ORIGINAL ARTICLE

Racial and ethnic disparities in oral healthcare quality among children enrolled in Medicaid and CHIP

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Abstract

Objectives: Addressing inequities in oral health care requires identification of which populations are experiencing performance gaps and the extent of those gaps. This study used Dental Quality Alliance (DQA) measures to examine variations in quality by race and ethnicity.

Methods: We used eligibility and claims data for 2018 for children aged <21 years for state Medicaid/CHIP programs available through the Transformed Medicaid Statistical Information System. For a subset of states with sufficient data quality, we calculated DQA measures of utilization of services, oral evaluation, and topical fluoride. The measures were stratified by race and ethnicity, age, sex, geographic location, and language. We used bivariate logistic regression to analyze relative disparities.

Results: Variations in measure scores were noted between racial and ethnic groups. Measure scores were typically lower for non-Hispanic black and American Indian/ Alaskan Native children and higher for non-Hispanic Asian and Hispanic children compared with non-Hispanic white children. There also was variation in the patterns of disparities between states. More than two-thirds of states had insufficient race and ethnicity data (>10% missing) to reliably report stratified measure scores.

Conclusions: Because disparities vary by state, each Medicaid/CHIP program should evaluate variations in care quality in the context of the population it serves. A critical first step is to improve collection of race and ethnicity. These measurements can be used to set improvement goals that not only raise quality of care for the population overall but also close gaps in performance between racial and ethnic groups.

KEYWORDS
dental care for children, healthcare disparities, Medicaid, quality indicators, health care

INTRODUCTION

The achievement of health equity requires the reduction of health disparities in healthcare access, quality, and outcomes. Although there is significant literature documenting disparities in access to care and in oral health outcomes, there is a paucity of literature that examines disparities in oral healthcare delivery quality at a population level. This is a significant gap because oral healthcare delivery is the bridge between access to care and outcomes of care. In part, this is not surprising because systematic, population-based quality measurement is a relatively recent development in dentistry. The 2000 report on Oral Health in America

recognized the lack of oral healthcare performance measures [1], and two Institute of Medicine (IOM) reports a decade later identified lack of quality measurement as a primary barrier to improving oral healthcare quality [2,3]. The 2021 report on Oral Health in America contains a much more robust discussion of quality measurement, noting the establishment of the Dental Quality Alliance (DQA) by the American Dental Association (ADA) in response to a request from the Centers for Medicare and Medicaid Services (CMS) in 2008 for a multi-stakeholder group to develop standardized oral healthcare performance measures [4]. It has been less than a decade that standardized quality measures have been available [5,6], and there is a paucity of

information on how performance on these standardized measures varies by race and ethnicity.

Improving inequities in oral healthcare requires a clear identification of which populations are experiencing performance gaps and the extent of those gaps. Quality measures can be reported by population characteristics to identify disparities in care—differences in care quality by such factors as race and ethnicity, gender, geographic location, and socioeconomic status. Addressing these disparities is a critical step on the road toward improving health equity. We use three DQA measures of utilization of services, oral evaluation and topical fluoride for low-income children enrolled in Medicaid and CHIP public health insurance programs to examine disparities in oral healthcare quality by race and ethnicity [7]. States are required to provide dental benefits to children enrolled in their Medicaid and CHIP programs. Utilization of Services serves as a proxy for access to care; it reflects children who had some touchpoint with the oral healthcare system during the reporting year, but it does not provide information about the content of the visit. Oral Evaluation identifies those children who received diagnostic care and treatment planning and who are more likely to be established into routine care (vs. problem focused or emergency care). Topical Fluoride identifies those children who received evidence-based caries prevention. Several systematic reviews identify two or more topical fluoride applications as effective for caries prevention [8–10]. The most recent of these includes the recently released updated recommendations from the United States Preventive Services Task Force, which focused on caries prevention efforts by medical primary care providers for pre-school aged children and, based on the evidence, recommends that medical primary care providers apply topical fluoride varnish to the primary teeth of children younger than 5 years [11].

Collectively, these three measures assess access to care and processes of care that are important indicators of whether children have a touchpoint with the oral healthcare delivery system and receive evidence-based care that is positively associated with improved health outcomes. Both Oral Evaluation and Topical Fluoride were adopted for inclusion in the 2022 Core Set of Children's Health Care Quality Measures for Medicaid and CHIP [12]. The Child Core Set measures will be required to be reported by all states in 2024 and will be a focal point for Medicaid and CHIP program quality improvement initiatives, providing significant opportunities for addressing oral healthcare disparities.

METHODS

Quality measures calculation

We report on three DQA measures: (1) Utilization of Services, Dental and Oral Health Services, (2) Oral Evaluation, and (3) Topical Fluoride, Dental and Oral Health Services. Utilization of Services measures the percentage of

children who had any service during the reporting year and includes all dental services (i.e., any CDT code) as well as oral health services, such as topical fluoride, that may be provided in medical primary care settings. Oral Evaluation measures whether children had at least one periodic or comprehensive evaluation during the reporting year. Because oral evaluation focuses specifically on diagnostic assessment and care planning, it is restricted to those services delivered by dental providers. Some states allow medical providers to use these CDT oral evaluation codes to bill for oral assessments and not oral evaluation; consequently, the measure requires that the rendering provider be classified as a "dental" provider, following the definition of dental provider in the Code of Federal Regulations [13] and identified using National Uniform Claim Committee provider taxonomy codes [14]. Topical fluoride identifies those children who received evidence-based caries prevention [10], requiring at least two topical fluoride applications during the reporting year. This measure includes fluoride application both by dental providers and by non-dental providers such as pediatricians and other medical primary care providers, aligned with the clinical guideline recommendations of application by both categories of providers [9–11]. These measures were calculated following the detailed specifications from the DQA [7]. The most recent specifications, effective January 1, 2022, were used.

