# Methods

**Indicator**

H10. Percentage of children ages 2 to 17 years who were obese, 1976-2008.
H11. Percentage of children ages 2 to 17 years who were obese, by race/ethnicity and family income, 2005–2008.

**Summary**

Since the 1970s, the National Center for Health Statistics, a division of the Centers for Disease Control and Prevention, has conducted the National Health and Nutrition Examination Surveys (NHANES), a series of U.S. national surveys of the health and nutrition status of the noninstitutionalized civilian population. Indicator H10 uses weight and height measurements in children ages 2 to 17 years from the NHANES surveys in 1976-1980, 1988-1991, 1991-1994, 1999-2000, 2001-2002, 2003-2004, 2005-2006, and 2007-2008; Indicator H11 uses those from 2005-2006 and 2007-2008. Obese is defined as having a body mass index that is at or above the 95$^{th}$ percentile for the age and sex, based on the 2000 CDC growth charts. The body mass index is the weight in kilograms divided by the square of the height in meters. Indicator H10 presents the percentages of children ages 2 to 17 years who are obese for each NHANES period. Indicator H11 presents the percentages of children ages 2 to 17 years who are obese for 2005-2008, stratified by race/ethnicity and family income. Table H10 displays the percentages of children who are obese for each NHANES period, stratified by race/ethnicity. Table H10a displays the percentages of children who are obese for each NHANES period, stratified by age. The survey data were weighted to account for over-sampling, non-response, and non-coverage.

**Data Summary**

| Indicator | H10. Percentage of children ages 2 to 17 years who were obese, 1976-2008<br>H11. Percentage of children ages 2 to 17 years who were obese, by race/ethnicity and family income, 2005–2008 | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Time Period | 1976-2008 | | | | | | | |
| Data | Weight and height data in children ages 2 to 17 | | | | | | | |
| Years | 1976-1980 | 1988-1991 | 1991-1994 | 1999-2000 | 2001-2002 | 2003-2004 | 2005-2006 | 2007-2008 |
| Children | 6,780 | 5,362 | 5,003 | 3,597 | 4,011 | 3,532 | 3,753 | 3,032 |
| Number of non-missing values (%)* | 6,724 (99%) | 5,207 (97%) | 4,905 (98%) | 3,533 (98%) | 3,760 (94%) | 3,458 (98%) | 3,685 (98%) | 2,969 (98%) |
| Number of missing values (%)* | 56 (1%) | 155 (3%) | 98 (2%) | 64 (2%) | 251 (6%) | 74 (2%) | 68 (2%) | 63 (2%) |

*Missing values are the number of sampled children ages 2 to 17 years in the Mobile Examination Center (MEC) sample that have no value reported either for the weight or the height or both.

**Overview of Data Files**

The following files are needed to calculate this indicator. The NHANES files together with the survey documentation and SAS programs for reading in the data are available at the NHANES website: http://www.cdc.gov/nchs/nhanes.htm. The growth chart files are available from the CDC at the url: http://www.cdc.gov/growthcharts/percentile_data_files.htm.

- NHANES II (1976-1980): Anthropometry file DU5301.txt. This text file contains the body weight (N2BM0412), body height (N2BM0418), examination calendar year (N2BM0198), examination calendar month (N2BM0184), date of birth year (N2BM0053), date of birth month (N2BM0051), sex (N2BM0055), race (N2BM0056), natural origin or ancestry (N2BM0060), poverty income ratio (N2BM0210 – given as a percentage), lead final examined survey weight (N2BM0282), pseudo-stratum (N2BM0324), and pseudo-PSU (N2BM0326). The age in months at the examination was calculated from the date variables. The body mass index was calculated from the weight and height variables.

