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## Investigating the Impact of Using an Alternate Classification Method for Race and Hispanic Ethnicity on Rates of Reported Gonorrhea

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### Abstract

**Background:** We aimed to examine how the classification of gonorrhea cases by race and Hispanic ethnicity (HE) affects the measurement of racial/HE disparities in the rates of reported gonorrhea.

**Methods:** We examined gonorrhea cases reported through the National Notifiable Diseases Surveillance System from January 1, 2010, to December 31, 2017, and assigned race and HE using (1) “current classification,” where cases with HE are classified as Hispanic regardless of race (e.g., Hispanic, non-Hispanic White, and non-Hispanic Black), and 2) “alternate classification,” which separates each race category by HE (e.g., Hispanic White and non-Hispanic White). We estimated annual gonorrhea rates during 2010 to 2017 by race/HE category and calculated disparity measures (index of disparity, population-attributable proportion, and Gini coefficient) for gonorrhea rates under each classification strategy.

**Results:** All disparity measures revealed decreases in racial/HE disparities in the rates of reported gonorrhea during 2010 to 2017, regardless of classification strategy; however, the magnitude of the disparity and the percent change in the disparity over time varied across disparity measures.

**Conclusions:** Understanding how classification of race/HE affects observed disparities is critical when monitoring interventions to reduce disparities and improve health equity.

There are documented disparities in the rate of reported gonorrhea cases in the United States among race and Hispanic ethnicity (HE) groups. In 2017, more than 555,600 cases of gonorrhea were reported, with a rate of 171.9 per 100,000 population.<sup>1</sup> This same year, the rate of reported gonorrhea was seven times higher for non-Hispanic Blacks (548.1 cases per 100,000 population) and almost twice as high for Hispanics (113.7 cases per 100,000

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population) compared with non-Hispanic Whites (66.4 cases per 100,000 population).<sup>1</sup> Reducing racial and ethnic disparities in sexually transmitted diseases (STDs), such as gonorrhea, is a national public health priority.<sup>2,3</sup>

In the US Centers for Disease Control and Prevention's (CDC) annual surveillance report on STDs, individuals of HE are classified into one category, "Hispanic/Latino," regardless of their race, whereas those who are not Hispanic (NH) are classified as NH-White, NH-Black, NH-Asian, NH-Native Hawaiian/other Pacific Islander (NHOPI), NH-American Indian/Alaska Native (AI/AN), NH-other, or NH-Multirace.<sup>1</sup> Although this classification strategy has been used by the CDC to present race/HE in STD surveillance reports for more than 25 years,<sup>4</sup> it may not provide a complete picture of important health disparities across race/HE categories, as categorical differences may be masked by the race/HE classification used. For example, when all Hispanics (H) are classified into one category, changes in racial/HE disparities might not be detected in a scenario in which disease rates were increasing among H-Blacks at the same rate they were decreasing among H-Whites. Because race- and ethnic-specific gonorrhea rates are used to monitor disease burden in the United States,<sup>1</sup> investigate associations with social determinants,<sup>5,6</sup> and monitor trends in health equity,<sup>7,8</sup> it is important to investigate how classification strategy might impact observed rates and disparities.

To inform decisions regarding the classification of race/HE in national gonorrhea case report data, we examined how the classification of cases by HE may affect the measurement of racial/HE disparities in the rates of reported gonorrhea. To demonstrate this, we used three measures commonly used to assess disparities in STDs: index of disparity (ID), population-attributable proportion (PAP), and Gini coefficient.<sup>7,9-14</sup> We calculated these measures for rates of reported gonorrhea under two race/HE classification strategies: (1) the "current classification," which is currently used, and (2) a proposed "alternate classification," which separates each race category by HE (e.g., NH-White and H-White, instead of NH-White and Hispanic). We also examined the proportion of reported cases of gonorrhea that would be categorized as unknown race/HE under each of the two classification strategies.

