

US EPA ARCHIVE DOCUMENT

Using Children's Environmental Health Indicators to Identify Disparities in Exposure and Health

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Background

America's Children and the Environment (ACE) is the U.S. EPA's series of reports on key indicators of children's health and the environment.

- 1st report: December 2000
- 2nd report: February 2003

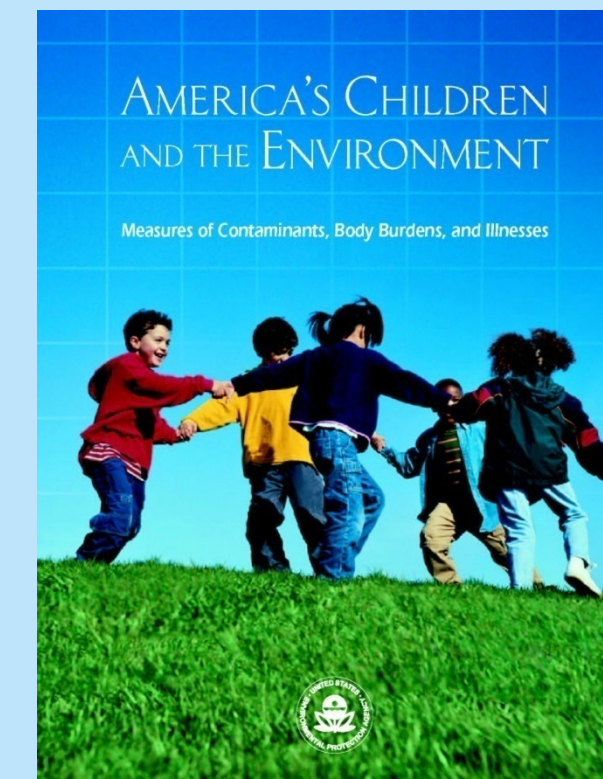
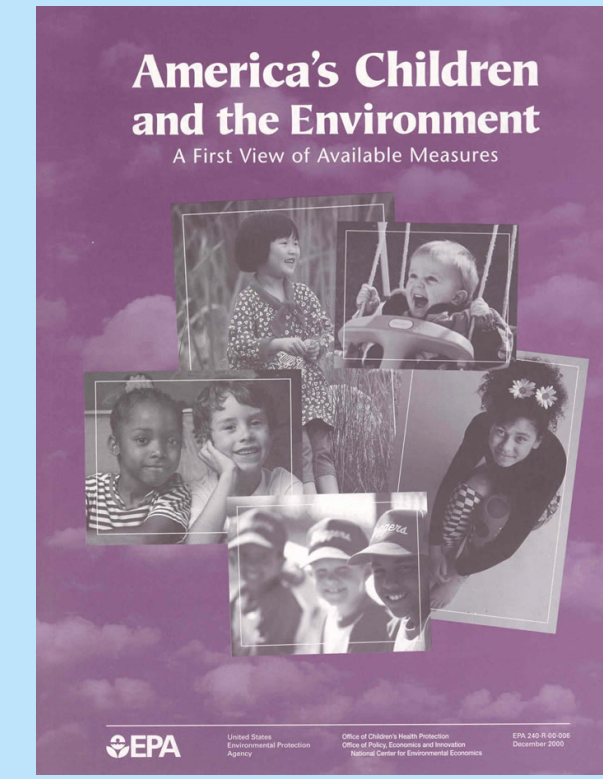
Annual data updates to the 2003 set of indicators are provided online at www.epa.gov/envirohealth/children.

EPA is developing a 3rd edition of ACE (ACE3), with publication expected in 2011. ACE3 will include updates to previously published indicators and several new indicators.

Disparities in childhood blood lead levels and childhood asthma prevalence have been highlighted in past editions of ACE—showing important differences by race/ethnicity and income.

Many of the data sets used for developing ACE indicators allow for comparisons by race/ethnicity and income.

We chose a broad selection of existing and proposed ACE topics and computed indicator values by race/ethnicity and income for each selected indicator.



Methods

Body Burdens

- All body burden indicators represent median values computed with the most current data from the National Health and Nutrition Examination Survey (NHANES).
- Data for four years are combined to increase the statistical reliability of the estimates for each race/ethnicity and income group.
- Some indicators focus on body burdens in women of child-bearing age: for contaminants where the primary concern is for prenatal exposure and/or data for children are limited. Our method for computing these indicators adjusts the data to represent prenatal exposure by weighting NHANES measurements for women ages 16 to 49 years with the age-specific probability of a woman giving birth.

Children's Health and Childhood Illnesses

- The indicators displayed represent selected effects for which environmental contaminant exposures may play a contributing role. The environmental contaminant contribution may result from interactions with genetic factors and other environmental factors such as nutrition, exercise, and stress.
- Asthma and ADHD indicators are obtained from the National Health Interview Survey (NHIS) 2005-2008. These indicators combine data for four years to increase the statistical reliability of the estimates for each race/ethnicity and income group.
- Indicator of overweight and obese children is from NHANES 2005-2008.
- The childhood cancer incidence data are from the National Cancer Institute's Surveillance, Epidemiology, and End Results program, using the SEER13 registries for 2004-2006.
- Birth outcome indicators are from the National Vital Statistics System for 2006.

