Methods

Indicator

H12. Percentage of babies born preterm, by race/ethnicity, 1993-2017.
H13. Percentage of babies born at term with low birth weight, by race/ethnicity, 1993-2017.

Summary

Since 1960, the National Center for Health Statistics, a division of the Centers for Disease Control and Prevention, has compiled birth certificate registration data from states and other U.S. jurisdictions. The National Vital Statistics System (NVSS) online database includes birth certificate data for virtually all U.S. births from 1968 to 2017. Indicator H12 uses the NVSS data from 1993 to 2017 to calculate the percentages of babies that are born preterm, defined as a period of gestation of less than 37 completed weeks. Indicator H13 uses the NVSS data from 1993 to 2017 to calculate the percentages of babies that are both born at term, defined as a period of gestation of at least 37 completed weeks, and have low birth weight, defined as a weight less than 2,500 grams (5 pounds, 8 ounces). Tabulated results give the percentages of preterm and term low birth weight babies by calendar year and maternal race/ethnicity. The supplementary tables H12a and H13a give the percentages of preterm and term low birth weight babies by calendar year and maternal age group (< 20, 20-39, and 40+). The supplementary tables H12b and H13b give the percentages of preterm and term low birth weight babies by calendar year and plurality (all, singleton, multiple).

Data Summary

Indicator	H12. Percentage of babies born preterm, by race/ethnicity, 1993-2017. H13. Percentage of babies born at term with low birth weight, by race/ethnicity, 1993-2017.					
Time Period	1993-2017					
Data	U.S. birth certificates.					
Years (1993-1998)	1993	1994	1995	1996	1997	1998
Birth certificates	4,004,523	3,956,925	3,903,012	3,894,874	3,884,329	3,945,192
Missing gestation period	35,888 (0.9%)	35,124 (0.9%)	36,501 (0.9%)	40,687 (1.0%)	38,503 (1.0%)	40,433 (1.0%)
Missing gestation period and/or birth weight	39,074 (1.0%)	38,026 (1.0%)	38,897 (1.0%)	43,321 (1.1%)	40,810 (1.1%)	43,045 (1.1%)
Years (1999-2004)	1999	2000	2001	2002	2003	2004

Indicator	H12. Percentage of babies born preterm, by race/ethnicity, 1993-2017. H13. Percentage of babies born at term with low birth weight, by race/ethnicity, 1993-2017.					
Birth certificates	3,963,465	4,063,823	4,031,531	4,027,376	4,096,092	4,118,907
Missing gestation period	42,987 (1.1%)	43,392 (1.1%)	39,874 (1.0%)	41,295 (1.0%)	43,883 (1.1%)	43,047 (1.0%)
Missing gestation period and/or birth weight	45,258 (1.1%)	45,500 (1.1%)	41,784 (1.0%)	43,099 (1.1%)	46,887 (1.1%)	46,285 (1.1%)
Years (2005-2010)	2005	2006	2007	2008	2009	2010
Birth certificates	4,145,619	4,273,225	4,324,008	4,255,156	4,137,836	4,007,105
Missing gestation period	29,585 (0.7%)	25,729 (0.6%)	20,197 (0.5%)	14,118 (0.3%)	11,618 (0.3%)	10,350 (0.3%)
Missing gestation period and/or birth weight	33,027 (0.8%)	29,358 (0.7%)	24,128 (0.6%)	17,388 (0.4%)	14,588 (0.4%)	13,620 (0.3%)
Years (2011-2016)	2011	2012	2013	2014	2015	2016
Birth certificates	3,961.220	3,960,796	3,940,764	3,998,175	3,988,733	3,956,112
Missing gestation period	9,303 (0.2%)	8,398 (0.2%)	7,483 (0.2%)	3,299 (0.1%)	2,975 (0.1%)	3,513 (0.1%)
Missing gestation period and/or birth weight	12,070 (0.3%)	11,571 (0.3%)	11,184 (0.3%)	5,876 (0.1%)	5,926 (0.1%)	6,954 (0.2%)
Years (2017)	2017					
Birth certificates	3,864,754					
Missing gestation period	2,827 (0.1%)					
Missing gestation period and/or birth weight	4,945 (0.1%)					

Overview of Data Files

The following files are needed to calculate this indicator.

