

# Experience Incentivizing Reduction of Racial and Ethnic Disparities in a Medicaid Hospital Quality Incentive Program

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Several public and private payers—including the Center for Medicare and Medicaid Innovation and various state Medicaid programs—have implemented or are designing value-based payment programs that incentivize the reduction of health disparities as a pillar of value alongside high-quality care.<sup>1-4</sup> This shift has been spurred by recognition that existing value-based payment programs have had mixed effects on health equity and in fact may unintentionally exacerbate health disparities.<sup>4-10</sup> However, experience to inform the design of equity-oriented value-based payment models remains sparse.

The Massachusetts Medicaid and Children's Health Insurance Program (administered by MassHealth) is one of the few payers in the nation that has longitudinal experience holding provider entities financially accountable for disparities reduction. In 2007, as part of its acute hospital quality incentive program (QIP), MassHealth began requiring its hospital providers to report individual-level race and ethnicity data to support stratification of clinical quality measures. In 2009, a subset of these measures was aggregated into a health disparity (HD) composite measure. A composite was used to overcome small sample sizes for individual measures. Measures were selected for inclusion in the program if they were in priority quality areas and had sufficient variation and opportunity for improvement. Measures included in the HD composite evolved with changing clinical measure slates, with new measures introduced and topped-out measures retired each year.

Hospitals receive payment for the HD composite based on their composite between-group variance (BGV): a summary disparity statistic that measures the consistency of care provided across racial and ethnic groups for targeted measures. BGV is a nondirectional disparities statistic that measures variability in quality of care compared with the reference group (all racial and ethnic groups). Quality was calculated using missed opportunity rates, or the percentage of opportunities in which quality care was not delivered. Larger variations in missed opportunity rates among racial and ethnic subgroups yields higher BGVs. The BGV approach was selected to account for variability in sample sizes across hospitals that made it challenging to reliably show disparities with other approaches.<sup>11</sup>

## ABSTRACT

**OBJECTIVES:** We aimed to describe the experience of a state Medicaid agency incentivizing reduction of racial and ethnic disparities in a hospital quality incentive program (QIP).

**STUDY DESIGN:** Retrospective review of a decade of experience implementing a hospital health disparity (HD) composite measure.

**METHODS:** Observational analysis of programwide trends in missed opportunity rates and between-group variance (BGV) for the HD composite from 2011 to 2020 and subanalysis of 16 metrics included in the HD composite for at least 4 years over the decade.

**RESULTS:** Programwide missed opportunity rates and BGV fluctuated widely from 2011 to 2020, likely due to variation in measures included in the HD composite. When the 16 measures that were included in the HD composite for at least 4 years were collapsed into a hypothetical 4-year period, missed opportunity rates decreased across the 4 consecutive years, from 47% in year 1 to 20% in year 4. Differences among racial and ethnic subgroups also decreased across the 4-year period, as reflected in the BGV decrease from  $7.85 \times 10^{-4}$  in year 1 to  $5.10 \times 10^{-4}$  in year 4.

**CONCLUSIONS:** Construction of a composite measure, use of a summary disparity statistic, and measure selection are key considerations in the design and interpretation of equity-focused payment programs. This analysis revealed improved aggregate quality performance and a modest reduction in racial and ethnic disparities for measures included in the HD composite for at least 4 years. Further research is needed to evaluate the association between equity-oriented incentives and health disparities.

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BGV of the HD composite determined between 5% and 23% of the total annual hospital QIP from 2011 to 2020, with associated total dollars eligible to be earned ranging from \$1.5 million to \$17 million across 60 acute care hospitals. A hospital with a lower BGV than other hospitals earned higher payments based on decile attainment thresholds. As part of the overall QIP, hospitals also received payment for each individual measure in the HD composite based on improvement in missed opportunity rates alone. Thus, for measures included in the HD composite, hospitals were dually incentivized to provide both high-quality and consistent care across racial and ethnic groups.

This review examines experience of the program over the past decade. It reports on HD composite performance aggregated at the programwide level to describe observed racial and ethnic variability in missed opportunity rates (or BGV) across the hospitalized MassHealth population. To facilitate interpretation of the equity-oriented QIP, it also presents the BGV for measures included in the HD composite for at least 4 years between 2011 and 2020. Although this observational analysis cannot suggest causality between the equity-oriented QIP and health disparity trends, the program design, evaluation approach, and experience with a summary disparity statistic may offer useful information for payers that are incorporating health equity incentives into their value-based payment programs.

## METHODS

Programwide HD composite performance was evaluated from 2011 to 2020 using HD composite BGV and missed opportunity rates for the hospitalized MassHealth population aggregated across 60 acute hospitals. Quality performance was calculated using chart-abstracted clinical and administrative data submitted annually by hospitals for MassHealth members. Race and ethnicity data were self-reported and validated through chart review. Programwide missed opportunity rates were calculated as the sum of all instances in which the desired care was not provided to a patient (in the numerator) divided by the total number of opportunities to provide desired care to patients (in the denominator). Programwide BGV was calculated as the sum of the difference between missed opportunity rates for each racial and ethnic subgroup and the overall missed opportunity rates (weighted by population of each subgroup). The BGV statistic is displayed in 6 decimal points and ranges from 0 to 1, with a BGV of 0 representing no variation among racial and ethnic groups in the care being measured and a BGV of 1 representing maximal variation. Further details on missed opportunity rates and BGV calculations are described in [eAppendix A](#) (eAppendices available at [ajmc.com](http://ajmc.com)).<sup>12,13</sup>

The evolving measures included in the HD composite made it difficult to interpret year-to-year changes in that composite

## TAKEAWAY POINTS

The Massachusetts Medicaid and Children's Health Insurance Program (administered by MassHealth) is one of the few payers with longitudinal experience holding provider entities financially accountable for health equity, specifically through its hospital quality incentive program (QIP).

- ▶ Construction of a composite measure and use of a summary disparity statistic are key considerations in the design of equity-oriented QIPs.
- ▶ This analysis revealed modest reductions in racial and ethnic differences for targeted quality measures across 4 years.
- ▶ Observed trends do not suggest an association between equity incentives and health disparities reduction. Further research is needed to evaluate the impact of equity-oriented QIPs on health equity.

