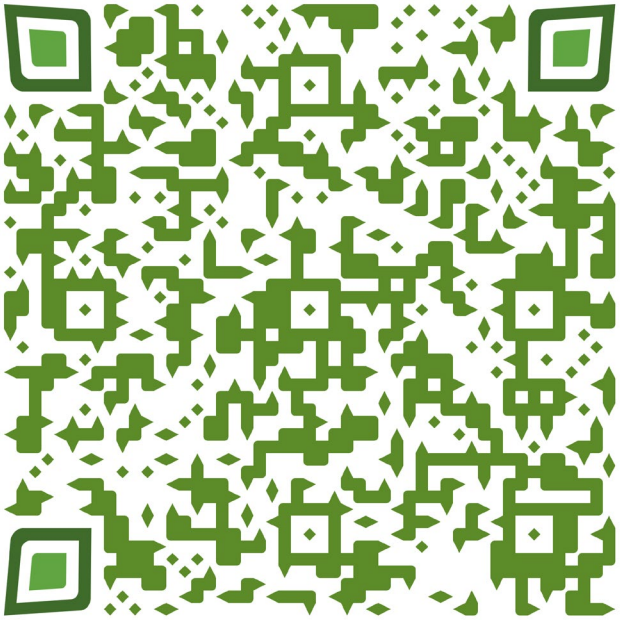
ALL files available here



Australian
National
University

Workshop on Decomposition Methods

Vladimir Canudas-Romo, Joo Won Park and Wen Su

What is Decomposition?

"In general, to decompose means to separate something into its constituent parts or elements or into simpler compounds. The decomposition methods used in demography also follow this separation principle by dividing demographic variables into specific components."

About Me

PhD

Univ. Groningen, NLD

Max-Planck Institute, DEU

Researcher

Penn State, USA

UC, Berkeley, USA

Faculty

Johns Hopkins University, USA

MaxO, DNK

ANU, AUS

About Joo Won

Bachelor & Master
SNU, SKO
Master & PhD
KDI, SKO

About Wen

Bachelor
UIR, CHN
Master & PhD
ANU, AUS

About You

And you?

Schedule

Day1. Direct and Indirect Standardization

Day2. Kitagawa and Vaupel & Canudas-Romo decomposition

Day3. Decomposing mortality measures

Day4. Decomposing fertility measures

Day5. Decomposition of alternative measures

Course style

Intensive: 25 hours

a) A demographic question?
b) Learn methods
c) R – data calculations

Course style

- Facilitation of **YOUR LEARNING**
- **ACTIVE** participation is highly recommended
- Follow-up readings and R-activities will increase learning

