HACETTEPE UNIVERSITY INSTITUTE OF POPULATION STUDIES (HUIPS)

DEM 601 Introduction to Demographic Analysis

Exercise Set 5

TERM	SET IN	WORTH	DUE
Fall 2026	lecture 5	2% of the final grade	3 November 2026, 23:59

Readings for this lecture

Rowland, Donald T. (2003) *Demographic Methods and Concepts*
Mortality and Health

Hinde, Andrew (1998) *Demographic Methods*
The Measurement of Mortality

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

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

Carmichael, Gordon A. (2016) *Fundamentals of Demographic Analysis: Concepts, Measures and Methods*
Analysis of Mortality: The Life Table and Survival

How to hand this in. By 3 November 2026, 23:59. Show your working: an answer with no arithmetic behind it earns no marks even when the number is right. **Give the units every time:** a death rate is per 1,000, a cause-specific rate per 100,000. Quote rates to two decimal places and probabilities to five, and never round in the middle of a calculation. Late work receives no credit.

Every table on this sheet is also a CSV in the `data/exercise05` zip file handed out with it, so no figure needs typing in by hand.

The population of Toyland

Questions 1 and 2 use this table. Toyland has a crude birth rate of 30 per thousand, a mid-year population of 876,888 and a sex ratio of 0.97 males per female.

Age group	Males mortality rate	Males, %	Females mortality rate	Females, %
0	28.2	1.5	25.2	1.6
1-4	1.4	5.9	1.2	6.0
5-14	0.6	13.9	0.5	13.7
15-24	0.8	8.7	0.7	7.6
25-34	1.4	9.0	1.3	8.2
35-44	3.0	11.1	2.8	11.3
45-54	7.7	11.1	7.1	10.5
55-64	15.9	13.9	11.0	12.7
65-74	28.9	17.6	22.2	18.2
75+	82.5	7.3	68.2	10.2
Total		100.0		100.0

Toyland, 1980. Rates are per 1,000 a year. Each percentage column is that sex's own distribution across the age groups.

1. Toyland, counted

20 marks

a. Use the sex ratio to split the population into males and females.

b. Compute the deaths in each age group for each sex. Then give the total deaths and the crude death rate for males, females and both sexes.

c. Men have the higher death rate at **every** age, yet in one age group more women die than men. Which group? Explain in two sentences how both can be true.

Türkiye at the 2000 Census

Question 2 uses this table: the census cut into Toyland's age groups.

Age group	Males	Females
0	640,760	603,915
1-4	2,755,930	2,584,217
5-14	7,056,403	6,578,870
15-24	7,117,932	6,781,689
25-34	5,528,800	5,376,110
35-44	4,537,110	4,386,033
45-54	3,067,148	3,018,970
55-64	1,880,553	2,007,157
65-74	1,312,751	1,505,409
75+	436,812	603,977
unknown	12,536	10,845

TurkStat, 2000 General Population Census. The last row is people counted without a recorded age.

2. The same rates, a different population

20 marks

a. Redistribute the unknown ages pro rata, **separately for each sex**, as in Exercise Set 4. Give each sex's factor to six decimal places.

b. Apply Toyland's rates to this population. Give the deaths for each sex, the crude death rate for males, females and both sexes, and the rate of natural increase using Toyland's crude birth rate.

c. Compare the crude death rates for both sexes from 1(b) and 2(b), and give the difference in points. Then, for each sex, give the percentage of the population in the oldest age group (75+), for Toyland and for the census after your redistribution in (a). Set out the four figures in a small table: males and females in the rows, Toyland and the census in the columns. In one sentence: how much of the difference between the two crude death rates comes from a change in mortality?

> Toyland's death rates stay the same throughout this question. Only the population they are applied to changes.

Türkiye by age and sex, 2025

Questions 3 and 4 use this table: the deaths registered in the year and the person-years they divide by.