## METHODS

We examined gonorrhea cases reported to the CDC by STD control programs in all 50 states, the District of Columbia and selected cities through the National Notifiable Diseases Surveillance System from January 1, 2010 to December 31, 2017.<sup>15</sup>

### Reporting of Race and HE

During this period, cases of gonorrhea were reported through the National Notifiable Diseases Surveillance System with information on HE along with information on race. Beginning in 2007, STD case report data could be reported in the 1997 Office of Management and Budget (OMB) race categories (White, Black, Asian, NHOPI, other, and AI/AN) and a separate ethnicity variable to capture HE.<sup>16</sup> Cases reported using the OMB-compliant race categories could be reported with more than one race to identify persons who are multirace; HE was reported separately to identify individuals of Hispanic origin, regardless of their race. Before 2007, and continuing past 2007 for jurisdictions that had

not fully transitioned to reporting using OMB-compliant categories, cases could be reported with only one race (White, Black, Asian/Pacific Islander, other, or AI/AN); HE continued to be reported separately using a single variable (Table 1).

### **Categorization of Cases by Race and HE**

Each case was assigned race and HE based on reported data. In this study, two race/HE classification strategies were applied.

### **Current Classification Strategy**

This is the strategy currently used in CDC's annual STD surveillance reports to categorize race/HE, where OMB-compliant variables are prioritized over non-OMB-compliant variables and HE takes precedence over race (see Supplemental Appendix, <http://links.lww.com/OLQ/A533> and Table 2 for more information, including information on how missing data were handled). Cases reported as Hispanic are classified as Hispanic, regardless of their race, and includes cases with unknown race (Table 2). Cases reported as non-Hispanic or of unknown HE are considered non-Hispanic. If a case was reported with race/HE data in both OMB-compliant and non-OMB-compliant categories, OMB-compliant categories are prioritized when determining the race and the HE of the case. If data in the OMB-compliant categories are missing, data from the non-OMB-compliant race/HE categories are used to assign race/HE. Cases classified as unknown race/HE include the following: (1) cases reported with unknown HE *and* unknown race and (2) cases reported as non-Hispanic or unknown HE *and* with race reported only as other. Unknown race/HE includes cases reported with other race as the only race because we were not able to determine their specific race.

### **Alternate Classification Strategy**

This classification strategy separates race categories by HE (e.g., NH-White, H-White, NH-Asian, and H-Asian; see Supplemental Appendix, <http://links.lww.com/OLQ/A533> for more information). Similar to the current classification, OMB-compliant variables are prioritized, and the definition of non-Hispanic is the same (Table 2). However, unlike the current classification, race categories are classified as either Hispanic or non-Hispanic. For example, cases reported as Hispanic and Black are classified as H-Black and cases reported as Black and non-Hispanic are classified as NH-Black. Cases classified as non-Hispanic/unknown race include cases reported with unknown HE *and* unknown race or other reported as the only race. Cases classified as Hispanic/unknown race include cases reported as Hispanic *and* unknown race or other reported as the only race. Non-Hispanic/unknown race and Hispanic/unknown race include cases reported with other race as the only race because we were not able to determine their specific race.

### **Data Analysis**

For each classification strategy, we estimated annual rates of reported gonorrhea during 2010 to 2017 by race/HE category using the number of reported gonorrhea cases per year as numerators and the US Census Population estimates for the corresponding year as denominators.<sup>17</sup> For the current classification, the denominator used for Hispanics was

the population estimate for all the Hispanic population, including Hispanics with unknown race. For the alternate classification, the denominator used for Hispanics was the population estimate for Hispanics by each race category. Cases with unknown race/HE were excluded from the analysis because rates could not be estimated. To estimate racial/HE disparities in the rates of reported gonorrhea, we used three relative measures of disparity: the ID, the PAP, and the Gini coefficient. The PAP and the Gini coefficient both range from 0 (no disparity) to 1 (maximum disparity). The ID also has a lower bound of 0 to indicate no disparity but does not have a constant upper bound. The methods used to calculate these measures are summarized hereinafter and have been described in more detail elsewhere.<sup>7,18–20</sup>

We calculated two versions of the ID: unweighted (standard) and weighted. The unweighted ID was calculated as follows:

$$100 * \left( \frac{\sum_{i=1}^n |Rate_i - Rate_{overall}|}{n} \right) / Rate_{overall}$$

where  $i$  indicates the race/HE group,  $n$  denotes the number of race/HE groups,  $Rate_i$  is the reported gonorrhea rate in group  $i$ , and “overall” refers to all  $n$  groups.<sup>7,20–22</sup>

The weighted ID was calculated as follows:

$$100 * \left( \frac{\sum_{i=1}^n |Rate_i - Rate_{overall}| * Population_i}{Population_{overall}} \right) / Rate_{overall}$$

where  $Population_i$  is the population size of group  $i$  and all other terms are as described previously.

