Do Slums Promote High Urban Fertility? Neighborhood Differences in Fertility in Accra, Ghana

John R. Weeks, Allan G. Hill, Arthur Getis, and Sarah Hinton

The achievement of low fertility in the richer nations, and the widespread, albeit uneven, declines experienced by less-rich nations have taken attention away from fertility levels as a topic of interest among demographers. But in countries like Ghana, fertility is still well above replacement level and appears to have stalled at about four children each, based on data from the last four rounds of the Ghana Demographic and Health Surveys. Even in the capital city of Accra, women are having nearly three children each, and the declines there seem also to have stalled. The average for Accra, however, hides a great deal of variability within the city and explaining that spatial variability is the goal of this paper.

Specifically, we test the hypothesis that slum characteristics of neighborhoods account for fertility variability within Accra, net of individual characteristics. There has been increasing attention in the literature to the role of neighborhoods as contexts within which health behavior is influenced by the local social, built, and natural environments (see, for example, Diez Roux 2001; MacIntyre and Ellaway 2003; Macintyre et al. 2002; Oakes 2004; Sampson 2003). Although a range of health outcomes have been examined in this literature, reproductive outcomes have not been prominent.

Fertility levels are generally considered to be influenced by the ideational changes that occur in a person's life based on characteristics such as education and income, although the diffusion of ideas within and between groups is also known to have an influence (Casterline 2001). Of course, the ideational factors affect fertility by motivating a woman and/or her partner

to implement one or more means of preventing a live birth, and the use of these, especially contraception and abortion, will be influenced by their availability in a given environmental setting. The concept of place, or neighborhood, thus plays a potentially strong, even if indirect, role in the reproductive behavior of women, as has been noted by Weeks and associates (Weeks et al. 2004).

At the individual level, education and income are among the most powerful predictors of fertility, and at the aggregate level in cities of developing countries, slums are the places where people with low levels of both are hypothesized to congregate (Montgomery and Hewett 2005; Montgomery et al. 2003). If the poor and less-well-educated simply live in proximity to each other, while the richer and more-well-educated live near each other, any spatial variability observed in fertility is apt to be only the compositional effect of the aggregation of people with similar demographic characteristics. However, if slums have an independent effect on individual behavior, we would expect that people with higher levels of income and/or higher levels of education living within a slum would have higher fertility than similar people living in non-slum areas. Conversely, people living in non-slums who are at the lower end of the income and educational scales would be expected to have lower fertility than similar people living in slums.

We test these hypotheses about the role of place in urban fertility by drawing upon a ten percent anonymised sample of individual-level census records from Accra, Ghana, for the year 2000. The data from the census allow us to characterize housing and demographic characteristics to define a neighborhood as a slum or not, drawing upon definitions of a slum developed by UN-Habitat (2006). We have produced a digital boundary file of the 1,724 enumeration areas within the greater Accra metropolitan area, but we do not assume that each

enumeration area represents a distinct neighborhood. Rather, we employ a new spatial statistical clustering technique called AMOEBA (A Multidirectional Optimum Ecotope-Based Algorithm) that allows us to aggregate contiguous EAs on the basis of their similarity with respect to slum characteristics (Aldstadt and Getis 2006). In this way we are able to identify places that are more likely to represent the actual boundaries of slum neighborhoods, as well as being able to treat slum areas on the basis of a continuum, not simply a dichotomy.

We then evaluate the importance of slum neighborhoods as predictors of fertility at the individual level using logistic regression analysis, and at the neighborhood level using spatially filtered multiple regression analysis, using methods developed by Getis (1995) and used in previous research exploring spatial variability in fertility in Egypt (Weeks et al. 2000; Weeks et al. 2004). Although the census data provide little information about the proximate determinants of fertility, we have the geo-referenced data from the 1998 and 2003 Ghana Demographic and Health Surveys and from the 2003 Women's Health Survey of Accra that permit us to make inferences about the spatial variability in factors such as age at first birth, knowledge and use of contraception, and evidence of the use of induced abortion.

The paper concludes with a discussion of the relevance of our findings for policies related to the provision of health and family planning services within slum areas of cities of developing nations.

Literature Cited

Aldstadt, Jared and Arthur Getis. 2006. "Using AMOEBA to Create a Spatial Weights Matrix and Identify Spatial Clusters." *Geographical Analysis* 38.

Casterline, John B. 2001. "Diffusion Processes and Fertility Transition: Introduction." in *Diffusion Processes and Fertility Transition: Selected Perspectives*, edited by J. B. Casterline. Washington, DC: National Research Council.

Diez Roux, A.V. 2001. "Investigating neighborhood and area effects on health." *American Journal of Public Health* 91:1783-1789.

Getis, Arthur. 1995. "Spatial Filtering in a Regression Framework: Examples Using Data on Urban Crime, Regional Inequality, and Government Expenditures." Pp. 172-185 in *New Directions in Spatial Econometrics*, edited by L. Anselin and R. Florax. Berlin: Spriger-Verlag.

MacIntyre, Sally and Anne Ellaway. 2003. "Neighborhoods and Health: An Overview." in *Neighborhoods and Health*, edited by I. Kawachi and L. F. Berkman. Oxford: Oxford University Press.

Macintyre, Sally, Anne Ellaway, and Steven Cummins. 2002. "Place effects on health: how can we conceptualise, operationalise and measure them?" *Social Science and Medicine* 55:125-139.

Montgomery, Mark and Paul C. Hewett. 2005. "Urban Poverty and Health in Developing Countries: Household and Neighborhood Effects." *Demography* 42:397-425.

Montgomery, Mark R., Richard Stren, Barney Cohen, and Holly Reed. 2003. "Cities Transformed: Demographic Change and Its Implications in the Developing World." Washington, DC: National Academies Press.

Oakes, J. Michael. 2004. "The (mis)estimation of neighborhood effects: causal inference for a practicable social epidemiology." *Social Science and Medicine* 58:1929-1952.

Sampson, Robert J. 2003. "Neighborhood-level context and health: Lessons from Sociology." in *Neighborhoods and Health*, edited by I. Kawachi and L. F. Berkman. New York: Oxford University Press.

UN Habitat. 2006. *State of the World's Cities 2006/7*. New York: United Nations.

Weeks, John R., M. Saad Gadalla, Tarek Rashed, James Stanforth, and Allan G. Hill. 2000. "Spatial Variability in Fertility in Menoufia, Egypt, Assessed Through the Application of Remote Sensing and GIS Technologies." *Environment and Planning A* 32:695-714.

Weeks, John R., Arthur Getis, Allan G. Hill, M. Saad Gadalla, and Tarek Rashed. 2004. "The Fertility Transition in Egypt: Intra-Urban Patterns in Cairo." *Annals of the Association of American Geographers* 94:74-93.