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Examining Progress Toward Elimination of Racial and Ethnic Health Disparities for Healthy People 2020 Objectives Using Three Measures of Overall Disparity

Data Evaluation and Methods Research

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Examining Progress Toward Elimination of Racial and Ethnic Health Disparities for Healthy People 2020 Objectives Using Three Measures of Overall Disparity

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Abstract

Background

Healthy People provides science-based, 10-year targets for public health objectives for the U.S. population. As in the preceding two decades, Healthy People 2020 (HP2020) included an overarching goal related to health disparities.

Objective

This report examines changes in health disparities over time by race and ethnicity for HP2020 objectives using three measures of disparity.

Methods

Data were analyzed for 506 objectives from 68 data sources from 2001 to 2018. Analyses were restricted to HP2020 objectives with data by race and ethnicity at the baseline and final timepoints for a minimum set of population groups. Health disparities by race and ethnicity were evaluated using three measures that were used in HP2020: the maximal rate difference, maximal rate ratio, and summary rate ratio. Changes in disparities over time were evaluated by comparing the baseline and final timepoints for each of the respective measures. Based on the statistical significance of the change ($n = 469$) or, when statistical significance

could not be assessed, the magnitude of the change ($n = 37$), each of the disparities measures was categorized as having narrowed, shown little or no detectable change, or widened. Analyses were conducted to compare findings and evaluate agreement in the change categories.

Results

Little or no change was detected in disparities for most of the objectives, regardless of the measure used (76.9% for the maximal rate difference, 83.3% for the maximal rate ratio, and 92.1% for the summary rate ratio). For each measure, a slightly higher percentage of objectives were categorized as having narrowed rather than widened in disparities. Agreement in the disparities change categories across objectives was 75.6% for the three measures.

Conclusion

These findings show that health disparities persist and that multiple measures provide different approaches for assessing progress toward their elimination.

Keywords: population subgroups • health equity • disparities measurement methods • statistical methods

Introduction

Established in 1979, Healthy People is an initiative of the U.S. Department of Health and Human Services that provides science-based, 10-year national objectives with numerical targets for improving the health of all Americans. For every decade since Healthy People 2000 (launched in 1990), the Healthy People initiative has also included an overarching goal related to health disparities and equity. For Healthy People 2020 (HP2020), the disparities-related goal was to “achieve health equity, eliminate disparities, and improve the health of all groups.” HP2020 also established 1,318

objectives spanning 42 topic areas (1). By the end of the decade (the year 2020), 985 of those objectives had at least two data points and a target to be achieved.

HP2020 Final Review (1) included a suite of interactive web-based charts and tables focused on different dimensions of the HP2020 goals and data:

- Assessments of progress toward the attainment of targets in the total population (2) and progress by population subgroups (3) are available from: https://www.cdc.gov/nchs/healthy_people/hp2020/progress-tables.htm

and https://www.cdc.gov/nchs/healthy_people/hp2020/population-groups.htm;

- Data for the Foundation Health Measures (4), which are global summary measures of population health, are available from: https://www.cdc.gov/nchs/healthy_people/hp2020/foundation-health-measures.htm; and
- An Overview of Health Disparities (5), providing summary disparities analyses for HP2020 objectives across population subgroups (defined using a set of six population characteristics: sex, race and ethnicity, family income, educational attainment, disability status, and geographic location), is available from: https://www.cdc.gov/nchs/healthy_people/hp2020/health-disparities.htm.

Healthy People 2020 Overview of Health Disparities (5) used a single measure of overall disparity, the summary rate ratio, to evaluate changes in disparities over time across all the population subgroups for each of the six population characteristics mentioned above. Because no single measure is considered the gold standard in the measurement of health disparities, it is useful to evaluate and compare multiple measures when time and resources allow. This report expands on the Overview of Health Disparities to examine changes in health disparities by race and ethnicity using all three measures of overall disparity developed for HP2020:

1. The maximal rate difference (MRD), an absolute measure of best–worst disparity (based on the highest and lowest rates)
2. The maximal rate ratio (MRR), a relative measure of best–worst disparity (based on the highest and lowest rates)
3. The summary rate ratio (SRR), a relative summary measure of disparity that was also used for the Overview of Health Disparities (5,6). Because it compares the best group rate to the average rate for all the other race and ethnicity groups, its variability is reduced in comparison with the other two measures, which are only based on the two extreme rates (most and least favorable, or least and most adverse).

Together, MRD, MRR, and SSR represent absolute, relative, best–worst, and summary measures and have been used individually in multiple HP2020 products (7,8), but the agreement among them has not been assessed. Several publications further establish the importance of, as well as the complexity involved in, considering multiple measures and multiple types of health disparities, like absolute compared with relative measures and pairwise compared with overall (summary) measures (see, for example, References 6,9–14). This report evaluates and assesses progress toward the elimination of health disparities among race and ethnicity groups across HP2020 objectives using these three measures of overall racial and ethnic health disparities, as well as an assessment of agreement among the three measures.

Methods

Data

HP2020 data come from a variety of federal agencies and nonfederal organizations and, consequently, vary with respect to source, method of collection, presentation standards, availability of measures of variability, and tracking period (15). Data analyzed in this report come from 68 data sources. Only estimates that met National Center for Health Statistics (NCHS) presentation standards, or other presentation standards provided by the data system as applicable, were included (16).

As in the *Healthy People 2020 Overview of Health Disparities* analysis (5), the analyses were restricted to HP2020 objectives ($n = 506$) with data by race and ethnicity at a baseline and a final timepoint for the following minimum set of three race and ethnicity groups: White, not Hispanic or Latino; Black, not Hispanic or Latino; and Hispanic or Latino. Data for some informational objectives (which did not have targets) as well as objectives that were measured using counts of events (instead of proportions or rates) were excluded from the analysis (17,18). The earliest and latest timepoints with data for the above–minimum set of race and ethnicity groups were used as the baseline and final timepoints, respectively. The baseline year could have started with data as early as 2001, and the final timepoint could have ended with data as recent as 2018. The median length of time between the baseline and final timepoints was 8 years (interquartile range: 5–10 years) across the included objectives. Additional race and ethnicity groups beyond the minimum three were included in the analyses for a given objective if data were available for those groups at both the baseline and final timepoints.

With a few exceptions, race and ethnicity groups were defined using mutually exclusive categories. The following criteria were applied when data were collected or reported using overlapping categories:

- Data for the separate groups a) Asian and b) Native Hawaiian or Other Pacific Islander (NHOPI) were included when available and were prioritized over data for the combined group, Asian or Pacific Islander (API), when reported in the same timepoint. However, if an objective reported data for the combined API category and not Asian and NHOPI at both the baseline and final timepoints, the API data were used instead.
- When data by Hispanic origin were reported at the baseline and final timepoints, American Indian or Alaska Native, not Hispanic or Latino was used instead of American Indian or Alaska Native; API, not Hispanic or Latino was used instead of API; Asian, not Hispanic or Latino was used instead of Asian; two or more races, not Hispanic or Latino was used instead of two or more races; and NHOPI, not Hispanic or Latino was used instead of NHOPI.

- Some objectives only included data for the group White or Black with no specification of Hispanic ethnicity. These objectives were not included in the analyses given the potential for a high degree of overlap, particularly between the groups White and Hispanic or Latino.

Measures of Disparities at a Single Timepoint

Three measures that quantify the extent of overall health disparity for each HP2020 objective across all the race and ethnicity groups included in the analysis at both the baseline and final timepoints were developed for HP2020 (6); see Appendix for the formulas used to compute these measures.

- **Maximal rate difference (MRD)**—An absolute measure of overall health disparity defined as the difference between the highest and lowest group rates, regardless of rates for the other groups at the given timepoint. This measure is particularly useful for tracking changes over time because it allows the analyst to determine if, overall, the absolute difference between the highest and lowest rates is decreasing (6).
- **Maximal rate ratio (MRR)**—Relative measure of overall health disparity defined as the ratio of the highest to the lowest group rates, regardless of rates for the other groups at the given timepoint. MRR is particularly useful for comparing objectives that are measured on different scales (6).
- **Summary rate ratio (SRR)**—Relative measure of overall health disparity that was used in the HP2020 Midcourse Review (11) and HP2020 Final Review (5). For objectives expressed in terms of favorable outcomes, SRR is the ratio of the group with the most favorable rate (“best” group rate) to the average rate for all other race and ethnicity groups at the given timepoint. For objectives expressed in terms of adverse outcomes, SRR is the ratio of that average rate to the best group rate.

The simplicity of MRD and MRR may be appealing because they only use two group rates, but this construction has certain analytic implications that should be considered. Because it compares the best group rate to the average rate for all the other race and ethnicity groups, the variability in the magnitude of SRR is reduced in comparison with MRD and MRR, which are calculated using only the highest and lowest group rates. As a result, both MRD and MRR usually result in disparities of greater magnitude than SRR because they are more sensitive to extremely high or low underlying subgroup rates. In other words, SRR can be thought of as a more conservative measure of overall disparity than MRD and MRR (6).

Measurement of Change in Disparities Over Time

The change in disparities between the baseline and the final timepoints can be quantified using both the absolute and relative change over time, potentially yielding diverging results (13–15). In *HP2020 Overview of Health Disparities* (5), changes in SRR were measured using only the simple difference between its values at the baseline ($SRR_{baseline}$) and the final timepoint (SRR_{final}), yielding an absolute measure of change in disparity over time:

$$\text{Simple difference in SRR} = SRR_{final} - SRR_{baseline}$$

In this report, for all three measures examined, the percent (relative) change between the baseline and final timepoints was calculated because it remains unit free and, unlike the absolute change from baseline, allows for direct comparisons between MRD and MRR or MRD and SRR. For example, the percentage difference between $SRR_{baseline}$ and SRR_{final} can be written as:

$$\text{Percentage difference in SRR} = 100 \cdot \left[\left(\frac{SRR_{final}}{SRR_{baseline}} \right) - 1 \right]$$

To be consistent with methods used in Healthy People 2010 and 2020 for measuring progress, the categories to describe change over time needed to cover all objectives in the initiative, including those with and without measures of variability (1,6,19).

