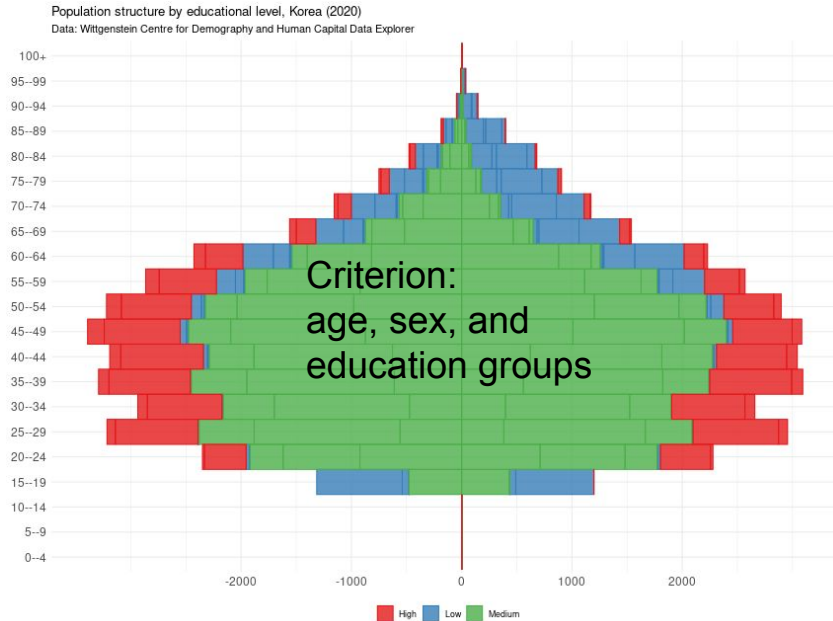
Statistics
Korea



Population:

the collection of persons alive at a specific point in time who meet certain criteria

Preston et al (2001)



Demography:

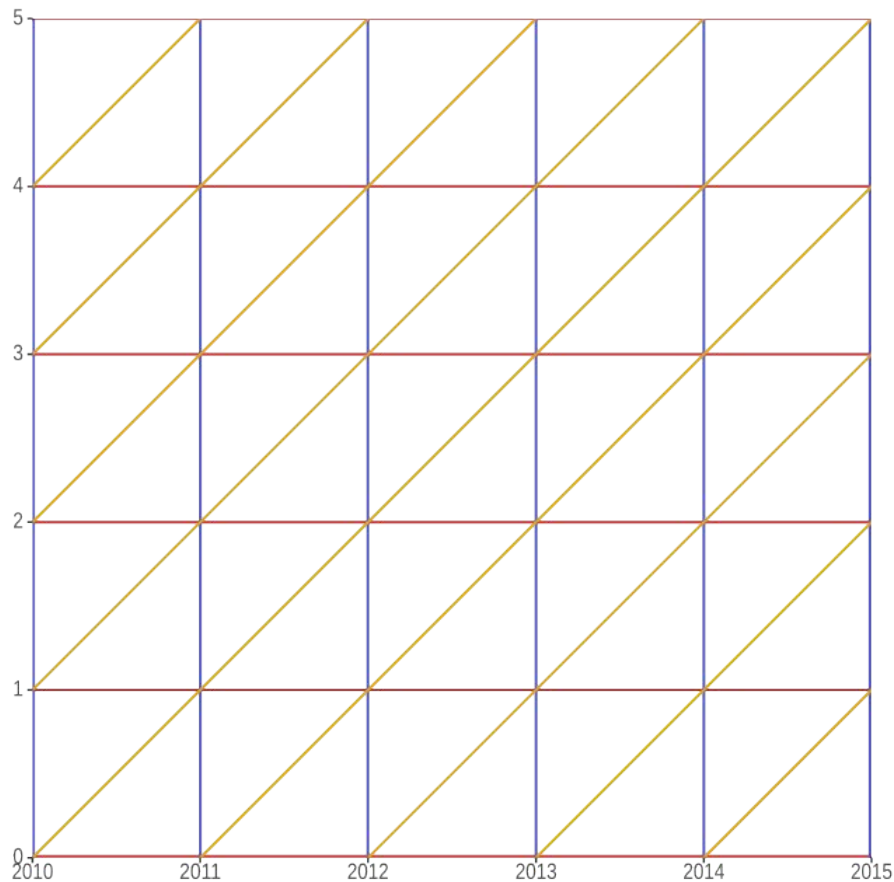
“Demography is the science of populations. Demographers seek to understand population dynamics by investigating three main demographic processes: birth, migration, and aging (including death)”- MPIDR