Direct and Indirect Standardization

Crude Death Rate

$$CDR(t) = D(t)/P(t)$$

Crude Death Rate

Table 1: CDR Comparison 2020

	Korea	Japan
CDR	5.9	11.1

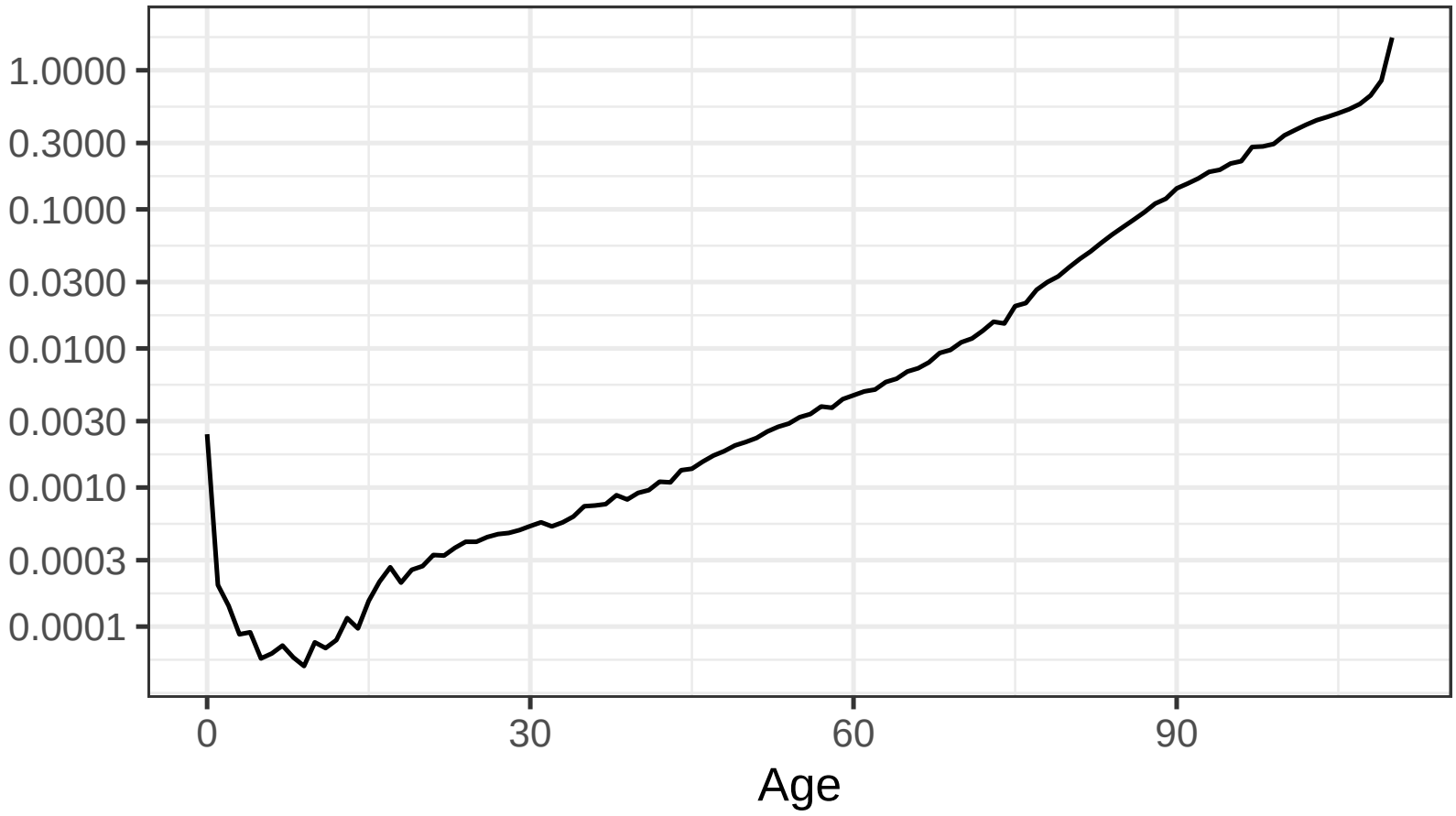
Note: Results are multiplied by 1000