- NHANES III (1988-1994): Body Measures Examination Data file EXAM.DAT. This text file contains the body weight (BMPWT), body height (BMPHT), Examination / Interview Status (DMPSTAT – defines whether the body measurements were made at the MEC or at home), age in months at MEC exam (MXPAXTMR), age in months at home exam (HXPAXTMR), sex (HSSEX), race (DMARACER), ethnicity (DMAETHNR), poverty income ratio (DMPPIR), NHANES III Phase (SDPPHASE), pseudo-stratum (SDPSTRA1 for Phase 1 and SDPSTRA2 for Phase 2), pseudo-PSU (SDPPSU1 for Phase1 and SDPPSU2 for Phase 2), and the Mobile Examination Center and Home (M+H) examined sample final survey weights (WTPFHX1 for Phase I and WTPFHX2 for Phase 2). The body mass index was calculated from the weight and height variables.

- NHANES 1999-2000: Demographic file demo.xpt. Body Measures Examination Data file bmx.xpt. The demographic file demo.xpt is a SAS transport file that contains the subject identifier (SEQN), age at examination in months (RIDAGEEX), sex (RIAGENDR), race/ethnicity (RIDRETH1), the poverty income ratio (INDFMPIR), the two year Mobile Examination Center (MEC) survey weight (WTMEC2YR), the pseudo-stratum (SDMVSTRA), and the pseudo-PSU (SDMVPSU). The Body Measures Examination Data file bmx.xpt contains SEQN, the body weight (BMXWT), and the body height (BMXHT). The two files are merged using the common variable SEQN. The body mass index was calculated from the weight and height variables.

- NHANES 2001-2002: Demographic file demo_b.xpt. Body Measures Examination Data file bmx_b.xpt. The demographic file demo_b.xpt is a SAS transport file that contains the subject identifier (SEQN), age at examination in months (RIDAGEEX), sex (RIAGENDR), race/ethnicity (RIDRETH1), the poverty income ratio (INDFMPIR), the two year Mobile Examination Center (MEC) survey weight (WTMEC2YR), the pseudo-stratum (SDMVSTRA), and the pseudo-PSU (SDMVPSU). The Body Measures Examination Data file bmx_b.xpt contains SEQN, the body weight (BMXWT), and the

body height (BMXHT). The two files are merged using the common variable SEQN. The body mass index was calculated from the weight and height variables.

- NHANES 2003-2004: Demographic file demo_c.xpt. Body Measures Examination Data file bmx_c.xpt. The demographic file demo_c.xpt is a SAS transport file that contains the subject identifier (SEQN), age at examination in months (RIDAGEEX), sex (RIAGENDR), race/ethnicity (RIDRETH1), the poverty income ratio (INDFMPIR), the two year Mobile Examination Center (MEC) survey weight (WTMEC2YR), the pseudo-stratum (SDMVSTRA), and the pseudo-PSU (SDMVPSU). The Body Measures Examination Data file bmx_c.xpt contains SEQN, the body weight (BMXWT), and the body height (BMXHT). The two files are merged using the common variable SEQN. The body mass index was calculated from the weight and height variables.

- NHANES 2005-2006: Demographic file demo_d.xpt. Body Measures Examination Data file bmx_d.xpt. The demographic file demo_d.xpt is a SAS transport file that contains the subject identifier (SEQN), age at examination in months (RIDAGEEX), sex (RIAGENDR), race/ethnicity (RIDRETH1), the poverty income ratio (INDFMPIR), the two year Mobile Examination Center (MEC) survey weight (WTMEC2YR), the pseudo-stratum (SDMVSTRA), and the pseudo-PSU (SDMVPSU). The Body Measures Examination Data file bmx_d.xpt contains SEQN, the body weight (BMXWT), and the body height (BMXHT). The two files are merged using the common variable SEQN. The body mass index was calculated from the weight and height variables.

- NHANES 2007-2008: Demographic file demo_e.xpt. Body Measures Examination Data file bmx_e.xpt. The demographic file demo_e.xpt is a SAS transport file that contains the subject identifier (SEQN), age at examination in months (RIDAGEEX), sex (RIAGENDR), race/ethnicity (RIDRETH1), the poverty income ratio (INDFMPIR), the two year Mobile Examination Center (MEC) survey weight (WTMEC2YR), the pseudo-stratum (SDMVSTRA), and the pseudo-PSU (SDMVPSU). The Body Measures Examination Data file bmx_e.xpt contains SEQN, the body weight (BMXWT), and the body height (BMXHT). The two files are merged using the common variable SEQN. The body mass index was calculated from the weight and height variables.