“The study of statistics such as births, deaths, income, or the incidence of disease, which illustrate the changing structure of human populations”- Oxford dictionary

“Demography is the study of the size, territorial distribution, and composition of population, changes therein, and the components of such changes” - Hauser 1959

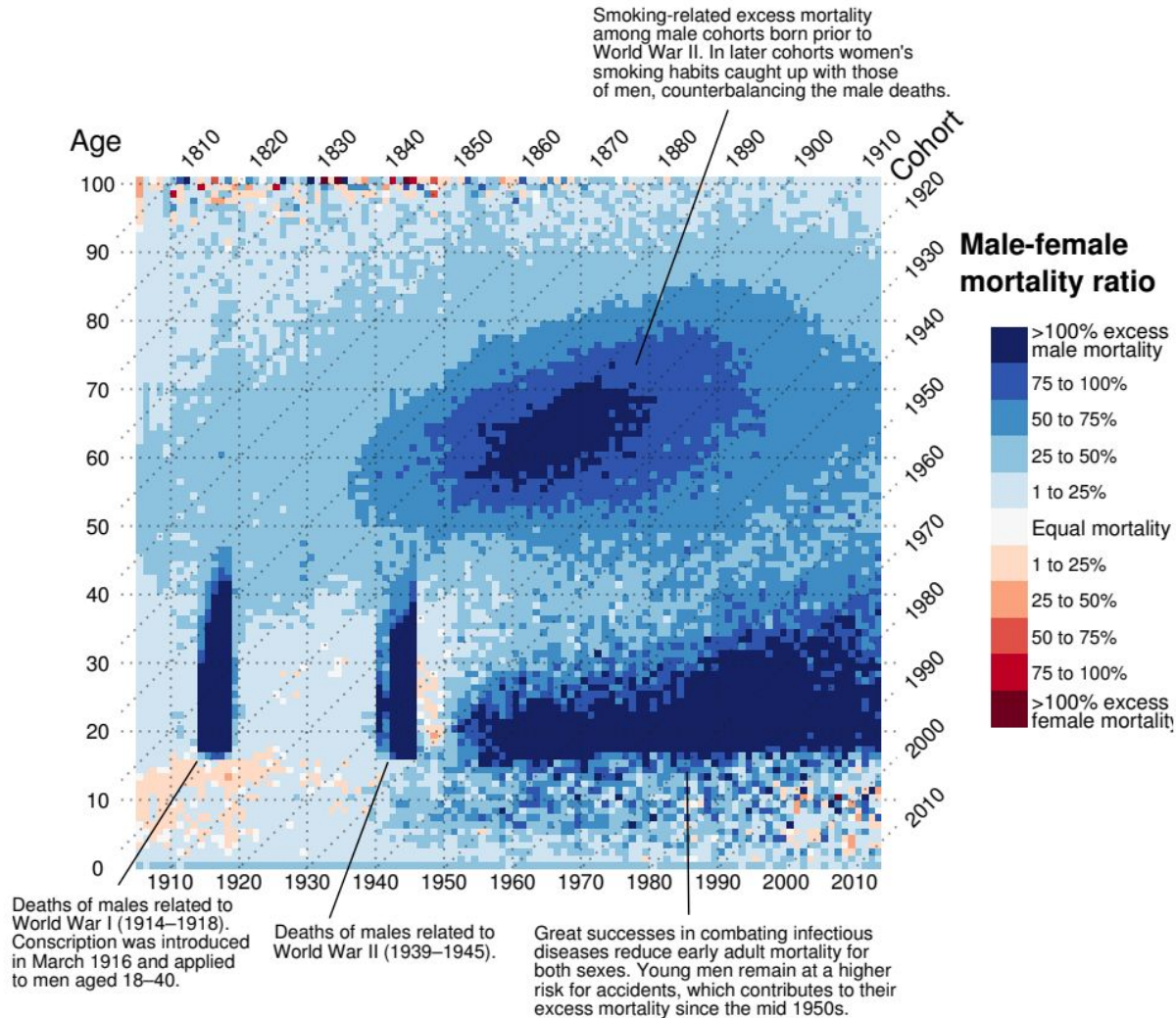
Time as structure

The Lexis diagram relates the dimensions of **age**, **period**, and **cohort** on a single plane.