Data source

We used Medicaid enrollment and claims data for calendar year 2018 contained within the Transformed Medicaid Statistical Information System (T-MSIS) [15] Analytic Files (TAFs) available through a Data Use Agreement from the CMS. The T-MSIS data contains detailed eligibility and claims data for Medicaid and CHIP enrollees. Claims data include professional and facility medical and dental claims. The ADA Institutional Review Board determined that this study meets the criteria for exempt research.

Stratification variables to identify disparities

The DQA encourages stratification of its measures by population characteristics, including race and ethnicity, and provides guidance for implementing stratifications in its User Guide [16]. To stratify measures by population characteristics, the denominator population is divided into mutually exclusive subsets based on the characteristics of interest, and the rates are reported for each subpopulation. Stratification enables identification of which populations are being reached with the greatest success and those for which targeted interventions are needed. To evaluate variations in quality measure performance by race and ethnicity, we calculated measure rates for each of the following sub-populations using the race and ethnicity categories contained within the T-MSIS data:

White, non-Hispanic; Black, non-Hispanic; Asian, non-Hispanic; American Indian/Alaskan Native, non-Hispanic, Hawaiian/Pacific Islander; Multiracial, non-Hispanic; and Hispanic, all races.

We also evaluated variations in quality measure performance by other population characteristics to provide a broader perspective of disparities in care as well as to evaluate how patterns in disparities in care may be similar or different between states across the different characteristics used to identify variations in care quality. The other stratifications that we evaluated were age using the DQA recommended age stratifications (1-2, 3-5, 6-7, 8-9, 10-11, 12-14, 15-18, 19-20), biological sex (female, male), geographic location (rural or urban), and the primary language spoken at home (English, Spanish, and other). We selected 8–9 years as the reference category for age as it often represents an age group that has relatively high receipt of dental services instead of the selecting the youngest or the oldest age group. Our other reference categories were non-Hispanic white for race/ethnicity, female for sex, English for language, and rural for geographic location. To identify rural versus urban geographic location, we mapped the beneficiary's residential zip code to the 2010 Rural-Urban Commuting Areas (RUCA) codes (revised in 2019) [17]. We used the Categorization D methodology to classify location into the categories of urban and rural [18].

Data analysis

We calculated measure scores, stratified by race and ethnicity, with their 95% confidence intervals for each of the three measures. We also stratified the measures by age, sex, geographic location, and language. We conducted bivariate logistic regression, regressing the measure score on the categorical stratification variable, to further evaluate differences in measure score performance between the sub-populations (e.g., between different race and ethnicity classifications). The 95% confidence intervals and p-values from the bivariate logistic regression were used to identify whether differences in measure performance between sub-populations were statistically significant using a significance level of $p < 0.05$. The resulting odds ratios from the bivariate logistic regression also enables comparisons of the magnitude of differences in performance relative to the reference group. Analyses were conducted using Stata/MP Version 17.0 (StataCorp). We specifically chose not to conduct multivariate analyses because process of care quality measures typically are not adjusted for patient characteristics and are reported without any such adjustment. Evaluations of variations by patient characteristics are conducted through measure score stratification, and we sought to be consistent with real-world applications of the measures.

Selection of states for reporting

We evaluated all states' data for completeness and quality both for calculating the measure scores and for stratifying the scores by race and ethnicity. We assessed data quality and missing/invalid data through two methods: using the CMS T-MSIS Data Quality Atlas and independent assessments of missing data and data quality for selected fields. The Medicaid and CHIP Business Information Solutions (MACBIS) conducted data quality assessments of T-MSIS enrollment, claims, expenditures and service use for each state and for each year and data release. The findings of these assessments are summarized in an online Data Quality Atlas, which assigns one of five values: low concern, medium concern, high concern, unusable, and unclassified [19]. We reviewed the results of these assessments for the following topics (with the full descriptions and methodology available within the Quality Atlas) that are relevant to the calculation of Utilization of Services, Topical Fluoride for Children, and Oral Evaluation: age (completeness and distribution of beneficiary age); Medicaid and CHIP enrollment (how well enrollment numbers align with those reported in the CMS Medicaid and CHIP Eligibility and Enrollment Performance Indicator, which is used as an external benchmark); claims volume—other services (includes outpatient services and identifies outlier states that may indicate incomplete or incorrectly formatted data); service users—other services (evaluates the percentage of beneficiaries with any ambulatory, physician or other outpatient services and identifies outlier states that may indicate incomplete or incorrectly formatted data or issues with linking service use and eligibility files); and procedure codes—other services (includes outpatient services and evaluates the extent of missing procedure codes in professional claims).

Further, we conducted our own assessments of the following data fields specifically for children <21 years of age: beneficiary identifier (how frequently beneficiary ID was missing); dental procedure codes (using the list of active and valid CDT codes for each year available from the ADA to evaluate how often non-missing values represent non-valid or non-active codes); rendering provider taxonomy for CDT codes (how often valid, active CDT codes had missing data on the rendering provider type); stratification data elements (extent of missing data for the variables of age, race/ethnicity, biological sex, beneficiary's zip code to classify geographic location, and primary language used at home). For consistency with the cut-points used by MACBIS for the Data Quality Atlas, we defined the following categories based on the percentage of missing data: low concern (missing ≤ 10%); medium concern (10% < missing ≤ 20%), high concern (20% < missing ≤ 50%), and unusable (missing > 50%). Because data completeness and quality are critical to quality improvement efforts in general and reducing disparities specifically, we evaluated and reported on the

T A B L E 1   Number of states with missing data by stratification characteristics for children < 21 years old enrolled in Medicaid & CHIP, CY 2018

	Low concern (missing ≤ 10%)	Medium concern (10% < missing ≤ 20%)	High concern (20% < missing ≤ 50%)	Unusable (missing > 50%)
Race/ethnicity	16	10	19	6
	31%	20%	37%	12%
Age	51	0	0	0
	100%	0%	0%	0%
Biological sex	51	0	0	0
	100%	0%	0%	0%
Geographic location	49	0	1	1
	96%	0%	2%	2%
Primary language	24	5	7	15
	47%	10%	14%	29%

extent of missing data in the T-MSIS data on each stratification category.