Most of the 506 HP2020 objectives with data by race and ethnicity had measures of variability. When standard errors were available ($n = 469$), the percent change in SRR was considered statistically significant at the 0.05 level using a two-sided test if $|z|$ was greater than 1.96, where the z score was calculated using the following formula (see Appendix):

$$z = \frac{\ln(SRR_{final}) - \ln(SRR_{baseline})}{\sqrt{SE[\ln(SRR_{baseline})]^2 + SE[\ln(SRR_{final})]^2}}$$

When standard errors were not available ($n = 37$), statistical significance could not be assessed, so the magnitude of the percent change was used instead of statistical significance.

The calculations for percentage difference in MRR and MRD are similar, with SRR in the last two formulas replaced by either MRR or MRD.

Changes in disparities were summarized for each of the three measures using three categories: narrowing, little or no detectable change, and widening. For each of the three disparities measures, the top 10 objectives that had the largest percent changes and that were categorized as narrowing or widening are presented. The criteria used to define the three change categories were:

- **Narrowing**—Percentage difference in the measure M ($M = SRR, MRR, \text{ or } MRD$) between the final and the baseline data year,

$$100 \cdot \left[\left(\frac{M_{final}}{M_{baseline}} \right) - 1 \right]$$

was negative and statistically significant when this could be assessed, or negative and its absolute value was 10% or greater when statistical significance could not be assessed.

- **Little or no detectable change**—Percentage difference in the measure M ($M = SRR, MRR, \text{ or } MRD$) between the final and the baseline data year,

$$100 \cdot \left[\left(\frac{M_{final}}{M_{baseline}} \right) - 1 \right]$$

was not statistically significant when this could be assessed, or its absolute value was more than 10% when statistical significance could not be assessed.

- **Widening**—Percentage difference in the measure M ($M = SRR, MRR, \text{ or } MRD$) between the final and baseline data year,

$$100 \cdot \left[\left(\frac{M_{final}}{M_{baseline}} \right) - 1 \right]$$

was positive and statistically significant when this could be assessed, or positive and greater than or equal to 10% when statistical significance could not be assessed.

Percentage agreement among the three measures in the disparities change category assignments and in the overall directionality of the change (widening or narrowing, independent of the statistical significance or relative magnitude of the change) was also calculated using the general formula:

$$\text{Percentage agreement} = \frac{\text{Number of objectives in the same change category across measures}}{\text{Total number of objectives}} \cdot 100$$

Findings

Race and Ethnicity Groups With the Most Favorable Rates at the Baseline and Final Data Points

The distribution of race and ethnicity groups that had the most favorable rates relative to other subgroups is shown in [Table 1](#). The White, not Hispanic or Latino group attained the most favorable rate for the highest proportion of objectives at the baseline (30.8%) and final (30.8%) data points, followed by Black, not Hispanic or Latino (16.4% at baseline and 16.2% at final); Asian (15.6% at baseline and 16.2% at final); and Hispanic or Latino (14.2% at baseline and 15.2% at final) groups. The Native Hawaiian or Other Pacific Islander, American Indian or Alaska Native, and two or more races groups attained the most favorable rate for a comparatively

smaller proportion of objectives, ranging from about 1% to 6% at the baseline and final data points, although data for these groups were less commonly reported compared with the three largest race and ethnicity groups in the analysis (White, not Hispanic or Latino; Black, not Hispanic or Latino; and Hispanic or Latino).

For 63.0% ($n = 319$) of the objectives in the analysis, the race and ethnicity group that attained the most favorable rate was the same at the baseline and final data points ([Table 1](#)). The White, not Hispanic or Latino group had the largest percentage of objectives with the most favorable rate at both time points (20.8% of total objectives), followed by the Asian (10.7%), Asian or Pacific Islander combined (10.3%), Black, not Hispanic or Latino (8.9%), and Hispanic or Latino (7.9%) groups.

SRR

The top 10 objectives with the largest widening or narrowing in disparities based on the percent change in SRR are shown in [Table 2](#) and [Figures 1](#) and [2](#). The magnitude of the increases in the percent change for the top 10 objectives that showed widening disparities ranged from 20.1% (MICH-28.2: Cases of anencephaly [per 100,000 live births]) to 57.4% (IID-26: New cases of hepatitis C [per 100,000 population]). In contrast, the top 10 objectives that showed the largest narrowing in disparities in the percent change from baseline ranged from -67.6% (SA-13.2: Adolescents using marijuana in past 30 days [percent, 12–17 years]) to -20.0% (STD-7.2: New cases of primary and secondary syphilis among males [per 100,000 population]).

MRR

The top 10 objectives with the largest widening or narrowing in disparities based on the percent change in MRR are shown in [Table 3](#) and [Figures 3](#) and [4](#). The magnitude of the increases in the percent change for the top 10 objectives that showed widening disparities ranged from 38.0% (TU-18.3: Adolescents and young adults exposed to tobacco marketing in movies and television [percent, grades 6–12]) to 227.8% (IVP-33: Physical assaults [per 1,000 population, 12+ years]). The magnitude of the percent change for the top 10 objectives that showed a narrowing in disparities ranged from -73.2% (SA-13.2: Adolescents using marijuana in past 30 days [percent, 12–17 years]) to -42.4% (MPS-2.4.4: Drug overdose deaths involving synthetic opioids, excluding methadone [per 100,000 population]).

Figure 1. Top 10 largest percentage increases in race and ethnicity disparities using summary rate ratio, by objective: Healthy People 2020

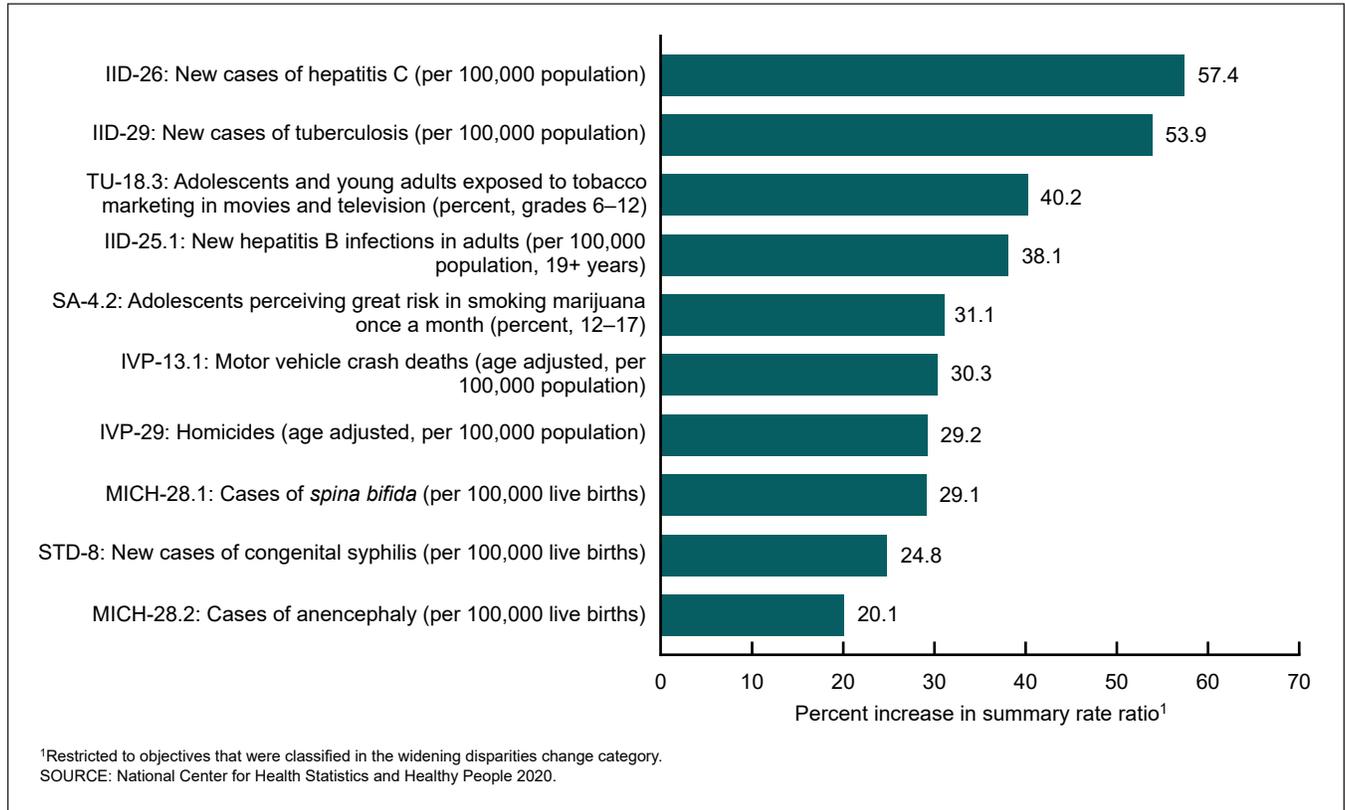


Figure 2. Top 10 largest percentage decreases in race and ethnicity disparities using summary rate ratio, by objective: Healthy People 2020