Birth data:

- NATLXXXX.DAT.Z, where XXXX denotes the four-digit year for years 1993 - 2006. Each file is a compressed file that when decompressed gives the national birth certificate data for a calendar year for births in the 50 U.S. states and Washington DC. The companion files with birth certificate data for U.S. territories were not used for these analyses. These files together with SAS code to extract and read these data files and convert them into SAS format were obtained from the National Bureau of Economic Research (NBER) at the url:

  http://www.nber.org/data/vital-statistics-natality-data.html

- NatlXXXXus.zip, where XXXX denotes the four digit year for years 2007-2010. Each file is a compressed file that when decompressed gives the national birth certificate data for a calendar year for births in 50 U.S. states and Washington D.C. The SAS code to process 2006 year data was downloaded from NBER as described above and modified to process the data contained in these files. These files were obtained from vital statistics data maintained online by the Centers for Disease Control and Prevention and available at the url:

  http://www.cdc.gov/nchs/data_access/Vitalstatsonline.htm

- natlXXXX.sas7bdat.zip, where XXXX denotes the four digit year for years 2011-2017. Each file is a compressed file that when decompressed gives a SAS data set with the national birth certificate data for a calendar year for births in 50 U.S. states and Washington D.C. These files were created by NBER by processing the vital statistics data maintained online by the Centers for Disease Control and Prevention. The files were obtained from NBER at the url:

  http://www.nber.org/data/vital-statistics-natality-data.html

  The variables needed for this indicator are the calendar year, mother's age, mother's race, mother's ethnicity, length of gestation, plurality, and birth weight. The variable names and formats vary by year and are detailed below.

National Vital Statistics System (NVSS) Natality Data

The National Vital Statistics System (NVSS) is maintained by the National Center for Health Statistics, a division of the Centers for Disease Control and Prevention. The NVSS compiles national registration certificate data for births, deaths, marriages, divorces, and fetal deaths

provided by various jurisdictions, including states. This indicator uses NVSS birth data to determine preterm and term low birth weight births.

For the years 1993 to 2006, the Indicator H12 uses the gestation period variable GESTAT3 (GESTREC3 from 2003 to 2006) coded as follows:

- 1 = Under 37 weeks
- 2 = 37 weeks and over
- 3 = Not stated

This variable is a recode of the variable DGESTAT (COMBGEST from 2003 to 2017) that ranges from 17 to 47 and provides the number of completed weeks of gestation of the mother. For most of the births in the years 1993 to 2006 (e.g., 94% of births in 2006), the gestation period is based on the date of the last menstrual period. A preterm birth is defined as a birth with GESTAT3 = 1. Birth certificates with an unknown gestation period (GESTAT3 = 3) were excluded from the calculation of the Indicator H12.

For the years 2007 to 2013, the Indicator H12 uses the gestation period variable ESTGEST which is the obstetric or clinical gestation estimate and is coded as follows:

- 17 to 47 = Completed weeks of gestation
- 99 = Unknown or not stated

Birth certificates with an unknown gestation period (ESTGEST = 99) were excluded from the calculation of the Indicator H12.

For the years 2014 to 2017, the Indicator H12 uses the gestation period variable OEGest_3 which is calculated from the obstetric or clinical gestation estimate and is coded as follows:

- 1 = Under 37 weeks
- 2 = 37 weeks and over
- 3 = Not stated

This variable is a recode of the variable OEGest_Comb that ranges from 17 to 47 and provides the number of completed weeks of gestation of the mother. Birth certificates with an unknown gestation period (OEGest_3 = 3) were excluded from the calculation of the Indicator H12.