We selected states for reporting measure scores stratified by race and ethnicity if they had "low concern" for all of the critical data elements needed to calculate the measure and if they had no more than 10% missing data for race and ethnicity. Although it is possible that measure scores could be reported accurately if certain data elements are of "medium" concern, we erred on the side of being conservative and reporting on the states with the highest assessed data quality.

RESULTS

We assessed the quality of the critical data elements used to calculate the measure scores for all 50 states plus the District of Columbia. For Utilization of Services and Topical Fluoride, there were 23 states that had at least one critical data element that was of medium concern or higher. These 23 states plus a total of eight additional states had at least one data element that was of medium concern or higher for calculating Oral Evaluation. Table 1 provides a summary of the extent of missing data for each of the stratification characteristics we examined. Only 31% of states had missing race and ethnicity data for 10% or fewer of their Medicaid and CHIP beneficiaries aged <21 years, and almost half (49%) had data missing race and ethnicity for more than 20% of their beneficiaries. There were no states that had missing data on age or biological sex for more than 10% of beneficiaries, and only two states had missing zip code data for more than 10% of beneficiaries. There also were significant missing data related to the beneficiary's primary language spoken at home, with 29% of states having missing data for more than 50% of their beneficiaries.

Taking into account both missing data on stratification data elements and missing data on the critical data elements used, the number of states we could reliably calculate measure scores stratified by race was 7 for Oral Evaluation and 10 for Utilization of Services and Topical Fluoride. We were able to stratify Utilization of Services and Topical Fluoride by age and biological sex for 28 states. Table 2 summarizes the patient characteristics in each of the 10 states for which we stratified the measure scores by race and ethnicity. We provide results at the state level rather than aggregated results to reflect the diversity between states.

Table 3 summarizes the measure scores for each of the three measures for each state stratified by race and ethnicity. The overall measure scores ranged from 48% to 61% for Utilization of Services, 17% to 29% for Topical Fluoride, and 37% to 54% for Oral Evaluation among the states included in our reporting.

Table 4 provides additional detail on the relative performance on quality measures by the different race and ethnicity classifications, including the odds ratios and 95% confidence intervals from the bivariate logistic regression, regressing the measure score on the categorical variable for race and ethnicity. Measure scores were generally consistently lower for non-Hispanic black children compared with non-Hispanic white children. The greatest disparity, as well as variation in performance across states, between measure scores for non-Hispanic black children and non-Hispanic white children was for Topical Fluoride (OR range: 0.577–0.920); Oral Evaluation had the smallest disparity in measure scores between these two groups (OR range: 0.824–1.021). Measure scores were also consistently lower for non-Hispanic American Indian/Alaskan Native children compared with non-Hispanic white children for all states for Oral Evaluation, all states except Alaska for Utilization of Services, and all states except Alaska and New Mexico for Topical Fluoride. Measure scores for Asian non-Hispanic children were generally consistently higher than those for non-Hispanic white children. Measure scores for Hispanic children were consistently higher for all measures and across all states compared with non-

TABLE 2 Characteristics of Medicaid/CHIP enrollees <21 years, CY 2018

	AK	DE	ID	IN	NE	NV	NM	NC	OK	SD
Total # enrollees	111,583	126,980	244,085	839,305	202,160	404,065	405,634	1,433,100	623,184	98,693
Age group										
<1 year	4.91%	4.95%	4.76%	5.60%	5.94%	5.37%	4.38%	5.00%	5.52%	5.47%
1–2 years	11.25%	10.66%	10.83%	11.47%	12.36%	11.46%	9.48%	10.54%	11.50%	11.77%
3–5 years	16.19%	15.38%	16.24%	16.20%	16.81%	16.17%	14.88%	15.59%	16.29%	16.89%
6–7 years	10.21%	10.09%	10.51%	10.06%	10.46%	10.21%	9.82%	10.09%	10.29%	10.86%
8–9 years	10.23%	10.38%	10.50%	9.99%	10.55%	10.22%	10.04%	10.23%	10.41%	10.47%
10–11 years	9.84%	10.45%	10.82%	10.07%	10.47%	10.36%	10.59%	10.51%	10.55%	10.68%
12–14 years	13.42%	14.23%	14.84%	13.79%	14.11%	14.07%	14.85%	14.36%	14.38%	14.43%
15–18 years	16.51%	16.64%	17.07%	16.20%	15.47%	15.84%	18.00%	17.14%	16.72%	15.65%
19–20 years	7.43%	7.22%	4.43%	6.63%	3.82%	6.29%	7.98%	6.53%	4.35%	3.78%
Missing	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Geographic location										
Rural	44.12%	18.54%	33.72%	22.25%	33.70%	5.89%	33.76%	26.12%	38.19%	54.13%
Urban	55.72%	81.46%	65.96%	77.70%	66.17%	94.05%	66.19%	73.10%	61.79%	45.85%
Missing	<1%	<1%	<1%	<1%	<1%	<1%	<1%	<1%	<1%	<1%
Race/ethnicity										
White, non-Hispanic	33.62%	34.82%	97.64%	56.93%	45.26%	24.80%	20.95%	38.87%	39.59%	50.69%
Black, non-Hispanic	3.57%	40.70%	<1%	21.18%	13.07%	20.61%	1.89%	34.03%	13.08%	4.36%
Asian, non-Hispanic	5.58%	2.03%	<1%	<1%	3.23%	2.93%	<1%	1.80%	1.83%	1.87%
AIAN, non-Hispanic	34.81%	<1%	2.01%	<1%	2.70%	1.32%	15.05%	1.24%	17.12%	36.17%
Hawaiian/Pacific Islander	4.76%	<1%	0.00%	2.48%	<1%	1.45%	0.00%	<1%	<1%	<1%
Multiracial, non-Hispanic	8.10%	0.00%	0.00%	0.00%	0.00%	<1%	0.00%	3.85%	0.00%	0.00%
Hispanic, all races	2.97%	22.12%	<1%	9.37%	26.84%	44.78%	60.13%	19.41%	22.38%	6.61%
Non-Hispanic, race unspecified	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Missing	6.58%	<1%	<1%	9.92%	8.74%	4.09%	1.33%	<1%	5.56%	<1%
Sex										
Female	48.70%	49.45%	48.98%	49.26%	49.41%	49.21%	49.39%	49.35%	49.46%	49.08%
Male	51.30%	50.55%	51.02%	50.74%	50.59%	50.79%	50.61%	50.65%	50.54%	50.92%
Missing	0.00%	<1%	0.00%	<1%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%

