HACETTEPE UNIVERSITY INSTITUTE OF POPULATION STUDIES (HUIPS)

DEM 601 Introduction to Demographic Analysis

Lecture 2 handout

TOPIC
Demographic Indicators and Person-Years-Lived

SESSION
1 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 **From counting to comparing**

Why Indicators

COMPARISON **The same growth, twice**

DEFINITION **What an indicator is**

$$\text{indicator} = \frac{\text{numerator}}{\text{denominator}} \times k$$

YOUR TURN **Name the four parts**

Summarising a Distribution

ARITHMETIC **The mean**

$$\bar{x} = \frac{1}{n}\sum_{i=1}^{n} x_i$$

ARITHMETIC **The mean, worked**

ARITHMETIC **What the mean hides**

ARITHMETIC **The median**

An odd number of values the middle one is a real observation

An even number of values the middle falls between two of them

ARITHMETIC **The median, worked**

ARITHMETIC **The median of grouped data**

$$M = L_0 + \left(\frac{P/2 - \sum f_0}{f_0}\right) i$$

ARITHMETIC **Mean or median?**

YOUR TURN **Why the median, every time?**

Five Words, Five Meanings

COMPARISON **Ratio**

$$\text{ratio} = \frac{a}{b} \times k$$

COMPARISON **Proportion**

$$\text{proportion} = \frac{a}{a+b}$$

COMPARISON **Percentage**

$$\text{percentage} = \frac{a}{a+b} \times 100$$

COMPARISON **One question tells them apart**

RATE **A rate needs time**

$$\text{rate} = \frac{e}{PY} \times k$$

An event must occur something happens, not something is

A group must be able to experience it the denominator has to be at risk

A period must be stated a rate without time is not a rate

RATE **Crude, specific, standardised**

Crude everybody in the denominator

Specific only the people at risk

Standardised a common age structure imposed

RATE **Is it a true rate?**

$$CBR = \frac{\text{births in the year}}{\text{mid-year population}} \times 1000$$

$$IMR = \frac{\text{deaths under age 1}}{\text{live births in the year}} \times 1000$$

RATE **When a rate is mostly noise**

Sketch the shape, and label the axes

PROBABILITY **A rate is not a probability**

$$q = \frac{e}{P_0}$$

PROBABILITY **Prevalence and incidence**

YOUR TURN **Find what is wrong**

THE ANSWER **What was wrong, and the version to publish**

Person-Years Lived

EXPOSURE **What person-years are**

Sketch the shape, and label the axes

EXPOSURE **Reading a Lexis diagram**

Sketch the shape, and label the axes

EXPOSURE **Counting them, one village**

EXPOSURE **The mid-year population**

$$\bar{P} = \frac{P_0 + P_1}{2}$$

YOUR TURN **Three lives, one year**

THE ANSWER **Two and a half against three**

CLOSING **What you can do now**