([eAppendix B](#)). Therefore, we performed a subanalysis to better represent individual-level measure trends obscured by the BGV statistic. For this subanalysis, performance data for 16 measures included in the HD composite for at least 4 consecutive years (eg, 2011-2014 or 2016-2019) ([eAppendix B](#)) were combined into a single hypothetical 4-year period of analysis ("performance years 1-4"). A threshold of 4 years was chosen to include as many measures as possible while allowing for trend evaluation. For these 16 measures, we calculated programwide missed opportunity rates and BGV for the HD composite for performance years 1 to 4. Finally, we stratified programwide missed opportunity rates and BGV results for these 16 measures by thematic categories ([eAppendix B](#)).<sup>12,13</sup> These data are a descriptive analysis of trends, and statistical analyses were not performed.

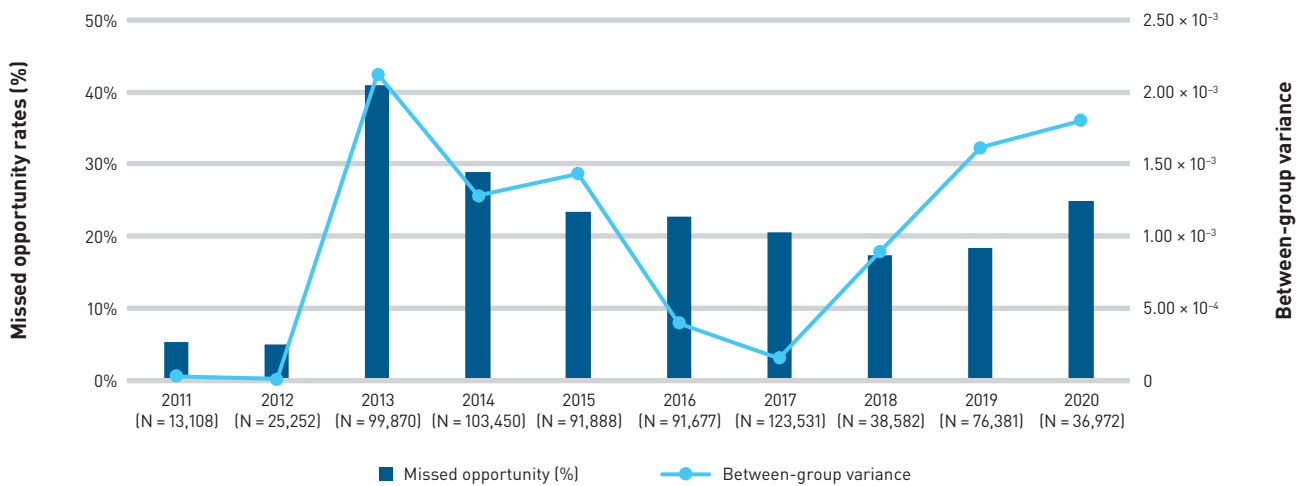
## RESULTS

From 2011 to 2020, the HD composite was composed of 5 to 15 individual measures per year (with a total of 24 different measures across the 10-year period). Included measures represented care in 7 major domains: pediatric asthma care (n=3), maternity care (n=6), care coordination (n=3), surgical infection care (n=3), pneumonia care (n=4), newborn care (n=2), and tobacco use screening and treatment (n=3) ([eAppendix B](#)). Measures contributed proportionally to the HD composite according to the total number of opportunities for quality care that they provided (the denominator). Care coordination measures made up the majority of total opportunities because those measures crossed all service lines ([eAppendix C](#)).

The programwide missed opportunity rate for the HD composite fluctuated from 2011 to 2020. In 2011 and 2012, the missed opportunity rate was 5% and increased to 41% in 2013. From 2013 to 2018, the missed opportunity rate decreased steadily to 17%, and from 2018 to 2020, it steadily increased to 25% ([Figure 1](#) and [eAppendix D](#)). The programwide HD composite BGV also varied across the 10 years. In 2011 and 2012, BGV was lowest, at  $2.9 \times 10^{-5}$  and  $8 \times 10^{-6}$ , respectively. The BGV increased to  $2.124 \times 10^{-3}$  in 2013 and steadily decreased to  $1.53 \times 10^{-4}$  by 2017. From 2017 to 2020, the BGV increased again to  $1.804 \times 10^{-3}$  ([Figure 1](#) and [eAppendix D](#)).

## TRENDS FROM THE FIELD

**FIGURE 1.** Missed Opportunity Rates and Between-Group Variance for the Health Disparities Composite (2011-2020)<sup>a</sup>



<sup>a</sup>N refers to the total number of potential opportunities for all included measures. Across the 10 years, 50% to 63% of total opportunities were for White members, 12% to 16% were for Black members, 19% to 27% were for Hispanic members, and 3% to 4% were for Asian members.

Subanalysis of performance data for 16 individual measures collapsed into hypothetical performance years 1 to 4 revealed an overall decrease in missed opportunity rates, from 47% in year 1 to 20% in year 4 (Figure 2 [A]). When stratified by race and ethnicity, each subgroup also had a steady decrease in its missed opportunity rate during this period. Differences among racial and ethnic subgroups also decreased across the hypothetical 4-year period, as reflected in the BGV decrease from  $7.85 \times 10^{-4}$  in year 1 to  $5.10 \times 10^{-4}$  in year 4 (Figure 2 [A]). For each year, White and Asian members had higher missed opportunity rates compared with Black and Hispanic members (Figure 2 [B] and eAppendix E). The maximum absolute missed opportunity rate difference among racial and ethnic subgroups ranged from 6% to 12% each year (eAppendix E).

When stratifying this subanalysis by measure category, measures related to pediatric asthma and maternity care had trends similar to those of the 16-measure subanalysis (eAppendix F [A and B]). The newborn care measure (exclusive breastfeeding) had opposite trends, with the missed opportunity rate and BGV increasing across the 4 years. It was also among the few measures in which minorities had higher missed opportunity rates than White members and showed the most variation in care (eAppendix F [C]). For care coordination measures, the missed opportunity rate decreased across the 4 years but BGV fluctuated (eAppendix F [D]). For surgical infection and pneumonia care measures, missed opportunity rates were less than 5%, making missed opportunity rates and BGV trends difficult to interpret (eAppendix F [E and F]).