The Indicator H13 uses the same gestation period variable GESTAT3 (GESTREC3 from 2003 to 2006, ESTGEST from 2007 to 2013, and OEGest_3 from 2014 to 2017) and the birth weight variable BIRWT4 (BWTR4 for 2003 to 2017) coded as follows:

- 1 = 1499 grams or less
- 2 = 1500 – 2499 grams
- 3 = 2500 grams or more
- 4 = Unknown or not stated

This variable is a recode of the variable DBIRWT (DBWT for 2004 to 2017) that ranges from 0227 to 8165 and gives the birth weight in grams. A term low birth weight birth has a gestation period of 37 or more completed weeks and a birth weight of less than 2,500 grams. Thus for the years 1996 to 2002, a term low birth weight birth is defined by GESTAT3 = 2 and BIRWT4 = 1 or 2. Birth certificates with an unknown gestation period (GESTAT3 = 3) and/or an unknown birth weight (BIRWT4 = 4) were excluded from the calculation of the Indicator H13.

The birth plurality used the variable DPLURAL, coded as follows:

- 1 = Single
- 2 = Twin
- 3 = Triplet
- 4 = Quadruplet
- 5 = Quintuplet or higher

Singleton births are defined as births with DPLURAL = 1. Multiple births are defined as births with DPLURAL ≥ 2. In rare cases (e.g., 0.006 % of births in 2017) the plurality was not reported on the birth certificate and the value of DPLURAL was imputed to be 1 (singleton birth).

Age, Race and Ethnicity

The mother's age, race, and ethnicity were obtained from each of the natality files that were regrouped by NVSS into categories, as follows:

Years 1993–2002

- o Mother's Age: The mother's age for 1993 to 2002 is characterized by the variable DMAGE. This variable ranges from 10 to 54 and gives the age of mother in single years. For these analysis, the following age groups for the mother were defined:

  - Mother's age less than 20 years (DMAGE < 20);
  - Mother's age between 20 and 39 (20 ≤ DMAGE < 40); and
  - Mother's age is 40 or greater (DMAGE ≥ 40).

- o Mother's Race and Hispanic origin: The mother's race for 1993 to 2002 is characterized by the variable MRACE. MRACE is given the following values for the U.S. state and Washington DC data used for these analyses. For the years 1993 to 2002, multiple race responses were not available.

MRACE

    01 ... White
    02 ... Black
    03 ... American Indian (includes Aleuts and Eskimos)
    04 ... Chinese
    05 ... Japanese

06 ... Hawaiian (includes part-Hawaiian)
07 ... Filipino
18 ... Asian Indian
28 ... Korean
38 ... Samoan
48 ... Vietnamese
58 ... Guamanian
68 ... Other Asian or Pacific Islander in areas reporting codes 18-58
78 ... Combined other Asian or Pacific Islander, includes codes 18-68 for areas that do not report them separately

The mother's Hispanic origin for 1993 to 2002 is characterized by the variable ORMOTH. ORMOTH assumes the following values:

ORMOTH

0 ... Non-Hispanic
1 ... Mexican
2 ... Puerto Rican
3 ... Cuban
4 ... Central or South American
5 ... Other and unknown Hispanic
9 ... Origin unknown or not stated

Based on the above data, the following categories of the mother's race/ethnicity were defined:

- White non-Hispanic (MRACE = 1 and ORMOTH = 0);
- Black non-Hispanic (MRACE = 2 and ORMOTH = 0);
- American Indian/Alaskan Native (AIAN) non-Hispanic (MRACE = 3 and ORMOTH =0);
- Asian or Pacific Islander (API) non-Hispanic (MRACE is 4, 5, 6, 7, 18, 28, 38, 48, 58, 68, or 78 and ORMOTH = 0);
- Hispanic Mexican American (ORMOTH = 1);
- Hispanic Puerto Rican (ORMOTH = 2);
- All Hispanic (ORMOTH = 1, 2, 3, 4, or 5); and
- Unknown ethnicity – (ORMOTH = 9).

In approximately 0.5% of the birth certificate records, the mother's race was not stated. In those cases, if the father's race was stated, then the father's race was used to impute the mother's race. Otherwise, the mother's race was imputed from the mother's race on the preceding record with a known mother's race. Thus a mother's race was assigned to all the records.

