

Demography and Ecology Written Preliminary Examination
August 2005
Morning Exam

I. Answer A or B

A. Many have argued that the level of schooling of the mother is a key factor in reducing child mortality in developing countries.

- a. Discuss the potential pathways through which mother's education is hypothesized to influence infant and child mortality.
- b. Critically review the evidence about the effects of maternal education on child mortality in developing countries with reference to the pathways you have identified above.
- c. Do you agree with the following statement about the relationship of maternal education and infant and child mortality? Why or why not?

"Although there is a strong correlation between maternal education and markers of child health, a causal relationship is a far from established."

B. The epidemiological transition framework, as proposed by Omran in 1971, predicted that mortality would stop declining once infectious diseases would be controlled for. Evaluate Omran's original framework using past and current evidence from Western countries, former communist countries, and developing countries.

II. Answer A or B

A. Discuss the Neo-Malthusian rationale for government intervention to control population growth and the counterarguments that have been raised over the past two decades or so to challenge it, especially those that have highlighted the role of the market or the role of social institutions. Evaluate these arguments by providing empirical examples.

B. A good deal of recent attention has focused on the residential segregation of the black population within American cities. Write an essay that focuses on the areas of agreement and disagreement among the major writers on this topic addressing the following issues:

- (1) The level and the history of black residential segregation in the U.S. as compared to the segregation of other groups both within the U.S. and in other countries.
- (2) The causes of this pattern of residential segregation in the U.S.
- (3) The place of demographic factors in these causal models.
- (4) Particular methodological issues facing those who do research in this general area.

III. Answer A or B (you can use a calculator or Excel)

A. The following equation is the Coale-Trussel fertility model:

$$r(a) = M * n(a) * \exp(m * v(a))$$

1. In words, give the usual substantive interpretation of indices M and m .
2. With age on the horizontal axis and fertility on the vertical axis, sketch the age pattern for two populations with the following M and m values (you can use the blank sheet provided to draw the graph):

Population 1: $M=1.0$ and $m=0$

Population 2: $M=.65$ and $m=0$

3. Identify a population that has fertility rates similar to each of these patterns. Identify the levels of the proximate determinants that might produce these index values.
4. Would the 'grandmother rule' (women stop having children once they become grandmothers) affect M , m , or both? Does this example suggest one must be cautious in assigning the standard substantive interpretation to M and m ?

B. You are studying a particular population and observe the following data:

Exact Age (x to $x+n$)	Number of females in census of 2000 (1)	Number of female births in age group, 2000 (2)	nL_x in 2000 female life table $l_0 = 1000$ (3)
0-15	16,000	---	13,000
15-30	11,000	1,100	11,000
30-45	7,000	700	9,000
45-60	4,000	----	6,000
60-75	1,000	----	3,000
75+	0	----	0

1. What is the life expectancy at birth in this population?
2. What is the gross reproduction rate in 2000?
3. Estimate the total fertility rate in 2000.
4. Estimate the net reproduction rate in 2000.
5. Estimate the intrinsic growth rate in 2000.
6. By comparing columns (1) and (3), indicate whether you think this population is growing, declining, or stationary. Why?

7. From the data provided, you can construct two “models” for this population, a stationary population model and a stable population model. Using your estimate in number 5, compare the age distributions in these two models.

Age Interval	Proportion in Age Interval, Stationary Model	Proportion in Age Interval, Stable Model
0-15		
15-30		
30-45		
45-60		
60-75		
75+		

- Characterize the difference between these age distributions
- Why do they differ?
- Which distribution will the population approach if age-specific fertility and mortality levels remain fixed?
- What will be the birth rate in this ultimate population?

Formulas:

$$r = \frac{\ln NRR}{T}$$

$$b = \frac{1}{\sum_{0,n} e^{-r(a+\frac{n}{2})} \frac{{}_n L_a}{l_0}}$$

$${}_n c_a = b e^{-r(a+\frac{n}{2})} \frac{{}_n L_a}{l_0}$$

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Afternoon Exam

I. Answer A or B

A. Some demographers claim that because of "tempo effects", current TFRs in many developed countries are artificially low. What is the argument for making this claim? Using elements of this argument and other theoretical considerations, explain why TFRs in countries where fertility is currently well below replacement levels are often projected to go up in the future.

B. Most theories of fertility contain implicit assumptions about "choice" and hence about the planned nature of entry into sexual activity, pregnancy, pregnancy resolution, and births.

- (1) What are the conceptual and methodological issues in assessing whether the above fertility components are planned or unplanned?
- (2) In the context of changing contraceptive regimes, discuss trends in these components for the U.S. during the past few decades.
- (3) Does "unplanned fertility" remain a problem in the U.S.? Why or why not?

II. Answer A or B

A. Why are better educated people more likely to migrate within most nations? Why is the distance between the origin and the destination positively correlated, in general, with education and skill levels of the migrants? Use a variety of perspectives in your answer.

B. The "demographic accounting equation" for expressing the components of population change is one of the first mathematical identities students of demography learn. More advanced demography students begin to appreciate some of the nuanced ways in which the various components are different. With respect to migration, review some of the ways in which migration, as a demographic event, differs from other demographic events such as births and deaths. Your answer should include attention to conceptual differences, measurement issues, the construction of appropriate rates, and theories underlying individual decision-making.

III. Answer A or B

A. Recent research on HIV/AIDS has focused on the socio-economic impact of HIV/AIDS on households and their members in developing countries. Write an essay in which you discuss how you would design a study to investigate empirically the socio-economic impact of HIV/AIDS on households. Assume that you can design data collection procedures for this project and the subsequent analysis. Discuss critically

questions of sample design, measurement as well as analytical and methodological issues involved with efforts to identify precisely the effects of HIV/AIDS on household outcomes (*e.g.* health, education, expenditures, coresidential arrangements).

B. Suppose you want to study the thesis that the likelihood to divorce is inherited.

- (1) What kind of data would you need?
- (2) What models would you use with these data?
- (3) What assumptions would you need to make in order to believe the outcomes?