

A spatial analysis of urbanization, migration and cardiovascular disease risk factors in China: a regional comparison to inform future health care policy for cardiovascular disease prevention

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Abstract

China is rapidly urbanizing, and rural-urban migration represents a large proportion of the increase of population in cities. Improving standard of living and life expectancy resulting from this accelerated change are countered by the increase in cardiovascular disease (CVD) risk factors associated with urbanization. Integrating data from different sources in a GIS environment, regional differences in CVD factors, rural-urban migration patterns, urbanization trends and selected quality of life indicators in China ca2000 were analyzed. The objective is to generate regional-specific inputs for a CVD policy model that can inform future urban and rural targeted health care policies. Preliminary results from this exploratory spatial analysis (using Moran's I, LISA, and geographic regression in GEODA) show a broad regional heterogeneity in urbanization and migration, with W-E differences somewhat larger than the N-S ones.

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Extended abstract

Introduction

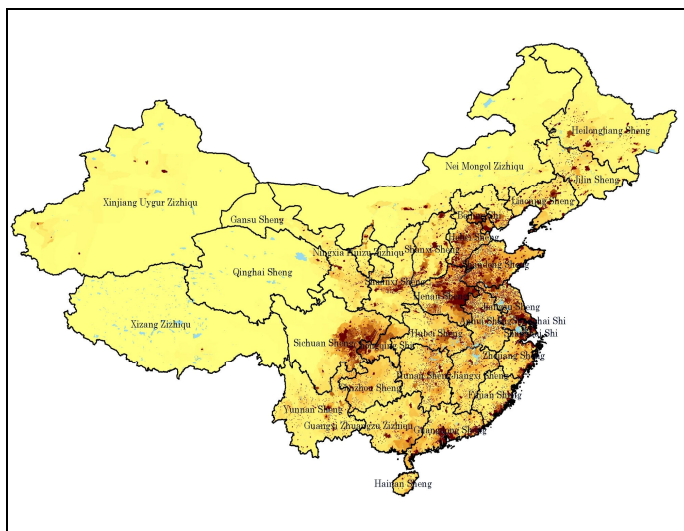
Rapid economic growth and urbanization in developing countries are associated with improved standard of living and life expectancy but also with some adverse effects on health, for example increasing cardiovascular disease (CVD) risk factors (Gao et al. 1999 ; Ramachandran et al. 2008).

China is not the exception, with a growing incidence of heart disease among adults and concomitant prevalence of cardiovascular disease risk factors (Muntner et al. 2005). The Cardiovascular Disease Policy Model-China is a computer predictive model developed at Columbia University that can be used to assess the effectiveness and cost-efficiency of targeting CVD prevention efforts to urban areas in China (Moran et al. 2007; Moran et al. 2008). The general objective is to contribute to generate regional-specific inputs for a CVD policy model that can inform future health care policies in the country, by examining regional differences in CVD factors, rural-urban migration patterns, urbanization trends and selected quality of life indicators in China ca 2000.

China demographic trends

China's current demographic trends show declining population growth, accelerate age transition, accelerate urban transition, increasing rural-urban and urban-urban migration, and uneven population distribution (map 1) with both East-West and North-South differences (Riley 2004; Kam 2007; Kam and Yeng 2008; Poston and Li 2008).

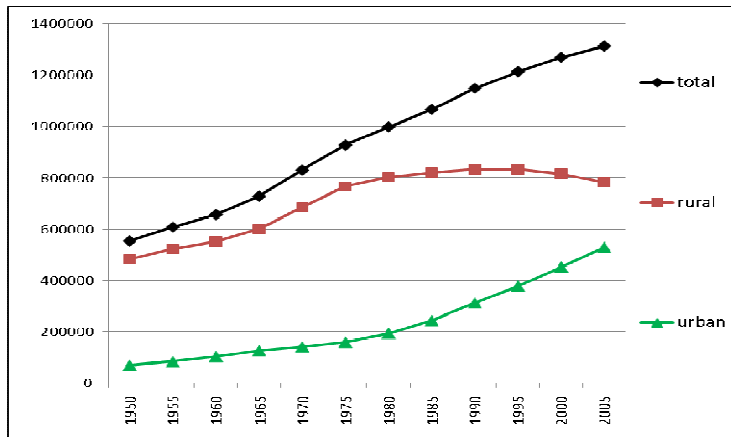
Map1: Urban population distribution, China ca 2000



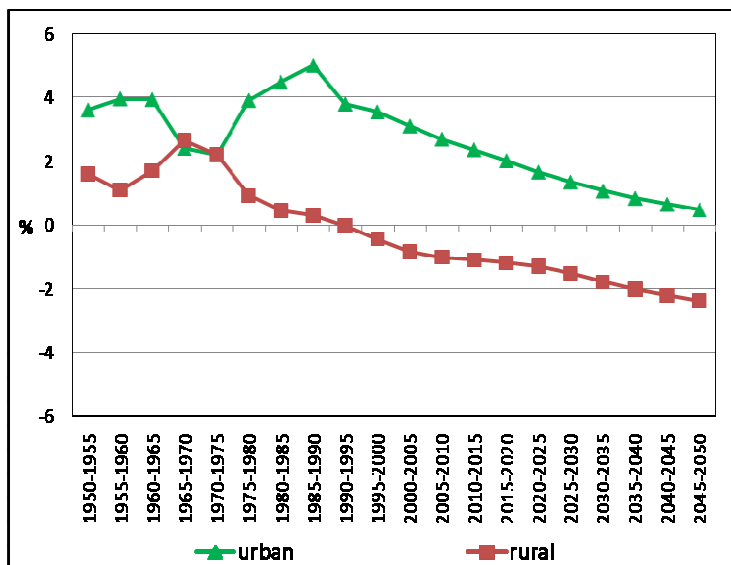
Source: CIESIN. Global Rural Urban Mapping Project (GRUMP)