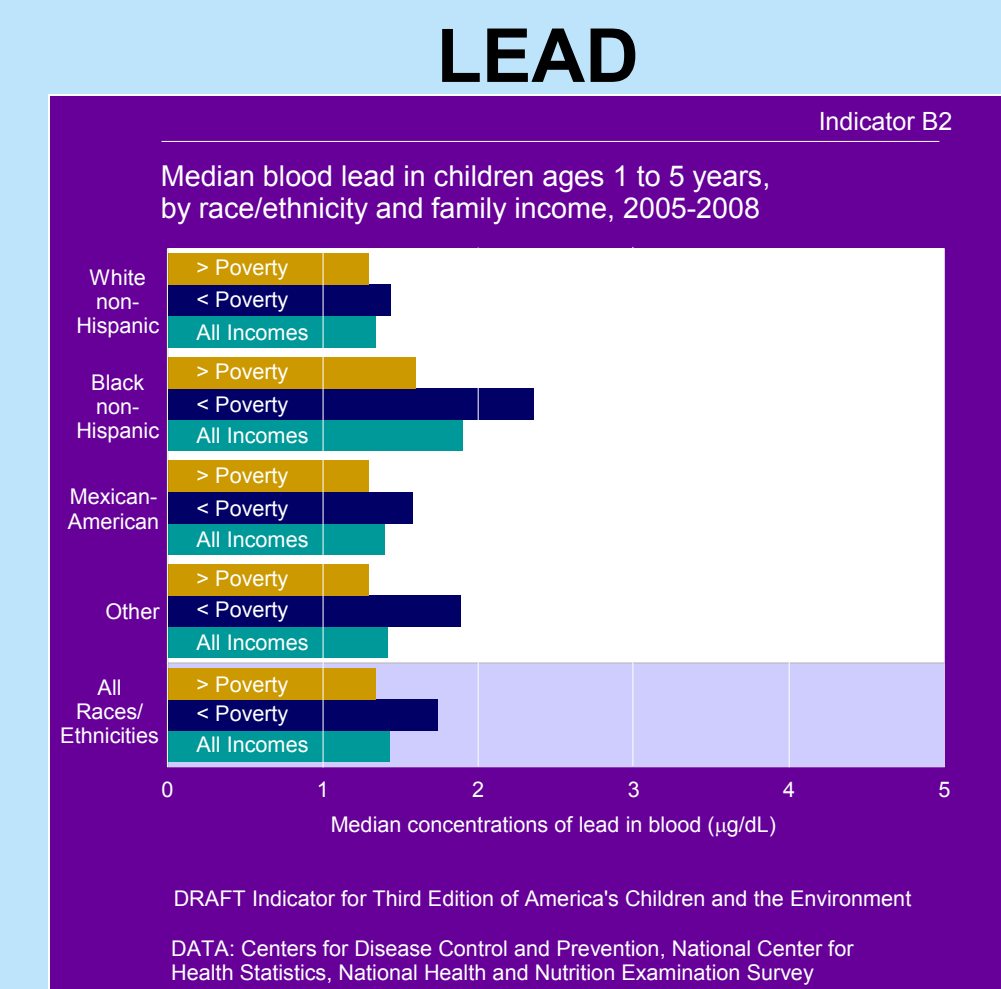
Environmental Contaminants

- Many of the ACE indicators for environmental contaminants are not readily evaluated by race/ethnicity and income.
- We focus here on data for ozone and fine particulate matter (PM2.5), using ambient monitoring data compiled in EPA's Air Quality System.
- The indicators are derived using monitor data at the county level. Indicator values by race/ethnicity and income are calculated using county-level census data.
- The ozone indicator reports the percentage of children living in counties where the level of the 8-hour ozone standard was exceeded at least once in 2008.
- The PM2.5 indicator reports the percentage of children living in counties where the level of the annual PM2.5 standard was exceeded in 2008.

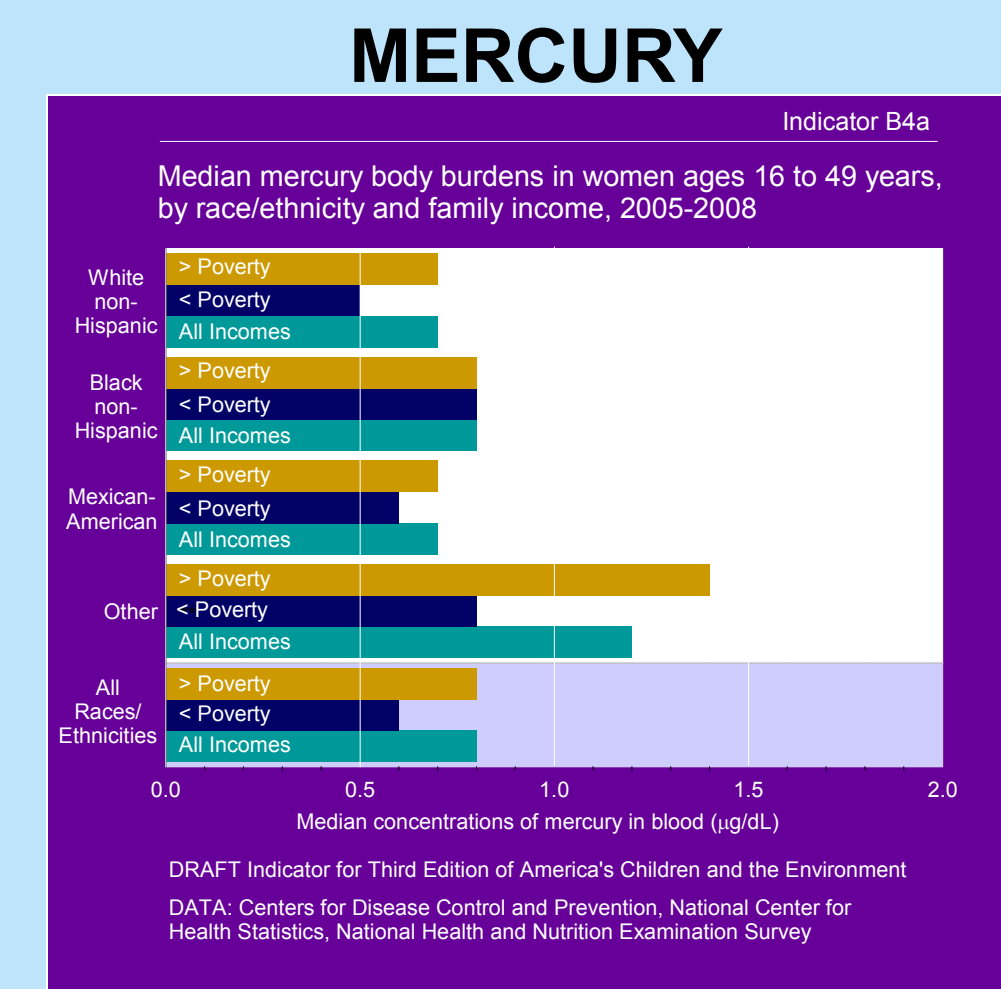
Race/Ethnicity Categories

- Categories vary by data source.
- All indicators include White non-Hispanic and Black non-Hispanic categories.
- NHANES indicators report values separately for Mexican-Americans. All other indicators shown report a value for all Hispanics.
- Apart from the indicators that use NHANES data, all indicators report a separate value for Asian non-Hispanic.
- American Indian/Alaska Native is reported for indicators other than those from NHANES and NHIS.
- "Other Race/Ethnicity" is used for NHANES and NHIS categories to capture all individuals not included in one of the other race/ethnicity categories shown.
- NHANES "other" includes: non-Hispanic Asian, non-Hispanic Native American, Hispanic other than Mexican-American, those reporting multiple races, and those with a missing value for race/ethnicity.
- NHIS "other" includes: non-Hispanic respondents who are not identified as White, Black, African-American, or Asian.