Source: HMD

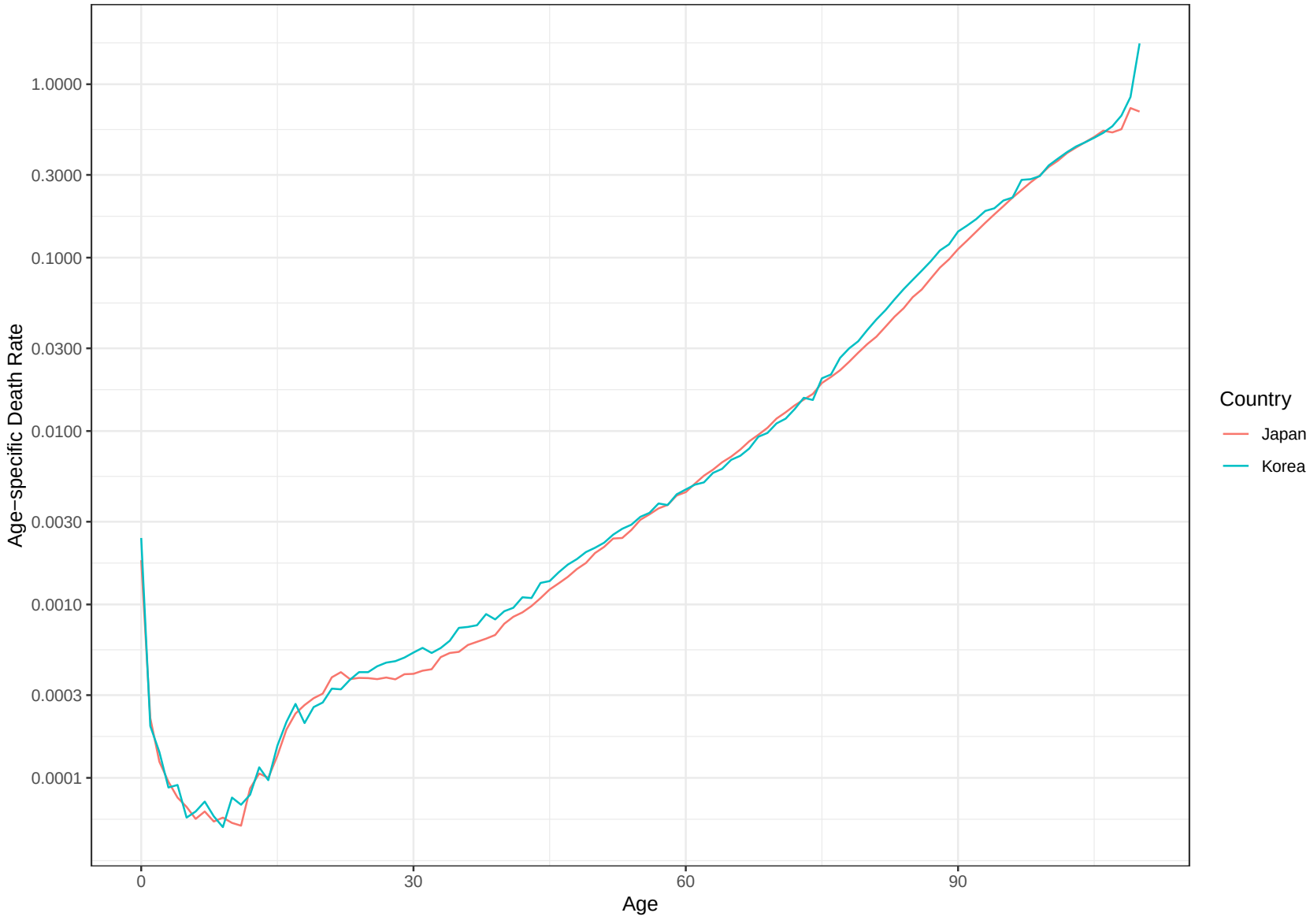
Crude Death Rate

$$CDR(t) = \frac{\sum_x m(x,t)P(x,t)}{\sum_x P(x,t)}$$

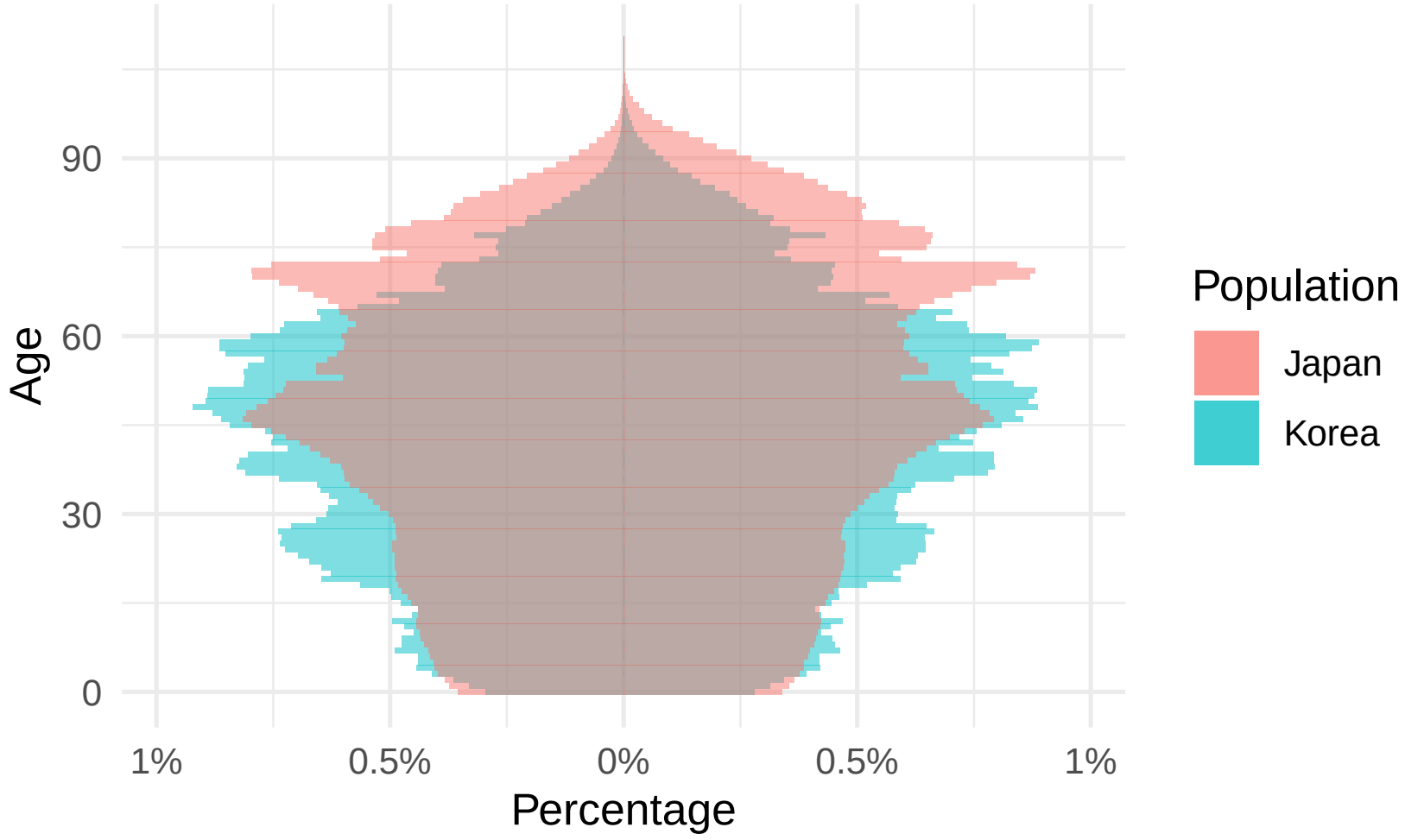
Age-specific Death Rate (Korea, 2020)



