

## Intra-urban Differentials in Poverty and Health in Accra, Ghana

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### *Extended Abstract*

One of the biggest obstacles facing researchers studying intra-urban health levels is the general lack of a database that can provide the kinds of information necessary to understand the interlinkages between health and the places where people are living in cities. In the first place, most research uses data aggregated for categories such as slum/not slum or central city/suburbs without reference to where those places are located, and thus without an ability to specify the nature of intra-urban differences. For this, we need data at the neighborhood level. Data collected on the ground from sources such as censuses, vital statistics, and surveys can provide some of the basic information on health levels by neighborhood or region within a city only when they are all geocoded and combined into a single geographic information system (GIS). But even that set of data is not sufficient to describe the character of the built and natural environments that comprise the physical properties of a neighborhood—properties that are potentially closely related to levels of morbidity and mortality. In this paper we show that it is possible to use data derived from remotely sensed imagery to describe and differentiate the built and natural environments in ways that can be linked up to, and potentially serve as proxy indicators for, health levels within an urban setting. Thus, in this paper we explore and develop the use of remotely sensed imagery and geographic information systems as tools for improving and advancing our understanding of intra-urban levels of health.

Our overall methodology is as follows:

1. Derive local (neighborhood) measures of health by combining spatially referenced census data, survey data, and vital statistics into a geographic information system for Accra, Ghana;

2. Derive local (neighborhood) measures of the built and natural environments through the classification and analysis of data from remotely sensed imagery;
3. Test the hypothesis that health levels in urban places are importantly influenced by the local neighborhood environmental context, including the natural and built environment, the socio-economic composition of the neighborhood's residents, and the location of a neighborhood within the broader urban environment (including its proximity to health clinics and hospitals).
4. Assess the relative contribution of neighborhood environmental context, population composition, and the neighborhood locational attributes to health outcomes in metropolitan Accra.
5. Model the interaction among the variables that predict health levels to determine what changes might be introduced into a neighborhood to bring its overall level of health up to a minimally acceptable standard; and finally,
6. Evaluate how well the remotely-sensed data can, on their own as a proxy, model the intra-urban inequalities in health in ways that might lead these data to be used as health monitoring tools.

We accomplish these goals by first calculating morbidity and mortality rates for sub-areas within the Greater Accra Metropolitan Area of Ghana. We do this by combining data from the 2000 population census, from the Accra Women's Health Survey, the Demographic and Health Survey, and vital statistics—all measured at the enumeration area level of geographic detail. We then combine data derived from the classification of satellite imagery (a Quickbird multispectral image) with the census data to define social and environmental characteristics of each neighborhood. We then use those data to undertake several different statistical analyses of intra-urban variability in

health and its proximate determinants. Our methods include multi-level analysis, spatial cluster analysis, and geographically weighted regression.

The paper illustrates the importance of more work on urban health differentials, especially in less developed countries where intra-urban income and wealth differentials appear to be sharpest. It shows how differentiating households in a city can lead to the identification of needs as pressing as those in rural areas.