Time as structure

“Lexis surface” with features in the **age**, **period**, and **cohort** perspectives. From Schoeley & Willekens (2017)

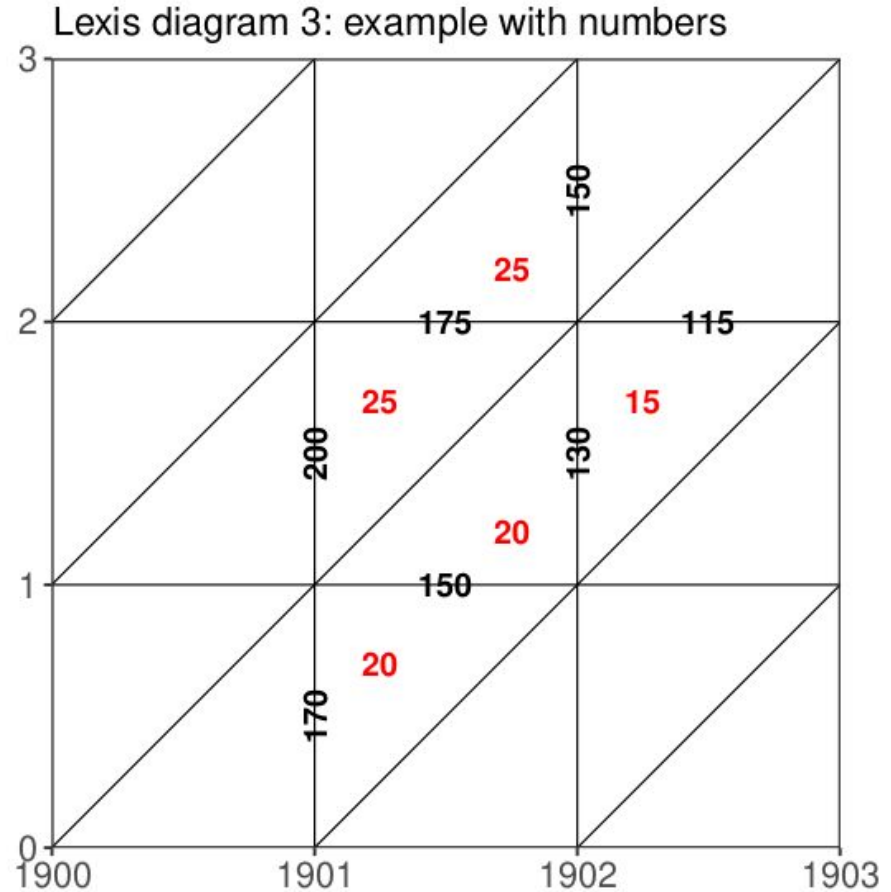


Probabilities vs rates

$$\textit{Probability} = \frac{\textit{Number of Occurences}}{\textit{Number of preceeding Events or trials}}$$

$$\textit{Rate} = \frac{\textit{Number of Occurences}}{\textit{Number of person - years lived}}$$

Probabilities vs rates



Crude rates

Korea 2014 data

E: 50,765,887 (HMD estimate)

