HACETTEPE UNIVERSITY INSTITUTE OF POPULATION STUDIES (HUIPS)

DEM 601 Introduction to Demographic Analysis

Exercise Set 6

TERM	SET IN	WORTH	DUE
Fall 2026	lecture 6	2% of the final grade	**10 November 2026, 23:59**

Readings for this lecture

Rowland, Donald T. (2003) *Demographic Methods and Concepts*
Comparing Populations

Hinde, Andrew (1998) *Demographic Methods*
Comparing Mortality Experiences

Newell, Colin (1988) *Methods and Models in Demography*
Mortality and Life Tables

Wachter, Kenneth W. (2014) *Essential Demographic Methods*
Periods and Cohorts · Period Fertility

Carmichael, Gordon A. (2016) *Fundamentals of Demographic Analysis: Concepts, Measures and Methods*
Comparison: Standardization and Decomposition

How to hand this in. By 10 November 2026, 23:59. Show your working. A right number without it earns no marks. Name the standard beside every standardized rate, and give the units beside every rate. Give rates to two decimal places, and round only at the end. Late work receives no credit.

Every table on this sheet is also a CSV in the `data/exercise06` zip file handed out with it, so no figure needs typing in by hand.

The country of Kestria

Questions 1 to 3 are about Kestria's two largest districts, Aldor and Beris, and its smallest district, Corve. This table gives the mid-year population and the deaths registered in the year for Kestria, Aldor and Beris.

Age group	Kestria, people	Kestria, deaths	Aldor, people	Aldor, deaths	Beris, people	Beris, deaths
0-14	800,000	560	52,000	47	26,000	16
15-39	1,320,000	1,254	74,000	81	52,000	42
40-59	1,000,000	3,800	44,000	185	50,000	170
60-69	440,000	4,840	18,000	216	32,000	320
70-79	300,000	8,700	9,000	288	26,000	702
80+	140,000	13,720	3,000	315	14,000	1,288
All ages	**4,000,000**	**32,874**	**200,000**	**1,132**	**200,000**	**2,538**

Kestria, synthetic. Aldor and Beris have the same total population.

1. Where a difference comes from

25 marks

a. Compute the crude death rate per 1,000 for Aldor and for Beris. Give the difference between them in points. A newspaper sees only these two rates. Which district would the newspaper call less healthy?

b. For each district, compute two columns: the death rate in every age group, and each age group's share of the district's population. For **one** district, multiply each age group's rate by its share and add the results. Show that the sum equals the crude rate from (a). In one sentence, say what this shows about a crude rate.

c. Compare the two districts' rates from (b). In which age groups does Aldor have the lower rate, and in which does Beris? Compare this with your answer to (a), and explain why the two answers disagree.

2. One structure for everybody

15 marks

a. Use direct standardization, with **Kestria's** age structure as the standard. Give the standardized rate for Aldor and for Beris, with Kestria's crude death rate beside them. Which district is above Kestria's rate, and which is below it?

b. A colleague puts your answer to (a) in this sentence: "Aldor's age-standardized death rate is _____ per 1,000." If the standard is Aldor and Beris added together, Aldor's rate becomes 10.27 per 1,000. In two or three sentences: what is missing from the colleague's sentence, and why does it matter?

> **The death rates do not change in this question.** The age-specific rates from 1(b) stay the same. Only the age structure used as weights changes.

The district of Corve

Corve registered **334 deaths** in the year. This total is the only death count we have: there are no deaths by age. This table gives Corve's population by age.

Age group	0-14	15-39	40-59	60-69	70-79	80+	All ages
People	3,600	6,000	6,200	3,600	3,000	1,600	**24,000**

3. When a district is too small

25 marks

a. In two sentences, explain why direct standardization (the method of question 2) cannot be used for Corve, and what happens to a standardized rate when an age group's rate rests on only a few deaths. Then apply Kestria's age-specific rates to Corve's population to get Corve's **expected** deaths, and compute Corve's SMR. Explain your SMR in plain words. Begin with "If Corve's people had died at Kestria's rates, we would have expected …" and finish the sentence.

b. Dral is a neighbouring district. Dral registered 452 deaths. Using Kestria's rates, Dral's expected deaths are 402.6. Compute Dral's SMR.

   A regional report says that mortality is worse in Dral than in Corve, because Dral's SMR is higher. Give **two** reasons why this conclusion is not justified. For the first reason, think about how many deaths each district has. For the second, think about how each district's expected deaths are calculated.

> **Give each SMR per 100, to one decimal place.**

Early life in Kestria

Questions 4 and 5 use this table. Its first two columns of figures show two years counted with **no threshold**. This means every birth and every death is counted, however early the pregnancy ended. Its last column is the later year counted again with a threshold of **28 weeks or 1,000 g**. This means a birth or a death is counted only if the pregnancy reached 28 weeks or the baby weighed 1,000 g. That is why every figure in the last column is smaller.

	2010, No threshold	2025, No threshold	2025, 28 weeks or 1,000 g
Live births	62,000	54,000	52,900
Infant deaths	1,178	486	340
of which neonatal	620	324	190
Fetal deaths registered	620	378	300
Early neonatal deaths	434	248	140

4. The denominator that is not a population

20 marks

a. For the two **no threshold** years, give the infant, neonatal and postneonatal mortality rates. Why do these rates not need age-standardizing? Why could they not be age-standardized anyway?

b. Give the neonatal share of infant deaths in each of those two years. The share rises, and a minister concludes that newborn care has become worse. In two or three sentences, say what is wrong with this conclusion, and name the two rates you would show the minister instead.

> **Every rate in (a) has births as its denominator, and every rate falls.** If your answer to (b) says that any rate got worse, check your working.

5. Where the boundary is drawn

15 marks

Give the perinatal mortality rate for 2025 **twice**: with no threshold, and with the 28-week threshold. Be careful: the denominator is not live births. In two sentences, say what changed between the two rates and what did not.

Total: 100 marks

THE POPULATION BLUEPRINT · CHAPTER 6

Chapter 5 gave you a crude death rate, which you were told not to trust, and an age-specific curve. This chapter makes the fair comparison that the crude rate could not.

1. Standardize your population's death rate **directly** on Türkiye's age structure for the same year, and give Türkiye's crude rate beside it. Name the standard in the sentence, not in a footnote.
2. Compute your population's SMR against Türkiye's age-specific rates, and say how many deaths it rests on.
3. Give the infant, neonatal, postneonatal and under-five mortality rates for your population for the latest year available, each over births. Give the source of the births, and say whether it applies a gestational-age threshold. If you cannot find out, say so, and say how that limits your rates.