

MSP-E2.2

45 Hours

SPATIAL DEMOGRAPHY

I. Concepts and Theories

Demography as a spatial science; difference between spatial demography and population geography; Spatial pattern and spatial process; location, distance and area; Distance and decay relationship and spatial hierarchy; space, place and region; Type of spaces- concrete and abstract space; absolute, relative and relational spaces.

Understanding demographic process by geographical scale; nature of disaggregated data- Census and secondary sources; Linking micro and macro demography in a spatial frame.

Application of spatial frameworks to demographic process; Space, culture and fertility; Spatial pattern of mortality and diseases; Distance as factor in access to health care and health planning; Migration and distance- gravity model; space, culture and migration; urban sprawl and sub-urbanization.

II. Statistical and Geospatial Data and Software

Spatial Concepts and Cartography: Spatial parameters: Site and location; Scale; Plane and spherical coordinate, Map Projection-UTM, Types of maps: cadastral, toposheet, thematic, digital; Representation of spatial and non spatial data;

Introduction to geospatial software: GIS: discrete data: point, and polygon data, Raster and vector data, layouts preparation. Geocoding and basics of digitization in ArcGIS

Introduction to Geoda: ESDA in (Exploratory Spatial Data Analysis); Local Indicators of Spatial Association (LISA)

Statistical Concepts: Bar diagram, Frequency polygon, Frequency curve; Test of significance, confidence intervals, Univariate and Multivariate Statistics: Correlation and Regression, Matrix algebra; Auto-correlation; kriging, Moran's I index

Introduction to Statistical software: SPSS, STATA, R

III. GIS and Spatial Analysis of demographic data

Representation of statistical data and automated cartography (Lab based exercises):

- a) Population distribution map of India using dot and sphere/circle, cubes, combined; Cartograms
- b) Density map by Choropleth and population density gradient by Isopleth;
- c) Fertility, mortality and natural growth of population by Polygraph.
- d) Measurement of population concentration by cumulative curve.
- e) Migration flow by Carogram

Concept and application Models:

- a) Spatial Lag and Error Regression Modeling;
- b) Multilevel modeling (hierarchical linear modeling);
- c) Geographically Weighted Regression;
- d) Spatial Pattern Analysis;
- e) Urban and city level projection

Reading List

Essential Readings :

1. Anselin, L. (2005). Exploring Spatial Data with GeoDa: A Workbook. UC Santa Barbara, CA: Center for Spatially Integrated Social Science. available on <http://geodacenter.asu.edu/>.
2. Bailey, T. and Gatrell, A. C. (1995): Interactive Spatial Data Analysis. Harlow, Longman.
3. Barbara E., Ronald R. R., Stephen J. W., Tom P. E. and Sara R. C. (1997). *Geographic Information Systems, Spatial Network Analysis, And Contraceptive Choice*. Demography. 34(2): 171-187.
4. Bonham, Carter G.F. (1995): Information Systems for Geoscientists—Modelling with GIS. Pergamon, Oxford.
5. Chen, X., Orum A.M., and Paulsen K.E. (2013). Introduction to Cities: How Place and Space shape Human Experience. West Sussex, Wiley-Blackwell.
6. de Castro M. C. (2007). *Spatial Demography: An Opportunity to Improve Policy Making at Diverse Decision Levels*. Population Research and Policy Review 26: 477-509.

7. Dorling, D. and Fairborn, D. (1997): Mapping. Ways of Representing the World. Longman, Harlow.
8. ESRI (1993): Understanding GIS. Redlands, USA
9. Fraser Taylor, D.R. (1980): The Computer in Contemporary Cartography. New York, John Wiley and Sons,
10. Griffith, D. A. and Amehein (1997): Multivariate Statistical Analysis for Geographers. Englewood Cliffs, New Jersey, Prentice Hall.
11. Goodchild, M.F. and Janelle, D.G. (eds). (2003). Spatially Integrated Social Science: Examples in Best Practice. Oxford University Press.
12. John R. Weeks. 2004. The Role of Spatial Analysis in Demographic Research. Chapter 19 (pp. 381-399) in M.F. Goodchild and D.G. Janelle (eds.) (2004) Spatially Integrated Social Science New York, NY, Oxford University Press.
13. Kurland K. S., Gorr W. L. (2007). GIS Tutorial for Health. Redlands, CA, ESRI Press.
14. Lo, C.P. and Yeung, A. K. W. (2002): Concepts and Techniques of Geographic Information Systems. New Delhi, Prentice Hall of India.
15. Massey, D. (2008). for space. New Delhi, Sage Publications Ltd.
16. Monkhouse, F.J. and Wilkinson, H. R. (1962). Maps and Diagrams. London, Methuen and Company Ltd.
17. Parker R. N., Asencio E. K. (2008). GIS and Spatial Analysis for the Social Sciences: Coding, Mapping, and Modeling. New York, NY, Routledge/Taylor & Francis.
18. Paul V. (2007). *Demography as a Spatial Social Science*. Population Research and Policy Review 26: 457-476. (plus Introduction to the special issue of PRPR on Spatial Demography) pp. 455-456).
19. Editor. (2007). *Introduction to the Special Issue*. Population Research and Policy Review 26: 455-456).
20. Reibel, Michael, (2007). *Geographic Information Systems and Spatial Data Processing in Demography: A Review*. Population Research and Policy Review 26: 601-608.
21. Robinson, A. H. H., Sale R., Morrison J. and Muehrcke, P. C (1984) Elements of Cartography . New York, John Wiley and Sons.
22. Shaw, G. and Wheeler, D. (1994). Statistical Techniques in Geographical Analysis. Englewood Cliffs, New Jersey, Prentice Hall.

23. Soja, E. W. (1996). *Thirdspace: Journeys to Los Angeles and Other Real-and-Imagined Places*. Wiley-Blackwell
24. Sparks Corey. (2013). *Spatial Analysis in R: Part 1*. Spatial Demography 1(1) 131-139
25. Sparks Corey. (2013). *Spatial Analysis in R: Part 2*. Spatial Demography 1(2) 219-226
26. Zhu E J. and Chi G. (2008). *Spatial Regression Models for Demographic Analysis*. Population Research Policy Review 27:17–42 DOI 10.1007/s11113-007-9051-8