## DISCUSSION

For more than a decade, MassHealth's acute hospital QIP has included an HD composite that measures differences in receipt

of high-quality care by patient race and ethnicity. As interest in incorporating measures of equity in value-based purchasing programs increases around the country, this program's experience with measuring and incentivizing health disparities reduction in a QIP may offer some useful lessons.

The program's approach to disparities measurement was not conducive to longitudinal interpretation of progress on equity. The BGV trend was not easily comparable year to year because the combination of quality measures included in the HD composite evolved annually (Figure 1 and eAppendix B [A]). Further, the financial incentives tied to disparities reduction also varied over time. The use of a consistent measurement approach with consistent financial incentives in a future program would aid in evaluating the program's impact.

Although summary disparity statistics (such as BGV) have gained favor among payers due to their simple representation of variation, they have several limitations.<sup>2,14</sup> The BGV measures uniformity of care and thus produces similar results regardless of which subgroup receives better care. In the subanalysis of 16 measures included in the HD composite for 4 consecutive years, White members had higher missed opportunity rates than members of racial and ethnic minority groups at baseline and thus benefited most from reductions in subgroup differences (Figure 2 [B]). If health equity programs aim to redress historical and contemporary injustices toward racial and ethnic minority groups, payers should intentionally select measures in which such groups fare worse or otherwise alter design to ensure that goals are met. This may require payers to have access to baseline measure data stratified by race and ethnicity or evidence of disparities for similar populations prior to measure selection.<sup>15</sup> Moreover, BGV is sensitive to racial or ethnic case mix, meaning that hospitals with more minority group patients

can receive worse results than those with fewer minority group patients because they will inherently have more opportunities for variation. Future health equity performance assessment efforts may benefit from selection of disparity statistics and other program design elements that safeguard against disadvantaging safety-net hospitals.

**Limitations**

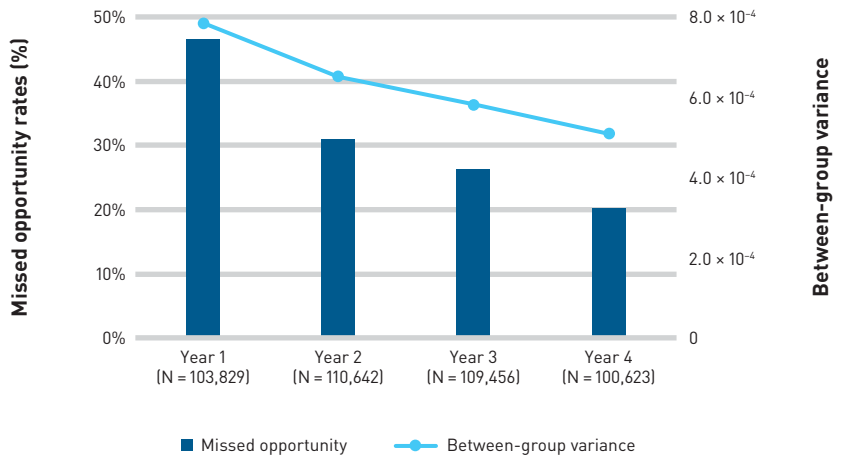
This analysis has several limitations. To overcome the limitations of BGV interpretation outlined earlier, we performed a subanalysis of 16 measures included in the HD composite for at least 4 years, and trends revealed modest disparities reduction across the hypothetical 4-year period. However, for several reasons, these trends do not suggest association or causality between the inclusion of a measure in the HD composite and reductions in disparities: Given that all hospitals participated in the QIP, comparison to a logical control group and rigorous statistical analyses were not possible; given that measures in the subanalysis were collapsed into a hypothetical 4-year period, they were subject to different external influences, including varying incentive amounts and unmeasured population traits. Although the implications of this analysis are limited, they point to important trends in the theoretical value of QIP in reducing disparities that require well-controlled investigation. Another limitation is that programmatic data from 2009 and 2010 were excluded from the trend analysis because they were not available. The HD composite was tied to financial incentives for the first time in 2009 (pay for reporting) and 2010 (pay for performance). Because 10 of the 16 analyzed measures in the 16-measure subanalysis were part of the HD composite in 2009-2010, this analysis does not capture the baseline subgroup variations for these 10 measures (eAppendix B [A]). Finally, hospital data from 2018 were drawn from only 2 rather than 4 quarters. Thus, the number of potential opportunities was reduced by half, limiting the eligible denominator for analysis.

**CONCLUSIONS**

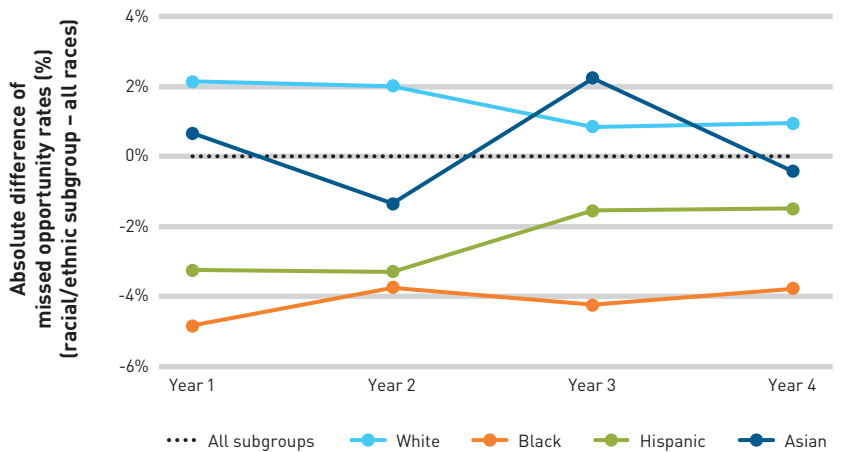
The recent collective imperative for action on health equity is increasingly prompting payers and health systems to consider incorporating health equity as an explicit component of value. This observational

