

Sociology 756  
Demographic Techniques II

Spring 2019  
T, Th 11:00-12:15  
Van Vleck B231

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This course builds on students' previous demographic research training in three ways. We derive and develop the continuous-time extension of life table quantities. We grow the state-space in which we work and the types of possible transitions we consider. We cover a series of additional demographic models that reveal (1) how populations change as a function of the interaction of multiple demographic processes, (2) how aggregate population change and individual lifecourse experiences are connected, and (3) how demographic phenomena can be modeled in the absence of perfect information. Throughout the semester, we will consider how knowledge in the social sciences can be advanced with the tools of formal demography. As a secondary goal, the course is designed to augment students' data acquisition, management, and visualization skills through application of these methods in real-world inquiry.

Prerequisite: Sociology 674 or discussion with instructor.

Required Texts:

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Preston, S., P. Heuveline, and M. Guillot. 2001. *Demography: Measuring and Modeling Population Processes*. London: Blackwell Publishers.

Healy, K. 2019. *Data Visualization: A Practical Introduction*. Princeton University Press. [Here](#).

Recommended: Wickham, H. & G. Grolemund. 2017. *R for Data Science*. O'Reilly. [Here](#).

Additional readings can be found through jstor.org, Google Scholar, and the UW-Madison MadCat system. Note: students should not need to pay for these.

CDE:

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Soc 756 students are encouraged to attend the weekly Center for Demography and Ecology Seminars, held Tuesdays: 12:15-1:30 in 4308 Sewell Social Sciences. <http://www.ssc.wisc.edu/cde/demsem/home.htm>. On occasion, we will allocate a portion of Thursday seminars to a discussion of methods used in the presentations.

Computing:

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All of the problem sets for this class should be completed in R. R is more powerful than Excel for dynamic modeling. It is also the dominant programming language used by demographers; you will

find a great deal of shared code that facilitates more complex demographic analysis. Knowledge of R will augment your ability to efficiently answer a wide range of research questions and effectively communicate your research findings. This has value for securing research jobs within and beyond the academy. **Please submit programs with problem sets.** If you have not yet used R, do not fear! You are not alone in this class. We will start slowly and build each week. Download R here: <https://cran.r-project.org> and R Studio here: <https://www.rstudio.com>. Please plan to attend the [Intro to R](#) session taught by the SSC staff. Then work through the short chapters 5, 3, 4, and 10-12, in that order, of Wickham and Grolemund 2017.

#### Evaluation:

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Grades will be based on 12 problem sets (35%) and two exams (exam 1: 30%, exam 2: 35%). Problem sets will be posted to our canvas page Wednesdays at 5pm. They should take between 4 and 8 hours (including learning new R code) and are due the following Tuesday at the beginning of class. It is acceptable, even advisable, to work in groups on problem sets. You are responsible for turning in your own work. You are strongly encouraged to make sure you understand anything produced in partnership with classmates.

Extra credit (up to 5%): Adapting Demographic Methods to the Study of Complexity in Human Populations. We will discuss this critical-thinking, writing assignment in class on February 7. 2,000-3,000 words. Due May 3<sup>rd</sup>, uploaded to the Canvas page.

#### Anticipated Course Schedule:

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##### **January 22: Why Demographic Methods?**

Ryder, N. 1965. The Cohort as a Concept in the Study of Social Change. *American Sociological Review* 30(6):843-861.

Duncan, G.J. 2008. When to Promote, and When to Avoid, a Population Perspective. *Demography* 45(4): 763-784.

Healy. Chapter 1.

##### **January 24: Age-Specific Rates and Probabilities, Standardization, Decomposition**

Preston et al. Chapter 2

Smith, H. S.P., Morgan, T. Koropecjy-Cox. 1996. A Decomposition of Trends in the Nonmarital Fertility Ratios of Blacks and Whites in the United States, 1960-1992. *Demography* 33(2):141-151.

Ottolinger, P. [LexisPlotR](#).

##### **January 29, 31: Single Decrement Processes**

Preston et al. Chapter 3

Healy. Chapter 2 & 3

Chiang, C.L. 1984. [The Life Table and Its Applications](#). Krieger Publishing. Pages 147-152.