Year 2003

o Mother's Age: The mother's age for the year 2003 is characterized by the variable MAGER41. This variable is encoded as follows:

MAGER41

01 = Under 15 years
02 = 15 years
03 = 16 years
04 = 17 years
…   …
…   …
39 = 52 years
40 = 53 years
41 = 54 years

o For these analyses, the following age groups for the mother were defined:

- Mother's age less than 20 years (MAGER41 < 7);
- Mother's age between 20 and 39 ($7 \leq$ MAGER41 < 27); and
- Mother's age is 40 or greater (MAGER41 $\geq$ 27).

o Mother's Race and Hispanic origin: The mother's race for the year 2003 is characterized by two variables MRACE and MBRACE for the U.S. state and Washington DC data used for these analyses. MRACE is used for states and years where multiple race responses are not available, and MBRACE is used for states and years where multiple race responses are available.

MRACE

01 ... White
02 ... Black
03 ... American Indian (includes Aleuts and Eskimos)
04 ... Chinese
05 ... Japanese
06 ... Hawaiian (includes part-Hawaiian)
07 ... Filipino
18 ... Asian Indian
28 ... Korean
38 ... Samoan
48 ... Vietnamese
58 ... Guamanian
68 ... Other Asian or Pacific Islander in areas reporting codes 18-58
78 ... Combined other Asian or Pacific Islander, includes codes 18-68 for areas that do not report them separately
Blank --- Not reported.

Beginning in 2003, some states started allowing multiple race responses for birth records. For example, in 2010, multiple race was reported by California, Colorado, Delaware, District of Columbia, Florida, Georgia, Idaho, Illinois, Indiana, Iowa, Kansas, Kentucky, Louisiana (for births occurring after November 30 2010) , Maryland, Michigan, Missouri, Montana, Nebraska, Nevada, New Hampshire, New Mexico, New York, North Carolina, North Dakota, Ohio, Oklahoma, Oregon, Pennsylvania, South Carolina, South Dakota, Tennessee, Texas, Utah, Vermont, Washington, and Wyoming, which used the 2003 revision of the U.S. Standard Certificate of Live Birth, as well as, Hawaii, Minnesota and Rhode Island , which used the 1989 revision of the U.S. Standard Certificate of Live Birth. These 38 states and the District of Columbia accounted for 83 percent of U.S. births in 2010 and reported 2.1 percent of mothers as multiracial, with levels varying from less than 1% (Indiana, New Hampshire, and Texas) to 35% (Hawaii). In order to provide uniformity and comparability of data across the years, NVSS bridged the multiple-race data according to the combination of races, Hispanic origin, sex, and age indicated on the birth certificate of the mother or father to obtain a single race for each birth record reporting multiple races in the NVSS datasets. For such records, the single race or bridged multiple race was given by the variable MBRACE. MBRACE is given the following values:

MBRACE

> 01 White – single race
> 02 Black – single race
> 03 American Indian / Alaskan Native – single race
> 04 Asian Indian – single race
> 05 Chinese – single race
> 06 Filipino – single race
> 07 Japanese – single race
> 08 Korean – single race
> 09 Vietnamese – single race
> 10 Other Asian – single race
> 11 Hawaiian – single race
> 12 Guamanian – single race
> 13 Samoan – single race
> 14 Other Pacific Islander – single race
> 21 White – bridged multiple race
> 22 Black – bridged multiple race
> 23 American Indian / Alaskan Native – bridged multiple race
> 24 Asian / Pacific Islander – bridged multiple race
> Blank – Not on certificate

A new variable CRACE was created by combining the data from MRACE and MBRACE using the following logic. CRACE is equal to MRACE if MRACE is not a missing value. Otherwise, CRACE is equal to MBRACE.