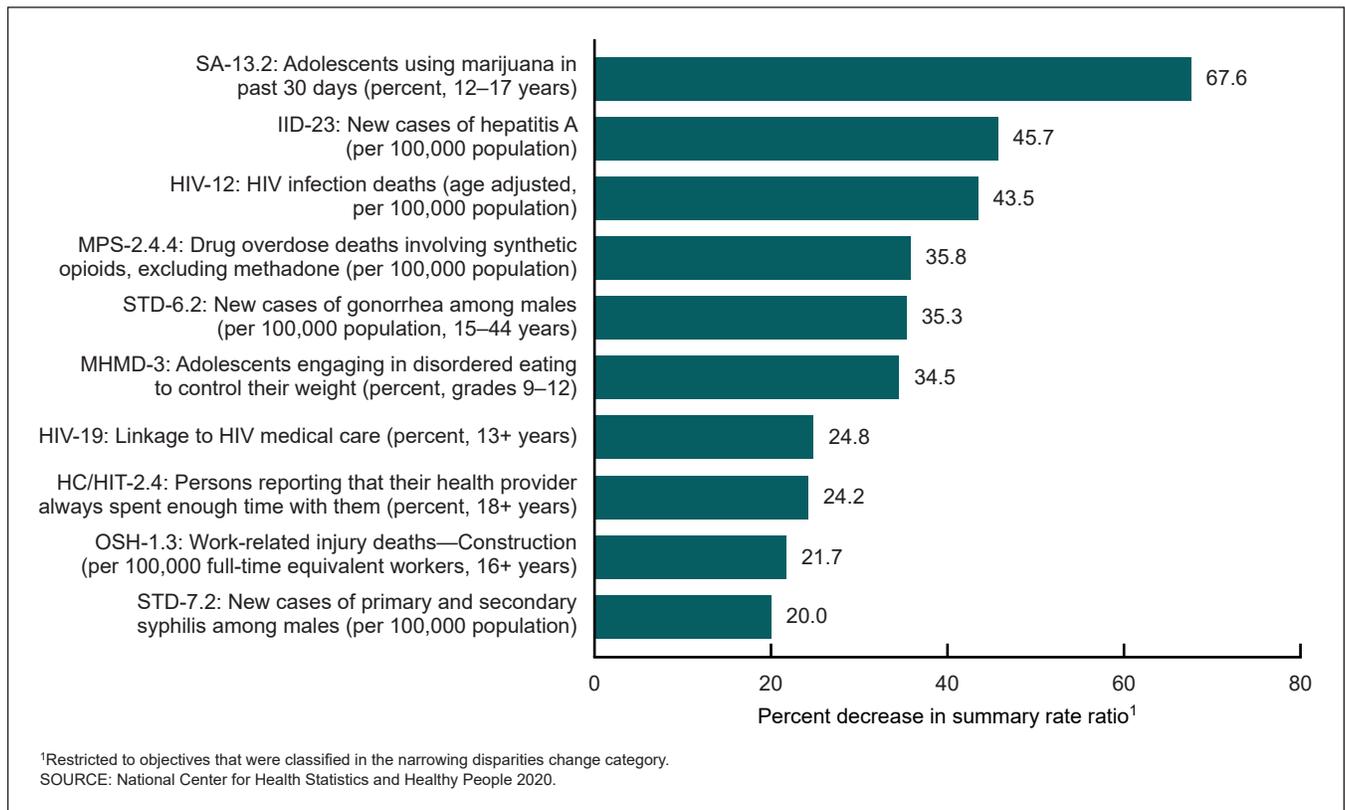


Figure 3. Top 10 largest percentage increases in race and ethnicity disparities using maximal rate ratio, by objective: Healthy People 2020

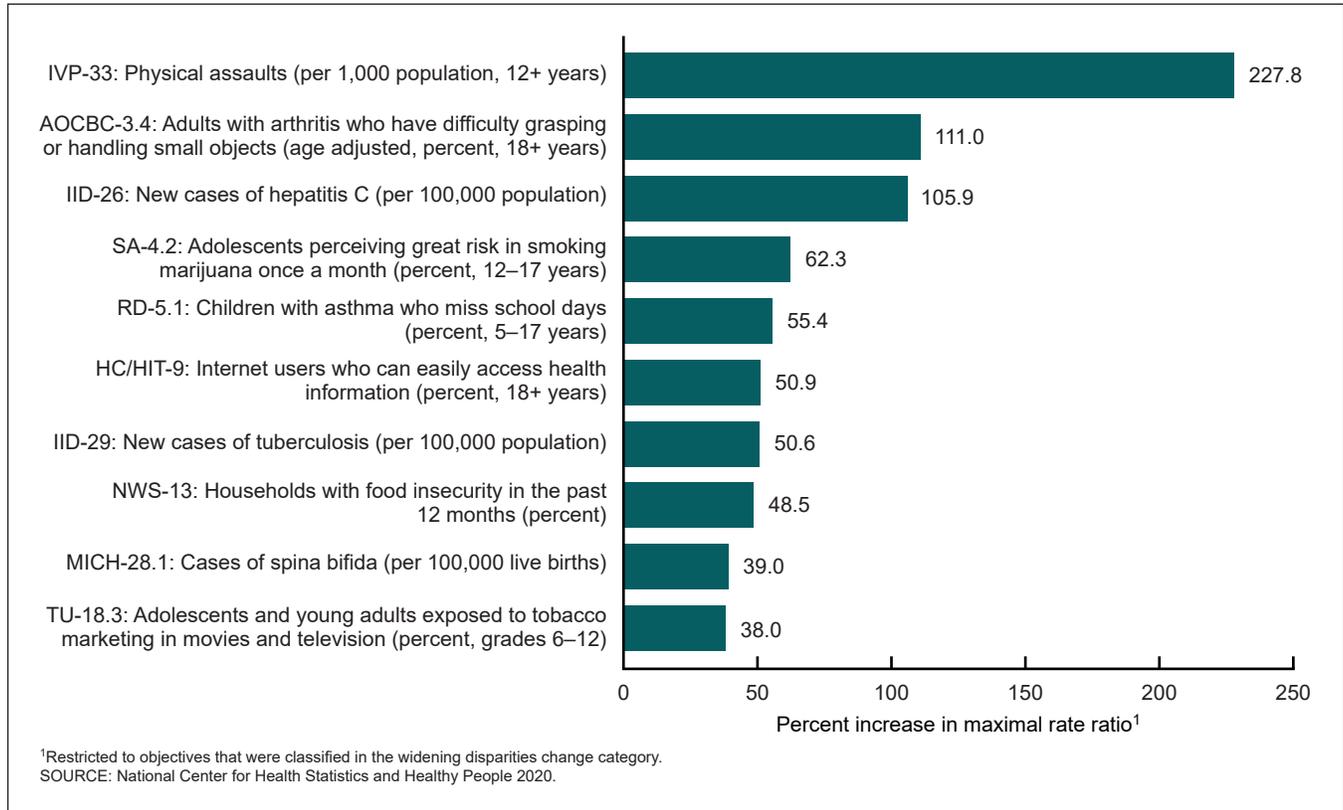
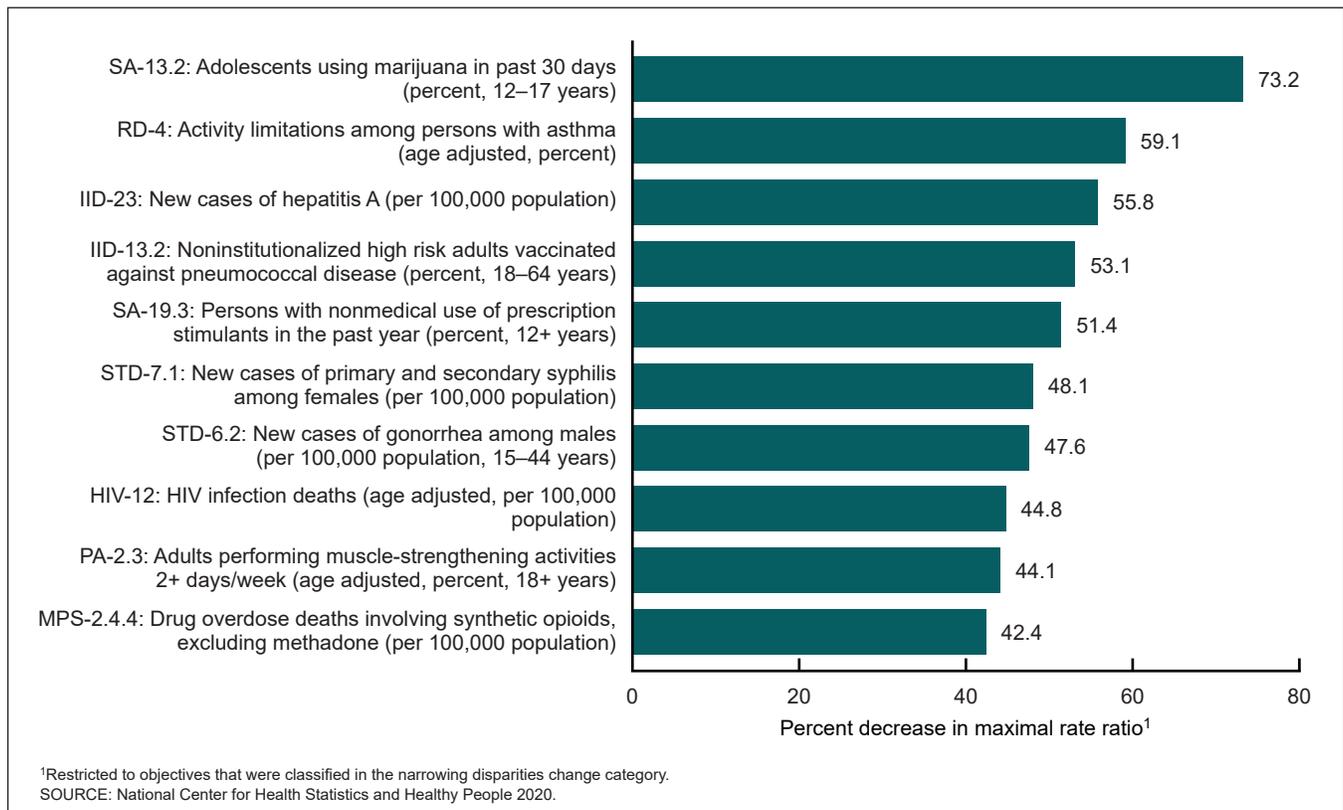