Wildeman, C. 2009. Parental Imprisonment, the Prison Boom, and the Concentration of Childhood Disadvantage. *Demography* 46(2):265-280.

Eloundou-Enyegue, P. 2004. Pregnancy-Related Dropouts and Gender Inequality in Education. *Demography* 41(3): 50-528.

### **February 5, 7: Modeling Mortality & Variance**

Healey. Chapter 4.

Chiang, C.L. 1984. The Life Table and Its Applications. Krieger Publishing.

Pages 78-85, 103-109, 153-167.

Molla, M.T., D.K. Wagener, and J.H. Madans. 2001. Summary Measures of Population Health: Methods for Calculating Healthy Life Expectancy. *Healthy People 2010*: 21. National Center for Health Statistics.

Efron, B. and R.J. Tibshirani. 1993. *Introduction to the Bootstrap*. Chapters 1,2, and 6.

### **February 12, 14: Multiple Decrement Processes**

Preston et al. Chapter 4

Hajnal, J. 1953. Age at Marriage and Proportions Marrying. *Population Studies* 7(2): 111-32.

Mensch, B.S., M.J. Grant, and A.K. Blanc. 2006. The Changing Context of Sexual Initiation in Sub-Saharan Africa. *Population and Development Review* 32(4):699-727.

Preston, S.H. 1970. The Age-Incidence of Death from Smoking. *Journal of the American Statistical Association* 65(331):1125-1130.

### **February 19, 21: Increment Decrement Processes**

Preston et al. Chapter 12

Rogers, A. 1975. *Introduction to Multiregional Mathematical Demography*. John Wiley and Sons. New York. Chapter 3.

Schoen, R. 1988. Practical Uses of Multistate Population Models. *Annual Review of Sociology* 14:341-61.

Heuveline, P., J. Timberlake, F. Furstenberg. 2003. Shifting Childrearing to Single Mothers: Results from 17 Western Countries. *Population and Development Review* 29(1): 47-71.

Land, K.C., J. M.Guralnik, and D.G.Blazer. 1994. Estimating Increment-Decrement Life Tables with Multiple Covariates from Panel Data: The Case of Active Life Expectancy. *Demography* 31(2):297-319.

### **February 26, 28: Measuring and Modeling Fertility, Demographic Translation**

Preston et al. Chapter 5

Bongaarts, J. 1982. The Fertility-Inhibiting Effects of the Intermediate Fertility Variables. *Studies in Family Planning* 13:179-189.

Schoen, R. 2004. Timing Effects and the Interpretation of Period Fertility. *Demography* 41(4): 801-819.

Bhrolcháin, M.N. 2011. Tempo and the TFR. *Demography* 48: 841-861.

Schoen, R. 2006. *Dynamic Population Models*. Springer. Chapter 6.

Schöley, J. Willekens, F. Visualizing Compositional Data on the Lexis Surface. *Demographic Research* 36(21):627-658.

Riffe, Tim. [The Joy of Fertility](#).

**March 5, 7, 9: Population Projection and Models of Renewal**

Preston et al. Chapter 6.

Lutz, W. W. Sanderson, and S. Scherbov. 2001. The End of World Population Growth. *Nature*. 412:543-545.

Mare, R. 1997. Differential Fertility, Intergenerational Educational Mobility, and Racial Inequality. *Social Science Research* 26(3): 263-291.

Preston, S.H. and C. Campbell. 1993. Differential Fertility and the Distribution of Traits: The Case of IQ. *American Journal of Sociology* 98(5):997-1019.

Mare, R. and V. Maralani. 2006. The Intergenerational Effects of Changes in Women's Educational Attainments. *American Sociological Review* 71:542-564.

Loveman, M. and J.O. Muniz. 2007. How Puerto Rico Became White: Boundary Dynamics and Intercensus Racial Reclassification. *American Sociological Review* 72(6):915-939.

**March 14: Midterm exam****March 19-26: No class. Spring Recess.****March 28, April 2, 4: The Stable Population Model, Population Momentum**

Preston et al. Chapter 7, pp. 138-161.