The mother's Hispanic origin for 2003 is characterized by the variable UMHISP. UMHISP assumes the following values:

UMHISP

        0 ... Non-Hispanic
        1 ... Mexican
        2 ... Puerto Rican
        3 ... Cuban
        4 ... Central or South American
        5 ... Other and unknown Hispanic
        9 ... Origin unknown or not stated

Based on the above data, following categories of the mother's race/ethnicity were defined:

- White non-Hispanic (CRACE = 1 or 21 and UMHISP = 0);
- Black non-Hispanic (CRACE = 2 or 22 and UMHISP = 0);
- American Indian/Alaskan Native (AIAN) non-Hispanic (CRACE = 3 or 23 and UMHISP =0);
- Asian or Pacific Islander (API) non-Hispanic (CRACE is 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 18, 24, 28, 38, 48, 58, 68, or 78 and UMHISP = 0);
- Hispanic Mexican American (UMHISP = 1);
- Hispanic Puerto Rican (UMHISP = 2);
- All Hispanic (UMHISP = 1, 2, 3, 4, or 5); and
- Unknown ethnicity (UMHISP = 9).

In approximately 0.5% of the birth certificate records, the mother's race was not stated. In those cases, if the father's race was stated, then the father's race was used to impute the mother's race. Otherwise, the mother's race was imputed from the mother's race on the preceding record with a known mother's race. Thus a mother's race was assigned to all the records.

Years 2004 – 2013

- o Mother's Age: The mother's age for 2004 to 2013 is characterized by the variable MAGER. This variable ranges from 12 – 50 and gives the age of mother in single years for ages 13 to 49, and codes the age group as 12 for ages 10 – 12 and as 50 for ages 50 and older. For these analysis, the following age groups for the mother were defined:

  - Mother's age less than 20 years (MAGER < 20);
  - Mother's age between 20 and 39 ($20 \leq$ MAGER < 40); and
  - Mother's age is 40 or greater (MAGER $\geq$ 40).

- o Mother's Race and Hispanic Origin: Just as for 2003, the mother's race and Hispanic origin category are given by the variables MRACE or MBRACE, and UMHISP respectively. The categories of the mother's race/ethnicity were defined exactly as for the year 2003.

In approximately 1% of the birth certificate records for 2004 to 2005, 2% of the birth certificate records reporting single races in 2006 to 2010, 6-7% of the birth certificate records reporting

multiple races in 2006 to 2010, and 6% of the birth certificate records for 2011 to 2013, the mother's race was not stated or reported as "other" race. In those cases, if the father's race was stated, then the father's race was used to impute the mother's race. Otherwise, the mother's race was imputed from the mother's race on the preceding record with a known mother's race; for 2006 and later, the race for Hispanic mothers was imputed from the preceding record of a Hispanic mother with a known race. Thus a mother's race was assigned to all the records.

Years 2014 – 2017

- o Mother's Age: The mother's age for 2014 to 2017 is characterized by the variable MAGER. This variable ranges from 12 – 50 and gives the age of mother in single years for ages 13 to 49, and codes the age group as 12 for ages 10 – 12 and as 50 for ages 50 and older. For these analysis, the following age groups for the mother were defined:

  - Mother's age less than 20 years (MAGER < 20);
  - Mother's age between 20 and 39 ($20 \leq$ MAGER < 40); and
  - Mother's age is 40 or greater (MAGER $\geq$ 40).

- o Mother's Race and Hispanic Origin: The mother's race and Hispanic origin category are given by the variables MBRACE (redefined), and MHISP_R respectively. The categories of the mother's race/ethnicity were defined as follows:

MBRACE (single race or multiple races bridged to a single race)

  01 White
   02 Black
  03 American Indian / Alaskan Native
  04 Asian or Pacific Islander

UMHISP

  0 ... Non-Hispanic
  1 ... Mexican
  2 ... Puerto Rican
  3 ... Cuban
  4 ... Central or South American
  5 ... Other and unknown Hispanic origin
  9 ... Hispanic origin not stated

Based on the above data, following categories of the mother's race/ethnicity were defined:

  - White non-Hispanic (MBRACE = 1 and MHISP_R = 0);
  - Black non-Hispanic (MBRACE = 2 and MHISP_R = 0);
  - American Indian/Alaskan Native (AIAN) non-Hispanic (MBRACE = 3 and MHISP_R = 0);
  - Asian or Pacific Islander (API) non-Hispanic (MBRACE = 4 and MHISP_R = 0);

- Hispanic Mexican American (MHISP_R = 1);
- Hispanic Puerto Rican (MHISP_R = 2);
- All Hispanic (MHISP_R = 1, 2, 3, 4, or 5); and
- Unknown ethnicity (MHISP_R = 9).