- Growth chart files. Body Mass Index Excel file (BMI for age) bmiagerev.xls. This file contains the sex, age in months (AGEMOS), and the 95th percentile of BMI (P95).

**National Health and Nutrition Examination Surveys (NHANES)**

Since the 1970s, the National Center for Health Statistics, a division of the Centers for Disease Control and Prevention, has conducted the National Health and Nutrition Examination Surveys (NHANES), a series of U.S. national surveys of the health and nutrition status of the noninstitutionalized civilian population. Indicator H10 uses weight and height measurements in children ages 2 to 17 years from the NHANES surveys in 1976-1980, 1988-1991, 1991-1994, 1999-2000, 2001-2002, 2003-2004, 2005-2006, and 2007-2008; Indicator H11 uses those from 2005-2006 and 2007-2008. The NHANES data were obtained from the NHANES website:

http://www.cdc.gov/nchs/nhanes.htm. For these analyses, the child's age was defined using the age in months at the time of the NHANES examination.

The NHANES use a complex multi-stage, stratified, clustered sampling design. Certain demographic groups were deliberately over-sampled, including Mexican-Americans (up to 2006), all Hispanics (2007-2008), and Blacks. Oversampling is performed to increase the reliability and precision of estimates of health status indicators for these population subgroups. The publicly released data includes survey weights to adjust for the over-sampling, non-response, and non-coverage. The statistical analyses used the applicable Mobile Examination Center (MEC) survey weights (N2BM0282 for 1976-1980, WTPFHX1 for 1988-1991, WTPFHX2 for 1991-1994, and WTMEC2YR for 1999 and later) to re-adjust the body mass index data to represent the national population.

**Obesity**

Obesity was defined using the 2000 CDC growth charts. The growth chart files are available from the CDC at the url: http://www.cdc.gov/growthcharts/percentile_data_files.htm. These analyses used the BMIAGE Excel file. Each child was determined to be obese or not obese based on comparing the calculated body mass index (BMI) with the 95th percentile in the growth chart files for the same age and sex. For this comparison, 0.5 was added to the age in months at the time of the NHANES examination, since the value of AGEMOS in the growth charts is tabulated at half-months to represent the entire month and the NHANES age variable is reported as integer months. For example, AGEMOS = 24.5 months means the age is at least 24 months but less than 25 months, corresponding to an NHANES age in months of 24. Obese is defined as having a body mass index that is at or above the 95th percentile for age and sex, based on the 2000 CDC growth charts.

**Race/Ethnicity and Family Income**

For Indicator H11, the percentiles were calculated for demographic strata defined by the combination of race/ethnicity and family income. For Table H10, the percentiles were calculated for demographic strata defined by race/ethnicity.

The family income was characterized based on the INDFMPIR variable (N2BM0210 for 1976-1980 and DMPPIR for 1988-1994), which is the ratio of the family income to the poverty level. The National Center for Health Statistics used the U.S. Census Bureau Current Population Survey to define the family units, and the family income for the respondent was obtained during the interview. The U.S. Census Bureau defines annual poverty level money thresholds varying by family size and composition. The poverty income ratio (PIR) is the family income divided by the poverty level for that family. Family income was stratified into the following groups:

- Below Poverty Level: PIR < 1
- Between 100% and 200% of Poverty Level: $1 \leq PIR \leq 2$
- Above 200% of Poverty level: PIR > 2
- Above Poverty Level: $PIR \geq 1$ (combines the previous two groups)
- Unknown Income: PIR is missing

For the four year period 2005-2008, the weighted percentage of children ages 2 to 17 years with unknown income was 5%.