We calculated the PAP as follows:

$$PAP = \frac{\sum_{i=1}^n (C_i - \hat{C}_i)}{C}$$

where  $C_i$  is the number of reported gonorrhea cases in group  $i$ ,  $\hat{C}_i$  is the number of reported gonorrhea cases that there would have been in group  $i$  if group  $i$  had the same reported gonorrhea case rate as the referent group, and  $C$  is the total number of reported gonorrhea cases across the  $n$  groups.<sup>7,20,22</sup> We calculated two versions of the PAP, one in which the referent group was the race/HE category with the lowest rate of reported gonorrhea in the given year and one in which the referent group was NH-Asians every year. For the current classification, NH-Asians had the lowest gonorrhea rate in all years, so this distinction did not matter. However, under the alternate classification, NH-Asians were not always the race/HE category with the lowest rate. Including a PAP measure using NH-Asians as the constant referent group allowed us to assess changes in disparity from one year to the next that were not attributable to the use of a different referent group.

To calculate the Gini coefficient for reported gonorrhea cases in a given year, the race/HE groups were ranked from 1 to  $n$  according to the gonorrhea rate ( $i = 1$  and  $i = n$  denote the group with the lowest and highest reported gonorrhea rate, respectively). The Gini coefficient ( $G$ ) was calculated as follows:

$$G = 1 - \sum_{i=1}^n (Y_i + Y_{i-1})(X_i - X_{i-1})$$

where  $Y_i$  and  $X_i$  are the cumulative percentage of gonorrhea cases and the cumulative percentage of the population, respectively, accounted for by group 1 through group  $i$ , and  $X_0$  and  $Y_0$  are both 0.<sup>7,21</sup>

To determine how classification of race and HE affects the assessment of disparities in the rates of reported gonorrhea, we estimated and compared the annual ID, PAP, and Gini coefficient during 2010 to 2017 using rates based on the current and the alternate classification strategies. In addition, we estimated the total number and proportion of gonorrhea cases that would be categorized as unknown race/HE for each classification strategy during 2010 to 2017.

## RESULTS

### Rates of Reported Gonorrhea Cases

Gonorrhea rates increased for all race/HE categories during 2010 to 2017, regardless of classification strategy applied (Table 3). Overall, gonorrhea rates based on the current classification increased by 70.7% during 2010 to 2017 (from 100.2 cases to 171.0 cases per 100,000 population) and were consistently highest among NH-Blacks and lowest among NH-Asians each year. Using the alternate classification, overall rates increased by 71.0% during 2010 to 2017 (from 105.1 cases to 179.7 cases per 100,000 population) and were consistently highest among NH-Blacks and lowest among H-multirace each year. Rates of reported gonorrhea were the same for non-Hispanics regardless of classification strategy because they were defined the same in both strategies. However, rates for Hispanics differed for each classification strategy because each defined and categorized Hispanics differently. For the current classification, rates of reported gonorrhea among Hispanics increased by 133.4% during 2010 to 2017 (from 47.6 cases to 111.1 cases per 100,000 population). For the alternate classification, among Hispanics, during 2010 to 2017, rates of reported gonorrhea increased the most among H-multirace (805.2% increase; from 5.8 cases to 52.5 cases per 100,000 population); however, H-Blacks had the highest rate of reported gonorrhea each year. When comparing gonorrhea rates by HE within each race category, we found that gonorrhea rates for H-White, H-Asians, and H-NHOPI were higher each year than those for their non-Hispanic counterparts, whereas gonorrhea rates for H-Black, H-AI/AN, and H-multirace were lower each year than those for their non-Hispanic counterparts.

### Racial/HE Disparity Measures

Compared with 2010, results from the ID, PAP, and Gini coefficient estimates indicated lower racial/HE disparities in the rates of gonorrhea in 2017, as described later for each of these three measures.