**FIGURE 2.** Analysis of the 16 Measures Included in the Health Disparities Composite for ≥ 4 Years (2011-2020)\*

**A.** Missed opportunity rates and between-group variance



**B.** Absolute difference of missed opportunity rates among racial and ethnic subgroups and all subgroups



\*To include and evaluate as many measures as possible, reported between-group variances were calculated based on the first 4 years of data available for each measure between 2011 and 2020. The 16 measures included in the aggregate analysis are CAC-1a, CAC-2a, CAC-3a, MAT-1, MAT-2A, MAT-2B, MAT-3, MAT-4, CCM-1, CCM-2, CCM-3, SCIP-1a, SCIP-2a, SCIP-3a, PN-6, and NEWB-1. Measure definitions are outlined in eAppendix B. N refers to the total number of potential opportunities for all included measures. Across the 4 years, 56% to 59% of total opportunities were for White members, 12% to 14% were for Black members, 21% to 22% were for Hispanic members, and 3% were for Asian members.

analysis identifies relevant considerations for equity-oriented QIP design and evaluation, including measure selection, construction of a composite measure, and use of a summary statistic. Further research is needed to evaluate the impact of equity incentives on disparities reduction. ■

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## TRENDS FROM THE FIELD

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## **eAppendices**

eAppendix A. Health Disparity Composite Description and Calculation Methods

eAppendix B. Measures included in the Health Disparity Composite Measure (2011-2020)

eAppendix C. Percent contribution of measure categories to potential missed opportunities for the Health Disparity Composite from 2011 to 2020

eAppendix D. Absolute and relative difference of missed opportunity rates between racial and ethnic subgroups and all subgroups for the Health Disparity Composite (2011-2020)

eAppendix E. Absolute and relative difference of missed opportunity rates between racial and ethnic subgroups and all subgroups for measures included in the Health Disparity Composite for  $\geq 4$  years (2011-2020)

eAppendix F. Between-group variances and missed opportunity rates of the 16 measures included in the Health Disparity Composite for  $\geq 4$  years, by measure category (2011-2020)

## **eAppendix A. Health Disparity Composite Description and Calculation Methods**

### **1) Measure Description**

**Composite Measure Components** - represents the total number of instances when each racial group did not receive the desired care process (numerator) divided by the total number of opportunities available for receiving the desired care process (denominator) defined as follows:

- **Racial Comparison Group Composite Rate** - is the sum of the numerators (instances desired care was not given) for each racial group divided by the sum of denominators (opportunities to receive the desired care).
- **Reference Group Composite Rate** - is the sum of the numerators from all combined racial groups (instances desired care was not given) divided by the sum of denominators (opportunities to receive the desired care).
- **Between Group Variance (BGV)** - the variance statistic measures the degree of variation in care of each racial comparison group composite rate from the hospitals reference group rate.

**Data Collection Approach:** Measure data were collected by hospitals through retrospective review of administrative and medical records and reported to MassHealth annually. Hospitals may over-sample their racial group data to improve precision of composite rates.

**Data Accuracy:** Consistent collection of race or Hispanic indicator data elements and minimizing UNKNOWN race codes were necessary to improve reliability of racial group composite rates.

**Risk Adjustment:** Does not apply to care process measures.

**Target Attainment:** To meet the target attainment threshold, a hospital's BGV had to be lower than the 2<sup>nd</sup> highest decile BGV value.

**Measure Interpretation:** Note that a BGV of zero (0) does not indicate the desired care was given to all patients every time, only that there was no variance in care provided to each racial group from the hospital reference group. Composite results should be interpreted in comparison to other data (e.g.: individual measure result rates) to identify areas for targeted quality improvement

## 2) Measure Calculation Method

### a) Definition of Hospital Measure Population Groups

- **Comparison Group:** The comparison groups are the count data for each of the five (5) racial/ethnic categories derived from the hospitals calendar year reported data, excluding UNKNOW code.
- **Reference Group:** The reference group is count data on total population of all racial/ethnic categories derived from the hospitals calendar year reported data, excluding UNKNOW code. This definition of the reference group was selected based on research literature which recommends pairing the total population average when using between group variance statistics. The total population average is more stable than a standard reference point and has the advantage of having the same value across all domains that encompass the same population. Other considerations included ability to calculate the disparity measure even when the hospitals data may not contain the maximum amount of racial groups.

b) *Definition of Reference Group Composite Rate.* Within each hospital, total of all five (5) racial/ethnic (R/E) categories, the hospital reference group composite rate ( $r_{ref}$ ) is calculated using the following formula:



$$r_{ref} = \frac{n_{ref}}{d_{ref}}$$

**Where:**

$d_{ref}$  = Sum the denominators from all 5 racial/ethnic groups to get the reference group denominator

$n_{ref}$  = Sum the numerators from all 5 racial/ethnic groups to get the reference group numerator

$r_{ref}$  = Reference group composite rate is calculated by dividing the reference group numerator ( $n_{ref}$ ) by the reference group denominator ( $d_{ref}$ )

- c) *Definition of Comparison Group Composite Rate:* Within each hospital, for each of the racial/ethnic categories, the comparison group *composite rate* ( $r_i$ ) is calculated using the following formula:

$$r_i = \frac{n_i}{d_i}$$

**Where:**

$n_i$  = For each R/E group, sum the numerators from all measures to get the comparison group numerator.

$d_i$  = For each R/E group, sum the denominators from all measures to get the comparison group denominator

$r_i$  = Comparison group composite rate is calculated by dividing the comparison group numerator ( $n_i$ ) by the comparison group denominator ( $d_i$ )

- d) *Between-Group Variance (BGV).* The BGV for each racial/ethnic comparison group's composite rate from the reference group composite rate is calculated using the following formula:

$$BGV = \sum_{i=1}^n \frac{d_i}{d_{ref}} (r_i - r_{ref})^2$$

Where:

$r_i$  = is the composite rate in racial/ethnic comparison group i

$r_{ref}$  = is the reference group composite rate

$d_i$  = is the denominator in racial/ethnic comparison group  $i$

$d_{ref}$  = is the denominator in the reference group

$n$  = is the number of racial/ethnic comparison groups within a hospital

$i=1$  to  $n$  is the range of number of groups where  $n$  is total number racial/ethnic comparison groups within the hospital.

The BGV measures the deviation of each racial/ethnic comparison group's composite rate from the reference group composite rate and weights each comparison group by its population size. The BGV accounts for relative sizes of groups and weights each racial/ethnic group by the hospital's population size.

- e) *Disparity Composite Value.* The composite value is defined as the final BGV statistic that is calculated by summing all the racial/ethnic comparison group BGV values. The BGV statistic uses an interval scale that ranges from zero to one (0 – 1) displayed in 6 decimal points. A value close to zero (0) may indicate no variation exists whereas a value close to one (1) may indicate that a wide variation exists.