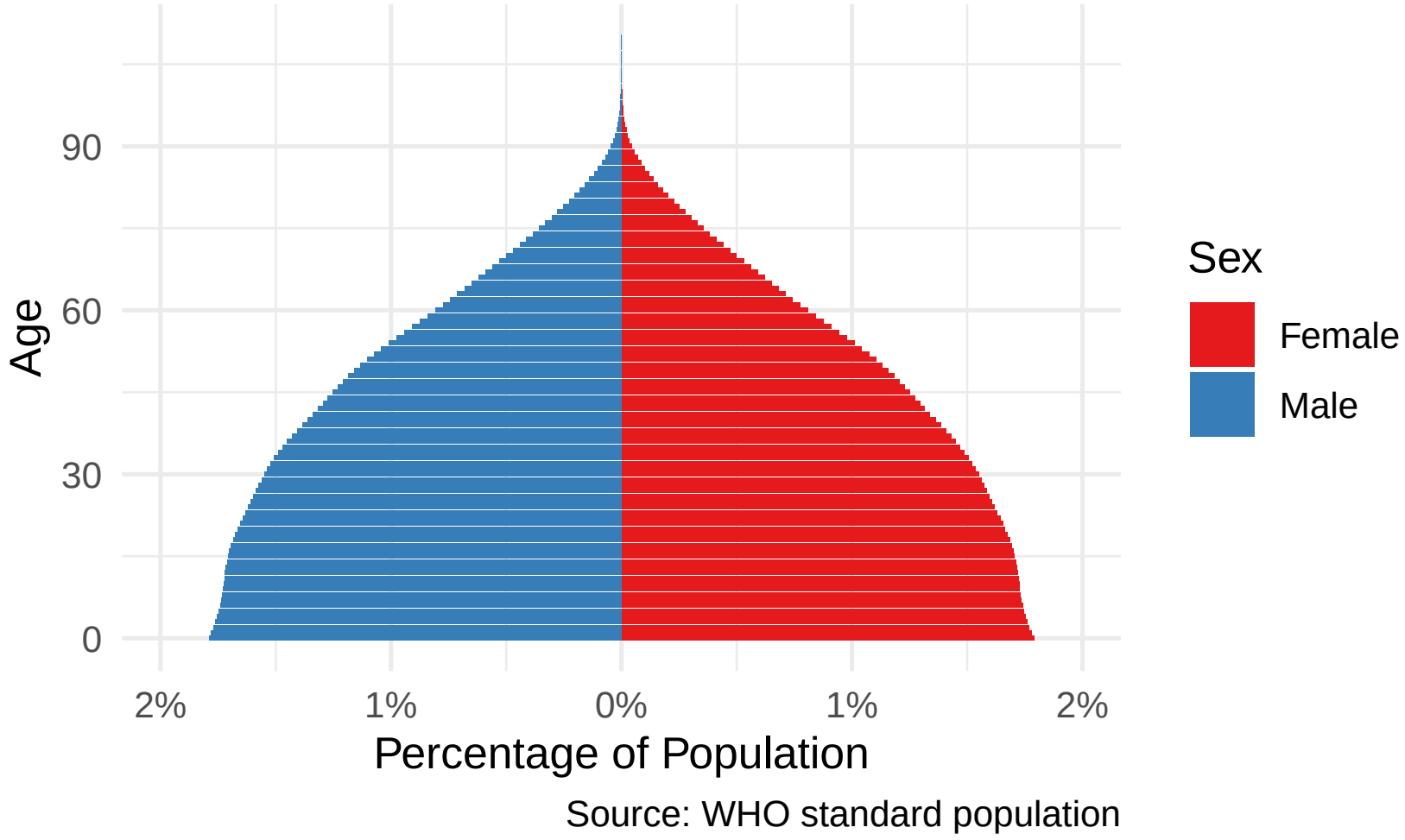
Age-specific Death Rates (2020)



