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The relationships between housing quality and occupant health in Uganda

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ABSTRACT

The Government of Uganda created in 2010 a strategic plan to invest in public health as part of its broader national development goals. The health plan recognizes housing and urbanization as a determinant of health, but has not yet formulated policy to address the relationship. This study can help guide health policy development as it relates to housing. It estimates relationships between housing quality and occupant health using "count outcome" regression models. An economic model of optimal household labor allocation in poor countries provides the foundation for the regression modeling. The data used to estimate the regressions are a stratified random sample of 7096 households surveyed in the 2005–06 Uganda National Household Survey. They provide, among other things, detailed information on physical housing attributes as well as the health status of its occupants. Consistent with the economic model and other empirical work, the results show that exposure to burning of biomass for cooking has the largest adverse health effect. Different definitions of illness yield results consistent with expectations, and a separate specification test suggests that the findings are reasonably robust.

Introduction

This paper proposes that improved housing quality can be a key component of health policy in Uganda, a poor but steadily growing East African nation. The Government of Uganda assembled a National Development Plan (2010) to guide the development made possible by an average economic growth rate of 4.2% per year over the past decade (World Bank, World Development Indicators). A complementary Health Sector Strategic & Investment Plan (2010) guides the government toward investment designed to attain medium term (5 years) national health improvement goals. It recognizes housing and urbanization as a determinant of health, but mentions only briefly how public infrastructure investment has not kept pace with rapid urbanization, which leads to housing related health issues in urban areas. The plan has not yet developed policy, but does refer to the Ministry of Works, Housing, and Communication, subsequently renamed the Ministry of Works and Transport, as a health related ministry. One of the ministry's mandates is to "promote standards in the construction industry," but there is no information about any attempt to do so.

This paper informs the search for improved health in Uganda in a novel way. Rather than simply focusing on urban infrastructure, we identify relationships between the physical quality of housing and occupant health throughout the country. We accomplish this using the Uganda National Household Survey (UNHS), a stratified random sample of Ugandan households whose richness is unusual in household surveys of poor countries. The detail contained in the surveys of individuals also allows us to estimate the relationships with "count outcome" regression modeling; a method rarely used in housing literature.

We find that poor quality housing is associated with occupant illness, which could help guide the implementation of the 2010 health plan. Our findings might also inform nongovernmental efforts to educate people about best practices to promote healthy living. Kremer, Leino, Miguel, and Zwane (2012) provides an excellent example.

Background

The housing-health relationship in developed countries

A substantial literature studies housing and health in developed countries, but the relationship is neither clear nor well-understood

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(Cassel, 1977; Matte & Jacobs, 2000). Many reviews exist. Saegert, Klitzman, Freudenberg, Cooperman-Mroczek, and Nassar (2003), for example, summarize the efficacy of public health interventions related to housing in the United States between 1990 and 2001, while Thomson, Petticrew, and Morrison (2001) survey interventions in the United Kingdom. In their overview, Matte and Jacobs (2000) emphasize that demonstrating causal relationships in more developed countries is difficult, and suggest that research myopia (e.g., focusing solely on lead poisoning) may hinder the effort. Notwithstanding this, researchers such as Smith (1990) have shown a link between housing quality and a variety of health problems. Kasl (1990) summarizes work that demonstrates how self-reported health is related to housing quality and Dunn (2002) documents this for a sample of households in Vancouver, BC. Lawrence (2004) summarizes much of the more recent work, including studies that focus on Latin America, Africa, and Asia.

The housing-health relationship in less developed countries

Britten (1990) highlights similarities and differences in housing needs between wealthy and poor countries including the value placed on artificial lighting by all. Cairncross, Hardoy, and Satterthwaite (1990) review, in mainly engineering terms, problems with water supply contamination, household waste removal, and other similar problems. Similar to Kasl (1990) and Dunn (2002), Fuller, Edwards, Sermsri, and Vorakitphokatorn (1993) show that subjective, self-reported, measures of poor housing quality in 1988 Bangkok have detrimental health effects while objective quality measures, including crowding, have little effect. Focusing on rates of sickness over time, Friel, McMichael, Kjellstrom, and Prapamontol (2004) show that improvements in housing conditions together with health literacy are correlated with lower disease rates in Thailand. Similar to wealthy country studies, Mathee, von Schirnding, Montgomery, and Rollin (2004) explore the effect of lead poisoning on children in South Africa. More closely related to our work, Ssewanyana and Younger (2008) use water quality and the quality of toilet facilities to help explain child mortality in Uganda, but they conclude that socioeconomic characteristics and public health programs are more important.

