HACETTEPE UNIVERSITY INSTITUTE OF POPULATION STUDIES (HUIPS)

DEM 601 Introduction to Demographic Analysis

Lecture 4 handout

TOPIC
Age and Sex Composition

SESSION
15 October 2026

NAME

> **The shape of the lecture, not a substitute for it.** Every heading is a slide, in the order it is shown, with the formulas it carries and the terms it defines.

Opening

WHERE WE ARE **Opening up the number**

Sex Composition

COMPOSITION **Why age and sex come first**

Every event is age specific risk is not flat

Every crude rate is a weighted average of the rates by age

Composition is a record of everything already done

SEX RATIO **Men per hundred women**

$$SR = \frac{P^m}{P^f} \times 100$$

Sex ratio Everybody, men over women

Age-specific sex ratio Inside one age group

Sex ratio at birth This year's births, boys over girls

SEX RATIO **The one number biology fixes**

SEX RATIO **Where it is not biology**

Sketch the shape, and label the axes

SEX RATIO **Türkiye, age by age**

Sketch the shape, and label the axes

SEX RATIO **Three things move it**

$$SR_x = \underbrace{SRB}_{\text{where the cohort began}} \times \underbrace{\frac{S_x^m}{S_x^f}}_{\text{surviving to age } x} \times \underbrace{M_x}_{\text{net migration}}$$

Where it starts Every cohort enters at the sex ratio at birth, about , unless something interfered

Mortality wears it down Men die faster at every age. Life expectancy at birth in Türkiye is for men and for women

SEX RATIO **What it looks like at the top**

Sketch the shape, and label the axes

YOUR TURN **Which province has the fewest men?**

Sketch the shape, and label the axes

YOUR TURN **Both ends are composition**

Sketch the shape, and label the axes

Age Composition

AGE **Two answers to one question**

AGE **Five dates, ten answers**

STRUCTURE **Three blocks, two cuts**

Children Under ____

Working ages ____

Older people and over ____

DEPENDENCY **Four ratios from three numbers**

$$\text{Child} = \frac{P_{0\text{-}14}}{P_{15\text{-}64}} \times 100$$

$$\text{Elderly} = \frac{P_{65+}}{P_{15\text{-}64}} \times 100$$

$$\text{General} = \text{Child} + \text{Elderly}$$

$$\text{Aging index} = \frac{P_{65+}}{P_{0\text{-}14}} \times 100$$

Child Under 15 over the working ages ____

Elderly 65 and over, same denominator ____

General The first two added ____

Aging index 65 and over per 100 children ____

DEPENDENCY **Every country, one year**

Sketch the shape, and label the axes

DEPENDENCY **A century and a half of it**

Sketch the shape, and label the axes

DEPENDENCY **What the ratio is not**

No work in it no employment data ____

Not one-way care flows both ways ____

Unequal costs added anyway ____

DEPENDENCY **Moving the boundary**

MEDIAN AGE **One number for a whole structure**

YOUR TURN **Fix the dependency ratio**

THE ANSWER **Three fixes, and what each costs**

When the Ages Are Wrong

QUALITY **Two ways an age column fails**

The age is missing nobody wrote one down ____

The age is rounded to a preferred number ____

UNKNOWN **Putting back the ages nobody wrote down**

$$f = \frac{\text{total}}{\text{of known age}}$$

UNKNOWN **When pro rata is wrong**

HEAPING **Peaks at nought and five**

Sketch the shape, and label the axes

HEAPING **Whipple's index**

$$W = 100 \times \frac{5\left(P_{25} + P_{30} + \cdots + P_{60}\right)}{P_{23} + P_{24} + \cdots + P_{62}}$$

If nobody rounds The eight multiples hold a fifth of the range ____

Türkiye The census, both sexes ____

If everybody rounds Every answer a multiple of five ____

COMPARING **The index of dissimilarity**

$$ID = \tfrac{1}{2}\sum_i |a_i - b_i|$$

YOUR TURN **Clean is not the same as right**

THE ANSWER **What a clean score misses**

The Population Pyramid

PYRAMID **A histogram turned on its side**

Sketch the shape, and label the axes

PYRAMID **Three shapes, one year, one scale**

Sketch the shape, and label the axes

PYRAMID **Reading one as history**

Sketch the shape, and label the axes

PYRAMID **Türkiye, three dates**

Sketch the shape, and label the axes

PYRAMID **Türkiye, forwards**

Sketch the shape, and label the axes

PYRAMID **Two ways to mislead with one**

Sketch the shape, and label the axes

YOUR TURN **Date the narrowing**

Sketch the shape, and label the axes

THE ANSWER **The narrowing, dated**

CLOSING **What you can do now**