TABLE 3   Measure scores stratified by race and ethnicity, with 95% confidence intervals, CY 2018

Utilization of services

	AK	DE	ID	IN	NE	NV	NM	NC	OK	SD
Total	48.8% 0.485–0.491	54.4% 0.541–0.546	58.5% 0.582–0.586	49.0% 0.488–0.490	57.7% 0.575–0.579	48.3% 0.480–0.484	61.0% 0.608–0.611	60.2% 0.600–0.602	52.0% 0.518–0.521	55.0% 0.546–0.553
White, non-Hispanic	48.2% 0.477–0.487	50.3% 0.498–0.508	58.5% 0.583–0.587	46.9% 0.467–0.470	55.8% 0.554–0.561	44.1% 0.437–0.444	56.8% 0.564–0.571	57.8% 0.577–0.579	50.3% 0.500–0.505	55.7% 0.552–0.562
Black, non-Hispanic	46.6% 0.449–0.482	50.6% 0.501–0.510	NR	46.4% 0.461–0.466	53.9% 0.532–0.545	38.9% 0.385–0.392	55.6% 0.543–0.567	55.1% 0.549–0.552	49.8% 0.493–0.501	48.5% 0.468–0.501
Asian, non-Hispanic	44.6% 0.433–0.458	58.0% 0.559–0.600	NR	NR	60.2% 0.588–0.614	52.5% 0.514–0.534	66.5% 0.645–0.684	62.7% 0.620–0.633	61.4% 0.603–0.623	61.1% 0.587–0.635
AIAN, non-Hispanic	51.4% 0.509–0.519	48.5% 0.414–0.554	54.3% 0.527–0.557	43.0% 0.397–0.461	48.4% 0.469–0.498	39.2% 0.378–0.406	55.4% 0.549–0.557	50.4% 0.496–0.511	44.2% 0.438–0.445	53.7% 0.531–0.542
Hawaiian/Pacific Islander	42.6% 0.412–0.440	53.4% 0.449–0.618	NR	56.5% 0.557–0.572	48.0% 0.418–0.541	44.7% 0.432–0.460	NR	51.2% 0.478–0.545	37.4% 0.353–0.394	55.3% 0.489–0.616
Multiracial, non-Hispanic	50.8% 0.497–0.518	NR	NR	NR	NR	40.9% 0.290–0.527	NR	58.5% 0.581–0.589	NR	NR
Hispanic, all races	53.2% 0.514–0.550	67.2% 0.666–0.677	79.7% 0.693–0.899	59.8% 0.594–0.602	64.8% 0.643–0.652	55.2% 0.549–0.554	64.1% 0.638–0.642	74.6% 0.744–0.747	61.4% 0.611–0.616	59.3% 0.580–0.606

Topical fluoride

	AK	DE	ID	IN	NE	NV	NM	NC	OK	SD
Total	16.5% 0.162–0.167	24.6% 0.242–0.248	26.8% 0.265–0.269	17.9% 0.177–0.179	27.9% 0.276–0.281	20.7% 0.205–0.208	28.2% 0.280–0.283	28.9% 0.288–0.290	21.9% 0.217–0.220	22.3% 0.219–0.226
White, non-Hispanic	16.5% 0.160–0.169	21.8% 0.213–0.222	26.9% 0.267–0.271	17.0% 0.168–0.171	25.2% 0.248–0.255	18.9% 0.185–0.192	24.8% 0.244–0.251	27.1% 0.269–0.272	20.1% 0.198–0.202	23.5% 0.230–0.240
Black, non-Hispanic	13.6% 0.123–0.147	18.8% 0.184–0.192	NR	14.5% 0.143–0.147	22.2% 0.216–0.228	11.9% 0.115–0.121	22.1% 0.209–0.231	22.8% 0.226–0.229	18.8% 0.184–0.190	20.8% 0.191–0.224
Asian, non-Hispanic	16.8% 0.157–0.177	30.5% 0.283–0.326	NR	NR	36.3% 0.348–0.377	23.6% 0.225–0.245	35.3% 0.331–0.375	34.5% 0.338–0.351	35.5% 0.343–0.365	26.7% 0.242–0.292
AIAN, non-Hispanic	17.7% 0.172–0.181	13.8% 0.083–0.193	19.2% 0.178–0.204	15.3% 0.126–0.180	18.2% 0.168–0.194	15.9% 0.146–0.171	25.8% 0.253–0.261	18.8% 0.181–0.193	17.0% 0.167–0.172	19.8% 0.192–0.202
Hawaiian/Pacific Islander	12.1% 0.111–0.131	33.6% 0.246–0.425	NR	24.9% 0.241–0.255	22.3% 0.157–0.288	17.8% 0.165–0.191	NR	24.7% 0.214–0.279	14.6% 0.127–0.163	31.9% 0.243–0.395
Multiracial, non-Hispanic	15.6% 0.148–0.164	NR	NR	NR	NR	0.066–0.289	NR	26.4% 0.259–0.267	NR	NR