Preston, S.H. 1982. Relations between Individual Life Cycles and Population Characteristics. *American Sociological Review* 47: 253-264.

Alho, J.M. 2008. Migration, Fertility, and Aging in Stable Populations. *Demography* 45(3): 641-650.

Tucker, C. and J. Van Hook. 2013. Surplus Chinese Men: Demographic Determinants of the Sex Ratio at Marriageable Ages in China. *Population and Development Review* 39(2): 209-229.

**April 10: Introduction to Variable-r**

Preston et al. Chapter 8

Preston, S. and A. Coale. 1982. Age Structure, Growth, Attrition and Accession: A New Synthesis. *Population Index* 48(2):217-259.

Merli, M.G. 1998. Mortality in Vietnam, 1979-1989. *Demography* 35(3): 345-360.

Cai, Y. 2008. An Assessment of China's Fertility Level Using the Variable-r Method. *Demography* 45(2): 271-281.

**April 12. No class. Population Association of America meetings**

Attend sessions or read about new research [here!](#)

Post on the Canvas discussion board.

**April 16, 18: Estimating Demographic Quantities from Multiple Sources**

Preston et al. Chapter 9

Healy Chapter 8

Dobra, A., N. Williams, and N. Eagle. Spatiotemporal Detection of Unusual Population Behavior Using Mobile Phone Data. *PLOS One* 10(3).

- Schmertmann, C.P. 2002. A Simple Method for Estimating Age-Specific Rates from Sequential Cross-Sections. *Demography* 39(2):287-310.
- Guillot, M. and Y.Yu. 2009. Estimating Health Expectancies from Two Cross-Sectional Surveys: The Intercensal Method. *Demographic Research* 21(17): 503-534.
- Cowan, S. 2013. Cohort Abortion Measures for the United States. *Population and Development Review* 39(2): 289-307.
- Cesare N., H. Lee, T. McCormick, E. Spiro, E. Zagheni. 2018. Promises and Pitfalls of Using Digital Traces for Demographic Research. *Demography* 55(5): 1979-1999.

**April 23, 25: Population Selection and Lagged Selection Bias**

Wickham and Grolemond Chapter 28.

- Vaupel, J.W. and A.I. Yashin. 1985. Heterogeneity's Ruses: Some Surprising Effects of Selection on Population Dynamics. *American Statistician* 39(3):176-185.
- Dowd, J.B. and A. Hamoudi. 2014. Lagged Selection Bias and Artefactual Trends in Mortality. *International Journal of Epidemiology* 43(4): 983-988.
- Palloni, A. and J.R. Thomas. 2013. Estimation of Covariate Effects with Current Status Data and Differential Mortality. *Demography* 50(2): 521-544.
- Engelman, M., V. Canudos-Romo, and E. Agree. 2010. The Implications of Increased Survivorship for Mortality Variation in Aging Populations. *Population and Development Review*. 36(3): 511-539.

**April 30, May 2: Population Dynamics and Kinship Structure**

- Watkins, S.C., J.A. Menken, J.G. Bongaarts. 1987. Demographic Foundations of Family Change. *American Sociological Review* 52:346-358.
- Song, X. and R. Mare. 2019. Demographic Transitions, Shared Lifetimes, and Multigenerational Transmission of Inequality. *Demography*.
- Zagheni, E. The Impact of the HIV/AIDS Epidemic on Kinship Resources for Orphans in Zimbabwe. *Population and Development Review* 37(4):761-783.
- Murphy, M. 2004. Tracing Very Long-Term Kinship Networks Using SOCSIM. *Demographic Research* 10: 171-196.
- Chung, P. and M. Alexander. Kin Dependency Ratios: An Extension and Application of the Goodman Method for Estimating the Availability of Kin. [Here](#).
- Umberson, D. and colleagues. 2017. Death of Family Members as an Overlooked Source of Racial Disadvantage in the United States. *Proceedings of the National Academy of Sciences* 114(5): 915-920.

**Final Exam** (cumulative): To take place between 5/6-5/9. Date to be discussed in class.