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Trends in Racial and Ethnic Disparities in Infant Mortality Rates in the United States, 1989–2006

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Abstract

Objectives—We sought to measure overall disparities in pregnancy outcome, incorporating data from the many race and ethnic groups that compose the US population, to improve understanding of how disparities may have changed over time.

Methods—We used Birth Cohort Linked Birth–Infant Death Data Files from US Vital Statistics from 1989–1990 and 2005–2006 to examine multigroup indices of racial and ethnic disparities in the overall infant mortality rate (IMR), preterm birth rate, and gestational age–specific IMRs. We calculated selected absolute and relative multigroup disparity metrics weighting subgroups equally and by population size.

Results—Overall IMR decreased on the absolute scale, but increased on the population-weighted relative scale. Disparities in the preterm birth rate decreased on both the absolute and relative scales, and across equally weighted and population-weighted indices. Disparities in preterm IMR increased on both the absolute and relative scales.

Conclusions—Infant mortality is a common bellwether of general and maternal and child health. Despite significant decreases in disparities in the preterm birth rate, relative disparities in overall and preterm IMRs increased significantly over the past 20 years.

In the United States, differences in infant mortality by race and ethnicity have been noted since at least the early 1900s. In particular, the large and persistent disparity in mortality between Black and White infants has been thoroughly examined (though remains largely unexplained), and the "Mexican American paradox"—surprisingly low mortality rates when one considers the seemingly unfavorable sociodemographic profile among those infants—has also been much studied. [1-8] Higher rates of poor outcome also are generally more frequent among American Indians/ Alaska Natives (AIAN) and certain Hispanic subpopulations.[4,8] Although infant mortality rates (IMRs) have decreased considerably over

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Note. The findings and conclusions in this article are those of the authors and do not necessarily represent the official position of the National Center for Health Statistics, Centers for Disease Control and Prevention.

Contributors
Both authors contributed substantially to the design, implementation, and analysis of this study.

Human Participant Protection
Because this study used publicly available secondary data, institutional review board approval was not needed.

the past several decades, it is unclear if much progress has been made in reducing overall disparities in infant mortality across multiple groups.[7] Reducing these disparities is a foundation of the national US health objectives.[9]

Most disparity analyses rely on pairwise comparisons—comparing the rate of adverse outcome in one group (e.g., mortality among Black infants) to that of a reference group (e.g., mortality among White infants)—on either a relative or absolute scale, depending on the purpose of the analysis. Pairwise comparisons have suggested that, at least in relative terms, the Black-White disparity in infant mortality has widened over the past several decades.[10,11] However, pairwise comparisons such as relative risk ratios (RRs) or risk differences (RDs) do not allow for assessment of the overall degree of disparity in the entire population comprising more than 2 groups, and are not weighted by population size to account for demographic distributions and changes in population size over time.[12-14] The choice of disparity metric (e.g., absolute vs relative, population-weighted vs equally weighted, pairwise vs multigroup) reflects various value judgments that are often not explicated; it is important to note that different metrics can lead to different conclusions about whether disparities are increasing or decreasing.[12-14]

Measurement of the degree of, and trends in, overall disparities in pregnancy outcome, incorporating data from the many racial and ethnic groups that compose the US population, will improve understanding of how disparities may have changed as a consequence of factors such as demographic changes or changes in perinatal care (e.g., changes in perinatal regionalization,[15,16] use of surfactant,[11] or medically induced preterm birth [PTB][17]). Social and medical advances have not benefited all racial and ethnic subgroups to the same degree.[7,8,11,18,19] As a consequence, it is unclear how population-based disparities across multiple different racial and ethnic subpopulations may have changed in the United States, or if there are differences when one is looking at disparities on an absolute or relative scale.

Ongoing methodological work in the assessment of health disparities has led to the development of several measures that incorporate data from multiple groups to calculate overall population-level disparity indices on the absolute and relative scale.[20] The objectives of this analysis were to examine how disparities in infant mortality in the United States have changed from 1989 to 2006, and to explore differential patterns across the major components of infant mortality: PTB rates and gestational age-specific infant mortality.[21] In addition, we calculated both population-weighted and equally weighted disparity measures to enable determination of how demographic changes may have influenced overall disparity in infant mortality.