## Index of Disparity

During 2010 to 2017, the unweighted ID decreased for both classification strategies (Table 4). The percent decrease in racial/HE disparity when using the unweighted ID was slightly higher for the current classification (17.7%) than for the alternate classification (14.5%). However, when using the weighted ID, which takes into account the population size for each race/HE category, the percent decrease in racial/HE disparity was slightly higher for the alternate classification (31.1%) than for the current classification (29.4%).

## Population Attributable Proportion

When using gonorrhea rates for NH-Asians as reference, the percent decrease in racial/HE disparity was similar under both classifications (11.7% for the current classification and 12.0% for the alternate classification; Table 4). However, when using the category with the lowest gonorrhea rate as reference, the percent decrease in racial/HE disparity was more pronounced for the alternate classification (19.6%) than for the current classification (11.7%). This was observed because the reference categories used to calculate the PAP for each classification strategy were different. For the current classification, the reference category was NH-Asians during 2010 to 2017, whereas for the alternate classification, the reference category was H-multirace during 2010 to 2013 and NH-Asians during 2014 to 2017.

## Gini Coefficient

The Gini coefficient estimates for both current and alternate classification strategies decreased each year during 2010 to 2017 (Table 4). During this period, the percent decrease in the Gini coefficient for the current classification (27.5%) was similar to that for the alternate classification (27.3%). Unlike the PAP, the Gini coefficient does not require a reference category and thus was not subject to fluctuations attributable to a change in the reference category from one year to the next.

## Unknown Race/HE Data

When using the current classification, the annual proportion of gonorrhea cases with unknown race/HE was relatively stable across the time period, ranging from 19.8% to 21.5% (Table 3); however, as the number of gonorrhea cases reported overall increased during this time period, the absolute number of reported gonorrhea cases with unknown race/HE increased by 83.8% during 2010 to 2017 (from 64,578 to 118,679 cases). Among cases categorized as unknown race/HE, the proportion corresponding to NH-other race increased by 189.5% during 2010 to 2017 (from 3.8% to 11.0%; not shown in Table 3). Each year, the proportion of gonorrhea cases categorized as unknown race/HE was greater when using the alternate classification compared with the current classification. Similar to the current classification, the annual proportion categorized as unknown race/HE was relatively stable in the alternate classification, ranging from 22.5% to 25.1%, whereas the absolute number of reported gonorrhea cases with unknown race/HE increased by 93.3% during 2010 to 2017 (from 72,230 to 139,605 cases). Among cases categorized as H-unknown race, the proportion corresponding to other race increased by 119.2% during 2010 to 2017 (from 26.6% to 58.3%; not shown in Table 3), whereas among cases categorized as NH-unknown

race, the proportion corresponding to other race increased by 189.5% (from 3.8% to 11.0%; not shown in Table 3).

## DISCUSSION

To inform decisions for reporting race/HE of national gonorrhea case surveillance data, we examined how classifying cases by HE affected the measurement of racial/HE disparities in the rates of reported gonorrhea. We used two different classification strategies for categorizing race and HE (current and alternate) to describe observed trends in the rate of reported gonorrhea, measure racial/HE disparities in the rates of reported gonorrhea, and determine the proportion of reported gonorrhea cases that would be categorized as being of unknown race/HE. Although the proportion of cases categorized as unknown race/HE was slightly larger under the alternate classification, the three measures of disparities did not vary much by classification strategy, all consistently showing declines in disparities during 2010 to 2017.

During 2010 to 2017, rates of reported gonorrhea cases increased every year for all race/HE categories using both current and alternate classification strategies. For both classification strategies, overall rates of reported gonorrhea cases were the same each year. Non-Hispanic Blacks had the highest rates of reported gonorrhea, regardless of classification strategy. For the alternate classification, H-Blacks had the highest rate of gonorrhea among Hispanics.

All disparity measures used in this analysis agreed with one another, indicating that racial/HE disparities in the rates of reported gonorrhea declined during 2010 to 2017, regardless of race/HE classification strategy used. Although we found that the race/HE classification strategy had practically no effect on the Gini coefficient and the PAP (using NH-Asians as reference), classification did affect the PAP (using the category with the lowest rate as reference), mainly because the alternate classification introduced a new group (H-Multirace) that became the referent group in years 2010 to 2013. The unweighted ID was notably lower each year under the alternate classification than the current classification. A main reason for this difference was that the unweighted ID reflects the average absolute difference of each race/HE group from the overall population rate, and the addition of more race/HE groups in the alternate classification diluted the impact of the disparity among NH-Blacks, the group with the highest reported gonorrhea rates. The weighted ID, on the other hand, was slightly higher each year under the alternate classification than the current classification. This occurred because the total Hispanic population size was lower under the alternate classification than the current classification, but the NH-Black population was the same under both classification strategies. As a result, the population weight applied to NH-Blacks (the category with the greatest disparity) was slightly higher under the alternate classification.