(Continues)

TABLE 3 (Continued)

Topical fluoride

	AK	DE	ID	IN	NE	NV	NM	NC	OK	SD
Hispanic, all races	19.3%	38.1%	41.4%	26.2%	34.6%	25.7%	30.0%	44.3%	29.4%	28.0%
	0.177–0.208	0.374–0.387	0.287–0.540	0.258–0.265	0.341–0.351	0.254–0.259	0.298–0.302	0.440–0.444	0.291–0.296	0.265–0.293

Oral evaluation

	AK	DE	ID	NV	NM	NC	OK
Total	39.0%	50.1%	52.9%	36.6%	53.9%	52.3%	47.1%
	0.386–0.392	0.498–0.503	0.527–0.531	0.364–0.367	0.537–0.540	0.522–0.523	0.469–0.472
White, non-Hispanic	39.8%	45.7%	53.1%	32.9%	49.7%	49.8%	44.9%
	0.392–0.403	0.451–0.462	0.528–0.533	0.325–0.331	0.493–0.500	0.496–0.499	0.446–0.450
Black, non-Hispanic	40.1%	46.0%	NR	28.7%	49.8%	47.4%	45.4%
	0.385–0.417	0.455–0.464		0.284–0.290	0.486–0.510	0.472–0.475	0.449–0.457
Asian, non-Hispanic	37.9%	54.3%	NR	41.3%	61.9%	54.4%	58.0%
	0.366–0.391	0.521–0.563		0.403–0.422	0.598–0.638	0.537–0.550	0.570–0.590
AIAN, non-Hispanic	38.5%	43.9%	44.9%	23.8%	46.2%	40.0%	39.0%
	0.380–0.390	0.369–0.508	0.433–0.464	0.225–0.250	0.457–0.466	0.392–0.407	0.387–0.393
Hawaiian/Pacific Islander	36.5%	51.1%	NR	34.9%	NR	43.6%	33.7%
	0.351–0.378	0.426–0.596		0.335–0.362		0.402–0.468	0.317–0.357
Multiracial, non-Hispanic	41.5%	NR	NR	37.9%	NR	49.3%	NR
	0.404–0.425			0.261–0.495		0.488–0.497	
Hispanic, all races	46.1%	63.8%	79.7%	42.7%	57.5%	67.1%	57.2%
	0.442–0.478	0.632–0.644	0.693–0.899	0.424–0.429	0.572–0.576	0.669–0.673	0.569–0.574

Abbreviation: NR, not reportable—either state does not use this category or denominator <30.

TABLE 4 Bivariate logistic regression, reporting odds ratios with standard errors and 95% confidence intervals, CY 2018

Utilization of services

	AK	DE	ID	IN	NE	NV	NM	NC	OK	SD
White, non-Hispanic	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref
Black, non-Hispanic	0.937 (0.0327) 0.875–1.003	1.009 (0.0141) 0.982–1.037	NR	0.979*** (0.0059) 0.967–0.990	0.928*** (0.0140) 0.901–0.956	0.807*** (0.0085) 0.791–0.824	0.953 (0.0245) 0.906–1.002	0.979** (0.0087) 0.963–0.997	0.748*** (0.0267) 0.697–0.802	0.727*** (0.0045) 0.718–0.736
Asian, non-Hispanic	0.864*** (0.0247) 0.817–0.914	1.363*** (0.0606) 1.249–1.487	NR	NR	1.197*** (0.0336) 1.133–1.265	1.398*** (0.0302) 1.340–1.458	1.514*** (0.0686) 1.385–1.654	1.570*** (0.0338) 1.505–1.637	1.249*** (0.0658) 1.126–1.385	1.105*** (0.0155) 1.075–1.135
AIAN, non-Hispanic	1.137*** (0.0172) 1.104–1.171	0.928 (0.1330) 0.701–1.229	0.840*** (0.0266) 0.790–0.894	0.853** (0.0567) 0.749–0.972	0.746*** (0.0225) 0.700–0.789	0.818*** (0.0257) 0.769–0.870	0.945*** (0.0107) 0.924–0.966	0.783*** (0.0063) 0.771–0.796	0.922*** (0.0139) 0.896–0.950	0.837*** (0.0378) 0.766–0.914
Hawaiian/Pacific Islander	0.797*** (0.0248) 0.750–0.847	1.130 (0.1970) 0.803–1.589	NR	1.470*** (0.0223) 1.427–1.514	0.731** (0.0928) 0.571–0.938	1.023 (0.0305) 0.965–1.085	NR	0.590*** (0.0266) 0.540–0.645	0.983 (0.1290) 0.760–1.272	1.201*** (0.0328) 1.138–1.267
Multiracial, non-Hispanic	1.108*** (0.0272) 1.056–1.162	NR	NR	NR	NR	0.877 (0.220) 0.537–1.433	NR	NR	NR	NR
Hispanic, all races	1.221*** (0.0467) 1.132–1.316	2.021*** (0.0342) 1.955–2.089	2.773*** (0.8970) 1.471–5.228	1.686*** (0.0141) 1.659–1.714	1.460*** (0.0176) 1.426–1.495	1.562*** (0.0137) 1.536–1.589	1.359*** (0.0118) 1.336–1.382	1.573*** (0.0116) 1.550–1.596	1.159*** (0.0341) 1.094–1.228	1.116*** (0.0146) 1.088–1.145