Age group	Male deaths	Male person-years	Female deaths	Female person-years
0-4	4,737	2,549,096	3,809	2,420,377
5-9	654	3,215,583	506	3,054,916
10-14	772	3,329,641	537	3,159,032
15-19	2,031	3,301,242	760	3,132,850
20-24	2,664	3,220,626	798	3,081,036
25-29	2,685	3,354,638	954	3,232,866
30-34	2,819	3,190,270	1,134	3,111,455
35-39	3,331	3,169,225	1,496	3,118,659
40-44	5,017	3,259,036	2,609	3,221,152
45-49	7,374	3,047,792	3,899	3,005,732
50-54	11,281	2,737,042	5,656	2,748,724
55-59	16,364	2,283,823	7,573	2,256,079
60-64	25,135	2,122,030	12,278	2,207,960
65-69	32,626	1,619,067	16,829	1,733,299
70-74	36,647	1,174,527	23,094	1,375,845
75+	116,641	1,382,636	138,974	2,062,304

TurkStat, Vital Statistics. Person-years are the mean of the two year-end register counts.

3. The curve

20 marks

a. Compute the age-specific death rate per 1,000 for males and for females in every age group.

b. Which age group has the lowest rate? Compute the rate for both sexes together in that group and in the oldest group, and divide the second by the first.

c. Compute the ratio of the male rate to the female rate in every group. Where does it peak, and at what value? In two sentences: what causes the peak, and what evidence from the lecture says it is not biology?

d. The last group is open-ended. What does that do to its rate, and why can it not be compared with another country's rate for the same group?

4. Rates and probabilities

20 marks

a. Convert the male rates from 3(a) for these five groups to probabilities of dying within the interval: 0-4, 5-9, 35-39, 55-59, 70-74. State the formula and its assumption. Which group in the table cannot be converted, and why?

b. For each sentence below: does the writer need a rate or a probability? Is the number they quoted the one they needed? If not, what goes wrong?

One"The death rate for men aged 60 to 64 is 12 per thousand, so a 60-year-old man has a 1.2 per cent chance of dying this year."
Two"We expect about 300 deaths in this district next year, given its age structure and the national rates."
Three"Nine in ten of the children born in that village in 1990 were still alive on their thirtieth birthday."

Causes of death

Question 5 uses this table: deaths from two causes, both sexes, with the two denominators.

	Respiratory	Neoplasms	All deaths	Mid-year population
2018	52,226	82,288	426,785	81,407,204
2025	74,440	79,091	491,684	85,878,556

TurkStat, Causes of Death Statistics. All deaths and the mid-year population: TurkStat, Vital Statistics.

5. Reading a cause statistic

20 marks

a. For each cause and each year, compute the share of all deaths and the rate per 100,000. Put the four pairs in one table.

b. One cause changed much more as a share than as a rate. Which one? Give both changes as a percentage of the starting value, and explain the difference in two or three sentences. Your answer must mention the other cause.

THE POPULATION BLUEPRINT · CHAPTER 5

Chapter 4 described your population by age and sex. This chapter measures how it dies.

1. Get deaths by sex and age group for the most recent year available, and the population by sex and age group for the same year. Name the source of each, and say whether both count the same people. Say whether deaths are counted by year of registration or of occurrence.
2. Compute the crude death rate. In one paragraph: what would you conclude if you stopped there, and what is wrong with that?
3. Compute the age-specific death rates for each sex. Comment about the low points, the climb, and the gap between the sexes.
4. Where does your source's last age group start, and what does that cost you?
5. Convert your rates to probabilities of dying within each interval, and state the assumption. You will need this column in chapter 7.
6. If your source publishes causes of death, give the three leading causes as shares and as rates, and the share of deaths with no cause. If it does not, say so and name who would publish them.

Bring the crude rate and the curve to class. Chapter 6 makes your crude rate comparable with anybody else's.

Total: 100 marks