Given the substantial burden of gonorrhea in the United States, most cases are not able to be investigated by local public health staff. Consequently, case report data often only include information available on laboratory reports, which may not include race and HE. During 2010 to 2017, approximately one-fifth of reported gonorrhea cases were missing race/HE information under both classification strategies. The proportion of cases categorized

as unknown race/HE was higher for the alternate classification than the current classification during 2010 to 2017. Because some Hispanic cases did not have information regarding their race, it was not possible to match them with a race category in the alternate classification. As a result, several Hispanic cases were categorized as unknown race/HE under the alternate classification. In the current classification, these cases were categorized as Hispanics because HE took precedence over reported race, including unknown race. Prioritizing HE over race reduced the number of cases categorized as unknown race/HE in the current classification. Regardless, using the alternate classification strategy allowed us to identify Hispanic cases within each race category, identifying previously masked differences in the rates of reported gonorrhea among Hispanics by race.

This analysis had some limitations. First, we found that HE classification did not have an important effect on the measurement of trends in racial/HE disparities in the rates of reported gonorrhea during 2010 to 2017; however, it is possible that the classification strategy could affect measurements of racial/HE disparities in the rates of gonorrhea in other time periods or for STDs other than gonorrhea. Second, our analysis was limited to race/HE reported on case reports provided to the CDC. Unknown (or missing) information on race/HE may have affected representativeness of the data, as well as biased estimates of racial/HE disparities in the rates of gonorrhea. It is possible that reported race and HE data were incomplete or inaccurate, particularly while states were transitioning to reporting cases using the 1997 OMB categories. Hispanic ethnicity classification may have affected our disparity measures if data on race/HE were more complete, particularly if data are not missing at random. More information on patterns of missing race/HE is needed to improve future estimates. In addition, we were not able to stratify HE into subgroups (e.g., Mexican and Puerto Rican) because this level of detail is not collected for STD cases reports; important disparities may be masked by using a single HE category.<sup>23,24</sup> Third, it is important to note that, regardless of how classified, race and HE are often a proxy for factors that can determine risk for STDs, including socioeconomic status, access to routine health care, and sexual networks.<sup>25</sup> There have been considerable discussions in public health groups regarding the utility and significance of using race/HE information in public health research and practice.<sup>26,27</sup> Understanding the limitations of using race and HE data in surveillance is critical to addressing health disparities. Finally, we did not investigate the reasons for the observed declines in racial/HE disparities in the rates of reported gonorrhea. Although they were reduced over time, significant racial/HE disparities in the rates of reported gonorrhea persist, and efforts are needed to identify and implement strategies to further reduce inequities.

## Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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**TABLE 1.**

Race and Hispanic Ethnicity Variables Reported Through NNDSS for Cases of Gonorrhea

OMB Compliant Variables*		Non-OMB Compliant Variables <sup>†</sup>	
Variable	Responses	Variable	Responses
<b>Race</b>			
American Indian/Alaska Native (AI/AN)	1 = yes; 2 = no; 9 = unknown	Netrace (race)	1 = AI/AN
Asian	1 = yes; 2 = no; 9 = unknown		2 = Asian/Pacific Islander
Black	1 = yes; 2 = no; 9 = unknown		3 = Black
Native Hawaiian/Other Pacific Islander (NHOPI)	1 = yes; 2 = no; 9 = unknown		5 = White
White	1 = yes; 2 = no; 9 = unknown		8 = Other
Race/ethnicity (other)	1 = yes; 2 = no; 9 = unknown		9 = Unknown
Race/ethnicity (unknown)	1 = yes; 2 = no; 9 = unknown		
Race/ethnicity (refused)	1 = yes; 2 = no; 9 = unknown		
<b>Hispanic ethnicity</b>			
Hispanic/Latino	1 = yes; 2 = no; 9 = unknown	Hispanic (Hispanic/Latino)	1 = yes; 2 = no; 9 = unknown

\* Can select more than one race per case; Hispanic ethnicity is collected separately in variable Hisplatt.