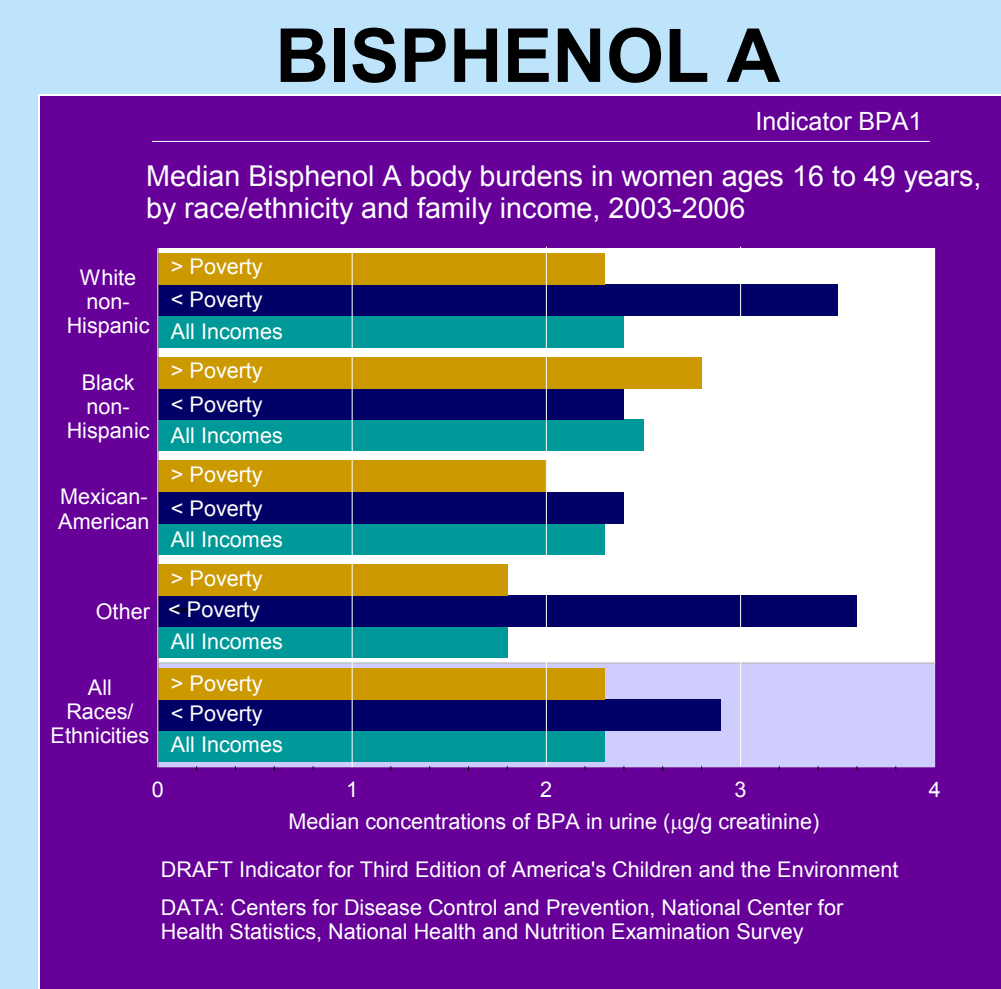
Body Burdens in Children and Women of Childbearing Age



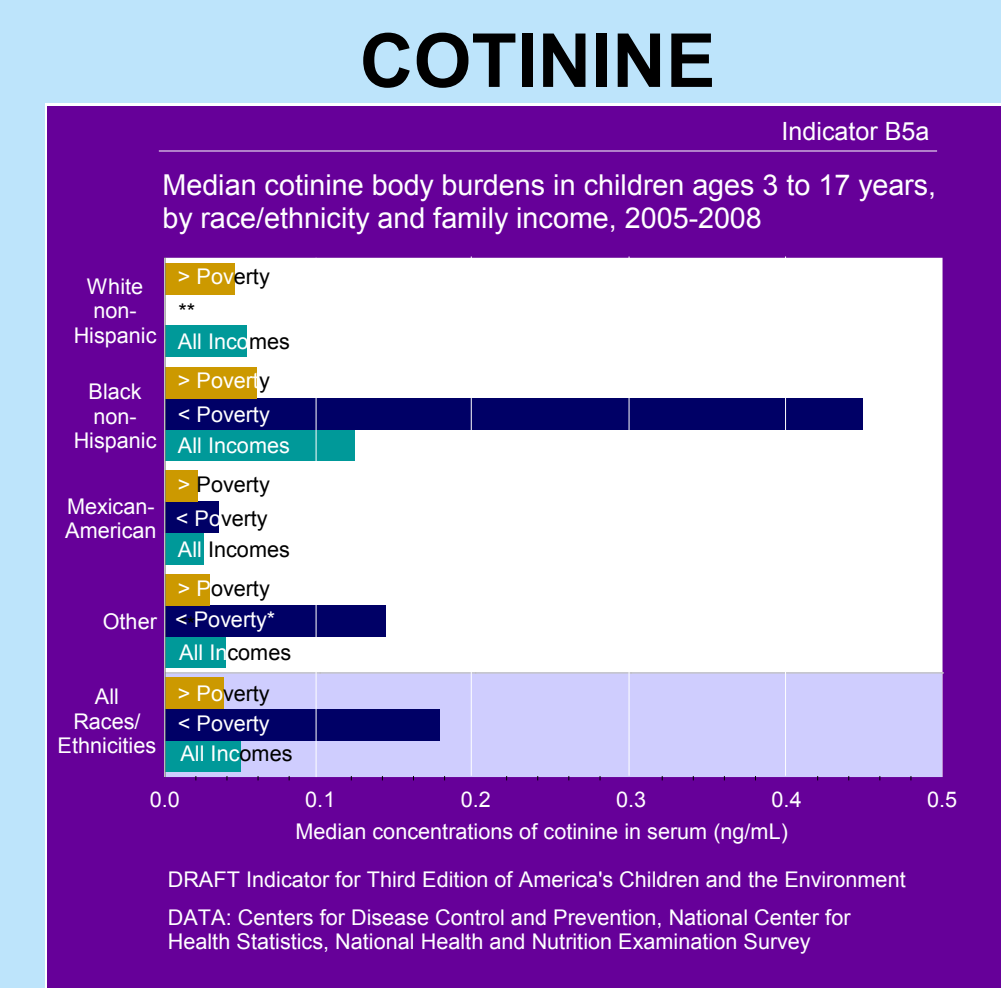
In 2005-2008, Black children in families below the poverty level had median blood lead concentrations of 2.4 µg/dL, which was the highest of any group shown.