**eAppendix B.** Measures included in the Health Disparity Composite Measure (2009-2020)

A. Measure Timeline

	Pediatric Asthma Care			Care Coordination			Maternity Care					
2009	CAC-1a	CAC-2a					MAT-1	MAT-2				
2010	CAC-1a	CAC-2a	CAC-3a				MAT-1	MAT-2A	MAT-2B			
2011	CAC-1a	CAC-2a	CAC-3a				MAT-1	MAT-2A	MAT-2B			
2012	CAC-1a	CAC-2a	CAC-3a				MAT-1	MAT-2A	MAT-2B	MAT-3		
2013	CAC-1a	CAC-2a	CAC-3a	CCM-1	CCM-2	CCM-3	MAT-1	MAT-2A	MAT-2B	MAT-3		
2014	CAC-1a	CAC-2a	CAC-3a	CCM-1	CCM-2	CCM-3	MAT-1	MAT-2A	MAT-2B	MAT-3		
2015				CCM-1	CCM-2	CCM-3	MAT-1	MAT-2A	MAT-2B	MAT-3		
2016				CCM-1	CCM-2	CCM-3				MAT-3	MAT-4	
2017				CCM-1	CCM-2	CCM-3					MAT-4	MAT-5
2018				CCM-1	CCM-2	CCM-3					MAT-4	
2019				CCM-1	CCM-2	CCM-3					MAT-4	
2020				CCM-1	CCM-2	CCM-3					MAT-4	

	Surgical Infection Care			Pneumonia Care				Newborn Care			Tobacco Screening & Treatment			
2009	SCIP-1a	SCIP-2a	SCIP-3a	PN-3b	PN-4	PN-5c	PN-6	NICU-1						
2010	SCIP-1a	SCIP-2a	SCIP-3a	PN-3b	PN-4	PN-5c	PN-6	NICU-1						
2011	SCIP-1a	SCIP-2a	SCIP-3a	PN-3b	PN-4	PN-5c	PN-6							
2012	SCIP-1a	SCIP-2a	SCIP-3a	PN-3b			PN-6							
2013	SCIP-1a	SCIP-2a	SCIP-3a	PN-3b			PN-6							
2014	SCIP-1a	SCIP-2a	SCIP-3a				PN-6							
2015														
2016											TOB-1	TOB-2	TOB-3	
2017										NEWB-1	NEWB-2	TOB-1	TOB-2	TOB-3
2018										NEWB-1				
2019										NEWB-1				
2020										NEWB-1				

In 2009, payment for the Health Disparity composite measure was for reporting.

From 2010 onwards, payment for the Health Disparity composite measure was for performance.

Data from 2009-2010 were not available and were thus not included in the trend analysis.

First year measure was included in Health Disparity composite
Year measure was retired from the Health Disparity composite
Sub-analysis including the 16 measures included in the health disparity composite for at least four consecutive years

## B. Measure Dictionary

<b>Measure Code</b>	<b>Measure Description</b>
MAT-1	Intrapartum Antibiotic Prophylaxis for Group B Streptococcus
MAT-2A	Perioperative Antibiotics for Cesarean Section –Antibiotic Timing
MAT-2B	Perioperative Antibiotics for Cesarean Section – Antibiotic Selection
MAT-3	Elective Delivery <39 weeks gestation
MAT-4	Cesarean Birth, Nulliparous vertex singleton term
MAT-5	Appropriate DVT prophylaxis for cesarean delivery
CAC-1a	Children’s Asthma Care – Inpatient Use of Relievers
CAC-2a	Children’s Asthma Care – Inpatient Use of Corticosteroids
CAC-3a	Children’s Asthma Care – Home Mgt. Plan of Care
PN-3b	Blood culture performed in ED prior to first antibiotic received in hospital
PN-4	Adult Smoking Cessation Advice/Counseling
PN-5c	Initial Antibiotic Received Within 6 Hours of Hospital Arrival
PN-6	Appropriate antibiotic selection for CAP in immuno-competent patients
SCIP-1a	Prophylactic antibiotic received within 1 hour prior to surgical incision
SCIP-2a	Appropriate antibiotic selection for surgical prophylaxis
SCIP-3a	Prophylactic antibiotic discontinued w/in 24 hrs after surgery end time
CCM-1	Reconciled medication list received by patient at discharge
CCM-2	Transition record with data received by patient at discharge
CCM-3	Timely transmittal of transition record at discharge
TOB-1	Tobacco Use Screening
TOB-2	Tobacco use treatment provided or offered
TOB-3	Tobacco use treatment provided or offered at discharge
NICU-1	Antenatal Steroid Administration
NEWB-1	Exclusive Breast Milk Feeding
NEWB-2	Newborn bilirubin screening prior to discharge

All measures except for MAT-3 and MAT-4 are process measures. MAT-3 and MAT-4 are outcome measures.

**eAppendix C.** Percent contribution of measure categories to potential missed opportunities for the Health Disparity Composite from 2011 to 2020

	<b>Measure Category</b>						
	<b>Care Coordination</b>	<b>Maternity Care</b>	<b>Newborn</b>	<b>Tobacco Use Screening + Treatment</b>	<b>Surgical Infection</b>	<b>Pediatric Asthma</b>	<b>Pneumonia</b>
2011-2020 (N=700,711)	69%	14%	6%	6%	3%	1%	1%

**eAppendix D.** Absolute and relative difference of missed opportunity rates between racial and ethnic subgroups and all subgroups for the Health Disparity Composite (2011-2020)