In approximately 6% of the birth certificate records for 2014 to 2017, the mother's race was not stated or reported as "other" race. In those cases, if the father's race was stated, then the father's race was used to impute the mother's race. Otherwise, the mother's race was imputed from the mother's race on the preceding record with a known mother's race; for 2006 and later, the race for Hispanic mothers was imputed from the preceding record of a Hispanic mother with a known race. Thus a mother's race was assigned to all the records.

Calculation of Indicator

For each demographic group, the percentage of preterm births was calculated as the number of preterm births divided by the total number of births:

Percentage of preterm births =
Number of preterm births for mothers in group / Number of births with a stated gestation period for mothers in group × 100%

For each demographic group, the percentage of term low birth weight births was calculated as the number of term low birth weight births divided by the total number of births:

Percentage of term low birth weight births =
Number of low birth weight births at term for mothers in group / Number of births with a stated gestation period and a stated birth weight for mothers in group × 100%

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 preterm or term low birth weight babies 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 baby is preterm or term low birth weight is assumed to be the sum of explanatory terms for the mother's age group and/or race/ethnicity. The odds that a given baby is preterm is the probability that the baby is preterm divided by the probability that the baby is not preterm (similarly for term low birth weight). Thus if two demographic groups have similar (or equal) percentages of preterm or term low birth weight births, 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 the SAS® (SAS Institute, Cary, North Carolina) statistical software GENMOD procedure and a binomial logistic model, treating the births for each demographic subgroup as a random sample of births. 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 six race/ethnicity groups: White non-Hispanic; Black non-Hispanic; Asian or Pacific Islander non-Hispanic; American Indian or Alaska Native non-Hispanic; Hispanic; Unknown ethnicity. In addition, for specific comparisons between the Mexican and Puerto Rican subgroups, we applied a similar statistical analysis to only the data from Mexican or Puerto Rican using two ethnicity groups: Mexican; Puerto Rican. We also used three age groups: < 20, 20-39, and 40+.

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 explanatory variables to the statistical model and use the statistical model to account for the possible confounding effects of these other variables. For example, the unadjusted race/ethnicity comparisons use and compare the percentages between different race/ethnicity pairs. The adjusted analyses add age terms to the statistical model and compare the percentages between different race/ethnicity pairs after accounting for the effects of the age group. For example, if White non-Hispanics tend to be older when they have babies compared to Black non-Hispanics, and if the probability of preterm births strongly depends on the mother's age only, then the unadjusted differences between these two race/ethnicity groups would be significant but the adjusted difference (taking into account age) would not be significant.

Comparisons of the percentages of preterm and term low birth weight births between pairs of race/ethnicity groups in the year 2017 are shown in Table 1. For the unadjusted 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 comparisons ("Adjusted for age"), the explanatory variables are terms for each race/ethnicity group together with terms for each age group. For these adjusted comparisons, the statistical test compares the pair of race/ethnicity groups after accounting for any differences in the age distributions between the race/ethnicity groups.

Additional comparisons of the percentages of preterm and term low birth weight births are shown in Table 2. The Against = "age" unadjusted p-value compares the percentages for different age groups in the year 2017. The adjusted p-value includes adjustment terms for 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 and race/ethnicity. The p-values for Against = "year" and specific values of Subset examine whether the trend for that race/ethnicity or age group demographic subset is statistically significant. The trend analyses are presented for the trends from 1993 to 2006 and from 2007 to 2017. Since the estimated gestation period was based on the date of the last menstrual period in years 1993 to 2006 and was based on the obstetric/clinical estimate in years 2007 to 2017, the trend from 1993 to 2017 was not

evaluated. Overall trend analyses are presented for all births, singleton births, and multiple births.