For 1999 and later, race/ethnicity was characterized using the RIDRETH1 variable. The possible values of this variable are:

- 1. Mexican American
- 2. Other Hispanic
- 3. Non-Hispanic White
- 4. Non-Hispanic Black
- 5. Other Race – Including Multi-racial
- "." Missing

Category 5 includes: all Non-Hispanic single race responses other than White or Black; and multi-racial responses.

For these indicators, the RIDRETH1 categories 2, 5, and missing were combined into a single "All Other Races/Ethnicities" category. This produced the following categories:

- White non-Hispanic: RIDRETH1 = 3
- Black non-Hispanic: RIDRETH1 = 4
- Mexican-American: RIDRETH1 = 1
- All Other Races/Ethnicities: RIDRETH1 = 2 or 5 or missing

The "All Other Races/Ethnicities" category includes Asian non-Hispanic; Native American non-Hispanic; Hispanic other than Mexican-American; those reporting multi-racial; and those with a missing value for race/ethnicity.

For 1976-1980, NHANES II, the same race/ethnicity categories were developed using the race variable N2BM0056 and the natural origin or ancestry variable N2BM0060. The possible values for these variables are:

N2BM0056

- 1. White
- 2. Black
- 3. Other

N2BM0060

- 1. Countries of Central or South America
- 2. Chicano
- 3. Cuban
- 4. Mexican

- 5. Mexicano
- 6. Mexican-American
- 7. Puerto Rican
- 8. Other Spanish
- 9. Other European
- 10. Black, Native, or Afro-American
- 11. American Indian or Alaska Native
- 12. Asian or Pacific Islander
- 13. Another group not listed.
- 88. Blank

These two variables were combined as follows:

- White non-Hispanic: N2BM0060 = 9, 10, 11, 12, 13 or 88 and N2BM0056 = 1
- Black non-Hispanic: N2BM0060 = 9, 10, 11, 12, 13 or 88 and N2BM0056 = 2
- Mexican-American: N2BM0060 = 4, 5, or 6
- All Other Races/Ethnicities: N2BM0060 = 1, 2, 3, 7, or 8 or (N2BM0060 = 9, 10, 11, 12, 13 or 88 and N2BM0056 = 3)

For 1988-1994, NHANES III, the same race/ethnicity categories were developed using the race variable DMARACER and the ethnicity variable DMAETHNR. The possible values for these variables are:

DMARACER

- 1. White
- 2. Black
- 3. Other
- 4. Mexican-American of unknown race

DMAETHNR

- 1. Mexican American
- 2. Other Hispanic
- 3. Not Hispanic

These two variables were combined as follows:

- White non-Hispanic: DMAETHNR = 3 and DMARACER = 1
- Black non-Hispanic: DMAETHNR = 3 and DMARACER = 2
- Mexican-American: DMAETHNR = 1
- All Other Races/Ethnicities: DMAETHNR = 2 or DMARACER = 3

## Calculation of Indicator

Indicator H10 gives the percentages of children ages 2 to 17 years who are obese for each NHANES period. Indicator H11 gives the percentages of children ages 2 to 17 years who are obese for 2005-2008, stratified by race/ethnicity and family income. Table H10 gives the percentages of children ages 2 to 17 years who are obese for each NHANES period, stratified by race/ethnicity. Tables H10a gives the percentages of children who are obese for each NHANES period, stratified by age. The definition of obese is given above.

To simply demonstrate the calculations, we will use the NHANES 2007-2008 body mass index (BMI) data values to estimate the percentage of children ages 2 to 17 years of all race/ethnicities and all incomes who were obese as an example for Indicator H10. Calculations for Indicator H11 and the supplementary tables are similar. We have rounded all the numbers to make the calculations easier:

We begin with all the non-missing BMI data from the NHANES 2007-2008 survey for children ages 2 to 17. Let a Yes response denote a child who is obese (i.e., has a body mass index above the 95th percentile for that age and sex), a No response denote a child who is not obese, and a missing response denote a child with missing body mass index data. Assume for the sake of simplicity that Yes or No responses were available for every sampled child. Each sampled child has an associated annual survey weight WTMEC2YR that estimates the annual number of U.S. children in 2007-2008 represented by that sampled child. For example, the first response for a child aged 2 to 17 years was No with a survey weight of 10,000, and so represents 10,000 children ages 2 to 17 years. A second child aged 2 to 17 years responded Yes with a survey weight of 11,000, and so represents 11,000 children ages 2 to 17 years. A third child aged 2 to 17 years responded No with a survey weight of 11,000, and so represents 11,000 children ages 2 to 17 years. The total of the survey weights for the sampled children equals 65 million, the annual U.S. population of children ages 2 to 17 years for the period 2007-2008.