	<b>Missed Opportunity Rate (%)</b>	<b>Difference Between Racial &amp; Ethnic Subgroup and All Subgroups</b>				
	All Subgroups	<b>Absolute Difference (Relative Difference)</b>				
		White (50%-63%)	Black (12%-16%)	Hispanic (19%-27%)	Asian (3%-4%)	Other (3%-7%)
2011	5%	0% (0%)	-1% (-11%)	0% (0%)	2% (46%)	0% (4%)
2012	5%	0% (2%)	-1% (-10%)	0% (4%)	-1% (-14%)	0% (10%)
2013	41%	4% (9%)	-7% (-16%)	-6% (-14%)	-1% (-3%)	-5% (-12%)
2014	29%	3% (10%)	-5% (-17%)	-5% (-16%)	-1% (-3%)	-3% (-11%)
2015	23%	3% (13%)	-6% (-25%)	-4% (-17%)	-1% (-6%)	-4% (-18%)
2016	23%	1% (6%)	-3% (-11%)	-3% (-13%)	-2% (-10%)	0% (1%)
2017	20%	1% (2%)	-2% (-10%)	-1% (-6%)	2% (11%)	3% (14%)
2018	17%	-2% (-13%)	3% (15%)	2% (13%)	8% (46%)	7% (40%)
2019	18%	-3% (-15%)	1% (6%)	3% (15%)	6% (35%)	12% (65%)
2020	25%	-3% (-13%)	0% (-2%)	4% (18%)	4% (17%)	10% (42%)

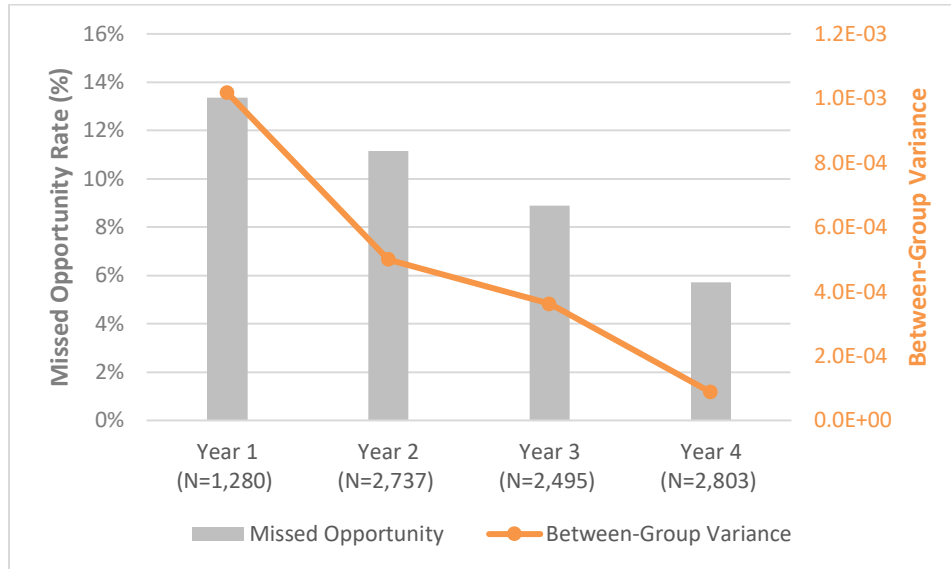
**eAppendix E.** Absolute and relative difference of missed opportunity rates between racial and ethnic subgroups and all subgroups for measures included in the Health Disparity Composite for  $\geq 4$  years (2011-2020)

	<b>Missed Opportunity Rate (%)</b>	<b>Difference Between Racial &amp; Ethnic Subgroup and All Subgroups</b>				
	All Subgroups (N=100,623-110,642)	<b>Absolute Difference (Relative Difference)</b>				
		White (56-59%)	Black (12-14%)	Hispanic (21-22%)	Asian (3%)	Other (4-5%)
Year 1	47%	2% (5%)	-5% (-10%)	-3% (-7%)	1% (1%)	0% (0%)
Year 2	31%	2% (7%)	-4% (-12%)	-3% (-11%)	-1% (-4%)	0% (0%)
Year 3	26%	1% (3%)	-4% (-16%)	-2% (-6%)	2% (9%)	8% (29%)
Year 4	20%	1% (5%)	-4% (-19%)	-1% (-7%)	0% (-2%)	7% (34%)



**eAppendix F.** Absolute and relative difference of missed opportunity rates between racial and ethnic subgroups and all subgroups for measures included in the Health Disparity Composite for  $\geq 4$  years, by measure category (2011-2020)

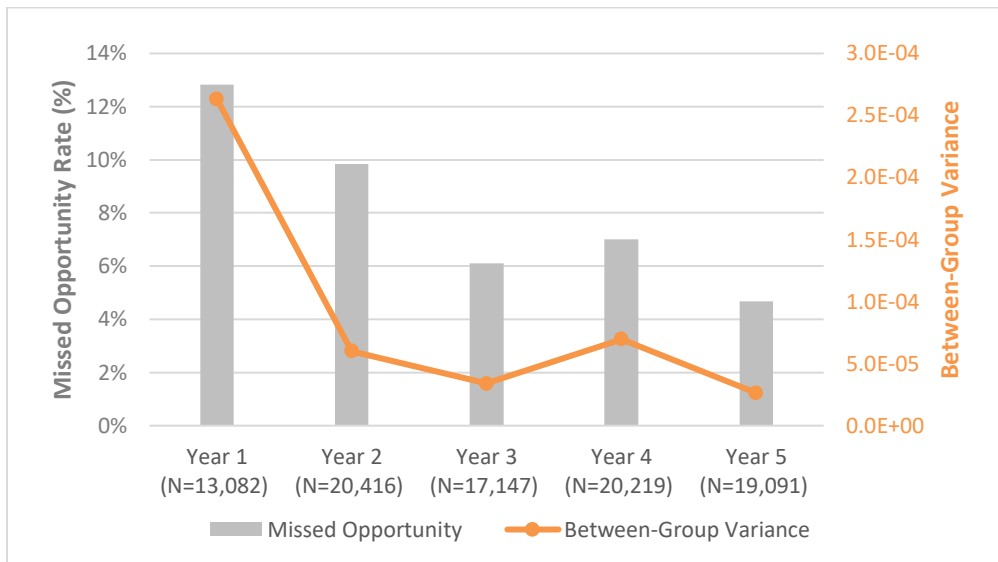
A. Pediatric asthma measures (2011-2014), 3 measures



	Missed Opportunity Rate (%)	Difference Between Racial & Ethnic Subgroup and All Subgroups				
		Absolute Difference (Relative Difference)				
	All Subgroups (N=1,280-2,803)	White (26-33%)	Black (23-26%)	Hispanic (32-38%)	Asian (3-5%)	Other (3-6%)
Year 1	13%	1% (8%)	-3% (-22%)	0% (2%)	12% (87%)	-6% (-41%)
Year 2	11%	3% (24%)	-3% (-24%)	0% (-3%)	-4% (-37%)	2% (19%)
Year 3	9%	2% (27%)	0% (-4%)	-2% (-22%)	-1% (-12%)	3% (35%)
Year 4	6%	1% (23%)	0% (-3%)	-1% (-17%)	1% (13%)	1% (12%)

For pediatric asthma measures, missed opportunity rates decreased steadily from 13% in year 1 to 6% in year 4. Differences between R&E subgroups also decreased across the four years, from a BGV of  $1.0 \times 10^{-3}$  in year 1 to  $8.7 \times 10^{-5}$  in year 4.