Figure 4. Top 10 largest percentage decreases in race and ethnicity disparities using maximal rate ratio, by objective: Healthy People 2020



MRD

The top 10 objectives with the largest widening or narrowing in disparities based on MRD are shown in [Table 4](#) and [Figures 5](#) and [6](#). The range in magnitudes of the increases in percent changes for the top 10 objectives showing widening disparities based on MRD was higher than for the other two measures, ranging from 104.4% (MICH-28.1: Cases of spina bifida [per 100,000 live births]) to 689.3% (IID-26: New cases of hepatitis C [per 100,000 population]). The magnitude of the decreases in percent change for the top 10 objectives that showed a narrowing in disparities ranged from -94.2% (HDS-19.2: Heart attack patients receiving percutaneous intervention within 90 minutes of hospital arrival [percent]) to -60.6% (PA-2.3: Adults performing muscle-strengthening activities 2+ days/week [age adjusted, percent, 18+ years]).

Comparing Changes Over Time Across the Three Disparities Measures

A comparison of the percentages of objectives in the disparities change categories across the three measures of overall health disparity is shown in [Table 5](#) and [Figure 7](#). The percentage of objectives in the little or no detectable change category was 76.9% for MRD, 83.3% for MRR, and 92.1% for SRR. MRD resulted in the highest percentage of objectives showing a narrowing ($n = 72$, 14.2%) or widening ($n = 45$, 8.9%) in disparities, followed by MRR ($n = 56$, 11.1% of objectives narrowing and $n = 28$, 5.6% widening) and SRR ($n = 21$, 4.2% of objectives narrowing and $n = 19$, 3.8% widening).

Figure 5. Top 10 largest percentage increases in race and ethnicity disparities using maximal rate difference, by objective: Healthy People 2020

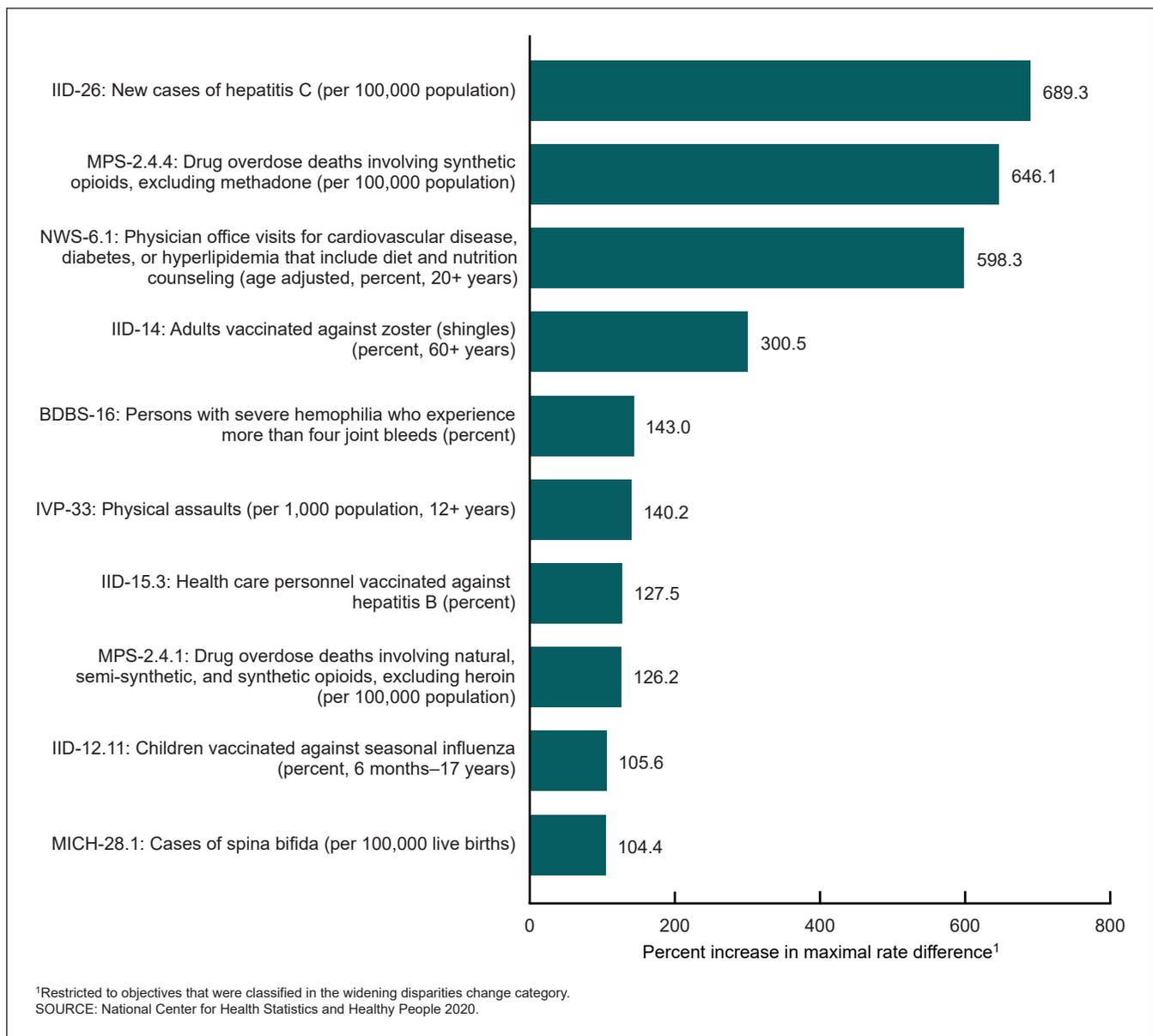
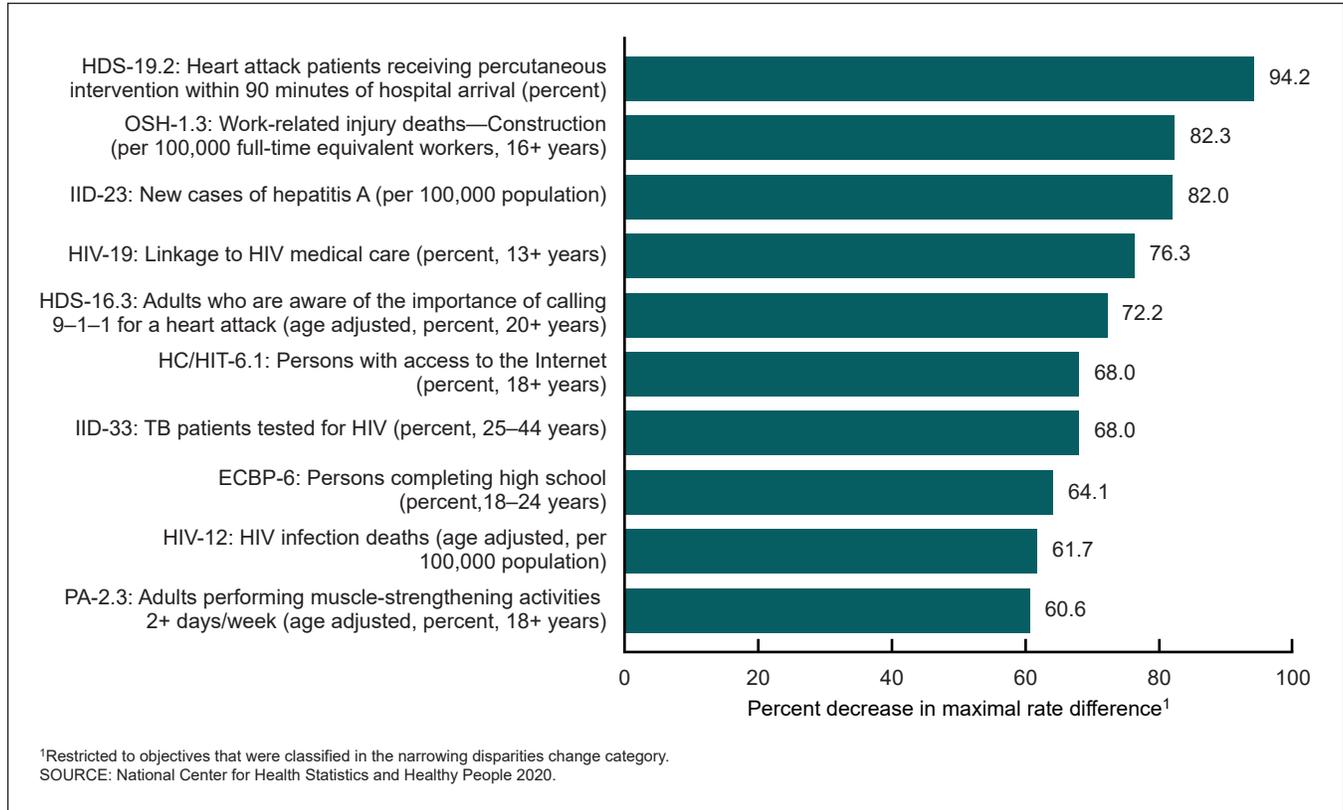


Figure 6. Top 10 largest percentage decreases in race and ethnicity disparities using maximal rate difference, by objective: Healthy People 2020



Agreement in the Assessment of Changes in Disparities Between Measures

To assess the consistency in the disparities change categories across all three measures and objectives included in the analysis, the percentage agreement overall and for pairs of measures was evaluated (Table 6 and Figure 8). Of the 504 objectives for which all three measures could be calculated, 381 (75.6%) were classified in the same disparities change category for SRR, MRR, and MRD (Figure 8). The highest pairwise agreement in classifying the disparities change category across all objectives was for SRR and MRR (87.5%), followed by MRR and MRD (83.9%) and SRR and MRD (79.0%). The pairwise agreement in the direction of the change from baseline (negative or positive), independent of statistical significance or relative magnitude, showed a similar range: 76.6% for SRR and MRD, 81.9% for SRR and MRR, and 83.1% for MRR and MRD (Table 7).