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

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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, 16 June, 2011.

Table 1. Statistical significance tests comparing the percentages of preterm or term low birth weight births between pairs of race/ethnicity groups for the year 2017.

Variable	First race/ethnicity group	Second race/ethnicity group	P-VALUES	
			Unadjusted	Adjusted for age
Preterm	White non-Hispanic	Black non-Hispanic	< 0.001	< 0.001
Preterm	White non-Hispanic	AIAN non-Hispanic	< 0.001	< 0.001
Preterm	White non-Hispanic	API non-Hispanic	< 0.001	< 0.001
Preterm	White non-Hispanic	Hispanic	< 0.001	< 0.001
Preterm	White non-Hispanic	Unknown ethnicity	< 0.001	< 0.001
Preterm	Black non-Hispanic	AIAN non-Hispanic	< 0.001	< 0.001
Preterm	Black non-Hispanic	API non-Hispanic	< 0.001	< 0.001
Preterm	Black non-Hispanic	Hispanic	< 0.001	< 0.001
Preterm	Black non-Hispanic	Unknown ethnicity	< 0.001	< 0.001
Preterm	AIAN non-Hispanic	API non-Hispanic	< 0.001	< 0.001
Preterm	AIAN non-Hispanic	Hispanic	< 0.001	< 0.001
Preterm	AIAN non-Hispanic	Unknown ethnicity	0.632	0.098
Preterm	API non-Hispanic	Hispanic	< 0.001	< 0.001
Preterm	API non-Hispanic	Unknown ethnicity	< 0.001	< 0.001
Preterm	Hispanic	Unknown ethnicity	< 0.001	< 0.001
Preterm	Mexican	Puerto Rican	< 0.001	< 0.001
Term low birth weight	White non-Hispanic	Black non-Hispanic	< 0.001	< 0.001
Term low birth weight	White non-Hispanic	AIAN non-Hispanic	0.022	0.077
Term low birth weight	White non-Hispanic	API non-Hispanic	< 0.001	< 0.001
Term low birth weight	White non-Hispanic	Hispanic	< 0.001	< 0.001
Term low birth weight	White non-Hispanic	Unknown ethnicity	< 0.001	< 0.001
Term low birth weight	Black non-Hispanic	AIAN non-Hispanic	< 0.001	< 0.001
Term low birth weight	Black non-Hispanic	API non-Hispanic	< 0.001	< 0.001
Term low birth weight	Black non-Hispanic	Hispanic	< 0.001	< 0.001
Term low birth weight	Black non-Hispanic	Unknown ethnicity	< 0.001	< 0.001
Term low birth weight	AIAN non-Hispanic	API non-Hispanic	< 0.001	< 0.001
Term low birth weight	AIAN non-Hispanic	Hispanic	0.396	0.467
Term low birth weight	AIAN non-Hispanic	Unknown ethnicity	0.002	0.001
Term low birth weight	API non-Hispanic	Hispanic	< 0.001	< 0.001
Term low birth weight	API non-Hispanic	Unknown ethnicity	< 0.001	< 0.001
Term low birth weight	Hispanic	Unknown ethnicity	< 0.001	< 0.001
Term low birth weight	Mexican	Puerto Rican	< 0.001	< 0.001

Table 2. Other statistical significance tests comparing the percentage of preterm and term low birth weight births.