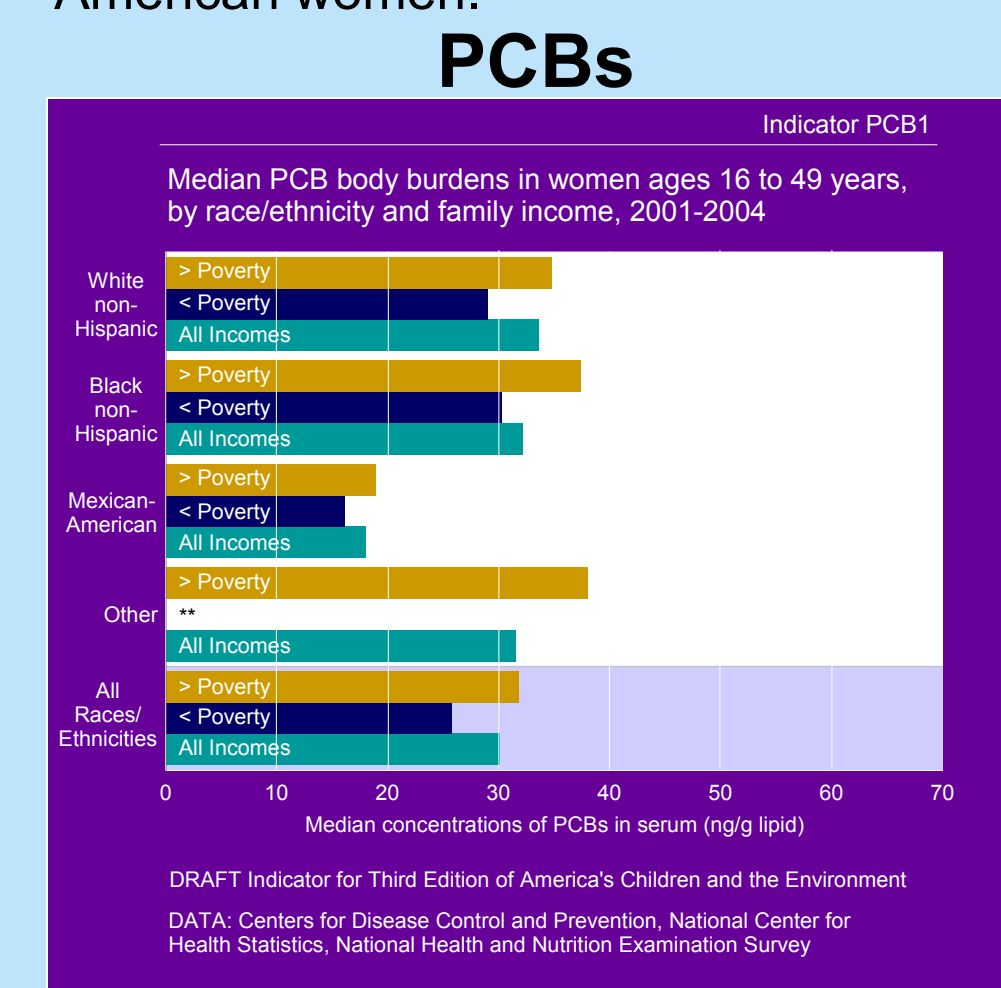
Women of "other" race ethnicity, including (among others) Asian women, had higher blood mercury levels in 2005-2008 than White, Black, and Mexican-American women.



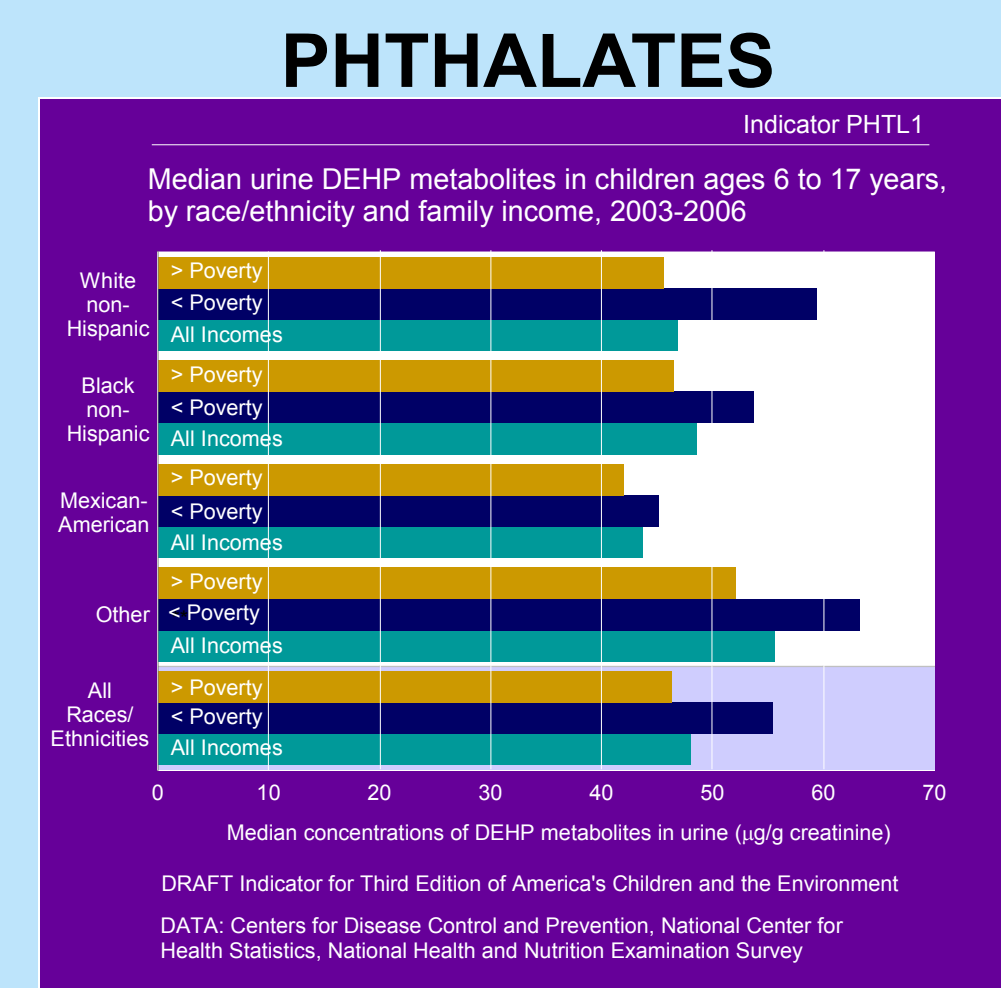
Large differences in median bisphenol A body burdens by poverty status were observed among White women and women of "other" race/ethnicity in 2003-2006.



In 2005-2008, the median concentration of cotinine (marker for secondhand smoke) in serum for children below poverty level was about 5 times as high as for children living at or above poverty level.