METHODS

We obtained data from the Birth Cohort Linked Birth-Infant Death Data Files from US Vital Statistics for 1989, 1990, 2005, and 2006, the last year for which cohort files were available. (Period-linked files are available for more recent years, but only date back to 1995.) Although the cohort files are available as far back as 1983, changes to the birth certificate in 1989 had a substantial impact on how race and ethnicity were coded. To maximize consistency in the definition of racial and ethnic subpopulations over time, we restricted our analysis to 1989 on. Although Hispanic origin was not reported by all states in 1989, the impact of this is likely minimal because 99% of the Hispanic population resided in the 47 states and District of Columbia that did report Hispanic origin on the birth certificates.[22]

We included all births and infant deaths (aged < 1 year) from 1989 to 1990 and 2005 to 2006 occurring in the 50 US States and District of Columbia. To enable consistent comparisons over time, we categorized race and ethnicity by using groups available in the 1989 data. Groups included non-Hispanic White, non-Hispanic Black, Mexican American, Puerto Rican, Cuban, Central or South American, other Hispanic, AIAN, and Asian or Pacific Islander (API; includes native Hawaiian, Chinese, Japanese, Filipino).

Although data were available for Asian subgroups (i.e., Chinese, Japanese, native Hawaiian) in the 1989–1990 files and the 2005–2006 files, there were changes to how these categories were defined and how race groups were bridged that limit the examination of these subgroups. For example, in the older files, native Hawaiian included part-Hawaiian, whereas in the 2005–2006 files, the native Hawaiian category did not include part-Hawaiian (which was categorized in the “other Asian or Pacific Islander” group). In addition, because mothers may have selected multiple race categories in the 2005–2006 files, multiracial individuals were bridged to 1 of 4 single-race categories (AIAN, API, Black, or White), but not to specific Asian subgroups.[23] To minimize the impact of these changes over time, we analyzed the data for the API category as a whole. Individuals of Hispanic origin can identify as any race, so the race categories were cross-tabulated with Hispanic origin to provide nonoverlapping, single-race/ethnicity groups; all race categories described herein are therefore non-Hispanic.[23]

Statistical Analysis

We pooled data from 1989–1990 and 2005–2006 to form two 2-year time periods. Gestational age in weeks was based on last menstrual period or clinical estimate if last menstrual periods were not reported, and we defined PTB as less than 37 weeks and term birth as 37 weeks or more. We cleaned the gestational age data by using accepted practices[24] to exclude implausible birth weight–gestational age combinations. We included deaths to infants with missing or implausible gestational ages in the overall IMR calculation, but excluded them from the preterm and term-specific IMRs. Approximately 9% and 8% of deaths were missing or had implausible gestational ages in 1989–1990 and 2005–2006, respectively; we also ran sensitivity analyses by using uncleaned gestational age data. Results were similar to those obtained with the cleaned data, so we present findings from analyses using the cleaned gestational age data.

We calculated overall IMRs as the number of deaths per 1000 births. We also calculated IMRs separately for preterm and term births as the number of deaths of preterm (or term) infants per 1000 preterm (or term) births. We generated standard errors for all IMRs and PTB rates according to methods delineated in data documentation files.[23] Record weights are available in the 2005–2006 files to account for the small proportion of unlinked deaths; however, because weights are not available for the 1989–1990 files, we chose to perform unweighted analyses. We conducted sensitivity analyses by using weighted data from 2005 to 2006, and results were similar to unweighted analyses.

We calculated several multigroup disparity metrics on the absolute and relative scales. These indices estimate disparities across multiple groups and can be calculated weighting for subpopulation size or weighting groups equally. Population weights enable consideration of how changes in racial and ethnic group size influence overall disparities. We used HD*Calc (version 1.2.0, Surveillance Research Program and Applied Research Program, National Cancer Institute, Bethesda, MD) to calculate disparity metrics and standard errors to examine the statistical significance of changes over time, at the P = .05 level. We also calculated the RD and RR by comparing the groups with the highest and lowest IMRs at each time period.