<sup>†</sup> Can select only one race per case; Hispanic ethnicity is collected separately in variable Hispanic.

AI/AN indicates American Indian/Alaska Native; NHOPI, Native Hawaiian/Other Pacific Islander; NNDSS, National Notifiable Diseases Surveillance System; OMB, Office of Management and Budget.

**TABLE 2.**

Current and Alternate Race and Hispanic Ethnicity Classification Strategies

Current Classification	Race						
	Black	White	Asian	AI/AN	NHOPI	Multirace	Other *
Hispanic/Latino							
Yes	Hispanic	Hispanic	Hispanic	Hispanic	Hispanic	Hispanic	Hispanic
No	NH-Black	NH-White	NH-Asian	NH-AI/AN	NH-NHOPI	NH-Multirace	Unknown
Unknown	NH-Black	NH-White	NH-Asian	NH-AI/AN	NH-NHOPI	NH-Multirace	Unknown
Alternate Classification	Race						
	Black	White	Asian	AI/AN	NHOPI	Multirace	Other *
Hispanic/Latino							
Yes	H-Black	H-White	H-Asian	H-AI/AN	H-NHOPI	H-Multirace	H-unknown
No	NH-Black	NH-White	NH-Asian	NH-AI/AN	NH-NHOPI	NH-Multirace	NH-unknown
Unknown	NH-Black	NH-White	NH-Asian	NH-AI/AN	NH-NHOPI	NH-Multirace	NH-unknown

AI/AN indicates American Indian/Alaska Native; H, Hispanic; NH, non-Hispanic; NHOPI, Native Hawaiian/other Pacific Islander.

\* Other reported as the only race.

**TABLE 3.** Rates of Reported Gonorrhea Cases by Race and Hispanic Ethnicity Classification Strategy, 2010 to 2017

Race/HE Classifications	2010			2011			2012			2013		
	No. Cases	Total Population	Rate *	No. Cases	Total Population	Rate *	No. Cases	Total Population	Rate *	No. Cases	Total Population	Rate *
<b>Current</b>												
NH-White	46,819	196,929,412	23.8	50,518	197,084,523	25.6	59,893	197,243,423	30.4	65,505	197,392,411	33.2
NH-Black	168,097	37,897,524	443.6	168,704	38,148,876	442.2	169,406	38,464,192	440.4	157,207	38,807,755	405.1
Hispanic <sup>‡</sup>	24,168	50,740,089	47.6	27,176	51,939,916	52.3	31,590	52,961,017	59.6	34,655	53,986,412	64.2
NH-Asian	1804	14,566,264	12.4	1917	14,854,988	12.9	2405	15,375,460	15.6	2506	15,841,339	15.8
NH-NHOPI	341	474,799	71.8	363	469,941	77.2	435	497,807	87.4	477	482,428	98.9
NH-AI/AN	2760	2,074,523	133.0	2972	2,086,995	142.4	3236	2,084,472	155.2	3602	2,059,457	174.9
NH-multirace	774	6,108,867	12.7	1040	6,441,467	16.1	1422	6,672,944	21.3	1721	6,917,614	24.9
Unknown race/HE <sup>‡</sup>	64,578	N/A	—	69,159	N/A	—	66,491	N/A	—	67,331	N/A	—
<b>Total</b>	<b>309,341</b>	<b>308,791,478</b>	<b>100.2</b>	<b>321,849</b>	<b>311,026,706</b>	<b>103.5</b>	<b>334,826</b>	<b>313,299,315</b>	<b>106.9</b>	<b>333,004</b>	<b>315,487,416</b>	<b>105.6</b>
% Unknown race/HE <sup>‡</sup>	20.9			21.5			19.8			20.2		
<b>Alternate</b>												
H-White	15,083	32,468,060	46.5	18,075	33,754,452	53.5	20,803	34,748,954	59.9	23,006	35,577,490	64.7
NH-White	46,819	196,929,412	23.8	50,518	197,084,523	25.6	59,893	197,243,423	30.4	65,505	197,392,411	33.2
H-Black	1135	977,101	116.2	1288	1,040,652	123.8	1439	1,158,946	124.2	1409	1,111,616	126.8
NH-Black	168,097	37,897,524	443.6	168,704	38,148,876	442.2	169,406	38,464,192	440.4	157,207	38,807,755	405.1
H-Asian	46	162,038	28.4	70	165,431	42.3	70	180,070	38.9	84	170,781	49.2
NH-Asian	1804	14,566,264	12.4	1917	14,854,988	12.9	2405	15,375,460	15.6	2506	15,841,339	15.8
H-AI/AN	106	479,043	22.1	123	460,011	26.7	155	479,033	32.4	217	461,674	47.0
NH-AI/AN	2760	2,074,523	133.0	2972	2,086,995	142.4	3236	2,084,472	155.2	3602	2,059,457	174.9
H-NHOPI	13	33,117	39.3	28	36,076	77.6	50	45,391	110.2	52	43,322	120.0
NH-NHOPI	341	474,799	71.8	363	469,941	77.2	435	497,807	87.4	477	482,428	98.9
H-multirace	133	2,289,501	5.8	186	2,280,351	8.2	235	2,400,670	9.8	309	2,451,927	12.6
NH-multirace	774	6,108,867	12.7	1040	6,441,467	16.1	1422	6,672,944	21.3	1721	6,917,614	24.9
Unknown race/HE <sup>‡</sup>	72,230	N/A	—	76,565	N/A	—	75,277	N/A	—	76,909	N/A	—