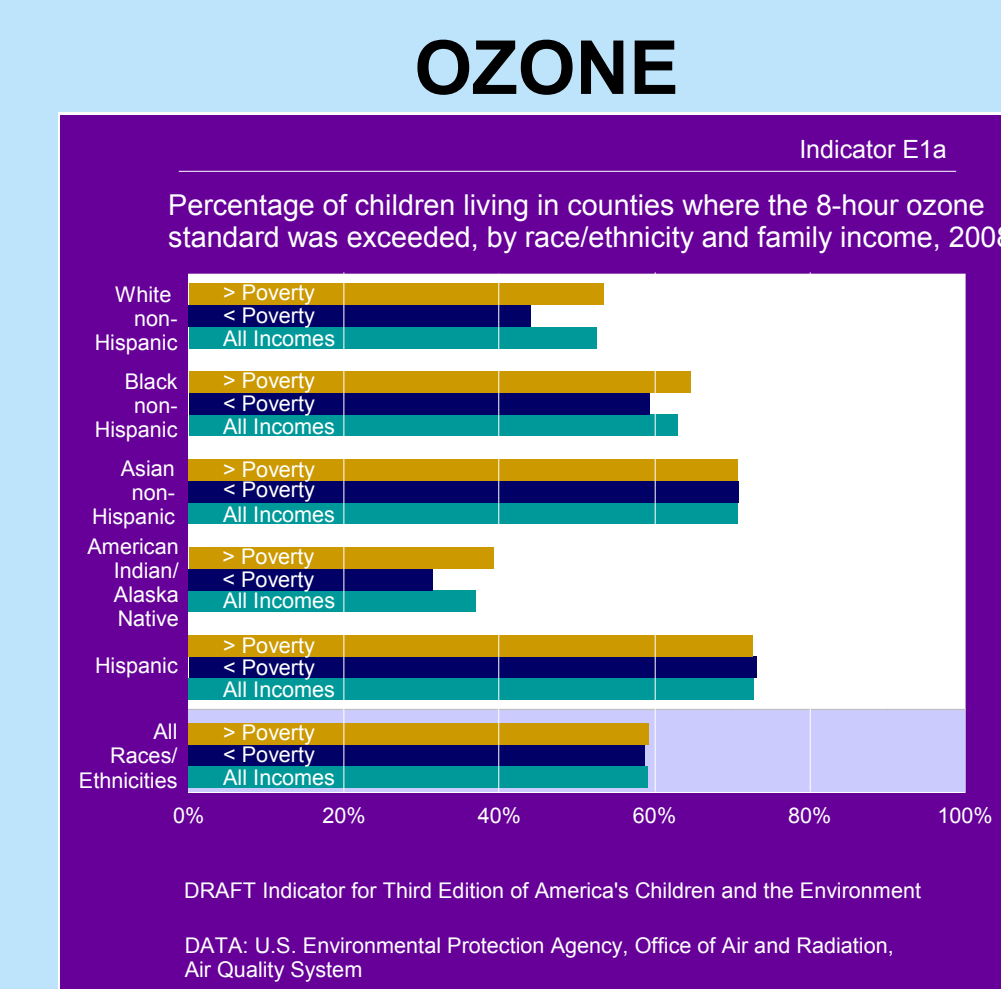


PCB body burdens in 2001-2004 were generally somewhat higher for women with higher incomes than women with lower incomes. Mexican-American women had the lowest PCB body burdens.

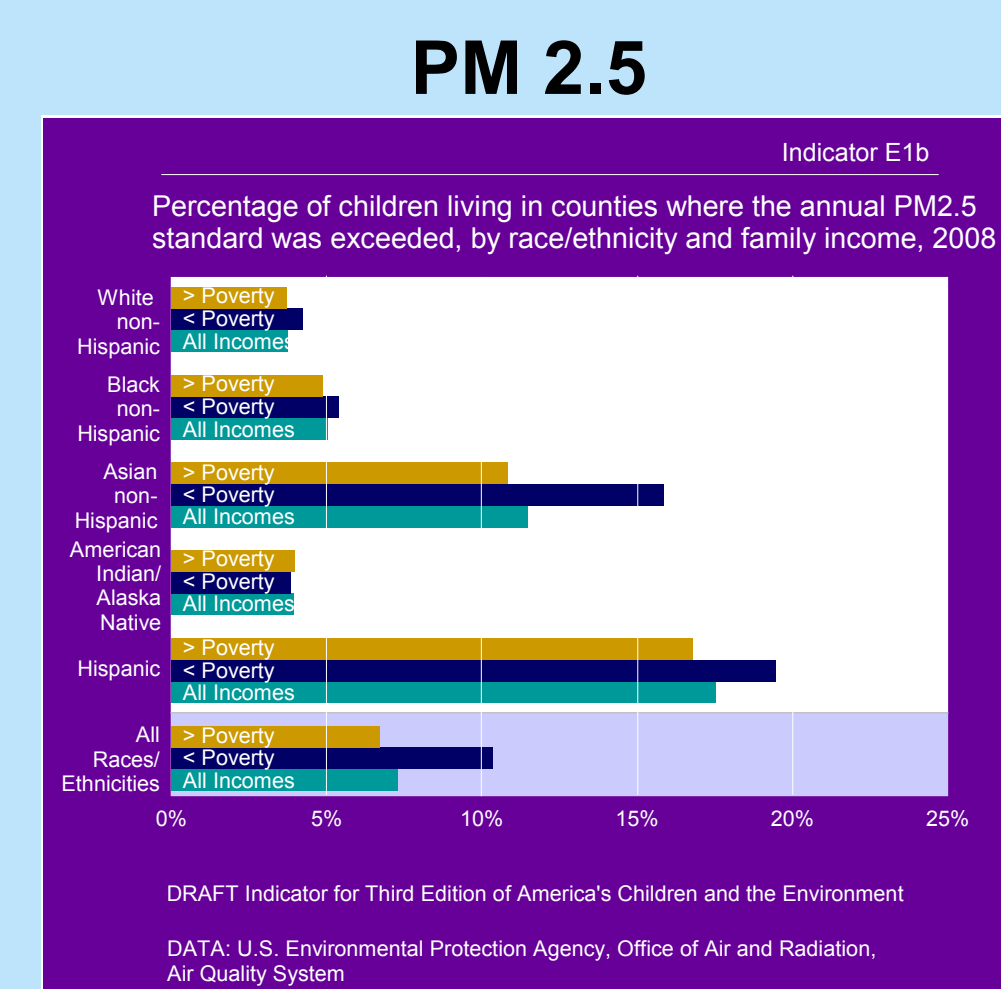


In 2003-2006, summed metabolites of di-2-ethylhexyl phthalate (DEHP) were higher in children below the poverty level than in children living at or above the poverty level.

Environmental Contaminants



In 2008, 73 percent of Hispanic children, 71 percent of Asian children, 63 percent of Black children, 53 percent of White children, and 37 percent of American Indian/Alaska Native children lived in counties where the 8-hour ozone standard was exceeded on at least one day.