The between-group variance (BGV) is a measure of absolute disparity and summarizes the squared deviations from a population average

$$BGV=\sum_{j=1}^{j} p_j (y_j - \mu)^2, \quad (1)$$

where p_j is group j 's population size, y_j is group j 's mean health status, and μ is the population average health status. The BGV can be weighted equally or by population size and is sensitive to larger deviations from the population average.[25]

The Theil index (T) and mean log deviation (MLD) are relative metrics used to measure the disproportionate burden of disease across subpopulations

$$\begin{aligned} T &= \sum_{j=1}^{j} p_j r_j ln r_j \\ MLD &= \sum_{j=1}^{j} p_j \left[-ln r_j\right] \end{aligned} \quad (2)$$

where p_j is the proportion of the population in group j, and r_j is the ratio of the mean health status in group j relative to the mean health status for the population. T and MLD can be used with both ordered and unordered groups,[20] and can be calculated weighting groups equally or by population size. Both T and MLD are sensitive to larger deviations from the population average because of the use of the logarithm (implying that reductions in inequality should ideally be achieved by improving the health status of the worst-off)[14]; T is more sensitive to changes in groups with a higher burden of disease and MLD is more sensitive to changes in groups with a higher population share. Thus, the symmetrized Theil Index (STI), which is the mean of the T and MLD, has been developed to circumvent this asymmetry issue.[26] Because calculations of the standard error of the STI were not available, we deemed changes in the STI over the study period to be statistically significant if the changes in the respective T and MLD were both statistically significant at the P = .05 level.

RESULTS

The distribution of total births by race and ethnicity changed substantially over the study period; for 7 of the 9 groups used in this analysis, their contribution to the US birth total changed more than 10%. Figure A (available as a supplement to the online version of this article at http://www.ajph.org) depicts the distribution of births by race and ethnicity across the study period. The percentage of Mexican American births almost doubled from 8.8% in 1989–1990 to 16.9% of all births in 2005–2006. Births of non-Hispanic Black infants decreased from 16.3% to 14.4% over the time period, and births of non-Hispanic White infants decreased from 65.7% to 55.0%. Although they account for a small proportion of total births in the United States, births to API and Central or South American women approximately doubled over the study period (3.3% to 5.4% and 1.9% to 3.8%, respectively).

Overall Infant Mortality

The overall IMR in the United States decreased from 9.2 infant deaths per 1000 live births in 1989–1990 to 6.7 in 2005–2006. In 1989–1990, race-specific IMRs ranged from a low of approximately 7 (per 1000) among Cuban, Central and South American, and API infants to a high of 17.5 among non-Hispanic Black infants (Figure 1). In 2005–2006, the rates among those same groups ranged from approximately 4.5 to slightly less than 14 per 1000 births (Figure 1).

On the absolute scale, overall disparities in IMR decreased significantly over the study period by approximately 40% (Table 1; Figure B, available as a supplement to the online version of this article at http://www.ajph.org). On the relative scale, the equally weighted STI did not change significantly from 1989–1990 to 2005–2006, but the population-weighted STI increased significantly, from 63.7 to 68.5. The difference in magnitude and significance between the equally weighted and population-weighted STI may be a consequence of several factors. The equally weighted STI was lower than the population-weighted STI in 1989–1990 because small groups with comparatively high IMRs contributed equally to the calculation of the overall population average IMR (i.e., AIAN, Puerto Rican). Thus, the population average denominator was higher for the equally weighted STI than for the population-weighted. As overall IMR decreased over the study period, these denominators converged. The difference in statistical significance is likely attributable to the weighting of non-Hispanic Black infants, who had the worst outcomes and constituted a large group; weighting according to group size may offer better power to detect a significant difference. Appendix A (available as a supplement to the online version of this article at http://www.ajph.org) displays the calculation and components of the STI for overall IMR and preterm IMR to help illustrate these patterns.

Components of Overall Infant Mortality Rate

Overall IMR can be decomposed into 3 main contributors: the distribution of PTBs, preterm-specific IMR, and term-specific IMR. In 1989–1990, 10.0% of all US births were preterm (born before 37 gestational weeks), ranging from approximately 8% among non-Hispanic White infants to almost 18% among non-Hispanic Black infants (Figure 2). The percentage of PTBs increased to 12.3% of all births in 2005–2006; PTB increased among all groups except non-Hispanic Black infants over the study period.