Overlap in the Largest Changes in Disparities Across Measures

Objectives that showed the largest widening or narrowing for SRR, MRD, or MRR (Tables 2–4) were compared across these three measures to evaluate consistency in the findings. Most of these objectives ($n = 27$ of 41 unique objectives) were specific to one of the three disparities measures evaluated in the analysis and did not overlap. However, the remaining

14 objectives overlapped across two or more measures (Figure 9). Specifically, two objectives (IID-26: New cases of hepatitis C [per 100,000 population] and MICH-28.1: Cases of spina bifida [per 100,000 live births]) were among the largest disparity increases for all three disparities measures, and two objectives (IID-23: New cases of hepatitis A [per 100,000 population] and HIV-12: HIV infection deaths [age adjusted, per 100,000 population]) were among the largest decreases for all three measures. An additional objective (MPS-2.4.4: Drug overdose deaths involving synthetic opioids, excluding methadone [per 100,000 population]) also overlapped across all three measures, but showed an inconsistent direction in change (decrease for MRR and SRR and increase for MRD).

In addition, nine total objectives that were included on exactly two of the three largest increase or decrease lists were consistent in the directionality of the change:

- HIV-19 (Linkage to HIV medical care [percent, 13+ years]) and OSH-1.3 (Work-related injury deaths—Construction [per 100,000 full-time equivalent workers, 16+ years]) overlapped for the SRR and MRD measures;
- IID-29 (New cases of tuberculosis [per 100,000 population]), STD-6.2 (New cases of gonorrhea among males [per 100,000 population, 15–44 years]), TU-18.3 (Adolescents and young adults exposed to tobacco marketing in movies and television [percent, grades 6–12]), SA-4.2 (Adolescents perceiving great risk in

Figure 7. Percentage of objectives in race and ethnicity disparities change categories for three selected measures: Healthy People 2020

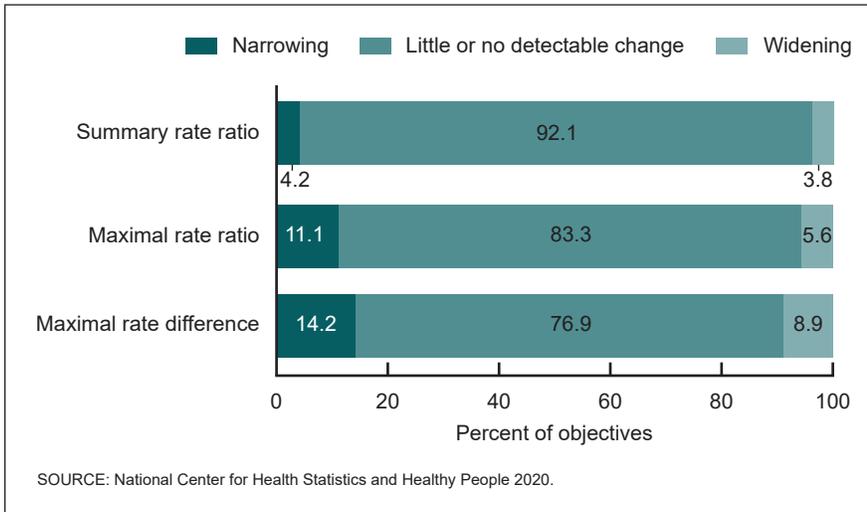
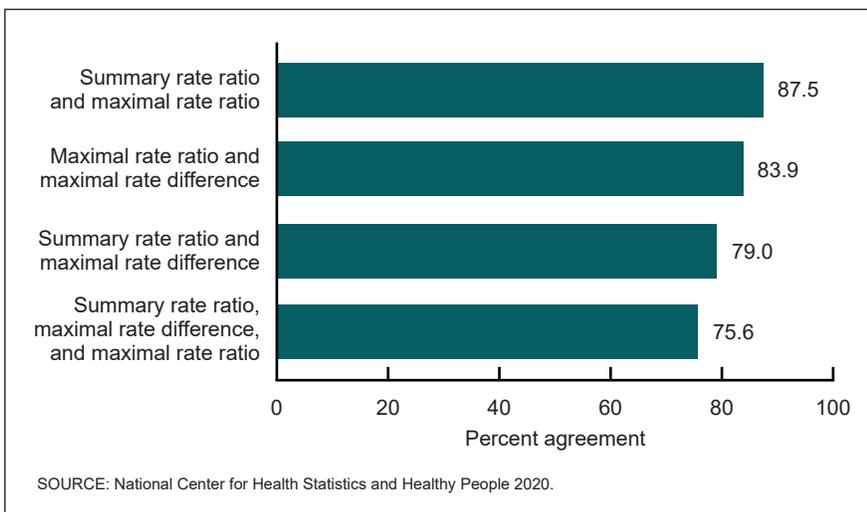


Figure 8. Percentage agreement in race and ethnicity disparities change categories across three selected measures: Healthy People 2020



smoking marijuana once a month [percent, 12–17]), and SA-13.2 (Adolescents using marijuana in past 30 days [percent, 12–17 years]) overlapped for the SRR and MRR measures; and

- IVP-33 (Physical assaults [per 1,000 population, 12+ years]) and PA-2.3 (Adults performing muscle-strengthening activities 2+ days/week [age adjusted, percent, 18+ years]) overlapped for the MRR and MRD measures.

Discussion

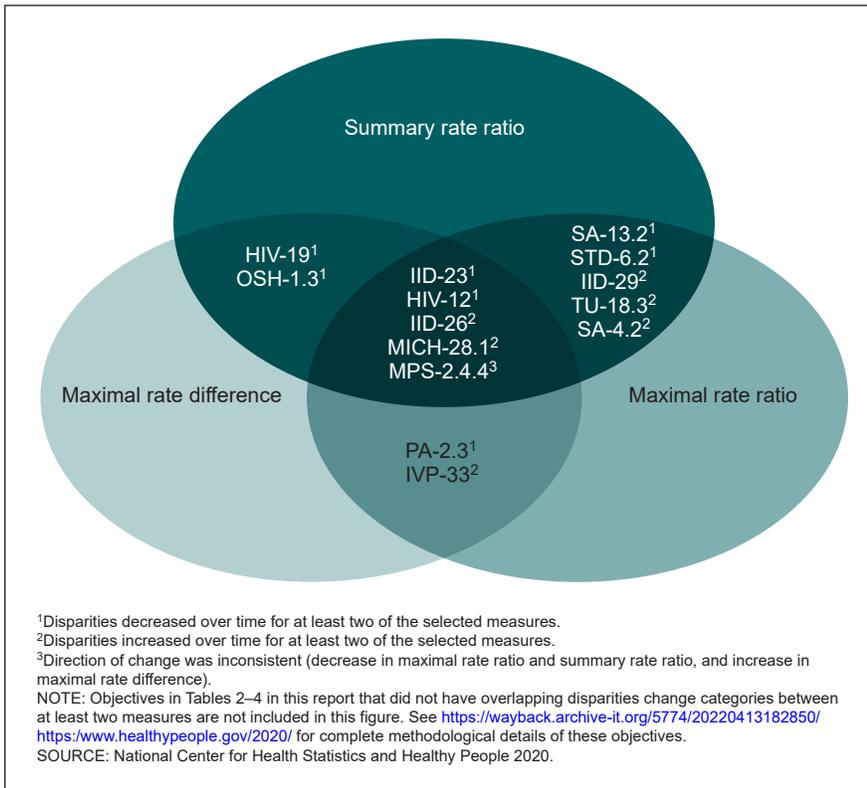
The primary analysis for this report focused on relative changes in disparities over time using and comparing three measures of overall racial and ethnic health disparities: MRD, MRR, and SRR. While most objectives showed little or no detectable change in disparities over time, the percentage in this category varied by measure, from 76.9% for MRD, to 83.3% for MRR, to 92.1% for SRR. For both MRR (11.1%) and MRD (14.2%), the percentage of objectives showing a narrowing in disparities was greater than the percentage showing a widening in disparities (5.6% and 8.9%, respectively). By contrast, for SRR, the percentage of objectives

showing a narrowing (4.2%) was only slightly higher than the percentage showing a widening (3.8%). Because SRR compares the best group rate to the average rate for all the other race and ethnicity groups included in the analysis, its variability is reduced in comparison with MRD and MRR, which are based on the two extreme group rates (most and least favorable, or least and most adverse). Therefore, SRR had a higher percentage of objectives that showed little or no detectable change from baseline (and a lower percentage of objectives showing a widening or narrowing) than the other two measures.