Topical fluoride

	AK	DE	ID	IN	NE	NV	NM	NC	OK	SD
White, non-Hispanic	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref
Black, non-Hispanic	0.795*** (0.0432) 0.715–0.884	0.832*** (0.0161) 0.801–0.864	NR	0.831*** (0.0077) 0.816–0.846	0.848*** (0.0173) 0.815–0.883	0.577*** (0.0101) 0.557–0.597	0.859*** {0.0292} 0.803–0.918	0.795*** (0.0041) 0.787–0.803	0.920*** (0.0118) 0.898–0.944	0.852*** (0.0448) 0.769–0.945
	1.018	1.575***	NR	NR	1.689***	1.322***	1.658***	1.420***	2.192***	1.185**

(Continues)

TABLE 4 (Continued)

Topical fluoride

	AK	DE	ID	IN	NE	NV	NM	NC	OK	SD
Asian, non-Hispanic	(0.0413) 0.940–1.102	(0.0846) 1.418–1.750			(0.0555) 1.583–1.801	(0.0401) 1.246–1.403	(0.0833) 1.503–1.830	(0.0222) 1.377–1.464	(0.0554) 2.086–2.303	(0.0793) 1.040–1.351
AIAN, non-Hispanic	1.087*** (0.0234) 1.04–1.134	0.575** (0.1350) 0.362–0.911	0.644*** (0.0280) 0.591–0.701	0.884	0.657*** (0.0299) 0.601–0.719	0.810*** (0.0407) 0.734–0.894	1.053*** (0.0151) 1.024–1.083	0.622*** (0.0133) 0.597–0.649	0.815*** (0.0098) 0.796–0.835	0.801*** (0.0167) 0.769–0.834
Hawaiian/Pacific Islander	0.698*** (0.0347) 0.633–0.769	1.817*** (0.3730) 1.216–2.716	NR	1.619*** (0.0313) 1.559–1.682	0.850 (0.1630) 0.584–1.239	0.929 (0.0431) 0.849–1.018	NR	0.884 (0.0782) 0.742–1.052	0.679*** (0.0512) 0.586–0.787	1.524** (0.2730) 1.072–2.165
Multiracial, non-Hispanic	0.938 (0.0337) 0.874–1.006	NR	NR	NR	NR	0.927 (0.3620) 0.432–1.991	NR	0.965*** (0.0109) 0.943–0.986	NR	NR
Hispanic, all races	1.208*** (0.0629) 1.091–1.338	2.208*** (0.0440) 2.123–2.296	1.916** (0.5110) 1.136–3.232	1.738*** (0.0183) 1.703–1.774	1.571*** (0.0227) 1.528–1.617	1.480*** (0.0188) 1.443–1.517	1.303*** (0.0141) 1.275–1.331	2.141*** (0.0118) 2.118–2.164	1.660*** (0.0157) 1.629–1.691	1.260*** (0.0475) 1.170–1.356

Oral evaluation

	AK	DE	ID	NV	NM	NC	OK
White, non-Hispanic	Ref	Ref	Ref	Ref	Ref	Ref	Ref
Black, non-Hispanic	1.014 (0.0361) 0.946–1.087	1.012 (0.0142) 0.985–1.040	NR	0.824*** (0.0093) 0.806–0.842	1.004 (0.0257) 0.955–1.055	1.021** (0.0091) 1.003–1.039	0.907*** (0.0037) 0.900–0.915
Asian, non-Hispanic	0.923*** (0.0270) 0.872–0.978	1.410*** (0.0621) 1.293–1.537	NR	1.437*** (0.0316) 1.377–1.501	1.643*** (0.0724) 1.507–1.791	1.700*** (0.0362) 1.631–1.773	1.202*** (0.0163) 1.171–1.235
AIAN, non-Hispanic	0.947*** (0.0147) 0.919–0.976	0.929 (0.1340) 0.700–1.233	0.720*** (0.0228) 0.677–0.766	0.638*** (0.0229) 0.595–0.685	0.869*** (0.0098) 0.850–0.888	0.788*** (0.0065) 0.775–0.800	0.672*** (0.0109) 0.651–0.694
Hawaiian/Pacific Islander	0.870*** (0.0278)	1.243 (0.2160)	NR	1.095*** (0.0340)	NR	0.626*** (0.0289)	0.778*** (0.0534)

(Continues)

TABLE 4 (Continued)

	Oral evaluation						
	AK	DE	ID	NV	NM	NC	OK
	0.817–0.926	0.884–1.747		1.030–1.164		0.572–0.685	0.680–0.890
Multiracial, non-Hispanic	1.074***	NR	NR	1.245	NR	NR	0.979**
	(0.0267)			(0.3160)			(0.0091)
	1.023–1.127			0.757–2.048			0.961–0.997
Hispanic, all races	1.293***	2.095***	3.460***	1.519***	1.366***	1.643***	2.059***
	(0.0495)	(0.0350)	(1.1190)	(0.0138)	(0.0117)	(0.0120)	(0.0105)
	1.199–1.394	2.028–2.165	1.835–6.522	1.492–1.547	1.344–1.390	1.620–1.667	2.039–2.080

Abbreviations: NR, not reportable—either state does not use this category or denominator <30; Ref, reference category.