To calculate the proportion of obese children ages 2 to 17 years, we can use the survey weights to expand the data to the 2007-2008 annual U.S. population of 65 million children ages 2 to 17 years. We have 10,000 No responses from the first child, 11,000 Yes responses from the second child, 11,000 No responses from the third child, and so on. Of these 65 million responses, a total of 11 million responses are Yes and the remaining 54 million are No. Thus 11 million of the 65 million children are obese, giving a proportion of about 17%.

In reality, the calculations need to take into account that Yes or No responses were not reported for every child, and to use exact rather than rounded numbers. There were non-missing responses for 2,969 of the 3,032 sampled children ages 2 to 17 years. The survey weights for all 3,032 sampled children add up to 65.6 million, the total U.S. population of children ages 2 to 17 years. The survey weights for the 2,969 sampled children with non-missing responses add up to 64.5 million. Thus the available data represent 64.5 million children, which is 98%, but not all, of the 2007-2008 annual U.S. population of children ages 2 to 17 years. The survey weights for the Yes responses add up to 10.9 million, which is 16.9% of the population with responses (10.9 million/64.5 million = 16.9%). Thus we divide the sum of the weights for participants with Yes responses by the sum of the weights for participants with non-missing responses. These

calculations assume that the sampled children with non-missing data are representative of the children with missing data.

Equations

The following equations give the mathematical calculations for the example of obese children in 2007-2008. Let $w(i)$ denote the survey weight for the i'th surveyed child of ages 2 to 17 years. Exclude any surveyed children with missing BMI data. Let the response indicator $c(i) = 1$ if the i'th surveyed child was obese and let $c(i) = 0$ if the i'th surveyed child was not obese.

1. Sum all the survey weights to get the total weight W:

$$W = \Sigma\ w(i)$$

2. Sum all the survey weights multiplied by the response indicators to get the total weight D for obese children:

$$D = \Sigma\ w(i) \times c(i)$$

3. Divide D by W to get the percentage of children who were obese:

$$\text{Percentage} = (D\ /\ W) \times 100\%$$

Relative Standard Error

The uncertainties of the percentages were calculated using SUDAAN® (Research Triangle Institute, Research Triangle Park, NC 27709) statistical survey software. The relative standard error depends upon the survey design. For this purpose, the public release version of NHANES includes the variables SDMVSTRA and SDMVPSU, which are the Masked Variance Unit pseudo-stratum and pseudo-primary sampling unit (pseudo-PSU). For approximate variance estimation, the survey design can be approximated as being a stratified random sample with replacement of the pseudo-PSUs from each pseudo-stratum; the true stratum and PSU variables are not provided in the public release version to protect confidentiality. If the relative standard error is too high, then the percentage will not be accurately estimated. The degrees of freedom is calculated as the number of pseudo-PSUs with body mass index data for the demographic group of interest minus the number of pseudo-strata with body mass index data for the demographic group of interest. If the degrees of freedom is too low, then the relative standard error will be less accurately estimated and thus may be underestimated. For these reasons, estimated percentages with high relative standard errors or with low degrees of freedom are unstable or unreliable.

Percentages with a relative standard error less than 30% and with 12 or more degrees of freedom were treated as being reliable and were tabulated. Percentages with a relative standard error that is 30% or greater but less than 40% and with 12 or more degrees of freedom were treated as being unstable; these values were tabulated but were flagged to be interpreted with caution. Percentages with a relative standard error less than 40% and with between 7 and 11 degrees of freedom were also treated as being unstable; these values were tabulated but were flagged to be

interpreted with caution. Percentages with a relative standard error that is 40% or greater, or without an estimated relative standard error, or with 6 or less degrees of freedom, were treated as being unreliable; these values were not tabulated and were flagged as having a large uncertainty.