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	2014			2015			2016			2017		
Race/HE Classifications	No. Cases	Total Population	Rate *	No. Cases	Total Population	Rate *	No. Cases	Total Population	Rate *	No. Cases	Total Population	Rate *
NH-unknown race <sup>§</sup>	64,578	N/A	—	69,159	N/A	—	66,439	N/A	—	67,331	N/A	—
H-unknown race	7652	14,331,229	—	7406	14,202,943	—	8838	13,947,953	—	9578	14,169,602	—
Total	309,341	308,791,478	100.2	321,849	311,026,706	103.5	334,826	313,299,315	106.9	333,004	315,487,416	105.6
% Unknown race/HE <sup>¶</sup>	23.3			23.8			22.5			23.1		

	2014			2015			2016			2017		
Race/HE Classifications	No. Cases	Total Population	Rate *	No. Cases	Total Population	Rate *	No. Cases	Total Population	Rate *	No. Cases	Total Population	Rate *
<b>Current</b>												
NH-White	74,456	197,409,353	37.7	88,020	197,534,496	44.6	110,315	197,479,450	55.9	131,420	197,285,202	66.6
NH-Black	156,279	39,267,149	398.0	167,778	39,597,600	423.7	192,118	39,717,127	483.7	220,506	40,129,593	549.5
Hispanic <sup>‡</sup>	38,672	55,279,452	70.0	44,550	56,496,122	78.9	54,300	57,398,719	94.6	65,367	58,846,134	111.1
NH-Asian	2951	16,513,652	17.9	3909	17,081,093	22.9	4934	17,345,193	28.4	6163	17,999,846	34.2
NH-NHOPI	520	507,550	102.5	700	502,876	139.2	928	533,675	173.9	1065	546,778	194.8
NH-AI/AN	4204	2,103,422	199.9	4555	2,069,645	220.1	5757	2,125,635	270.8	7208	2,145,162	336.0
NH-multirace	2750	7,097,378	38.7	3274	7,437,680	44.0	4103	7,769,441	52.8	5200	7,932,565	65.6
Unknown race/HE <sup>‡</sup>	70,230	N/A	—	82,430	N/A	—	96,059	N/A	—	118,679	N/A	—
Total	350,062	318,177,956	110.0	395,216	320,719,512	123.2	468,514	322,569,240	145.3	555,608	324,885,280	171.0
% Unknown race/HE <sup>¶</sup>	20.1			20.9			20.5			21.4		
<b>Alternate</b>												
H-White	25,319	36,553,775	69.3	28,719	37,405,604	76.8	34,971	37,164,589	94.1	39,537	38,222,255	103.4
NH-White	74,456	197,409,353	37.7	88,020	197,534,496	44.6	110,315	197,479,450	55.9	131,420	197,285,202	66.6
H-Black	1509	1,111,917	135.7	1670	1,097,677	152.1	1969	1,176,242	167.4	2564	1,263,898	202.9
NH-Black	156,279	39,267,149	398.0	167,778	39,597,600	423.7	192,118	39,717,127	483.7	220,506	40,129,593	549.5
H-Asian	110	173,308	63.5	120	192,684	62.3	170	211,742	80.3	237	215,482	110.0
NH-Asian	2951	16,513,652	17.9	3909	17,081,093	22.9	4934	17,345,193	28.4	6163	17,999,846	34.2
H-AI/AN	236	498,292	47.4	314	527,604	59.5	339	550,764	61.6	504	581,116	86.7
NH-AI/AN	4204	2,103,422	199.9	4555	2,069,645	220.1	5757	2,125,635	270.8	7208	2,145,162	336.0
H-NHOPI	67	49,604	135.1	62	52,070	119.1	92	62,311	147.6	137	61,441	223.0
NH-NHOPI	520	507,550	102.5	700	502,876	139.2	928	533,675	173.9	1065	546,778	194.8
H-multirace	946	2,508,393	37.7	1011	2,543,850	39.7	1134	2,656,994	42.7	1462	2,782,900	52.5
NH-multirace	2750	7,097,378	38.7	3274	7,437,680	44.0	4103	7,769,441	52.8	5200	7,932,565	65.6