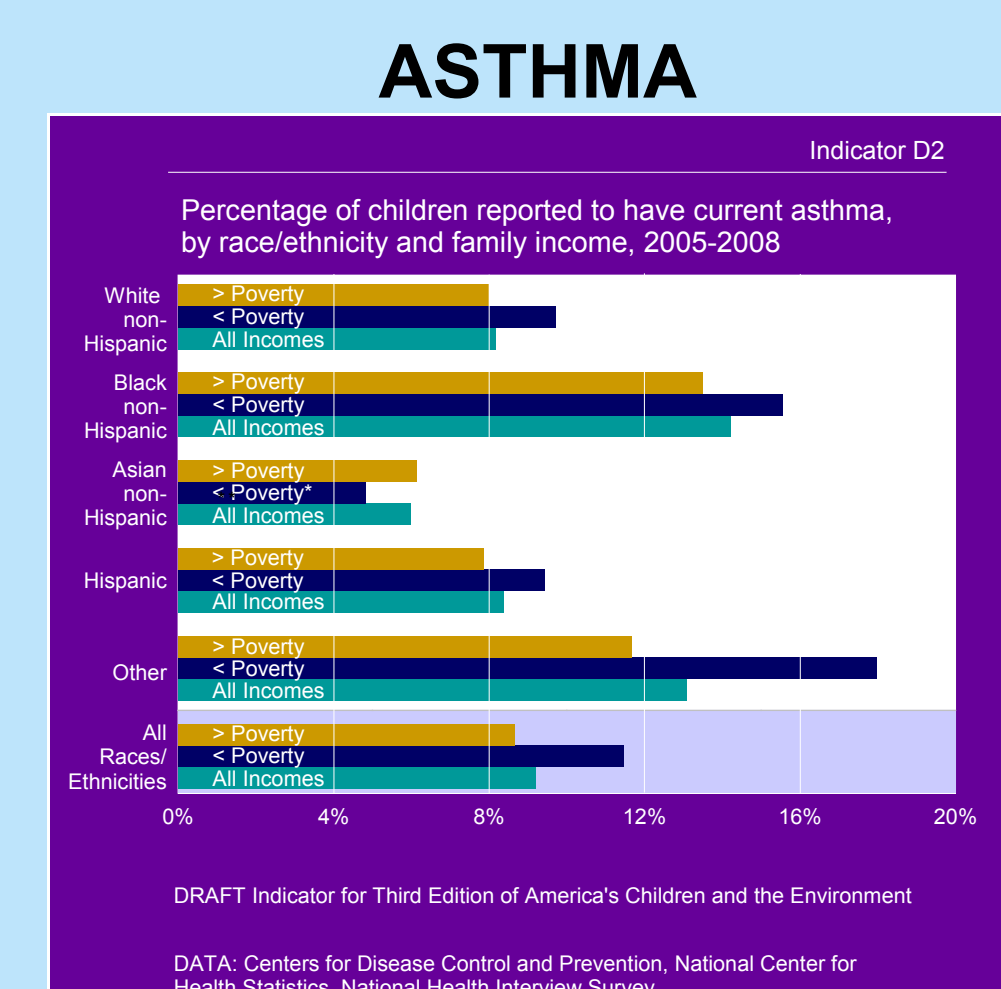


In 2008, 18 percent of Hispanic children, 11 percent of Asian children, 63 percent of Black children, 4 percent of American Indian/Alaska Native children, and 4 percent of White children lived in counties where the PM2.5 standard was exceeded.

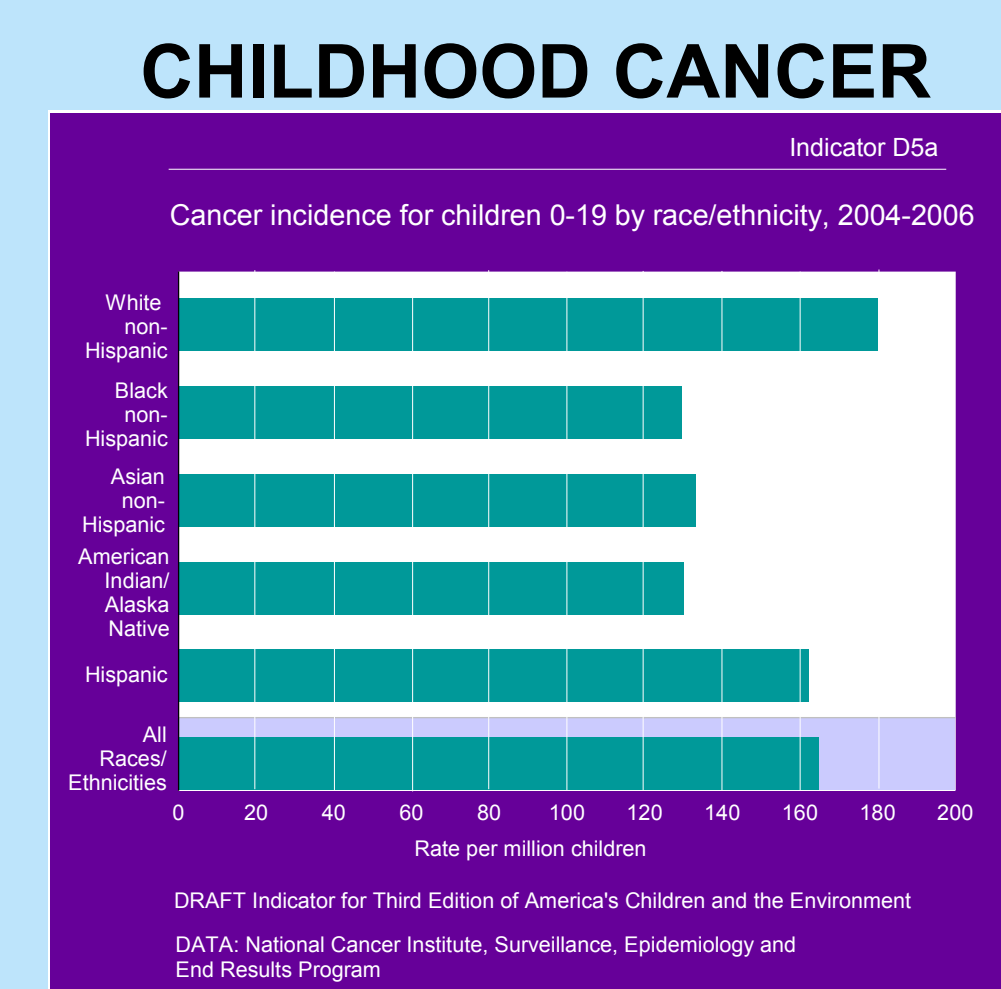
Conclusions

- A number of indicators show elevated exposure or higher rates of adverse health outcomes for Black non-Hispanic children: lead and cotinine body burdens, asthma prevalence, and adverse birth outcomes.
- Hispanic children had greater likelihood of living in counties where air pollution standards were exceeded, and had higher prevalence of overweight/obesity than other children.
- Women of child-bearing age of "other" race/ethnicity had the highest mercury body burdens, reflecting the high rates of fish consumption among Asian and Native American women. Mercury and PCB body burdens tended to be higher for women with family incomes above the poverty level than for those below poverty level.
- Consideration of poverty status along with race/ethnicity can substantially affect conclusions. For example, only those women of "other" race/ethnicity with low family incomes had elevated body burdens of bisphenol A.
- White non-Hispanic children have relatively high rates of ADHD and childhood cancer.
- All indicators shown were able to compare data for White non-Hispanic, Black non-Hispanic, and Hispanic or Mexican-American populations. For many indicators, data can also be displayed for Asian and American Indian/Alaska Native populations.
- Poverty status or other income data are not available for the childhood cancer and birth outcomes indicators.
- Body burdens and health/illness indicators are drawn from data sets that provide an excellent basis for deriving nationally representative statistics by demographic group, based on individual survey responses; however, most of these data sets cannot provide data at a community level.
- Air quality data are drawn from community-level monitoring data; however, assessment of demographic differences is derived from matching with census data rather than individual-level data.
- Two indicators under development will provide additional comparisons by race/ethnicity and income for environmental contaminants:
 - Contaminated lands (using census data of populations in proximity to Superfund sites and RCRA corrective action sites); and
 - Lead in house dust (using HUD survey data).
- Please watch our website for information on the development of ACE3: www.epa.gov/envirohealth/children