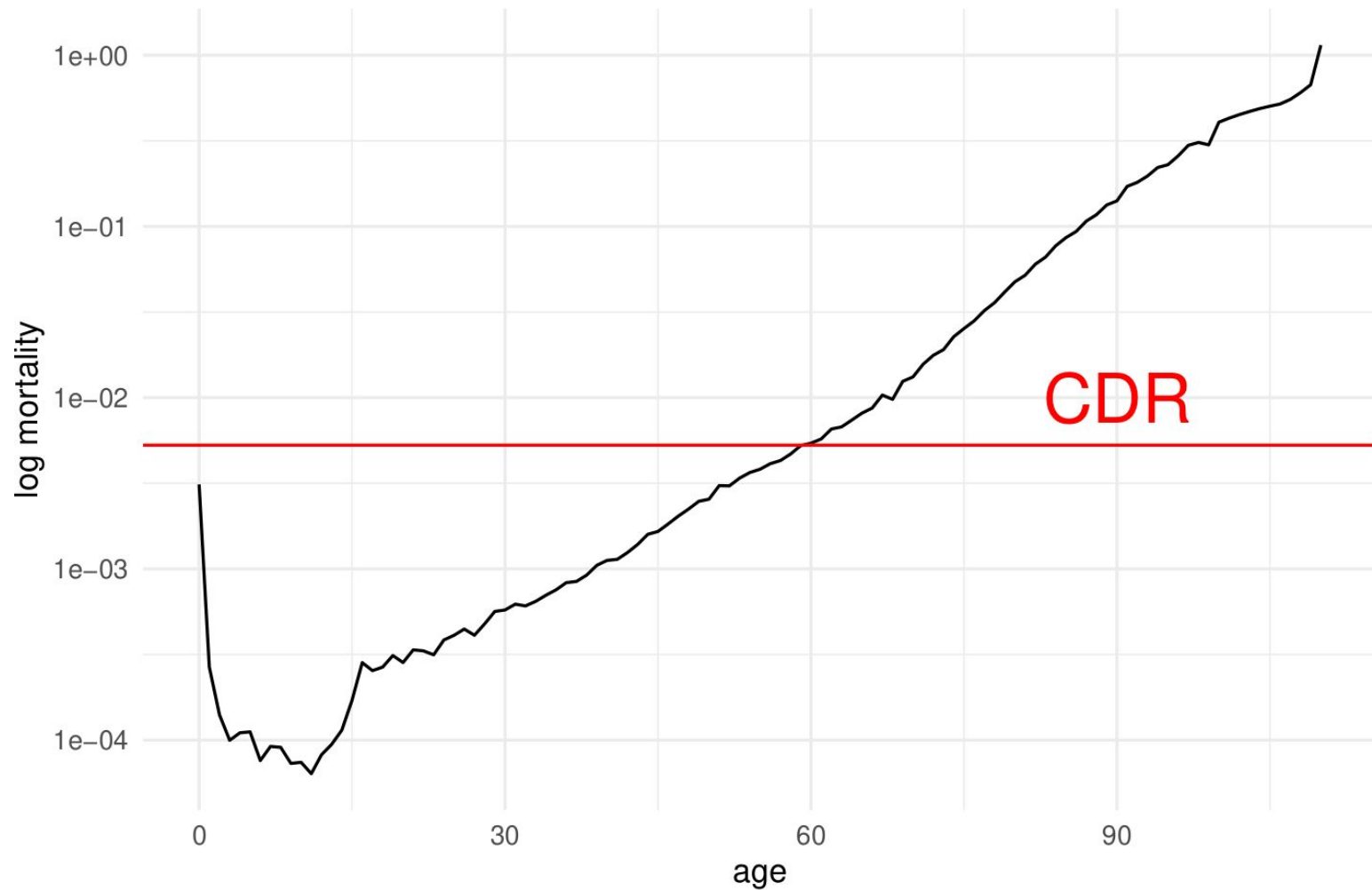
B: 435,435

D: 267,692

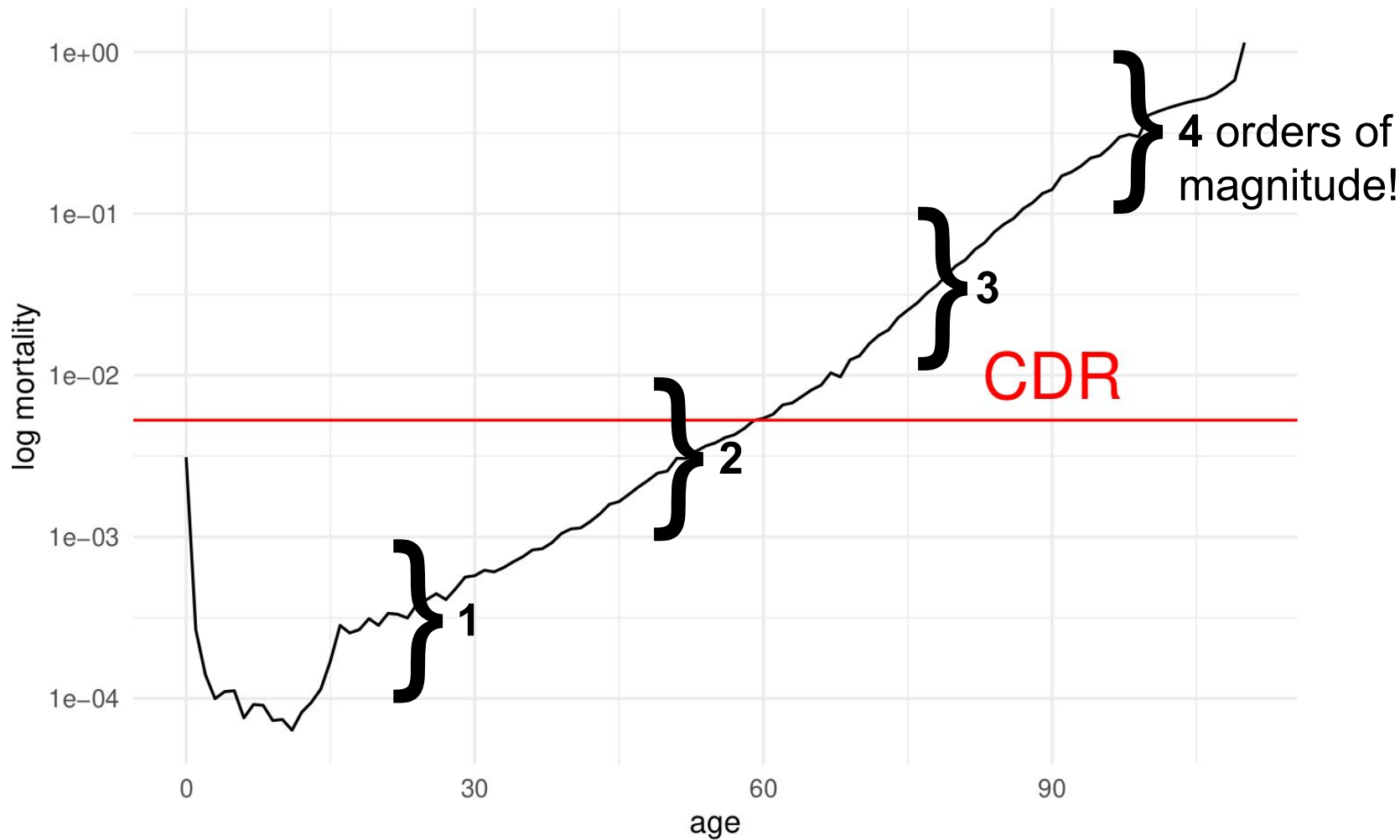
CDR(2014) = $D / E = 0.00527$ or 5.3 per 1000

CBR(2014) = $B / E = 0.00857$ or 8.6 per 1000

Age-specific mortality rates for Korea (total population, 2014)



Age-specific mortality rates for Korea (total population, 2014)



Time for us to move to R!