Out of Breath: Childhood Asthma, Poverty and Housing
Metropolitan Housing Coalition (March 2005)

Methodology and Data Sources

Asthma Hospitalization Rates:
Rates among children ages 0-14 were determined by calculating in-patient discharges over a four-year period (2000-2003) by patient residence zip codes. These numbers were compared to four years of zip code level population data for children 0-14, as reported in the 2000 U.S. Census, to determine a rate per 100,000 children ages 0-14. Population data were obtained for the census equivalent of zip codes, Zip Code Tabulation Areas (ZCTAs). These are generalized representations of U.S. Postal Service ZIP codes.

Because these data reflect inpatient hospitalizations, they represent only a part of the asthma and respiratory picture. Cases that may have been treated in clinics, emergency rooms, health departments, and physicians' offices, are not included. Hospitalization data are not available by race.

Hospitalization data disclaimer:
The Kentucky Inpatient and Outpatient Hospitalization Claims databases provide a method to collect, analyze, and disseminate information regarding hospital health care services statewide. As required by KRS 216.2920-216.2947, hospitals and hospital-based outpatient clinics submit selected data elements from billing data to the Cabinet for Health and Family Services, Health Policy Analysis Branch. The current databases cover calendar years 2000 through the most recent complete year of data and include submissions from the approximately 125 licensed acute care, psychiatric, and rehabilitation facilities in the Commonwealth.   The compliance rate among contributing facilities (percent of total discharges included in the databases) has risen steadily from approximately 95% in 2000 to over 99% at the present time. Each record in the databases includes patient gender, age group, county of residence, diagnosis and procedure codes, claimed charges, admission and discharge status, and payer information. However, patient race and/or ethnicity information is not collected on admission to hospitals or clinics and is therefore not included in these data.

**Source: Kentucky Inpatient/Outpatient Hospitalization Claims Files, 2000-2003.
Kentucky Department for Public Health, Health Policy Analysis Branch, Frankfort, KY.**

Asthma Emergency Room Visits by Louisville Metro Zip Code, Children 0-14:
Visits reported by Kosair Children's Hospital for years 2001-2004. Data reflect numbers of emergency room visits from children living in Louisville Metro with primary diagnosis asthma for children 0-14 years.
Source: Kosair Children's Hospital

Cartographic Modeling of Factors Associated with Substandard Housing:
Due to the lack of housing condition variables in Jefferson County's tax parcel and building map databases, we used a number of census variables to identify neighborhoods "at risk" for substandard housing at the census tract level. These variables were incorporated into a map database and synthesized, using cartographic modeling techniques, to produce a final map showing substandard housing "risk" by census tract.

Cartographic modeling is also known by the names "suitability analysis" and "map algebra." It is a commonly-used geographic modeling technique that works by ranking and overlaying a series of variables (or map layers) to produce a final map that is a synthesis of all variables. Each variable in the analysis is ranked (or weighted) according to a criterion (in this case, "risk") and all of the rankings for each variable are summed for each geographic unit to produce a final score for that unit. Those scores are then mapped.

We incorporated nine variables into our analysis, based on a literature review of substandard housing and census variables (Table 1). Data for the analysis came from the U.S. Census Summary File 3 (SF3). The first seven variables were expressed as percentages. Each variable was categorized as posing a "low," "medium," or "high" risk for substandard housing and assigned a ranking of "1," "2" or "3," respectively. Values for each variable were assigned ranks based on an algorithm that is used to assign map data to different classes: the natural breaks (Jenks) method, an optimization algorithm. Ranks and values are shown in Table 2. Rankings for all nine variables were summed for each census tract and mapped according to modeled risk. For example, a census tract that ranked high (3) for all variables would have a total score of 27.

Table 1: Census variables
1. Population below povery
2. Vacant
3. Renter-occupied (vs. owner-occupied)
4. Crowding (>1 person per room)
5. Lacking heat
6. Lack of complete plumbing facilities
7. Lacking complete kitchen facilities
8. Median year structure built
9. Median house value

Table 2:

Variable	Low Risk (1)	Medium Risk (2)	High Risk (3)
Poverty	1.36 – 15.08	15.08 – 37.53	37.53 – 74.72
Vacant Housing	1.78 – 6.29	6.29 – 12.13	12.13 – 19.43
Rented Housing	3.29 – 28.54	28.54 – 56.71	56.71 – 99.63
Crowding	0 – 2.34	2.34 – 6.38	6.38 – 12.84
No Heating Fuel	0 – 0.44	0.44 – 1.69	1.69 – 14.53
Incomplete Plumbing	0 – 0.73	0.73 – 2.46	2.46 – 5.10
Incomplete Kitchen	0 – 0.71	0.71 – 2.31	2.13 – 5.59
Year Structure Built	1977 - 1998	1957 - 1976	1939 - 1956
Median House Value	173301 - 301100	98501 - 173300	9999 - 98500