Different sources assign different rates and gradients to these trends (e.g. Kam 2007). But there is little doubt that, since the late 1970s, China is rapidly urbanizing, as can be seen in Graphs 1 and 2. By 2005, the country's total population (1,312,979, 000) was 60% rural (782,320,000) and 40% urban (530,659,000) (United Nations 2007). Estimated and projected urban and rural population growth rates, displayed in graph 2, show a similar trend, with the largest gap in terms of growth rates in the early 1990s.

Graph 1: Evolution of total, urban and rural populations, 1950-2005



Graph 2: Estimated and projected urban and rural growth rates



Differently from other developing countries, urban population growth in China is still driven more by internal migration (60%) than by natural urban growth (40%) (Montgomery 2008:763). This is likely related to the strict fertility control program and to the relaxation of restrictions to mobility, starting in the 1980s (Fan 2005; OTHERS?). Migration flows are still predominantly

rural-urban, but urban-urban flows are increasing urban-urban. These flows are closely related to both economic development and growing inequality (Fan 2007, 2008).

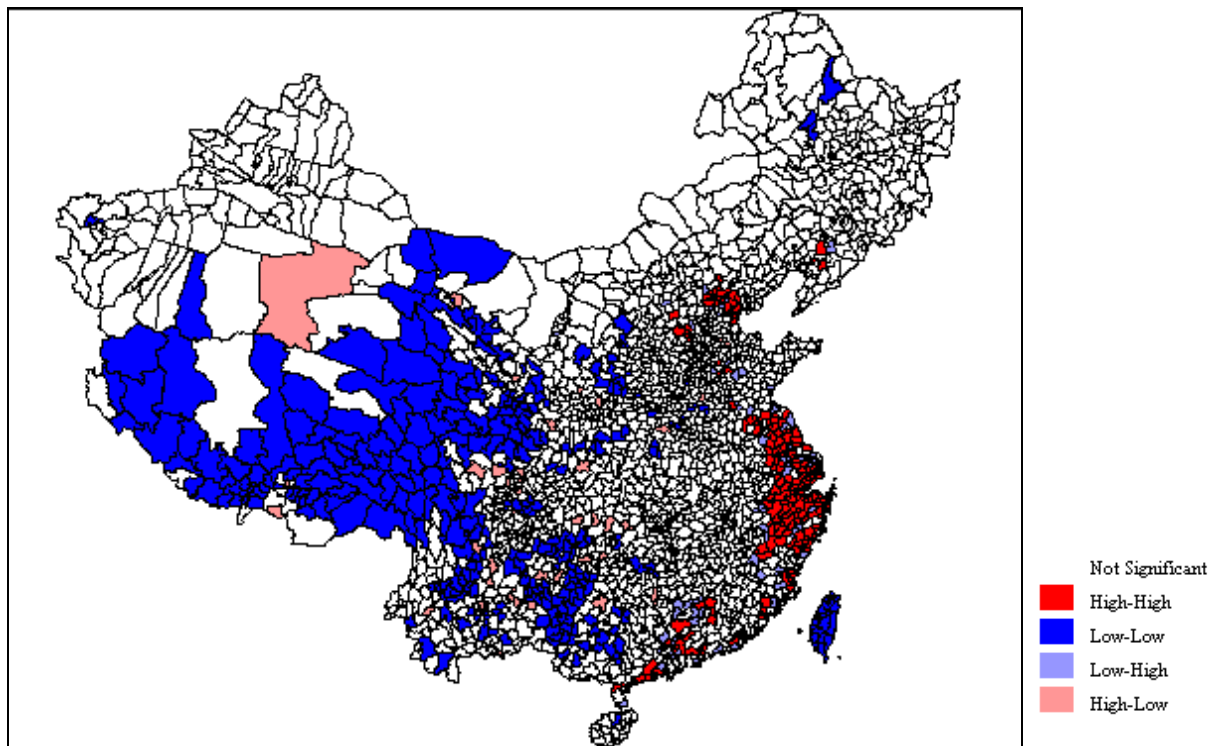
Data and Methods

The data for the presentation come from the integration of different sources (China 2000 population censuses, GRUMP, the International Collaborative Study of Cardiovascular Disease in Asia database, bibliographic sources on migration trends in China) in a GIS environment. These data are analyzed using exploratory spatial data analysis techniques (Moran's I for spatial autocorrelation testing, LISA for the components of clustering, and geographic regression for testing association among variables) in GEODA® (geodata analysis software) in order to identify spatial patterns and correlates.

Results

Data analysis is currently underway, but preliminary results show a broad regional heterogeneity in the distribution of the variables when analyzed at the county level. As an example, the map shows the local indicators of spatial correlation (LISA), with clusters corresponding to the distribution of the percentage of migrant population, at the county level. The Moran's I (global indicator) for this variable is 0.4.

Map 2: Cluster map for percent of inter-county migrant population in China ca 2000



Source: Karakouzian 2009

This result is relevant for any model attempting to draw scenarios of CVD risk factors in China, as it is an indication of regions of concentration of migrant population.

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