**$p < 0.05$.

***$p < 0.01$.

Hispanic white children with odds ratios ranging from 1.1 for Utilization of Services in South Dakota to 3.5 for Oral Evaluation in Idaho. There was greater variation in measure scores between states for Hawaiian/Pacific Islander children compared with non-Hispanic white children across both states and measures. The greatest variation was for Topical Fluoride (OR range: 0.679–1.817) with 2 states where performance was lower for Hawaiian/Pacific Islander children, 3 states where it was higher, and non-significant differences in 3 states.

For context, Table 5 presents a high-level, consolidated summary of the qualitative results of a series of bivariate logistic regressions, regressing the measure score not only on race and ethnicity but also on age, geographic location, biological sex, and primary language spoken at home espectively. We have summarized the number of states for which the stratification category had a statistically significant lower performance, no difference in performance, or statistically significant higher performance compared with the reference category. For example, among the 10 states for which we stratified the performance on Utilization of Services by race and ethnicity, the measure scores for non-Hispanic black children were lower than those for non-Hispanic white children in 6 states, the measure scores were not statistically significant different in 3 states, and one state had an insufficient number of non-Hispanic black children for reporting.

As noted in our discussion of Table 3, there were some differences between states and measures in how measure score performance varied by race and ethnicity. Typically, measure scores were lower for non-Hispanic black children compared with non-Hispanic white children. This was most often the case for topical fluoride (9 out of 10 states). Fewer differences between these two racial groups were found for oral evaluation, with lower performance among non-Hispanic black children in 2 of 7 states, no statistically significant differences in 3 states, and higher performance in 1 state. Measure scores for non-Hispanic Asian children compared with non-Hispanic white children were higher in 7 of 10 states for Utilization of Services and Topical Fluoride and 5 of 7 states for Oral Evaluation; the performance was lower in 1 state for each Utilization of Services and Oral Evaluation. Measure scores for American Indian and Alaskan Native children compared with non-Hispanic white children were lower in 8 of 10 states for Utilization of Services, 7 of 10 states for Topical Fluoride, and 6 of 7 states for Oral Evaluation; the performance was higher in 2 states for Topical Fluoride and in 1 state for Utilization of Services. Relative measure score performance was even more varied for children classified as Hawaiian/Pacific Islanders compared with non-Hispanic white children: the scores were lower in 3 states and higher in 2 states (out of 10) for Utilization of Services, lower in 2 states and higher in 3 states (out of 10) for Topical Fluoride, and lower in 3 states and higher in 1 state (out of 7) for

TABLE 5 Bivariate logistic regression, reporting number of states with statistically significant differences from the reference category, CY 2018

	Utilization of Services, Dental or Oral Health Services				Topical Fluoride, Dental or Oral Health Services				Oral Evaluation, Dental Services			
	<Ref	NS	>Ref	NR	<Ref	NS	>Ref	NR	<Ref	NS	>Ref	NR
Race/ethnicity	$n = 10$ states				$n = 10$ states				$n = 7$ states			
White, non-Hispanic	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref
Black, non-Hispanic	6	3	0	1	9	0	0	1	2	3	1	1
Asian, non-Hispanic	1	0	7	2	0	1	7	2	1	1	5	0
AIAN, non-Hispanic	8	1	1	0	7	1	2	0	6	1	0	0
Hawaiian/Pacific Islander	3	3	2	2	2	3	3	2	3	1	1	2
Multiracial, non-Hispanic	0	1	1	8	1	2	0	7	1	1	1	4
Hispanic, all races	0	0	10	0	0	0	10	0	0	0	7	0
Language	$n = 14$ states				$n = 14$ states				$n = 10$ states			
English	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref
Spanish	0	1	13	0	0	0	14	0	0	0	10	0
Other	0	2	11	1	0	2	11	1	0	2	7	1
Age	$n = 28$ states				$n = 28$ states				$n = 20$ states			
<1 year	28	0	0	0	NA	NA	NA	NA	20	0	0	0
1–2 years	28	0	0	0	28	0	0	0	20	0	0	0
3–5 years	28	0	0	0	23	2	3	0	19	1	0	0
6–7 years	8	19	1	0	7	17	4	0	6	14	0	0
8–9 years	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref
10–11 years	25	3	0	0	23	5	0	0	16	4	0	0
12–14 years	28	0	0	0	28	0	0	0	20	0	0	0
15–18 years	28	0	0	0	28	0	0	0	20	0	0	0
19–20 years	28	0	0	0	28	0	0	0	20	0	0	0
Geographic location	$n = 28$ states				$n = 28$ states				$n = 20$ states			
Rural	Ref	Ref	Ref		Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref
Urban	8	1	19		5	3	20	0	3	1	16	0
Biological sex	$n = 28$ states				$n = 28$ states				$n = 20$ states			
Female	Ref	Ref	Ref		Ref	Ref	Ref	Ref	Ref	Ref	Ref	Ref
Male	28	0	0		24	4	0	0	20	0	0	0

Abbreviations: NA, not applicable—lower bound of age range for topical fluoride is 1 year; NR, not reportable—either state does not use this category or denominator <30; NS, not significant; Ref, reference category.

Oral Evaluation. Measure scores for children with Hispanic ethnicity (all races) were consistently higher compared with non-Hispanic white children.

In contrast, the patterns in relative performance on quality measure scores is fairly consistent across states for age, biological sex, and primary language spoken at home. Most age cohorts other than 6–7 years had lower performance on all three measures compared to the cohort of children 8–9 years old. In the majority of states, children 6–7 years had similar performance to those 8–9 years. There also were a few states for which children 10–11 years had similar performance to those 8–9 years. Measure scores for children with a biological sex of male were consistently lower compared with measure scores for children of female biological sex. Measure scores were generally higher for children in homes where the primary language spoken at home was Spanish or another non-English language compared with those for children with English identified as the primary language. There was more variation in results for geographic location. Although the measure scores for children living in areas classified as urban were higher than those for children living in rural areas in the majority of states, there were states for which the reverse was true.