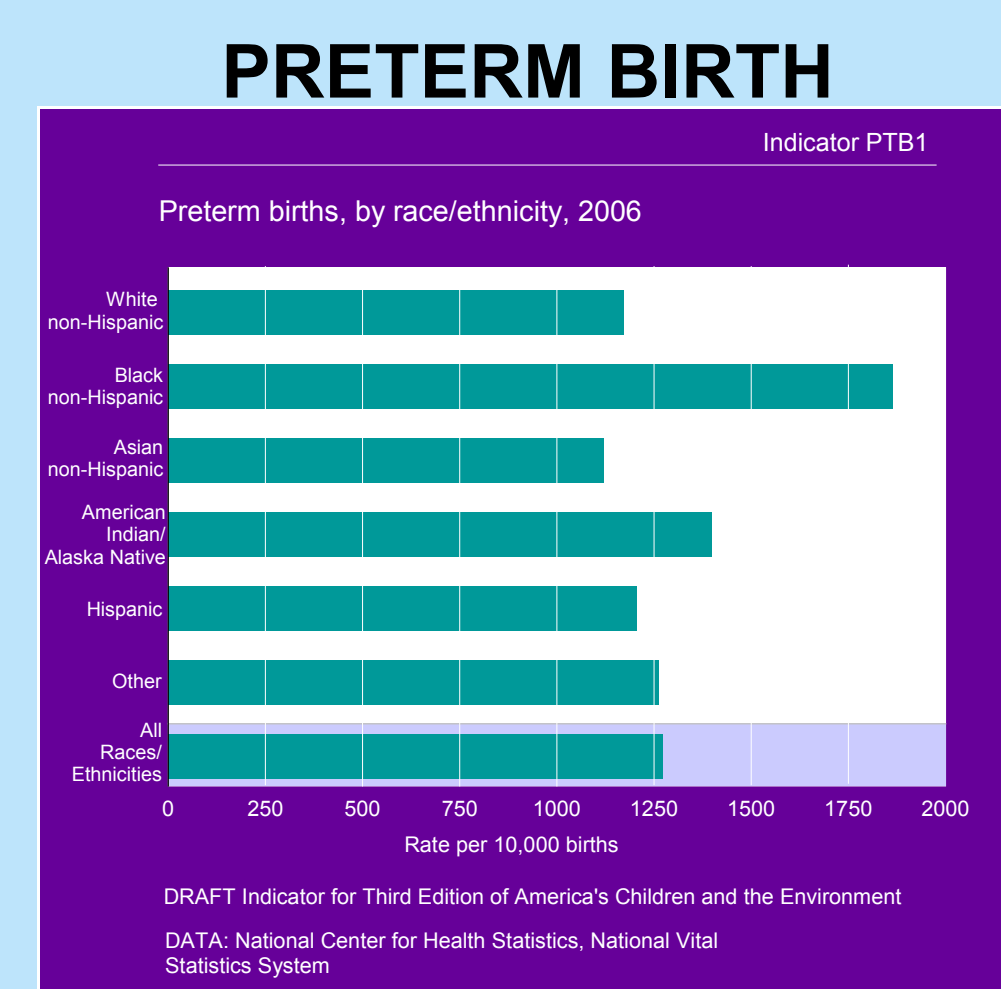
Children's Health and Illnesses



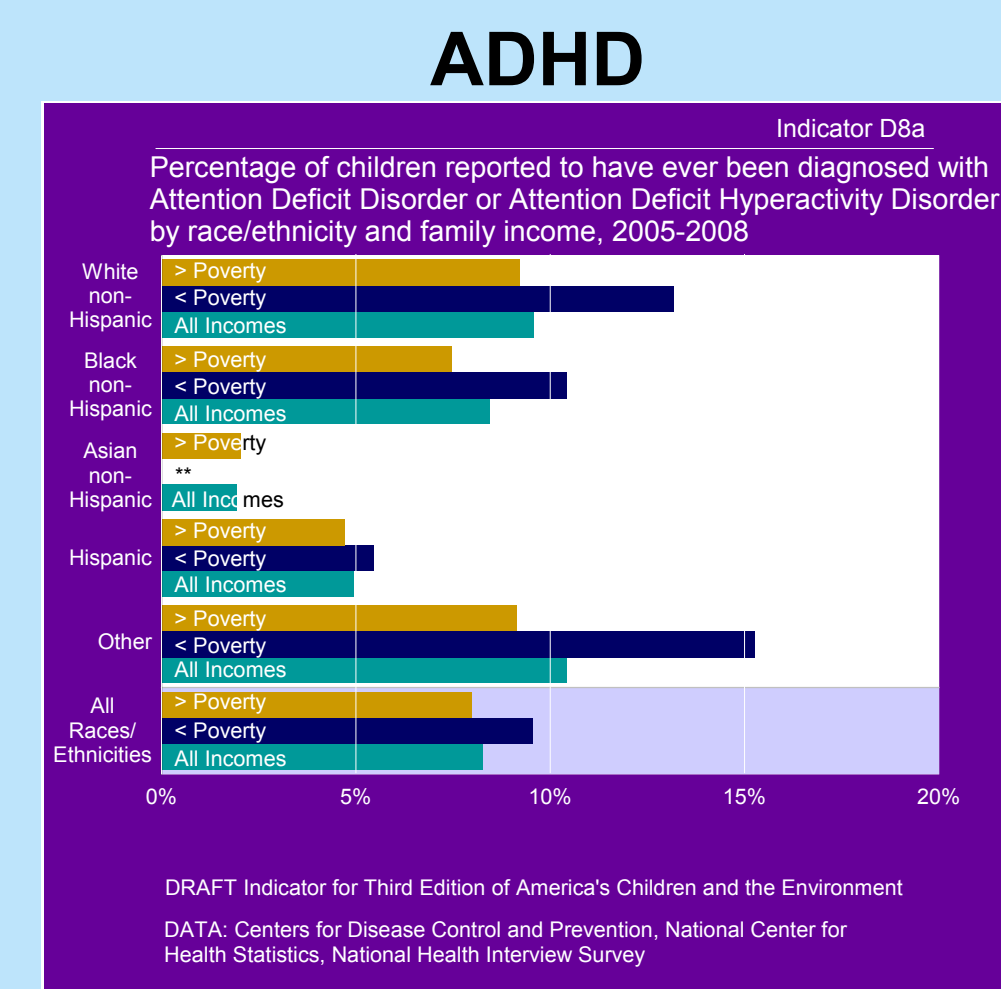
In 2005-2008, 16 percent of Black children and 18 percent of "other" race/ethnicity children in families with incomes below poverty level were reported to currently have asthma.



