

Demography and Ecology Written Preliminary Examination
January 8, 2001

Part I: Morning Exam

Answer either questions I.A. or I.B.

I.A. Describe **12** of the following **14** terms in a sentence or two. You can use formulas to supplement your definition if absolutely necessary, but don't use them as a substitute. In the case of demographers identified by name, comment briefly on one major contribution to the field of demography brought by this individual.

1. Intrinsic rate of increase
2. Length of a generation
3. Proportional hazard model
4. Gravity model
5. Life expectancy at age 30
6. Gross reproduction rate
7. Coale's and Trussel's marital fertility indices M and m
8. Contraceptive effectiveness
9. Crude rate of net migration
10. Competing risk process
11. Ron Lesthaeghe
12. William Brass
13. Alfred Lotka
14. O. Dudley Duncan

I.B. For any **seven** of the following **eight** pairs, state the relationships between the two parts, contrasting and comparing as appropriate:

1. direct standardization; indirect standardization
2. mover-stayer model; frailty model
3. parity progression; birth interval
4. unemployed; out of the labor force
5. period effect; cohort effect
6. stable population; stationary population
7. index of dissimilarity; Gini coefficient
8. metropolitan area; urbanized area

II. Answer either A or B

A. Childhood mortality rates that are higher for girls than for boys are common throughout South East Asia. Some analysts have suggested that as educational levels of mothers and access to health care services improve, we should find a reduction in sex mortality differentials in this region.

1. Discuss the evidence on excess female mortality in childhood, i.e., is there a generalized tendency to give preferential treatment to boys over girls? Does the evidence support the hypothesis that increased levels of schooling and access to health care services will reduce excess female mortality?
 2. What factors (behaviors) are likely to account for the mortality differentials you discussed above? You have available to you all the census, vital statistics and survey data you need to test the explanations you gave. How would you analyze your data to test your hypotheses? Give an example of how you would interpret your results. Be as specific as possible.
- B.** Review existing arguments about the likely future course of adult and old age mortality and morbidity in developed countries. According to these arguments, will adult and old age mortality and morbidity continue to decline, change a little or increase? What if any empirical evidence is consistent with these arguments? In light of your explanation, do you think sex differences in mortality and morbidity will continue to increase, decline or stay the same?

III. Answer *either A or B*

- A.** We plan to calculate the age-specific first marriage rates for women in the US in 1999 and employ them to produce a life table of age at first marriage

We plan to estimate ${}_nL_x$ using the equation:

$${}_nL_x = 0.5 \quad n \quad (l_x + l_{x+n})$$

1. What are the assumptions underlying this equation?
2. Within the age span for first marriage, at which ages is this equation inadequate to estimate ${}_nL_x$? In these age groups, will this equation exaggerate or understate the true value of ${}_nL_x$ (Note: you might want to draw a simple diagram to explain your answer)
3. What interpretation would you give to the value of e_0 in this life table?
4. We are worried that marriage rates might have been so low in 1999 that the life table will still have a substantial proportion of women still single at age 100 years. If this happens, will e_0 be a useful summary measure? If not, suggest an alternative measure.
5. We want to use this life table to estimate what proportion of the women now aged 25-29 will marry in the next five years. How would you do this? Explain the assumptions underlying this method.

B. The United Nations has sent you to Poplandia to be the first resident demographic advisor. You find yourself in a beautiful fertile land and begin investigating its mortality pattern. You find that at every age, the mortality rate is 10 per 1,000. From this single fact, you answer the following questions.

1. What is the life expectancy at age 80, the last age in your life table?
2. What is the life expectancy at birth?
3. What proportion of children born in Poplandia die before their 10th birthday? (You need not do the arithmetic, only set up the equation)
4. The population size is carefully controlled to be constant in Poplandia. What is the Crude Birth Rate of the population?
5. If the sex ratio at birth is 100 and males and females have exactly the same mortality rates, how would you go about calculating the General Fertility Rate?