**Questions and Comments**

Questions regarding these methods, and suggestions to improve the description of the methods, are welcome. Please use the "Contact Us" link at the bottom of any page in the America's Children and the Environment website.

## Statistical Comparisons

Statistical analyses of the percentages of obese children were used to determine whether the differences between percentages for different demographic groups were statistically significant. Using a logistic regression model, the logarithm of the odds that a given child is obese is assumed to be the sum of explanatory terms for the child's age group, sex, income group and/or race/ethnicity. The odds of being obese are the probability of being obese divided by the probability of not being obese. Thus if two demographic groups have similar (or equal) probabilities of being obese, then they will also have similar (or equal) values for the logarithm of the odds. Using this model, the difference in the percentage between different demographic groups is statistically significant if the difference between the corresponding sums of explanatory terms is statistically significantly different from zero. The uncertainties of the regression coefficients were calculated using SUDAAN® (Research Triangle Institute, Research Triangle Park, NC 27709) statistical survey software to account for the survey weighting and design. A p-value at or below 0.05 implies that the difference is statistically significant at the 5% significance level. No adjustment is made for multiple comparisons.

For these statistical analyses we used three income groups, below poverty level, at or above poverty level, and unknown income. We used four race/ethnicity groups: White non-Hispanic; Black non-Hispanic; Mexican-American; All Other Races/Ethnicities. We used four age groups: 2-5, 6-10 and 11-15, and 16-17.

For each type of comparison, we present unadjusted and adjusted analyses. The unadjusted analyses directly compare a percentage between different demographic groups. The adjusted analyses add other demographic explanatory variables to the statistical model and use the statistical model to account for the possible confounding effects of these other demographic variables. For example, the unadjusted race/ethnicity comparisons use and compare the percentages between different race/ethnicity pairs. The adjusted analyses add age, sex, and income terms to the statistical model and compare the percentages between different race/ethnicity pairs after accounting for the effects of the other demographic variables. For example, if White non-Hispanics tend to have higher family incomes than Black non-Hispanics, and if the prevalence of obesity strongly depends on family income only, then the unadjusted differences between these two race/ethnicity groups would be significant but the adjusted difference (taking into account income) would not be significant.

Comparisons of the prevalence of obese children ages 2 to 17 years between pairs of race/ethnicity groups and between income groups are shown in Tables 1 and 2, respectively. For the unadjusted "All incomes" comparisons, the only explanatory variables are terms for each race/ethnicity group. For these unadjusted comparisons, the statistical tests compare the percentage for each pair of race/ethnicity groups. For the adjusted "All incomes (adjusted for age, sex, income)" comparisons, the explanatory variables are terms for each race/ethnicity group together with terms for each age, sex, and income group. For these adjusted comparisons, the statistical test compares the pair of race/ethnicity groups after accounting for any differences in the age, sex and income distributions between the race/ethnicity groups.

In Table 1, for the unadjusted "Below Poverty Level" and "At or Above Poverty Level" comparisons, the only explanatory variables are terms for each of the 12 race/ethnicity/income combinations (combinations of four race/ethnicity groups and three income groups). For example, in row 1, the p-value for "Below Poverty Level" compares White non-Hispanics below the poverty level with Black non-Hispanics below the poverty level. The same set of explanatory variables are used in Table 2 for the unadjusted comparisons between one race/ethnicity group below the poverty level and the same race/ethnicity group at or above the poverty level. The corresponding adjusted analyses include extra explanatory variables for age and sex, so that race/ethnicity/income groups are compared after accounting for any differences due to age or sex. Also in Table 2, the unadjusted p-value for the population "All" compares the percentages for children ages 2 to 17 years below poverty level with those at or above poverty level, using the explanatory variables for the two income groups (below poverty, at or above poverty), excluding those with unknown income. The adjusted p-value includes adjustment terms for age, sex, and race/ethnicity in the model.