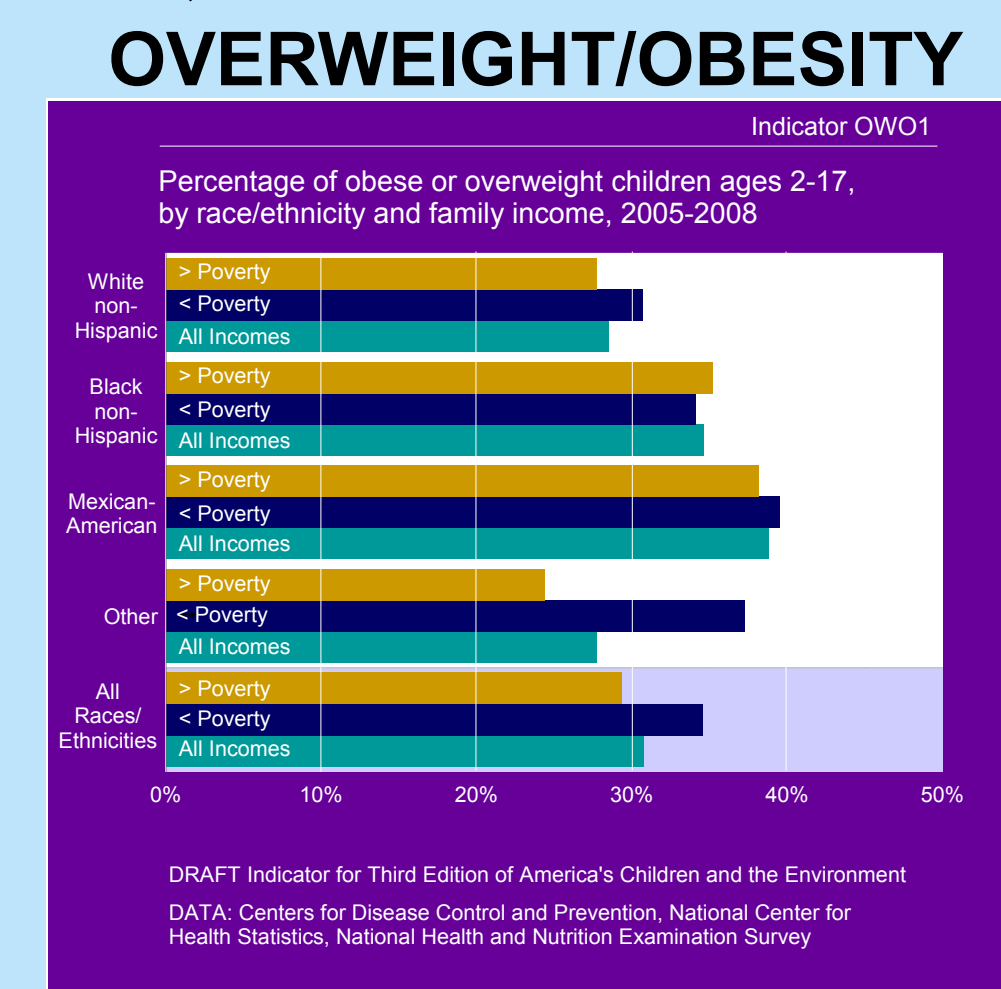
The rate of cancer incidence in 2006 was 180 cases per million White children, 162 per million Hispanic children, and approximately 130 per million for Black, Asian, and American Indian/Alaska Native children.



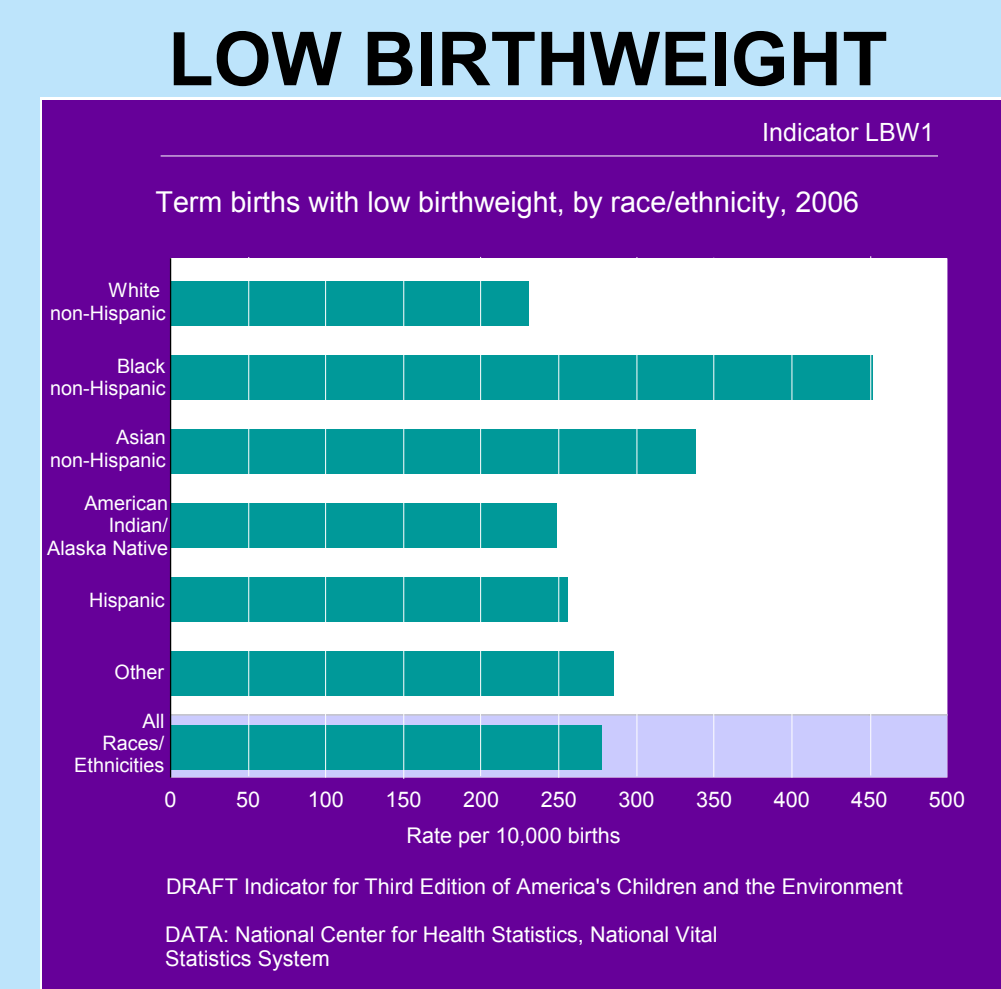
The rate of preterm births to Black women in 2006 was 1,864 per 10,000 births, compared with 1,272 per 10,000 overall.



In 2005-2008, prevalence of ADHD was highest among children of "other" race/ethnicity, White children, and Black children below poverty level.



More than 30 percent of children were overweight or obese in 2005-2008. Mexican-American children were most likely to be overweight or obese.



Among births at full term in 2006, babies with low birthweight were born to Black mothers at a rate of 452 per 10,000, compared with 278 per 10,000 overall.

Statistical Note for NHANES and NHIS indicators:

* The estimate should be interpreted with caution because the standard error is relatively large: the relative standard error, RSE, exceeds 30% (RSE = standard error divided by the estimate).

** The estimate is not reported because it has large uncertainty: RSE exceeds 40%.