HACETTEPE UNIVERSITY INSTITUTE OF POPULATION STUDIES (HUIPS)

DEM 601 Introduction to Demographic Analysis

Lecture 5 handout

TOPIC
Measures of Mortality

SESSION
22 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 **The oldest question**

The Crude Death Rate

MORTALITY **The event that happens once**

CRUDE RATE **Deaths per thousand people**

$$CDR = \frac{D}{PY} \times 1000$$

Deaths Registered in the year, every age

Person-years The mid-year population, from lecture 2

Crude death rate The first over the second

THE DENOMINATOR **Which population, exactly?**

TÜRKIYE **A rate that increased while mortality fell**

Sketch the shape, and label the axes

COMPARISON **Two countries the rate cannot separate**

THE WORLD **Where the crude death rate is highest**

Sketch the shape, and label the axes

YOUR TURN **Which country is dying faster?**

THE ANSWER **Three reasons, one number**

Age-Specific Death Rates

AGE-SPECIFIC **One age at a time**

$$ {}_nm_x = \frac{{}_nD_x}{{}_nPY_x} \times 1000$$

Safest age The trough of the curve

Age 75-79 times the safest age

THE AXIS **What a linear axis hides**

Sketch the shape, and label the axes

THE SHAPE **The J-curve, and the law under it**

Sketch the shape, and label the axes

WHY Every rate fell, and the crude rate increased

Sketch the shape, and label the axes

MEN A hump that is not biology

Sketch the shape, and label the axes

PROVINCES The same failure, inside one country

Sketch the shape, and label the axes

THE OPEN END The group with no upper limit

YOUR TURN Two rankings, one province

THE ANSWER Two headlines, one truth

Rates and Probabilities

CORRESPONDENCE The rule every rate obeys

THE RATE A rate lives in a square

Sketch the shape, and label the axes

THE PROBABILITY A probability lives in a parallelogram

Sketch the shape, and label the axes

DERIVATION m-type to q-type

Sketch the shape, and label the axes

CONVERSION From one to the other

$$q_x = \frac{2m_x}{2 + m_x} \qquad {}_nq_x = \frac{2n \cdot {}_nm_x}{2 + n \cdot {}_nm_x}$$

CHOOSING Which one can you actually have?

YOUR TURN Which quantity did they mean?

THE ANSWER People or a population?

Cause of Death

TWO MEASURES A share is not a risk

$$\text{share}_c = \frac{D_c}{D} \times 100 \qquad \text{rate}_c = \frac{D_c}{PY} \times 100{,}000$$

TÜRKIYE What people die of

Sketch the shape, and label the axes

BY AGE What each age dies of

Sketch the shape, and label the axes

YOUR TURN The share that doubled

THE ANSWER Four explanations, one table

CLOSING

What you can do now

Compute a crude death rate and say why it cannot compare two populations

Build the age-specific curve and read its trough, its climb and its male hump

Tell a rate from a probability draw either one on a Lexis diagram, and convert between them

Read a cause statistic as a share and as a rate, and know which one measures risk