Most objectives were consistently assigned to the same disparities change category, regardless of the measure used. The overall agreement among all three measures was 75.6%, and the percentage agreement based on pairwise comparisons of measures ranged from 79.0% (SRR and MRD) to 87.5% (SRR and MRR). Additionally, the objectives for which the disparities change category assignment differed across measures were mainly due to differences in the magnitude or statistical significance of the percent change from baseline, rather than disagreement in whether the percent change is positive or negative. Notably, regardless of the statistical significance or the threshold used for determining the category of change in disparities over time, the agreement in the observed sign of the percent change from baseline ranged from 76.6% (SRR and MRD) to 83.1% (MRR and MRD) between pairs of measures.

Even among objectives for which the disparities change category was consistent across all three measures, differences in the magnitude of the percent changes resulted in different rankings among objectives (Tables 2–4). Still, some consistency in the objectives among those with the largest increases and decreases was observed. Specifically, two objectives (IID-26 and MICH-28.1) were among the largest disparity increases for all three measures, and two objectives (IID-23 and HIV-12) were among the largest decreases for

Figure 9. Overlap across selected disparities measures among objectives with the largest percentage increases or decreases, by race and ethnicity: Healthy People 2020



all three measures. Nine objectives were included on exactly two of the three largest increase or decrease lists: HIV-19, OSH-1.3, IID-29, TU-18.3, SA-4.2, SA-13.2, STD-6.2, IVP-33, and PA-2.3.

Findings in this report are subject to several limitations and considerations. Because of the wide range of measures and data sources included in HP2020, the length of time between the baseline and final timepoints differed among the objectives included in this analysis. Consequently, it is possible that objectives with shorter tracking periods were more likely to fall in the little or no detectable change category than the widening or narrowing categories. Additionally, this report only considered data for two timepoints for each objective. It is possible, for example, that disparities analyses that consider intermediate timepoints, including trend analyses, would result in different conclusions. The number and composition of the race and ethnicity groups included in the analyses also differed among objectives. To include a diverse set of objectives and data sources in the analysis in a way that would facilitate comparisons across these objectives, standardized inclusion criteria for race and ethnicity groups were developed as described in Methods.

The three disparities measures selected for this analysis have different inherent characteristics. MRD and MRR only use the two highest and lowest rates among race and ethnicity groups, regardless of the objective’s directionality (favorable outcome to be improved or adverse outcome to be reduced), and are therefore subject to disparities of greater magnitude than SRR because they are more sensitive to extremely high or low rates. In contrast, SRR uses data for all the race and ethnicity groups included and, because it compares the best group rate to the average rate for all the other race and ethnicity groups, it is not as subject to extreme rates as MRD and MRR. As mentioned previously, the percentage of objectives in the little or no detectable change category was higher for SRR (92.1%)

than for the other two measures (76.9% for MRD and 83.3% for MRR).

MRD is an absolute measure of disparity, whereas MRR and SRR are relative measures of disparity, and both types of measures are important to consider to provide a more complete picture of disparities (17,18). Finally, the relative (percent) change over time from baseline was used for all three measures because it remains unit free and allows for direct between-measure comparisons. The use of multiple measures is recommended in health disparities analyses, where possible, because there is no commonly accepted gold standard and different measures can yield different conclusions (10,13). While additional measures could have been chosen for this report, analyses were limited in scope to the three measures used in previous HP2020 products and related publications (10,11,15). Consideration should be given to the inherent characteristics of these measures, such as those briefly described here and addressed more thoroughly elsewhere (13–15), when a specific measure is selected.

Statistical significance could not be assessed for all measures, because 37 (7.3%) of the 506 objectives did not include standard errors. For objectives with standard errors, the percent change in the measure between the baseline and final timepoints was required to be statistically significant to be categorized as having widened or narrowed over the decade. But for objectives without standard errors, a cutoff of 10% was used for the absolute value of the percent change from baseline to be categorized as having widened or narrowed. Varying this 10% cutoff for objectives without standard errors, or requiring a magnitude threshold in addition to the statistical significance criterion for objectives with standard errors, would impact the frequency of the three change categories reported in this analysis. Still, regardless of the statistical significance or the threshold used for determining the category of change in disparities, the agreement

in the observed sign of the percent change from baseline was consistent with the level of agreement in the change categories that were defined using statistical significance or magnitude thresholds.

As stated in “Measuring Progress Toward Target Attainment and the Elimination of Health Disparities in Healthy People 2020” (6), findings remain conditional on the reliability of the observed rank order of the group rates, from highest to lowest (or vice versa), which impacts the range-based disparities measures MRD and MRR, as well as the identification of the reference group in the calculation of SRR. Methods that account for the variability of group rankings were not implemented in HP2020. Finally, the disparities measures analyzed are measures of overall health disparity. Therefore, findings of increase or decrease in overall disparities may differ from pairwise disparities for individual groups. While detailed pairwise comparisons are beyond the scope of this report, the HP2020 disparities tool includes a more complete suite of health disparities measures (8).

Conclusion

This report expands on the “Healthy People 2020 Overview of Health Disparities” analysis (5) to provide a more comprehensive report on progress toward the elimination of health disparities among race and ethnicity groups across HP2020 objectives. When looking at changes in overall health disparity over time for race and ethnicity groups in HP2020, several conclusions are apparent. First, although most objectives (over 75% for all three measures) showed little or no detectable change in disparities over time, a higher percentage of objectives showed a narrowing in disparity rather than a widening for all three measures. Second, a higher percentage of objectives was categorized as having shown a widening or narrowing in disparities over time for the two measures of disparity that only use the highest and lowest group rates, MRD and MRR, compared with SRR, which incorporates data from all race and ethnicity group rates. Third, using measures of absolute disparity (such as MRD) and relative disparity (such as MRR and SRR) can result in different conclusions about the direction and percent change in disparities. However, the analyses here suggested relatively high agreement among the categories of change in disparities over time (79.0%–87.5% concordance between pairs of measures). In addition, regardless of the statistical significance or the threshold used for determining the category of change in disparities over time, an examination of the sign of the percent change from baseline across measures revealed a slightly lower but comparable level of agreement (76.6%–83.1% concordance).

The findings in this report underscore the fact that disparities persist and that, because there is no gold standard in health disparities measurement, using multiple measures to evaluate disparities can provide different approaches to assess progress toward the elimination of health disparities

and achievement of health equity. Agreement among multiple measures of disparities, as shown in this report for most objectives, can help provide confidence in the findings, while disagreement may suggest the need for a more in-depth subject-matter analysis to better understand and potentially address the factors contributing to the inconsistencies in results. As Healthy People 2030 continues to highlight the importance of measuring and tracking disparities and inequity in public health outcomes along with its overarching goal to eliminate health disparities and achieve health equity, the findings here and the lessons learned from HP2020 will inform further research and analytic and methodological development.

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Table 1. Race and ethnicity groups with the most favorable rate at baseline and final data points, by objective: Healthy People 2020

Race and ethnicity group	Baseline	Final year	Both baseline and final year ¹
		Number (percent)	
White, not Hispanic or Latino	156 (30.8)	156 (30.8)	105 (20.8)
Black, not Hispanic or Latino	83 (16.4)	82 (16.2)	45 (8.9)
Asian	79 (15.6)	82 (16.2)	54 (10.7)
Hispanic or Latino	72 (14.2)	77 (15.2)	40 (7.9)
Asian or Pacific Islander ²	57 (11.3)	58 (11.5)	52 (10.3)
Two or more races	28 (5.5)	18 (3.6)	9 (1.8)
American Indian or Alaska Native	24 (4.7)	22 (4.3)	10 (2.0)
Native Hawaiian or Other Pacific Islander	7 (1.4)	11 (2.2)	4 (0.8)

¹The race and ethnicity group with the best (most favorable) population group rate was the same at baseline and final data points for 319 (63.0%) of the 506 objectives in this analysis. For the remaining 187 objectives (37.0%), the race and ethnicity group with the best population group rate differed at baseline and final data points.

²Reported as one combined group in the objective's data source.

SOURCE: National Center for Health Statistics and Healthy People 2020.

Table 2. Top 10 largest percentage increases and decreases in summary rate ratio for race and ethnicity disparities: Healthy People 2020

Objective ¹ and disparities change category	Percent change	Baseline summary rate ratio
Widening disparity		
1. IID-26: New cases of hepatitis C (per 100,000 population)	57.4	1.43
2. IID-29: New cases of tuberculosis (per 100,000 population)	53.9	10.12
3. TU-18.3: Adolescents and young adults exposed to tobacco marketing in movies and television (percent, grades 6–12)	40.2	1.08
4. IID-25.1: New hepatitis B infections in adults (per 100,000 population, 19+ years)	38.1	1.85
5. SA-4.2: Adolescents perceiving great risk in smoking marijuana once a month (percent, 12–17 years)	31.1	1.19
6. IVP-13.1: Motor vehicle crash deaths (age adjusted, per 100,000 population)	30.3	2.28
7. IVP-29: Homicides (age adjusted, per 100,000 population)	29.2	4.31
8. MICH-28.1: Cases of spina bifida (per 100,000 live births)	29.1	1.25
9. STD-8: New cases of congenital syphilis (per 100,000 live births)	24.8	5.85
10. MICH-28.2: Cases of anencephaly (per 100,000 live births)	20.1	1.71
Narrowing disparity		
1. SA-13.2: Adolescents using marijuana in past 30 days (percentage, 12–17 years)	-67.6	7.72
2. IID-23: New cases of hepatitis A (per 100,000 population)	-45.7	2.63
3. HIV-12: HIV infection deaths (age adjusted, per 100,000 population)	-43.5	13.91
4. MPS-2.4.4: Drug overdose deaths involving synthetic opioids, excluding methadone (per 100,000 population)	-35.8	3.44
5. STD-6.2: New cases of gonorrhea among males (per 100,000 population, 15–44 years)	-35.3	6.40
6. MHMD-3: Adolescents engaging in disordered eating to control their weight (percent, grades 9–12)	-34.5	1.96
7. HIV-19: Linkage to HIV medical care (percentage, 13+ years)	-24.8	1.41
8. HC/HIT-2.4: Persons reporting that their health provider always spent enough time with them (percent, 18+ years)	-24.2	1.44
9. OSH-1.3: Work-related injury deaths—Construction (per 100,000 full-time equivalent workers, 16+ years)	-21.7	1.37
10. STD-7.2: New cases of primary and secondary syphilis among males (per 100,000 population)	-20.0	2.98

¹See <https://wayback.archive-it.org/5774/20220413182850/https://www.healthypeople.gov/2020/> for complete methodological details of these objectives.