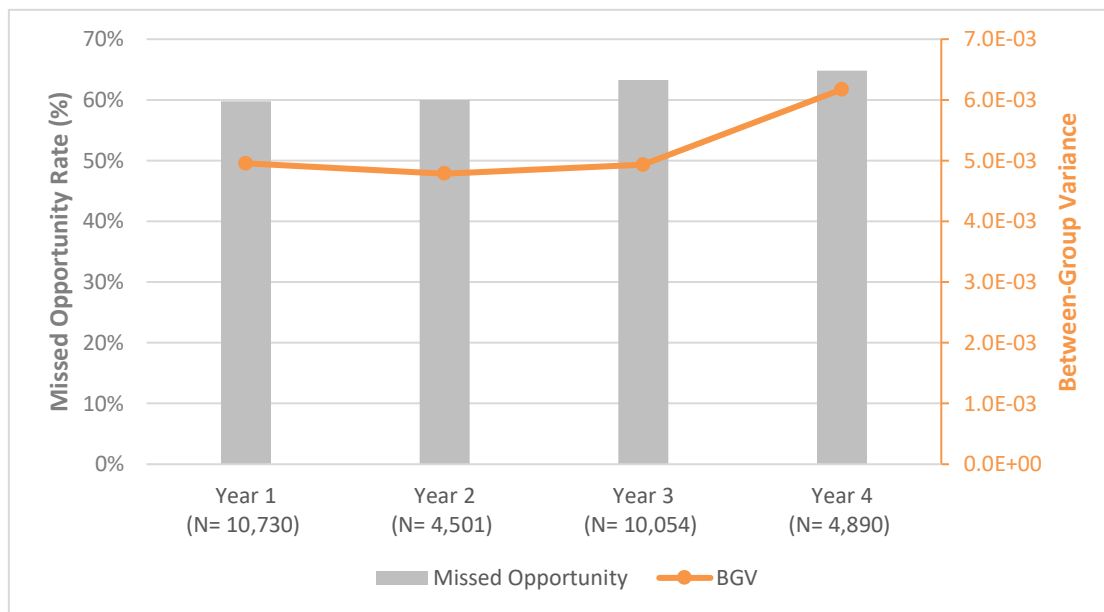
B. Maternity care measures (2011-2019), 5 measures



	Missed Opportunity Rate (%)	Difference Between Racial & Ethnic Subgroup and All Subgroups				
		Absolute Difference (Relative Difference)				
	All Subgroups (N=13,082-20,416)	White (40-43%)	Black (15-17%)	Hispanic (31-33%)	Asian (4-5%)	Other (5-6%)
Year 1	13%	1% (9%)	0% (0%)	-2% (-16%)	0% (-1%)	4% (31%)
Year 2	10%	1% (6%)	0% (-1%)	-1% (-6%)	-2% (-23%)	1% (14%)
Year 3	6%	0% (3%)	1% (10%)	-1% (-11%)	-1% (-12%)	1% (24%)
Year 4	7%	0% (2%)	0% (-6%)	-1% (-7%)	-1% (-9%)	3% (45%)
Year 5	5%	0% (9%)	0% (-4%)	0% (-9%)	-1% (-24%)	1% (28%)

For maternity care measures, missed opportunity rates decreased from 13% in year 1 to 5% in year 5. Differences between R&E subgroups also decreased across the five years, from a BGV of  $2.6 \times 10^{-4}$  in year 1 to  $2.6 \times 10^{-5}$  in year 5

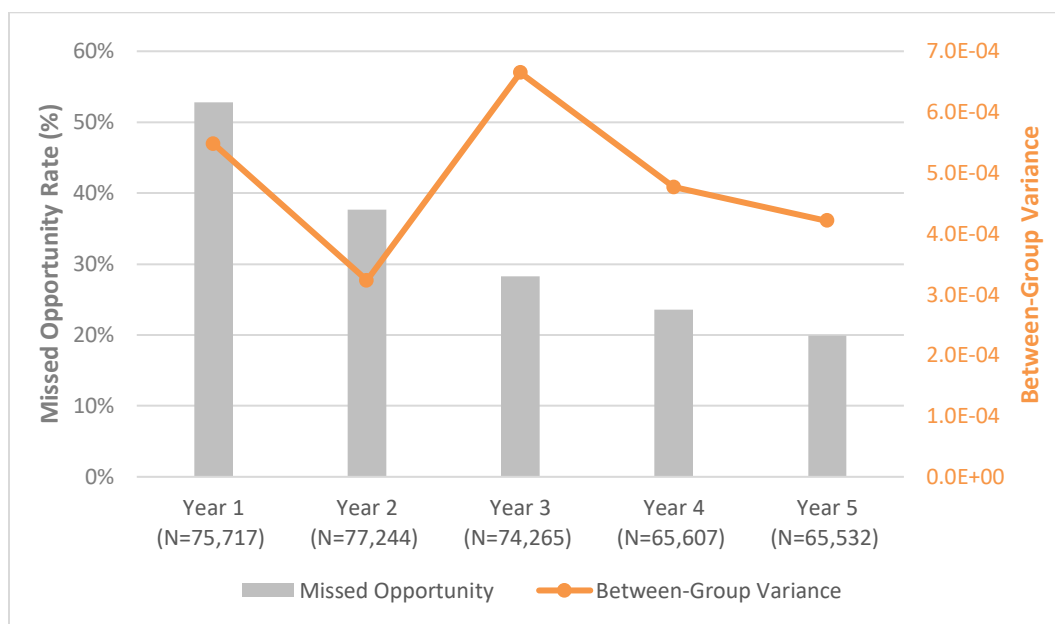
C. Newborn Care Measure (2017-2020), 1 measure