Additional comparisons are shown in Table 3. The Against = "age" unadjusted p-value compares the percentages for different age groups. The adjusted p-value includes adjustment terms for income, sex, and race/ethnicity in the model. The Against = "sex" unadjusted p-value compares the percentages for boys and girls. The adjusted p-value includes adjustment terms for age, income, and race/ethnicity in the model. The Against = "income" unadjusted p-value compares the percentages for those below poverty level with those at or above poverty level, using the explanatory variables for the two income groups (below poverty, at or above poverty). The adjusted p-value includes adjustment terms for age, sex, and race/ethnicity in the model. The Against = "year" p-value examines whether the linear trend in the percentages is statistically significant; the adjusted model for trend adjusts for demographic changes in the populations from year to year by including terms for age, sex, income, and race/ethnicity. The Subset column specifies the demographic group of interest. For the Against = "age," "sex," and "income" comparisons, the comparisons are for all children and so no Subset is defined. For the Against = "year" trend analyses, results are given for the overall trend (Subset = missing) and for the trends in each sex or race/ethnicity group, so that, for example, the Subset = "Males" examines whether there is a statistically significant trend for boys ages 2 to 17.

For more details on these statistical analyses, see the memorandum by Cohen (2011).[i]

Table 1. Statistical significance tests comparing the percentages of children ages 2 to 17 years who were obese, between pairs of race/ethnicity groups, for 2005-2008.

| Variable | First race/ethnicity group | Second race/ethnicity group* | P-VALUES | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | All incomes | All incomes (adjusted for age, sex, income) | Below Poverty Level | Below Poverty Level (adjusted for age, sex) | At or Above Poverty Level | At or Above Poverty Level (adjusted for age, sex) |
| Obese | White non-Hispanic | Black non-Hispanic | 0.003 | 0.005 | 0.471 | 0.434 | 0.003 | 0.002 |

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[i] Cohen, J. 2011. *Selected statistical methods for testing for trends and comparing years or demographic groups in other ACE health-based indicators.*. Memorandum submitted to Dan Axelrad, EPA, 3 October, 2011.

| Variable | First race/ethnicity group | Second race/ethnicity group* | P-VALUES | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | All incomes | All incomes (adjusted for age, sex, income) | Below Poverty Level | Below Poverty Level (adjusted for age, sex) | At or Above Poverty Level | At or Above Poverty Level (adjusted for age, sex) |
| Obese | White non-Hispanic | Mexican-American | < 0.001 | < 0.001 | 0.045 | 0.022 | 0.002 | 0.001 |
| Obese | White non-Hispanic | Other | 0.882 | 0.939 | 0.104 | 0.084 | 0.436 | 0.483 |
| Obese | Black non-Hispanic | Mexican-American | 0.247 | 0.183 | 0.328 | 0.218 | 0.421 | 0.356 |
| Obese | Black non-Hispanic | Other | 0.010 | 0.015 | 0.503 | 0.462 | 0.002 | 0.002 |
| Obese | Mexican-American | Other | 0.003 | 0.003 | 0.933 | 0.994 | 0.003 | 0.002 |

\* "Other" represents the "All Other Races/Ethnicities" category, which includes all other races and ethnicities not specified, together with those individuals who report more than one race.

Table 2. Statistical significance tests comparing the percentages of children ages 2 to 17 who were obese, between those below poverty level and those at or above poverty level, for 2005-2008.

| Variable | Population* | P-VALUES | |
|---|---|---|---|
| | | Unadjusted | Adjusted (for age, sex)** |
| Obese | All | 0.005 | 0.020 |
| Obese | White non-Hispanic | 0.115 | 0.093 |
| Obese | Black non-Hispanic | 0.932 | 0.954 |
| Obese | Mexican-American | 0.770 | 0.518 |
| Obese | Other | 0.006 | 0.005 |

\* "Other" represents the "All Other Races/Ethnicities" category, which includes all other races and ethnicities not specified, together with those individuals who report more than one race.
\*\* Comparison for "All" is adjusted for age, sex, and race/ethnicity; comparisons for race/ethnicity categories are adjusted for age and sex.