NOTE: Data are restricted to objectives that were classified in the widening or narrowing disparities change categories.

SOURCE: National Center for Health Statistics and Healthy People 2020.

Table 3. Top 10 largest percentage increases and decreases in maximal rate ratio for race and ethnicity disparities: Healthy People 2020

Objective ¹	Percent change	Baseline maximal rate ratio
Widening disparity		
1. IVP-33: Physical assaults (per 1,000 population, 12+ years)	227.8	5.69
2. AOCBC-3.4: Adults with arthritis who have difficulty grasping or handling small objects (age adjusted, percent, 18+ years)	111.0	1.37
3. IID-26: New cases of hepatitis C (per 100,000 population)	105.9	1.67
4. SA-4.2: Adolescents perceiving great risk in smoking marijuana once a month (percent, 12–17 years)	62.3	1.29
5. RD-5.1: Children with asthma who miss school days (percent, 5–17 years)	55.4	1.39
6. HC/HIT-9: Internet users who can easily access health information (percent, 18+ years)	50.9	1.14
7. IID-29: New cases of tuberculosis (per 100,000 population)	50.6	23.35
8. NWS-13: Households with food insecurity in the past 12 months (percent)	48.5	3.17
9. MICH-28.1: Cases of spina bifida (per 100,000 live births)	39.0	1.29
10. TU-18.3: Adolescents and young adults exposed to tobacco marketing in movies and television (percent, grades 6–12)	38.0	1.22
Narrowing disparity		
1. SA-13.2: Adolescents using marijuana in past 30 days (percent, 12–17 years)	-73.2	10.66
2. RD-4: Activity limitations among persons with asthma (age adjusted, percent)	-59.1	3.99
3. IID-23: New cases of hepatitis A (per 100,000 population)	-55.8	3.50
4. IID-13.2: Noninstitutionalized high risk adults vaccinated against pneumococcal disease (percent, 18–64 years)	-53.1	3.02
5. SA-19.3: Persons with nonmedical use of prescription stimulants in the past year (percent, 12+ years)	-51.4	5.69
6. STD-7.1: New cases of primary and secondary syphilis among females (per 100,000 population)	-48.1	32.25
7. STD-6.2: New cases of gonorrhea among males (per 100,000 population, 15–44 years)	-47.6	25.92
8. HIV-12: HIV infection deaths (age adjusted, per 100,000 population)	-44.8	38.39
9. PA-2.3: Adults performing muscle-strengthening activities 2+ days/week (age adjusted, percent, 18+ years)	-44.1	2.17
10. MPS-2.4.4: Drug overdose deaths involving synthetic opioids, excluding methadone (per 100,000 population)	-42.4	5.53

¹See <https://wayback.archive-it.org/5774/20220413182850/https://www.healthypeople.gov/2020/> for complete methodological details of these objectives.

NOTE: Restricted to objectives that were classified in the widening or narrowing disparities change categories.

SOURCE: National Center for Health Statistics and Healthy People 2020.

Table 4. Top 10 largest percentage increases and decreases in maximal rate difference for race and ethnicity disparities: Healthy People 2020

Objective ¹	Percent change	Baseline maximal rate difference
Widening disparity		
1. IID-26: New cases of hepatitis C (per 100,000 population)	689.3	0.10
2. MPS-2.4.4: Drug overdose deaths involving synthetic opioids, excluding methadone (per 100,000 population)	646.1	1.09
3. NWS-6.1: Physician office visits for cardiovascular disease, diabetes, or hyperlipidemia that include diet and nutrition counseling (age adjusted, percent, 20+ years)	598.3	2.92
4. IID-14: Adults vaccinated against zoster (shingles) (percent, 60+ years)	300.5	5.55
5. BDBS-16: Persons with severe hemophilia who experience more than four joint bleeds (percent)	143.1	0.91
6. IVP-33: Physical assaults (per 1,000 population, 12+ years)	140.2	35.36
7. IID-15.3: Health care personnel vaccinated against hepatitis B (percent)	127.5	10.92
8. MPS-2.4.1: Drug overdose deaths involving natural, semi-synthetic, and synthetic opioids, excluding heroin (per 100,000 population)	126.2	6.71
9. IID-12.11: Children vaccinated against seasonal influenza (percent, 6 months–17 years)	105.6	11.64
10. MICH-28.1: Cases of spina bifida (per 100,000 live births)	104.4	8.30
Narrowing disparity		
1. HDS-19.2: Heart attack patients receiving percutaneous intervention within 90 minutes of hospital arrival (percent)	-94.2	90.97
2. OSH-1.3: Work-related injury deaths—Construction (per 100,000 full-time equivalent workers, 16+ years)	-82.3	6.42
3. IID-23: New cases of hepatitis A (per 100,000 population)	-82.0	1.00
4. HIV-19: Linkage to HIV medical care (percent, 13+ years)	-76.3	38.10
5. HDS-16.3: Adults who are aware of the importance of calling 9–1–1 for a heart attack (age adjusted, percent, 20+ years)	-72.2	12.66
6. HC/HIT-6.1: Persons with access to the Internet (percent, 18+ years)	-68.0	25.71
7. IID-33: TB patients tested for HIV (percent, 25–44 years)	-68.0	25.49
8. ECBP-6: Persons completing high school (percent, 18–24 years)	-64.1	20.80
9. HIV-12: HIV infection deaths (age adjusted, per 100,000 population)	-61.7	17.14
10. PA-2.3: Adults performing muscle-strengthening activities 2 or more days per week (age adjusted, percent, 18+ years)	-60.6	13.06

¹See <https://wayback.archive-it.org/5774/20220413182850/https://www.healthypeople.gov/2020/> for complete methodological details of these objectives.

NOTE: Restricted to objectives that were classified in the widening or narrowing disparities change categories.

SOURCE: National Center for Health Statistics and Healthy People 2020.

Table 5. Change in race and ethnicity disparities for selected measures: Healthy People 2020

Measure	Narrowing (percent)	Little or no detectable change (percent)	Widening (percent)	Total number of objectives
Summary rate ratio	21 (4.2)	465 (92.1)	19 (3.8)	¹ 505
Maximal rate ratio	56 (11.1)	420 (83.3)	28 (5.6)	² 504
Maximal rate difference	72 (14.2)	389 (76.9)	45 (8.9)	506

¹Summary rate ratio could not be calculated for one objective, IVP-20, due to a zero in the denominator.

²Maximal rate ratio could not be calculated for two objectives, IVP-20 and HDS-19.2, due to zeroes in their denominators.

SOURCE: National Center for Health Statistics and Healthy People 2020.

Table 6. Percentage agreement in the change in race and ethnicity disparities categories between three selected measures: Healthy People 2020

Measure	Summary rate ratio				Maximal rate ratio				Maximal rate difference			
	Narrowing	Little or no detectable change	Widening	Percentage agreement in change category	Narrowing	Little or no detectable change	Widening	Percentage agreement in change category	Narrowing	Little or no detectable change	Widening	Percentage agreement in change category
Summary rate ratio												
Narrowing	21	...	...	...	17	4	0	...	12	5	4	...
Little or no detectable change .....	...	465	...	...	38	411	15	...	56	378	31	...
Widening .....	...	...	19	...	1	5	13	...	4	6	9	...
Percentage agreement in change category .....	...	...	...	100.0	...	...	...	87.5	...	...	...	79.0
Maximal rate ratio												
Narrowing	17	38	1	...	56	...	...	...	38	13	5	...
Little or no detectable change	4	411	5	...	...	420	...	...	30	368	22	...
Widening	0	15	13	...	...	...	28	...	3	8	17	...
Percentage agreement in change category .....	...	...	...	87.5	...	...	...	100.0	...	...	...	83.9
Maximal rate difference												
Narrowing	12	56	4	...	38	30	3	...	72	...	...	...
Little or no detectable change	5	378	6	...	13	368	8	...	...	389	...	...
Widening	4	31	9	...	5	22	17	...	...	...	45	...
Percentage agreement in change category .....	...	...	...	79.0	...	...	...	83.9	...	...	...	100.0

... Category not applicable.

NOTE: Maximal rate difference includes 506 objectives, summary rate ratio includes 505, and maximal rate ratio includes 504.

SOURCE: National Center for Health Statistics and Healthy People 2020.

Table 7. Percentage agreement in the direction of change from baseline between three selected disparities measures: Healthy People 2020

Measure	Summary rate ratio			Maximal rate ratio			Maximal rate difference		
	Positive change	Negative change	Percentage agreement in the direction of change	Positive change	Negative change	Percentage agreement in the direction of change	Positive change	Negative change	Percentage agreement in the direction of change
Summary rate ratio									
Positive change from baseline	228	...	...	178	50	...	162	66	...
Negative change from baseline .....	...	277	...	41	235	...	52	225	...
Percentage agreement in the direction of change from baseline .....	...	...	100.0	...	...	81.9	...	...	76.6
Maximal rate ratio									
Positive change from baseline	178	41	...	219	...	...	174	45	...
Negative change from baseline	50	235	...	...	285	...	40	245	...
Percentage agreement in the direction of change from baseline .....	...	...	81.9	...	...	100.0	...	...	83.1
Maximal rate difference									
Positive change from baseline	162	52	...	174	40	...	215	...	...
Negative change from baseline	66	225	...	45	245	...	...	291	...
Percentage agreement in the direction of change from baseline .....	...	...	76.6	...	...	83.1	...	...	100.0

... Category not applicable.

