Future Directions in Spatial Demography

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Demographers have made much of time, conceptualizing it variously in terms of age, period, and cohort; individual, family, and historical time; and the like. There is no analogy in demographic thinking for space . . .

(Entwisle and Gutmann, 2001)

Spatial demography has been gaining momentum during the last decades. For example, in 2001 the Demographic and Behavioral Sciences Branch (DBSB) of the Center for Population Research (CPR) (National Institute of Child Health and Human Development-NICHD) included it among the topical areas to explore or to expand within the discipline. Later, two special issues of Population Research and Policy Review (26: 5/6, 2007 and 27: 1, 2008) and a special issue of PNAS (Proceedings of the National Academy of Sciences) (102:43, 2005) have been dedicated to this topic.

Several concurrent factors are behind this, among them the growing availability of spatial (geo-referenced) population data, improvements in computers and software (free and commercial) and, more broadly, the emergence of spatiality target (i.e., localized) policies and assessments of social and other contexts of demographic outcomes (e.g., neighborhood effects) (de Castro, 2007), all this within the framework of the spatial turn in social sciences (i.e., the consideration of social processes embedded within spatial context) (Goodchild and Janelle, 2004; Voss, 2007).

A spatial or geographic approach to social phenomena needs to take into account the effect of purely spatial factors like location and distance, as well as the effect of contextual and environmental factors that define specific places, for example local cultural characteristic or socioeconomic status (Wieczorek and Hanson, 1997). Spatial factors are usually defined in terms of distance and area, of intersection of space with specific social and physical contexts, and of the relative position in space and place. “Spatial dimension” includes variability across space, the effects of scale, and the significance of place. This dimension is implicit in the distribution of hazards, population settlements, and demographic processes; or in the effects of regional/local variability in vulnerability to climate changes impacts.

Both the relative position in relation to other points in space and the individual and social significance that people attribute to a particular locality are important in order to understand and explain the patterns of distribution of social phenomena in space. Consideration of the spatial dimensions of an event, phenomenon or process implies research on the definition and measurement of place, which is defined by the social structure, social relationships and living experience. “Place” is matched with “meaningful space” (Tuan, 1977), and explained by people’s experiences. Within demography, it is common to refer to place as “local social and
spatial contexts” (Entwisle, 2007: 687), where “local” could be as broad or narrow as rural and urban areas, or neighborhoods. Instead, “space” tends to be defined by topological rules, by Euclidean distances, as in Tobler’s classical first rule of geography1 (Tobler 1970:236).

If “place” and “space” are both part of spatial demography, how are they related? And how, in turn, are they related to scale? Work with space or place is always linked to the issue of scale—which could range from global to dwellings—and particularly to the integration or articulation across scales, to some extent similar to nested models linking different levels of analysis. Both the scale of the spatial unit and the scale of analysis affect the visualization of the processes and consequently our conclusions about them. For example, the IPCC has argued that “the choice of scale at which impacts are examined is also crucial, as considerations of fairness, justice or equity require examination of the distribution of impacts, vulnerability and adaptation potential, not only between, but also within, groupings” (Schneider et al., 2007).

Selecting the right scale or resolution is an important step in the design, but this is not always discussed, made explicit or justified.

Growing availability, quality and appropriateness of geo-referenced data (from coarse to high spatial resolution) has been an important factor in the advance of spatial demography. Examples include the Landsat collection being available online, Google Earth, the attention to census geography and GIS (particularly to actually making it available) in the 2010 round of censuses, and the inclusion of GPS information in Demographic and Health Surveys and in the Multiple Indicators Cluster surveys. There is, however, ample room for improvement, as these developments are very heterogeneous across and within countries. In particular, the construction of spatial time series is challenge by diachronic and synchronic mismatches between population and spatial data.

Spatial demography can be approached from different points of view. Some researchers define it very broadly: “spatial demography extends across space and time, from the changing face of everyday world of present experience to glimmerings of our remote origins and interconnections. It brings sciences together: geography and demography, political and social sciences, mathematics, statistics, physics and biology” (Wachter, 2005). For others, it is “the formal demographic study of areal aggregates, i.e., of demographic attributes aggregated to some level of geographic hierarchy” (Voss, 2007) and or “demography viewed from a spatial perspective. Spatial, together with temporal, variations in mortality, fertility and migration are studied as preliminaries to the investigation of population structure in its entirety” (Woods, 1984).

Instead, other authors are much more specific, affirming that “spatial demography includes only research on the core of demographic analysis, defined by the three demographic components—fertility, mortality and migration—and by models of population size, change and composition. It implies the use of formal statistical modeling, such as techniques in spatial statistical analysis, geostatistics, Bayesian modeling, and spatial econometrics, as well as population models in three dimensions: age, time and space” (de Castro, 2007).

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1 “Everything is related to everything else, but near things are more related than distant things”
These different definitions are a first glimpse of the different ways to address space within demography, from mapping demographic variables (visualization) to Bayesian models to autoregressive models. Along this continuum, there is certainly increasing methodological sophistication (de Castro, 2007), but I think that the question remains, does this welcomed sophistication in methods imply a better understanding of the underlying processes?

In summary, a number of challenges remain -- among them confidentiality issues (VanWey et al. 2005), the implementation of interdisciplinary research, the development of theory and the implementation of training on spatial analysis (de Castro, 2007). I think that the timing of the Conference is excellent to take stock of the field so far, address the remaining issues, and plan future steps.

Cited References