DISCUSSION

We examined performance by race and ethnicity on three standardized, validated dental quality measures for children enrolled in 10 states' Medicaid and CHIP programs. The overall measure scores demonstrated gaps in performance generally. In the highest performing state for each measure, respectively, 39% of children did not receive

any dental service during 2018, 46% did not receive an oral evaluation, and 71% did not receive at least two topical fluoride applications. In addition, we found disparities in performance by race and ethnicity. In general, measure scores were lower for non-Hispanic black and non-Hispanic American Indian/Alaskan Native children and higher for non-Hispanic Asian and Hispanic children compared with non-Hispanic white children. Other studies of dental service utilization among Medicaid enrolled children that have examined racial and ethnic differences also have found higher utilization among Hispanic enrollees [20,21]. Although it was not the central focus of our study, we also examined disparities in performance by other beneficiary characteristics including age, geographic location, biological sex, and primary language spoken at home in order to understand for which characteristics we see more similar and less similar patterns between states. In addition, state Medicaid programs may find it useful to look across beneficiary characteristics when determining how to most effectively target outreach efforts to promote health equity. A study of dental sealant utilization by Wisconsin Medicaid enrollees found that utilization patterns between different race and ethnicity groups were influenced by geographic variation [21], underscoring the importance of examining disparities comprehensively and the need to evaluate the root causes of observed differences.

Almost 20 years ago, in 2003, the IOM report *Unequal Treatment* identified standardized data collection as "critically important in the effort to understand and eliminate racial and ethnic disparities in health care." [22] The 2000 report on Oral Health in America also emphasized the importance of data collection in reducing oral health disparities [1]. Yet we continue to find significant gaps in data related to population characteristics in Medicaid and CHIP data systems. Missing data created the most significant limitation of our study, significantly decreasing the number of state programs for which we could reliably calculate stratified measures scores. Because our analysis focused on a subset of state Medicaid programs, caution should be made in making generalizations to other programs. More than one-third of all children in the U.S. are enrolled in Medicaid and CHIP [23]. Having more standardized, comprehensive data related to population characteristics and social determinants of health would not only yield insight into disparities at a large population level but also is essential for helping to reduce disparities in care among these at-risk children.

Improving data collection requires coordinated efforts across all levels of the health care delivery system, including requirements from the program/payer to the site of care. The federal government, through agencies such as CMS, identifies national standards and reporting requirements and can provide incentives and supports for building the needed infrastructure. The challenges in collecting race and ethnicity information have long been recognized and include identifying and adopting reliable methods of data collection to ensure the accuracy of racial and ethnic data, misperceptions about the legality of collecting these data, and concerns by patients about how their demographic information will be used [22]. Currently, CMS's Office of Minority Health houses an inventory of resources to support the collection of standardized demographic and language data [24], but more targeted requirements and supports are needed. Different state Medicaid programs have used a range of strategies for collecting and validating race and ethnicity data in their programs [25]. In addition to collecting demographic information during eligibility determination, state Medicaid programs can leverage their relationships with managed care organizations (MCOs) to help with improving data completeness and quality by incentivizing or requiring the collection of race, ethnicity, language, and other demographic information. MCOs, in turn, can work with their contracted providers to further support efforts to improve data collection and quality. Identifying successful approaches, creating opportunities for dissemination of these strategies, and sharing learnings across states could help spread models for respectful collection of reliable race and ethnicity data.

Improving data collection is only a first step, however, to understanding racial and ethnic disparities in care quality. The categorical classifications are broad, and the populations within those broad categories are diverse. In addition to having more complete data collection, efforts should be made to capture beneficiary characteristics more comprehensively. For example, some states internally capture race and ethnicity data on a more expansive set of categories to more accurately and comprehensively capture the diversity of the populations they serve. In addition, most data capture of what is often referred to as "gender" is a recording of sex assigned at birth, but does not reflect gender identity. Moreover, the care quality gaps faced by individuals within and between different racial and ethnic groups are influenced by a multitude of factors at the individual, community, and broader system levels. As a result, a one-size-fits-all approach is not likely to be effective. We have presented information at the state level rather than aggregating the information across states precisely because the systems of care and the populations served by those systems vary across states. State Medicaid programs must look at care quality and disparities in care within the context of the specific populations that they serve and tailor interventions accordingly. We also purposely chose not to conduct multivariable analyses to reflect how process of care quality measures are reported in practice. In quality reporting applications, measure scores can be stratified by population characteristics as demonstrated in Table 5. However, future research that incorporates multivariable analyses will enable deeper dives into the data and help to uncover the root causes of observed differences to better inform quality improvement interventions.

As noted earlier, both Oral Evaluation and Topical Fluoride are included in the 2022 Core Set of Children's Health Care Quality Measures for Medicaid and CHIP. Reporting on the Child Core Set will be mandatory for state Medicaid and CHIP programs starting in 2024. This presents a significant opportunity for reducing disparities and advancing health equity if efforts are undertaken to go beyond reporting of the overall measure scores to reporting those scores by population characteristics. This opportunity was recognized and highlighted by the 2022 Child and Adult Core Set Annual Review Stakeholder Workgroup, which recommended core set measures to be stratified by beneficiary characteristics, including race and ethnicity, to identify and address health disparities [26]. Doing so will require improved data collection and additional reporting, but these are necessary efforts to meaningfully advance health equity.

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