NOTE: Maximal rate difference includes 506 objectives, summary rate ratio includes 505, and maximal rate ratio includes 504.

SOURCE: National Center for Health Statistics and Healthy People 2020.

Appendix. Technical Notes

Notation

For an objective with data by K race and ethnicity groups, let x_1, x_2, \dots, x_K denote the group rates. Let $x_{(1)} \leq x_{(2)} \leq \dots \leq x_{(K)}$ denote the ordered values, from smallest to largest. Therefore, for an objective expressed in terms of an adverse outcome or condition that is to be decreased, the least adverse (“best”) group rate x_B is equal to $x_{(1)}$ and the most adverse group rate is $x_{(K)}$. Conversely, for an objective expressed in terms of a favorable outcome or condition to be increased, the most favorable (best) group rate $x_B = x_{(K)}$ and the least favorable group rate is $x_{(1)}$.

In Healthy People 2020 (HP2020), measures of overall disparity across multiple population subgroups quantify the gap between the highest and lowest group rates. HP2020 also includes a measure of the gap between the best group rate and the average of the subgroup rates excluding the best group. Let x_A denote the average of the $K-1$ groups other than the group with the best rate.

HP2020 Measures of Overall Health Disparity

Three measures were developed for HP2020 and analyzed in this report (10).

Maximal rate difference (MRD)

MRD is an absolute measure of disparity defined as the difference between the highest, $x_{(K)}$, and lowest, $x_{(1)}$, group rates, regardless of intermediate rates.

$$MRD = x_{(K)} - x_{(1)}$$

Note that MRD remains greater than or equal to zero.

Maximal rate ratio (MRR)

MRR is a relative measure of disparity defined as the ratio of the highest, $x_{(K)}$, to the lowest, $x_{(1)}$, group rates, regardless of intermediate rates.

$$MRR = \frac{x_{(K)}}{x_{(1)}}$$

Note that MRR remains 1 or greater, so it is sometimes referred to as a *directional* ratio.

Summary rate ratio (SRR)

SRR is also a relative measure of disparity defined for objectives expressed in terms of favorable outcomes as the directional ratio of the best group rate, x_B , to the average rate for all other race and ethnicity groups, x_A (or, as the directional ratio of that average rate to the best group rate for objectives expressed in terms of adverse outcomes).

$$SRR = \max\left\{\frac{x_B}{x_A}, \frac{x_A}{x_B}\right\}$$

By construction, SRR remains 1 or greater, regardless of the objective’s directionality (favorable outcome to be improved or adverse outcome to be reduced).

Standard Errors of HP2020 Measures of Overall Health Disparity

When measures of variability are available, let the highest and lowest group rates $x_{(K)}$ and $x_{(1)}$ have associated standard errors $SE_{(K)}$ and $SE_{(1)}$, respectively, and assume for simplicity that the highest and lowest group rates are independent. The standard error of MRD is derived in “Measuring Progress Toward Target Attainment and the Elimination of Health Disparities in Healthy People 2020” (6). For later reference, the standard error of the natural logarithm of MRD is provided here. The natural logarithm transformation is useful when assessing the statistical significance of the percent change from baseline for MRD.

$$SE(MRD) = \sqrt{SE_{(1)}^2 + SE_{(K)}^2} \text{ and } SE[\ln(MRD)] \approx \frac{SE(MRD)}{MRD} \quad [1]$$

For MRR, the natural logarithm transformation facilitates the calculation of the standard error:

$$SE[\ln(MRR)] = \sqrt{\frac{SE_{(1)}^2}{x_{(1)}^2} + \frac{SE_{(K)}^2}{x_{(K)}^2}} \text{ and } SE(MRR) \approx MRR \cdot SE[\ln(MRR)] \quad [2]$$

Similarly, for SRR, the rates x_B and x_A are assumed to be independent, and

$$SE[\ln(SRR)] = \sqrt{\frac{SE_{(B)}^2}{x_{(B)}^2} + \frac{SE_{(A)}^2}{x_{(A)}^2}} \text{ and } SE(SRR) \approx SRR \cdot SE[\ln(SRR)] \quad [3]$$

where SE_B is the standard error of x_B and SE_A is the standard error of x_A , the latter having been calculated using

$$SE_A = \sqrt{\frac{SE_{(1)}^2 + SE_{(2)}^2 + \dots + SE_{(K-1)}^2}{K-2}} \text{ or } SE_A = \sqrt{\frac{SE_{(2)}^2 + SE_{(3)}^2 + \dots + SE_{(K)}^2}{K-2}}$$

when the best group rate, x_B , is the highest rate, $x_{(K)}$, or the lowest rate, $x_{(1)}$, respectively.

Changes in HP2020 Disparity Measures Between the Baseline and Final Timepoints

In this report, the changes in the three HP2020 disparity measures—MRD, MRR, and SRR—between the baseline and final timepoints is quantified using the relative change over time, which allows for direct comparisons among these measures.

Relative (percentage) difference

The percentage difference between the value of the disparity measure M at baseline and its value at the final timepoint is given by

$$\text{Percentage difference in measure } M = 100 \cdot \left[\left(\frac{M_{final}}{M_{baseline}} \right) - 1 \right]$$

When standard errors are available, the statistical significance of the percentage difference can be evaluated using the statistical significance of the natural logarithm of the ratio $M_{final} / M_{baseline}$, because $(M_{final} / M_{baseline}) - 1 = 0$ if and only if $\ln(M_{final} / M_{baseline}) = 0$. In turn, this is equivalent to testing the significance of the difference in the natural logarithms, $\ln(M_{final}) - \ln(M_{baseline})$. As a result, the percentage difference is considered statistically significant at the 0.05 level using a two-sided test if $|z|$ is greater than 1.96, when the z score is given by:

$$z = \frac{\ln(M_{final}) - \ln(M_{baseline})}{\sqrt{SE[\ln(M_{baseline})]^2 + SE[\ln(M_{final})]^2}}$$

Equations 1–3 can be used to calculate this z score for $M = MRD, MRR, \text{ or } SRR$.

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Discontinued Series

- Series 4. Documents and Committee Reports**
Reports contain findings of major committees concerned with vital and health statistics and documents. The last Series 4 report was published in 2002; these are now included in Series 2 or another appropriate series.
- Series 5. International Vital and Health Statistics Reports**
Reports present analytical and descriptive comparisons of U.S. vital and health statistics with those of other countries. The last Series 5 report was published in 2003; these are now included in Series 3 or another appropriate series.
- Series 6. Cognition and Survey Measurement**
Reports use methods of cognitive science to design, evaluate, and test survey instruments. The last Series 6 report was published in 1999; these are now included in Series 2.
- Series 10. Data From the National Health Interview Survey**
Reports present statistics on illness; accidental injuries; disability; use of hospital, medical, dental, and other services; and other health-related topics. As of 2015, these are included in Series 3.
- Series 11. Data From the National Health Examination Survey, the National Health and Nutrition Examination Surveys, and the Hispanic Health and Nutrition Examination Survey**
Reports present 1) estimates of the medically defined prevalence of specific diseases in the United States and the distribution of the population with respect to physical, physiological, and psychological characteristics and 2) analysis of relationships among the various measurements. As of 2015, these are included in Series 3.
- Series 12. Data From the Institutionalized Population Surveys**
The last Series 12 report was published in 1974; these reports were included in Series 13, and as of 2015 are in Series 3.
- Series 13. Data From the National Health Care Survey**
Reports present statistics on health resources and use of health care resources based on data collected from health care providers and provider records. As of 2015, these reports are included in Series 3.

- Series 14. Data on Health Resources: Manpower and Facilities**
The last Series 14 report was published in 1989; these reports were included in Series 13, and are now included in Series 3.
- Series 15. Data From Special Surveys**
Reports contain statistics on health and health-related topics from surveys that are not a part of the continuing data systems of the National Center for Health Statistics. The last Series 15 report was published in 2002; these reports are now included in Series 3.
- Series 16. Compilations of Advance Data From Vital and Health Statistics**
The last Series 16 report was published in 1996. All reports are available online; compilations are no longer needed.
- Series 20. Data on Mortality**
Reports include analyses by cause of death and demographic variables, and geographic and trend analyses. The last Series 20 report was published in 2007; these reports are now included in Series 3.
- Series 21. Data on Natality, Marriage, and Divorce**
Reports include analyses by health and demographic variables, and geographic and trend analyses. The last Series 21 report was published in 2006; these reports are now included in Series 3.
- Series 22. Data From the National Mortality and Natality Surveys**
The last Series 22 report was published in 1973. Reports from sample surveys of vital records were included in Series 20 or 21, and are now included in Series 3.
- Series 23. Data From the National Survey of Family Growth**
Reports contain statistics on factors that affect birth rates, factors affecting the formation and dissolution of families, and behavior related to the risk of HIV and other sexually transmitted diseases. The last Series 23 report was published in 2011; these reports are now included in Series 3.
- Series 24. Compilations of Data on Natality, Mortality, Marriage, and Divorce**
The last Series 24 report was published in 1996. All reports are available online; compilations are no longer needed.

For answers to questions about this report or for a list of reports published in these series, contact:

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