Preterm birth disparities—Racial and ethnic disparities in the percentage of infants born before 37 weeks decreased across the board, for both absolute and relative disparity metrics and equally weighted and population-weighted metrics (Table 1; Figure B, available as a supplement to the online version of this article at http://www.ajph.org). The BGV decreased by 40% and 57% (from 7.2 to 4.3, and 12.2 to 5.3) for equally weighted and population-weighted indices, respectively. Likewise, the STI decreased by 54% and 70% (from 26.2 to 12.1, and 50.0 to 15.2), for equally weighted and population-weighted indices, respectively. The substantial decrease in disparities from 1989–1990 to 2005–2006 reflects increasing PTBs among all groups except among non-Hispanic Black infants, who had the highest probability of PTB across the study period, but were the only group not to experience a significant increase in the PTB rate.

Preterm birth—related infant mortality rate disparities—Although PTBs account for 10% to 12% of births in the United States, deaths of preterm infants account for more than half of all infant deaths. During the study period, the IMR among preterm infants decreased overall, from 49.4 to 33.4 per 1000 births. In 1989–1990, preterm IMRs ranged from a low of 32.3 among API infants to 60.6 among non-Hispanic Black infants (Figure 3a). By 2005–2006, preterm IMRs had decreased to about 25 to 30 per 1000 among most of the groups, but remained higher among Puerto Rican (37.5 per 1000) and non-Hispanic Black (51.3 per 1000) infants. Disparities in IMR among preterm infants increased over the study period, on both the absolute and relative scale, though results differed by weighting.

The equally weighted BGV did not change significantly, whereas the population-weighted BGV increased by 28% (Table 1; Figure B, available as a supplement to the online version of the article at http://www.ajph.org). On the relative scale, the equally weighted STI increased by approximately 52% (from 17.3 to 26.3) and the population-weighted STI increased by 136% (from 14.1 to 33.3). The difference between the changes in the population- and equally weighted indices was primarily attributable to a relatively smaller decrease in preterm IMR observed for non-Hispanic Black infants, who had the highest preterm IMR and also constitute a large proportion of PTBs (20.8%–28.8%); the equally weighted STI did not increase to the same degree because various small groups who had relatively high preterm IMRs to start experienced large relative decreases over time (e.g., AIAN, Cuban, and non-Hispanic White). (See Appendix A, available as a supplement to the online version of this article at http://www.ajph.org, for an illustration of these patterns.)

Term infant mortality rate disparities—Full-term infants are at substantially lower risk for death than are preterm infants, although this group still accounts for approximately 40% of infant deaths. Mortality among all full-term infants decreased from 3.9 to 2.4 per 1000 over the study period. In 1989–1990, rates ranged from a low of 2.5 among Cubans to 8.1 among AIAN infants (Figure 3b). By 2005–2006, the respective full-term IMRs had decreased to 1.4 and 4.7 for these same groups.

On the absolute scale, disparities in term IMR decreased significantly by 58% for the population-weighted BGV and 62% for the equally weighted BGV (Table 1; Figure B, available as a supplement to the online version of this article at http://www.ajph.org). Disparities on the relative scale did not change significantly. The difference in magnitude between the equally weighted and population-weighted indices at each time period (Table 1) is reflective of the extreme rates, high and low, occurring in groups representing a small proportion of the population. In addition, the largest absolute decrease in term IMR over time occurred among AIAN infants, who had the worst rates to start. We observed smaller absolute decreases for the other groups, resulting in decreasing absolute disparities overall.

DISCUSSION

In this analysis, we used multigroup indices of racial and ethnic disparities in IMRs to examine changes in disparities in pregnancy outcome in the United States over the past 2 decades. Findings from this analysis highlight the complex nature of racial and ethnic disparities, as the direction and magnitude of change in disparities was dependent upon whether disparities were absolute or relative and whether the groups were weighted equally or according to population size. Although birth outcomes have generally improved over the past 2 decades, these improvements have not been distributed equitably across racial and ethnic subpopulations.

For overall IMR, disparities decreased on the absolute scale in tandem with a decreasing temporal trend. On the relative scale, population-weighted disparities in overall IMR increased significantly, although they did not change significantly based on the equally weighted STI. For PTB rates, disparities decreased for the absolute and relative measures and for all weighting schemes. The main driver of this pattern was the increasing PTB rates among all subgroups except non-Hispanic Black. Finally, in the case of PTB-related IMR, disparities increased across absolute and relative metrics, although the magnitude of the increases varied by equally weighted or population-weighted indices. These different patterns highlight the need to examine multiple disparity metrics because the reliance on a single measure will not encapsulate the full picture of how disparities may have changed over time.