Table 3. Other statistical significance tests comparing the percentages of children ages 2 to 17 who were obese for 2005-2008 (trends for 1976-2008 and 1999-2008).

| Variable | From | To | Against | Subset* | P-VALUES | |
|---|---|---|---|---|---|---|
| | | | | | Unadjusted | Adjusted** |
| Obese | 2005 | 2008 | age | | < 0.001 | < 0.001 |
| Obese | 2005 | 2008 | income | Known Income | 0.005 | 0.020 |
| Obese | 2005 | 2008 | sex | | 0.153 | 0.148 |
| Obese | 1976 | 2008 | year | | < 0.001 | < 0.001 |
| Obese | 1976 | 2008 | year | 2-5 years | < 0.001 | < 0.001 |
| Obese | 1976 | 2008 | year | 6-10 years | < 0.001 | < 0.001 |
| Obese | 1976 | 2008 | year | 11-15 years | < 0.001 | < 0.001 |
| Obese | 1976 | 2008 | year | 16-17 years | < 0.001 | < 0.001 |
| Obese | 1976 | 2008 | year | Males | < 0.001 | < 0.001 |
| Obese | 1976 | 2008 | year | Females | < 0.001 | < 0.001 |
| Obese | 1976 | 2008 | year | White non-Hispanic | < 0.001 | < 0.001 |
| Obese | 1976 | 2008 | year | Black non-Hispanic | < 0.001 | < 0.001 |

| Variable | From | To | Against | Subset* | P-VALUES | |
|---|---|---|---|---|---|---|
| | | | | | Unadjusted | Adjusted** |
| Obese | 1976 | 2008 | year | Mexican-American | < 0.001 | < 0.001 |
| Obese | 1976 | 2008 | year | Other | < 0.001 | < 0.001 |
| Obese | 1976 | 2008 | year | Below Poverty Level | < 0.001 | < 0.001 |
| Obese | 1976 | 2008 | year | At or Above Poverty Level | < 0.001 | < 0.001 |
| Obese | 1976 | 2008 | year | Unknown Income | 0.004 | 0.006 |
| Obese | 1999 | 2008 | year | | 0.076 | 0.078 |
| Obese | 1999 | 2008 | year | 2-5 years | 0.920 | 0.816 |
| Obese | 1999 | 2008 | year | 6-10 years | 0.073 | 0.076 |
| Obese | 1999 | 2008 | year | 11-15 years | 0.140 | 0.151 |
| Obese | 1999 | 2008 | year | 16-17 years | 0.125 | 0.092 |
| Obese | 1999 | 2008 | year | Males | 0.101 | 0.091 |
| Obese | 1999 | 2008 | year | Females | 0.203 | 0.219 |
| Obese | 1999 | 2008 | year | White non-Hispanic | 0.086 | 0.084 |
| Obese | 1999 | 2008 | year | Black non-Hispanic | 0.214 | 0.289 |
| Obese | 1999 | 2008 | year | Mexican-American | 0.484 | 0.379 |
| Obese | 1999 | 2008 | year | Other | 0.438 | 0.413 |
| Obese | 1999 | 2008 | year | Below Poverty Level | 0.212 | 0.193 |
| Obese | 1999 | 2008 | year | At or Above Poverty Level | 0.149 | 0.208 |
| Obese | 1999 | 2008 | year | Unknown Income | 0.097 | 0.074 |

* "Other" represents the "All Other Races/Ethnicities" category, which includes all other races and ethnicities not specified, together with those individuals who report more than one race.
** For Against = "age," the p-values are adjusted for sex, race/ethnicity, and income.
For Against = "sex," the p-values are adjusted for age, race/ethnicity, and income.
For Against = "income," the p-values are adjusted for age, sex, and race/ethnicity.
For Against = "year," the p-values are adjusted for age, sex, race/ethnicity, and income.