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Unknown total <sup>‡</sup>	80,715	N/A	—	95,084	N/A	—	111,684	N/A	—	139,605	N/A	—
NH-unknown race <sup>§</sup>	70,230	N/A	—	82,430	N/A	—	96,059	N/A	—	118,679	N/A	—
H-unknown race	10,485	14,384,163	—	12,654	14,676,633	—	15,625	15,576,077	—	20,926	15,719,042	—
Total	350,062	318,177,956	110.0	395,216	320,719,512	123.2	468,514	322,369,240	145.3	555,608	324,885,280	171.0
% Unknown race/HE <sup>¶</sup>	23.1			24.1			23.8			25.1		

\* Per 100,000 population.

<sup>‡</sup>The population for Hispanics in the US Census includes other and multirace. For gonorrhea cases who are Hispanics (numerator), other race is only included if it is reported together with another race.

<sup>§</sup>Unknown category includes other race when reported as the only race.

<sup>§</sup>NH-unknown race includes cases of unknown Hispanic ethnicity and unknown race.

<sup>¶</sup>Calculated by dividing the total number of cases classified as “unknown total” by the total number of cases and multiplying by 100.

HE indicates Hispanic ethnicity; N/A, not available; —, rate not calculated.

**TABLE 4.** Racial and Hispanic Ethnicity Disparity Measures by Classification Strategy and Year, 2010 to 2017

Racial/HE Disparity Measure	Year										% Decrease, 2010-2017	
	2010	2011	2012	2013	2014	2015	2016	2017				
Index of disparity (unweighted)												
Current classification	116.4	113.3	107.0	106.0	101.3	101.1	100.4	99.5				14.5
Alternate classification	94.5	87.1	84.8	83.2	78.6	76.5	76.0	77.8				17.7
Index of disparity (weighted by population)												
Current classification	113.7	110.0	102.8	95.2	88.7	84.3	80.5	78.4				31.1
Alternate classification	117.3	113.2	106.3	98.9	92.4	88.1	84.1	82.7				29.4
Population-attributable proportion (using rates in NH-Asians as comparator)												
Current classification	0.844	0.841	0.817	0.812	0.797	0.765	0.754	0.745				11.7
Alternate classification	0.847	0.844	0.820	0.814	0.798	0.767	0.755	0.746				12.0
Population-attributable proportion (using group with lowest rate as comparator)												
Current classification	0.844	0.841	0.817	0.812	0.797	0.765	0.754	0.745				11.7
Alternate classification	0.928	0.901	0.887	0.852	0.798	0.767	0.755	0.746				19.6
Gini coefficient												
Current classification	0.615	0.600	0.566	0.533	0.500	0.477	0.456	0.446				27.5
Alternate classification	0.625	0.610	0.577	0.544	0.508	0.485	0.466	0.454				27.3

HE indicates Hispanic ethnicity; NH = non-Hispanic.