There are many different ways to measure disparities and change over time. The choice of a particular metric presents concomitant value judgments that are often not made explicit.[12-14,20,27] For example, selecting an equally weighted disparity metric implies that all groups should be considered of equal importance, regardless of group size. The consequence of this choice is that individuals belonging to smaller groups are given greater import than individuals belonging to larger groups. By contrast, population-weighted metrics weight individuals equally and therefore small groups are given less weight even if they bear a disproportionate burden of disease. With respect to assessing change over time, using equally weighted metrics does not allow for the examination of shifting population distributions and the impact these changes may have on overall disparities. For example, the proportion of births to Mexican women nearly doubled over the study period. Moreover, in evaluating change over time, disparities may decrease because the more advantaged groups get worse, as illustrated in the PTB rate disparities. Although equity at any cost may be a goal for some, others may not consider decreasing disparities a success in this context.

The significant decreases in disparities in PTB rates observed in the present study are consistent with previous research.[17,28,29] Because PTB is a major contributor to infant mortality, it might be expected that disparities in IMR would follow the same pattern as that observed for PTB. This is not necessarily the case, as demonstrated by the increasing disparity in mortality among preterm infants seen in this analysis. Previous research has suggested that the increases in PTB may be largely driven by medically indicated PTB, which has increased for all groups over time, but less so for Black infants.[17] This differential pattern of medically indicated PTB rates over time might lead to smaller disparities in PTB rates but larger disparities in PTB-associated IMR if medically indicated PTB is associated with reduced risk of perinatal mortality and stillbirth.[17]

Additional factors that may contribute to the diverging patterns of disparities are the changing distributions of multiple births,[28] maternal age,[29] or maternal preconception health characteristics (e.g., obesity, diabetes) by race or ethnicity,[29] as well as various social determinants such as poverty and access to preconception, prenatal, perinatal, and infant health care.[10,17,18,30-32] A few studies have suggested that interventions to improve infant health can have a negative impact on disparities because the benefits of interventions are not equitably distributed across racial and ethnic subpopulations. The “Back-to-Sleep” campaign, a 1994 initiative to reduce deaths attributable to sudden infant death syndrome has been cited as an example of how overall population health may improve, but disparities may increase.[33-35] In a similar way, racial and ethnic disparities have been reported to increase following the introduction of surfactant[11]; however, it is difficult to determine how changes related to maternal characteristics, socioeconomic factors, social programs and policies (e.g., Special Supplemental Nutrition Program for Women, Infants, and Children), perinatal regionalization, or other factors may have played a role.[15,18] Because of the limitations of using vital statistics to examine causal pathways, we chose to take a broad perspective and examine IMR across all births, but future research looking at plurality, type of PTB, maternal characteristics, or geographic variation may elucidate more specific patterns in disparities and potential causes underlying those patterns.

Several studies have reported widening disparities between Black and White infants in overall IMR[7,10,11,29,30] and preterm IMR from 1985 to 2000.[10,29,30] Because these studies have relied on pairwise relative comparisons, it is difficult to compare findings to results of this analysis. However, our findings are somewhat consistent with these earlier studies in that we did observe increasing disparities for preterm-specific IMR, and it appears that the trend of increasing disparities has continued through 2006. In addition, we observed increasing relative disparities in overall IMR, but only when we used population-weighted metrics. In contrast with previous studies, disparities in overall IMR decreased on the absolute scale and did not change significantly when we used the equally weighted relative metric. This is likely attributable to the use of different measures of disparity in this analysis compared with previous research, and perhaps the use of more recent data.

This study has some limitations. First, the inability to link a small percentage of infant deaths to their corresponding birth certificate means that IMRs may be underestimated for some subgroups. Although the percentage of unlinked records is small (approximately 2% of births) and we conducted sensitivity analyses with record weights to adjust for this non-linkage, which produced results that were very similar to the unweighted analyses, it is unclear how these unlinked records may influence the disparity indices or change over time.