	Missed Opportunity Rate (%)	Difference Between Racial & Ethnic Subgroup and All Subgroups				
		Absolute Difference (Relative Difference)				
	All Subgroups (N=4,501-10,730)	White (36-47%)	Black (12-15%)	Hispanic (24-30%)	Asian (4-5%)	Other (10-18%)
Year 1	60%	-7% (-11%)	-1% (-1%)	10% (17%)	7% (12%)	4% (7%)
Year 2	60%	-7% (-11%)	0% (0%)	9% (15%)	14% (24%)	2% (3%)
Year 3	63%	-8% (-12%)	2% (3%)	8% (12%)	13% (21%)	2% (3%)
Year 4	65%	-9% (-14%)	1% (1%)	9% (14%)	16% (24%)	-1% (-1%)

For the newborn care measure (exclusive breastfeeding), missed opportunity rates increased from 60% in year 1 to 65% in year 4 and each R&E subgroup experienced worsening quality during this period. Differences between R&E subgroups remained largely unchanged in the first three years ( $4.8 \times 10^{-3}$  –  $5.0 \times 10^{-3}$ ) and increased in the fourth year to  $6.2 \times 10^{-3}$ . For the newborn care measure, Hispanic, Black, and Asian members had higher missed opportunity rates compared to White members; the maximum missed opportunity rate difference between subgroups ranged from 17% to 25% each year.

#### D. Care Coordination Measures (2013-2017), 3 measures

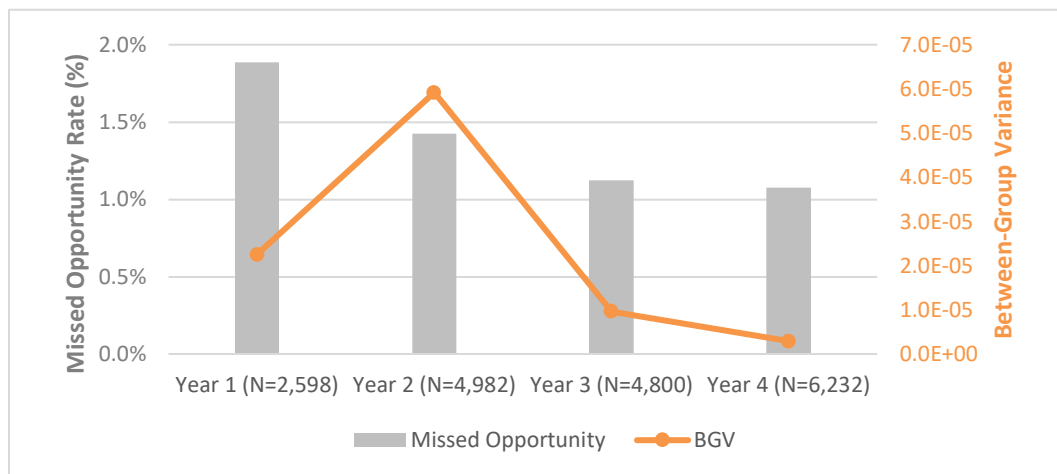


	<b>Missed Opportunity Rate (%)</b>	<b>Difference Between Racial &amp; Ethnic Subgroup and All Subgroups</b>				
		<b>Absolute Difference (Relative Difference)</b>				
	All Subgroups (N= 65,532-77,244)	White (62-65%)	Black (11-13%)	Hispanic (18-20%)	Asian (2-3%)	Other (3-4%)

Year 1	53%	2% (3%)	-4% (-8%)	-3% (-5%)	3% (6%)	-3% (-6%)
Year 2	38%	1% (3%)	-3% (-9%)	-2% (-6%)	1% (3%)	-1% (-4%)
Year 3	28%	2% (6%)	-5% (-19%)	-2% (-7%)	3% (10%)	-4% (-13%)
Year 4	24%	2% (6%)	-4% (-18%)	-2% (-10%)	-1% (-4%)	1% (6%)
Year 5	20%	1% (6%)	-3% (-18%)	-2% (-13%)	4% (20%)	2% (9%)

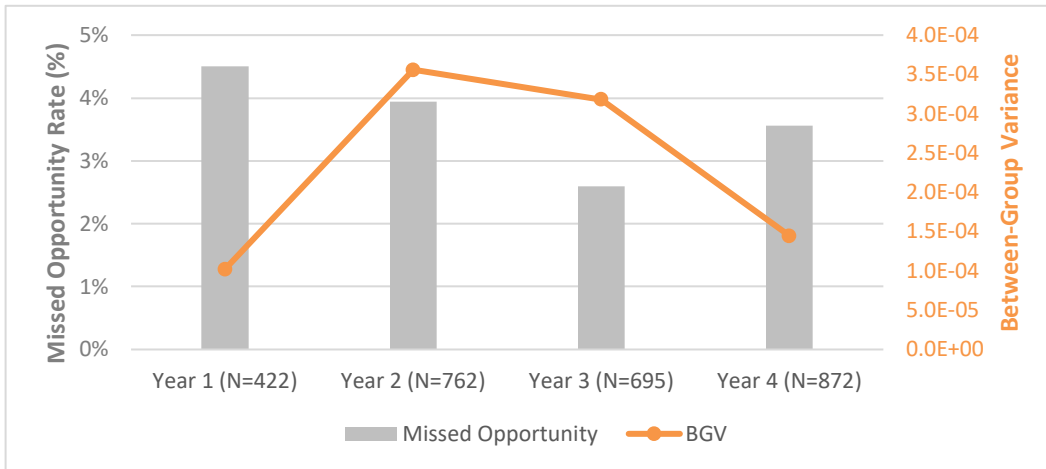
For care coordination measures, missed opportunity rates decreased steadily from 53% in year 1 to 20% in year 5. While all R&E groups benefited from the improved quality in care coordination, differences between subgroups fluctuated throughout the five years

#### E. Surgical infection measures (2011-2014), 3 measures



Missed opportunity rates for surgical infection were below 5% in 2011, making quality and disparity trends difficult to interpret by measure category.

#### F. Pneumonia care measure (2011-2014), 1 measure



Missed opportunity rates for pneumonia were below 5% in 2011, making quality and disparity trends difficult to interpret by measure category.