Other studies emphasize how housing affects health differently in urban and rural environments. Goldstein (1990) relates poor health and housing in an urban environment. Comaru and Westphal (2004) argue that integrated health and environmental policy is needed to improve the health of residents in rapidly growing urban areas of Brazil.

Indoor air pollution

Quite a few studies focus on the effect of indoor air pollution (IAP) on health and development. Chen, Hong, Pandey, and Smith (1990) provides an overview of earlier work. Our results merit a review of some of the more recent work. Ezzati and Kammen (2001) find that acute respiratory illness in rural Kenya increases with exposure to airborne particulates but at a decreasing rate. Following this, Dasgupta, Huq, Khaliquzzaman, Pandey, and Wheeler (2006a) show that cooking indoors with biomass fuel affects IAP, but household factors such as ventilation matter more than fuel choice. In a subsequent paper, Dasgupta, Huq, Khaliquzzaman, Pandey, and Wheeler (2006b) find that within a household, children and adult females are exposed to much more IAP than adult males.

Pitt, Rosenzweig, and Hassan (2005) take this work further by developing a theoretical economic model of the optimal allocation of female labor time between cooking and farming that maximizes household, rather than individual, welfare. The model assumes that only women cook. It posits that the productivity (and thus income) of time spent farming is greater with better health but that health does not affect cooking productivity. It predicts that household welfare is maximized when the least healthy woman cooks because, given that poor health affects farming productivity, she has the lowest opportunity cost. If more than one cook is needed, a healthier woman would split her time between the two tasks. Using rural data from Bangladesh, they find that less healthy women indeed do most of the cooking, and this proximity to cooking stoves exposes them to relatively more IAP. Similar work by Duflo, Greenstone, and Hanna (2008b) surveys the IAP literature and highlights the extent of the problem. Following this, Duflo, Greenstone, and Hanna (2008a) find that one-third of the adults and half of the children in a sample from Orissa, India experienced respiratory illness in the 30 days preceding the survey, and that this strongly correlates with the indoor use of traditional cooking stoves that burn biomass.

Health problems associated with IAP also exist in poorer areas of more developed countries. For example, Lissowska et al. (2005) demonstrate a higher likelihood of lung cancer from indoor burning for cooking and heating in the United Kingdom and in Eastern and Central Europe. Similarly, Morris et al. (1990) and Robin et al. (1996) demonstrate that wood burning stoves used in Navajo homes in the United States increase the risk of lower respiratory tract infection in children, especially when the primary caretaker is not the child's mother. Recognizing the problem, the US Environmental Protection Agency has established the Indoor Air Quality (IAQ) Tribal Partners Program (www.epa.gov/iaqtribal/index.html). Finally, a recent meta-analysis of 25 different studies by Po, FitzGerald, and Carlsten (2011) shows that indoor biomass combustion is associated with various respiratory diseases in women and children living in rural areas of the US.

Data and empirical methods

We use the socioeconomic component of the third round of the Uganda National Housing Survey (UNHS III, 2005–06), which contains a rich set of structural dwelling characteristics as well as indicators of occupant health. The UNHS III is a nationwide stratified random sample of households and individuals compiled by the Uganda Bureau of Statistics between May 2005 and April 2006. Its primary goal is to meet the data needs of government ministries, development partners, and the larger NGO community. None of the households or the individuals who comprise them is identifiable. We analyze the housing-health relationship at the household rather than the individual level to be consistent with the theoretical model developed by Pitt et al. (2005) of optimal labor time allocation for the household. Thus, our data consist of information on 7096 urban and rural dwellings and their inhabitants.

Like the Indian data used by Duflo et al. (2008a), the UNHS reports the number of days in the past 30 during which an occupant reports being ill from one or more of 26 different maladies. We use this information to construct the five dependent variables used in our analysis and described in Table 1. The first four are the number of days ill out of the past 30 from all reported maladies (*all sick days*), respiratory illness (*r-sick days*), gastrointestinal illness (*g-sick days*), and injuries (*injury days*). We choose the number of sick days reported by the household member who was ill for the longest time if more than one occupant reports being ill. We then use the fifth dependent variable to see if this is a reasonable choice.

The Pitt et al. (2005) model guides this choice because our goal is to identify relationships between housing quality and illness. The model predicts that this "sickest person" will perform tasks like cooking. This places them indoors more frequently than other residents, which makes them more susceptible to the effects of