In a similar way, the accuracy or completeness of gestational age data may vary by race and over time; the limitations of gestational age data in vital statistics have been described.[36] It is possible that misreporting of last menstrual period may vary by race or over time, and potentially affect results. In addition, despite efforts to maximize consistency in how race was coded and defined over the study period, discrepancies may remain and we were unable to examine several subgroups within the API category or to look at potentially important variables such as immigration status. Finally, the metrics we examined used the population average as a reference and it is unclear specifically how results would be affected by a different reference point such as an "ideal" rate or value (e.g., *Healthy People 2020* target) or the best group's rate. We included the RD and RR, which use the best group as the reference, for comparison, and methodological work on the measurement of health disparities is ongoing.

Despite these limitations, this study has several strengths. This is one of the first studies to examine racial and ethnic disparities in infant mortality by using multiple disparity metrics on both the absolute and relative scales. Disparities are complex and multifaceted; it is important to examine multiple indices of disparities to determine if progress in reducing disparities over time has been achieved.

Over the past 20 years, significant headway has been made in reducing racial and ethnic disparities in overall infant mortality on the absolute scale. However, relative disparities have widened when one takes into account the population distribution. Despite significant decreases in disparities in the PTB rate, disparities in preterm infant mortality have substantially increased. Infant mortality is a common bellwether of general and maternal and infant health, and the increasing disparities in preterm IMR warrant further investigation.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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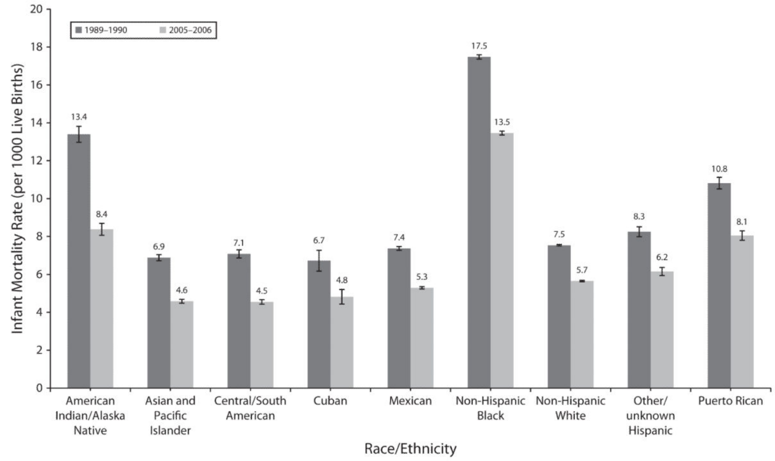

FIGURE 1.

Overall infant mortality rate (per 1000 live births) by race and ethnicity: Birth Cohort Linked Birth–Infant Death Data Files from US Vital Statistics, 1989–1990 and 2005–2006.

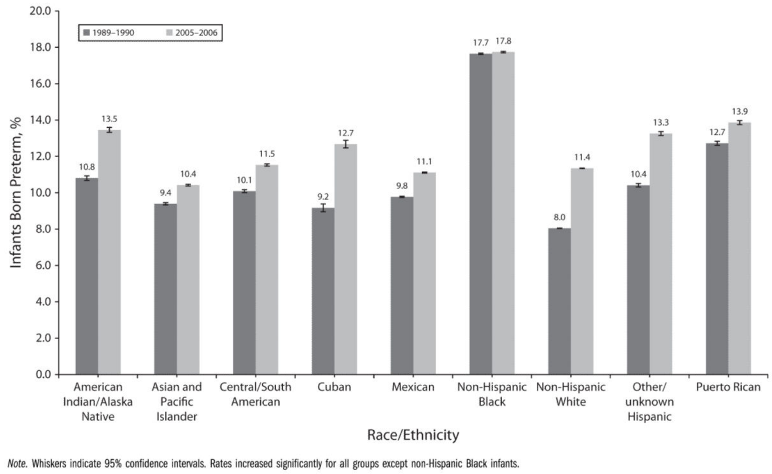

FIGURE 2.

Percentage of infants born preterm (< 37 weeks) by race and ethnicity: Birth Cohort Linked Birth–Infant Death Data Files from US Vital Statistics, 1989–1990 and 2005–2006.