Variable	From	To	Against	Subset	P-VALUES	
					Unadjusted	Adjusted*
Preterm	2017	2017	age		< 0.001	< 0.001
Preterm	2017	2017	race		< 0.001	< 0.001
Preterm	1993	2006	year		< 0.001	< 0.001
Preterm	1993	2006	year	White non-Hispanic	< 0.001	< 0.001
Preterm	1993	2006	year	Black non-Hispanic	0.010	0.001
Preterm	1993	2006	year	AIAN non-Hispanic	< 0.001	< 0.001
Preterm	1993	2006	year	API non-Hispanic	< 0.001	< 0.001
Preterm	1993	2006	year	Hispanic	< 0.001	< 0.001
Preterm	1993	2006	year	Unknown ethnicity	< 0.001	< 0.001
Preterm	1993	2006	year	< 20	< 0.001	< 0.001
Preterm	1993	2006	year	20-39	< 0.001	< 0.001
Preterm	1993	2006	year	40+	< 0.001	< 0.001
Preterm	1993	2006	year	Singleton	< 0.001	< 0.001
Preterm	1993	2006	year	Multiple	< 0.001	< 0.001
Preterm	2007	2017	year		< 0.001	< 0.001
Preterm	2007	2017	year	White non-Hispanic	< 0.001	< 0.001
Preterm	2007	2017	year	Black non-Hispanic	< 0.001	< 0.001
Preterm	2007	2017	year	AIAN non-Hispanic	< 0.001	< 0.001
Preterm	2007	2017	year	API non-Hispanic	< 0.001	< 0.001
Preterm	2007	2017	year	Hispanic	< 0.001	0.084
Preterm	2007	2017	year	Unknown ethnicity	< 0.001	< 0.001
Preterm	2007	2017	year	< 20	< 0.001	< 0.001
Preterm	2007	2017	year	20-39	< 0.001	< 0.001
Preterm	2007	2017	year	40+	0.091	< 0.001
Preterm	2007	2017	year	Singleton	< 0.001	< 0.001
Preterm	2007	2017	year	Multiple	< 0.001	< 0.001
Term low birth weight	2017	2017	age		< 0.001	< 0.001
Term low birth weight	2017	2017	race		< 0.001	< 0.001
Term low birth weight	1993	2006	year		< 0.001	< 0.001
Term low birth weight	1993	2006	year	White non-Hispanic	< 0.001	< 0.001
Term low birth weight	1993	2006	year	Black non-Hispanic	0.124	0.987
Term low birth weight	1993	2006	year	AIAN non-Hispanic	0.001	0.002
Term low birth weight	1993	2006	year	API non-Hispanic	< 0.001	< 0.001
Term low birth weight	1993	2006	year	Hispanic	< 0.001	< 0.001
Term low birth weight	1993	2006	year	Unknown ethnicity	0.992	0.917
Term low birth weight	1993	2006	year	< 20	< 0.001	< 0.001
Term low birth weight	1993	2006	year	20-39	< 0.001	< 0.001
Term low birth weight	1993	2006	year	40+	< 0.001	< 0.001
Term low birth weight	1993	2006	year	Singleton	0.001	< 0.001
Term low birth weight	1993	2006	year	Multiple	< 0.001	< 0.001
Term low birth weight	2007	2017	year		< 0.001	< 0.001
Term low birth weight	2007	2017	year	White non-Hispanic	< 0.001	< 0.001
Term low birth weight	2007	2017	year	Black non-Hispanic	< 0.001	< 0.001

Variable	From	To	Against	Subset	P-VALUES	
					Unadjusted	Adjusted*
Term low birth weight	2007	2017	year	AIAN non-Hispanic	0.011	0.009
Term low birth weight	2007	2017	year	API non-Hispanic	< 0.001	< 0.001
Term low birth weight	2007	2017	year	Hispanic	< 0.001	< 0.001
Term low birth weight	2007	2017	year	Unknown ethnicity	0.952	0.486
Term low birth weight	2007	2017	year	< 20	< 0.001	< 0.001
Term low birth weight	2007	2017	year	20-39	< 0.001	< 0.001
Term low birth weight	2007	2017	year	40+	0.895	0.172
Term low birth weight	2007	2017	year	Singleton	< 0.001	< 0.001
Term low birth weight	2007	2017	year	Multiple	0.585	0.237

*For Against = "age," the p-values are adjusted for race/ethnicity.
For Against = "year," the p-values are adjusted for age and race/ethnicity.