Population Comparison between Korea and Japan (2020)



WHO Standard



Direct Standardization

Table 2: CDR comparison with WHO standard

	Korea	Japan
CDR	5.9	11.1
Standardized CDR	3.1	2.8

Note: Results are multiplied by 1000

Use a Different Standard

Table 3: Comparison of Standardized CDR

	Standard as JPN	Standard as KOR
Korea	12.7	5.9
Japan	11.1	5.3

Note: Results are multiplied by 1000

BREAK

Weighted Average

$$\bar{v}(t) = \frac{\sum_x v(x,t)w(x,t)}{\sum_x w(x,t)}$$

Weighted Average

$$\bar{v}(t) = \frac{\int_0^{\omega} v(x,t)w(x,t)dx}{\int_0^{\omega} w(x,t)dx}$$

General Fertility Rate

$$\bar{g}(t) = \frac{\int_{12}^{55} f(x,t) P_F(x,t) dx}{\int_{12}^{55} P_F(x,t) dx}$$

Mean Age of the Population

$$\bar{a} = \frac{\int_0^\omega aP(a,t)da}{\int_0^\omega P(a,t)da}$$

Crude Birth Rate

$$CBR(t) = \frac{B(t)}{P(t)}$$

Crude Birth Rate

$$CBR(t) = \sum_{x} f(x,t) c_F(x,t)$$

Direct Standardization

$$\bar{v}^s(t) = \frac{\int_0^\omega v(x,t)w^s(x,t)dx}{\int_0^\omega w^s(x,t)dx}$$

Indirect Standardization

$$\bar{v}^s(t) = \frac{\int_0^\omega v^s(x,t)w(x,t)dx}{\int_0^\omega w(x,t)dx}$$

General Fertility Rate

$$\bar{g}(t) = \frac{\int_{12}^{55} f(x,t) P_F(x,t) dx}{\int_{12}^{55} P_F(x,t) dx}$$

General Fertility Rate (Direct S)

Table 4: GFR comparison, Korea

	2000	2020
GFR	40.1	18.0
Standardized GFR	35.8	20.4

Note: Results are multiplied by 1000

Expected Number of Births

$$ENB = \int_{12}^{55} f(x) P_F(x) dx$$

Expected Number of Births (DS)

Table 5: ENB Comparison, Korea & USA, * 100,000

	KOR standard	USA standard
Korea	3.0	20.4
USA	5.6	37.5

Note: Results are divided by 100000

Mean Age of the Population

$$\bar{a} = \frac{\int_0^\omega aP(a,t)da}{\int_0^\omega P(a,t)da}$$

Mean Age of the Population (DS)

Table 6: MAP comparison

	Korea	Japan
MAP	42	47.2

Crude Death Rate (Indirect S)

Table 7: CDR comparison, Korea vs Japan

	Korea	Japan
CDR	5.9	11.1
Indirect Standardized CDR	5.6	11.9

Note: Results are multiplied by 1000

Expected Number of Deaths

$$END = \int_0^{\omega} m(x)P(x)dx.$$

Expected Number of Deaths (IS)

Table 8: END with indirect standard, Korea & USA 2020, * 100,000

	KOR standard	USA standard
Korea	3	5
USA	21	34

Note: Results are divided by 100,000

Assignment

Select one of the measures in the examples of this section and apply to a different population from HMD or HFD.

Submit ONE page: one Figure (or Table) and a brief paragraph describing the results that you find.