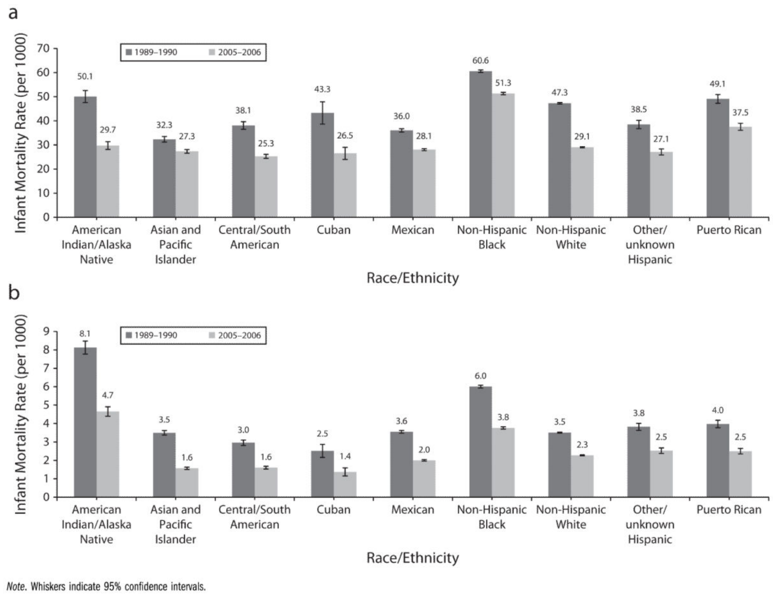

FIGURE 3.

Infant mortality rate (per 1000 live births) by race/ethnicity among (a) preterm infants (< 37 weeks) and (b) term infants (≥ 37 weeks): Birth Cohort Linked Birth–Infant Death Data Files from US Vital Statistics, 1989–1990 and 2005–2006.

TABLE 1

Changes in Absolute and Relative Racial and Ethnic Disparities in Infant Mortality in the United States: Birth Cohort Linked Birth–Infant Death Data Files From US Vital Statistics, 1989–1990 and 2005–2006

Disparity Metric	1989–1990	2005–2006	Difference (SE)	Percentage Change
Overall infant mortality[a]				
Absolute				
RD	10.8	8.9	–1.8 (0.6)*	–17.2*
BGV equal weight	12.3	7.4	–5.0 (0.6)*	–40.2*
BGV population weight	13.8	8.0	–5.8 (0.4)*	–42.0*
Relative				
RR	2.6	3.0	0.4 (0.2)	13.8
STI equal weight	58.8	67.1	8.3	14.2
STI population weight	63.7	68.5	4.8*	7.6
Preterm birth rate[a]				
Absolute				
RD	9.6	7.3	–2.3 (0.1)*	–23.7*
BGV equal weight	7.2	4.3	–2.9 (0.1)*	–40.3*
BGV population weight	12.2	5.3	–6.9 (0.1)*	–56.7*
Relative				
RR	2.2	1.7	–0.5 (0.0)*	–22.4*
STI equal weight	26.2	12.1	–14.1*	–53.8*
STI population weight	50.0	15.2	–34.9*	–69.7*
Preterm infant mortality[a]				
Absolute				
RD	28.3	26.0	–2.2 (1.6)	–7.9
BGV equal weight	68.2	61.0	–7.2 (8.3)	–10.5
BGV population weight	67.2	85.8	18.7 (5.6)*	27.8*
Relative				
RR	1.9	2.0	0.2 (0.1)	8.3
STI equal weight	17.3	26.3	9.0*	52.3*
STI population weight	14.1	33.3	19.2*	136.0*
Term infant mortality[a]				
Absolute				
RD	5.6	3.3	–2.3 (0.6)	–41.5*
BGV equal weight	2.7	1.1	–1.7 (0.4)*	–61.6*
BGV population weight	1.0	0.4	0.6 (0.1)*	–57.9*
Relative				
RR	3.2	3.4	0.2 (0.7)	5.0

Disparity Metric	1989–1990	2005–2006	Difference (SE)	Percentage Change
STI equal weight	65.3	78.1	12.8	19.6
STI population weight	25.7	30.7	5.1	19.7

Note. BGV = between-group variance; RD = risk difference; RR = risk ratio; STI = symmetrized Theil index. Population-weighted and equally weighted disparity metrics are presented, with the corresponding absolute and percentage changes. Standard errors are not available for the difference in the symmetrized Theil index. Difference estimates may vary slightly because of rounding.

[a]The rates are per 1000 live births.

*Statistically significant change over time $P < .05$.