NATIONAL HEALTHCARE QUALITY & DISPARITIES REPORT

2018

Introduction and Methods

DEPARTMENT OF HEALTH & HUMAN SERVICES · USA

AHRQ
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Research and Quality

2018 National Healthcare Quality and Disparities Report

Introduction and Methods

ACKNOWLEDGMENTS

The National Healthcare Quality and Disparities Report (QDR) is the product of collaboration among agencies from the U.S. Department of Health and Human Services (HHS), other federal departments, and the private sector. Many individuals guided and contributed to this effort. Without their magnanimous support, the report would not have been possible.

Specifically, we thank:

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INTRODUCTION AND METHODS

This **Introduction and Methods** document provides background on the annual *National Healthcare Quality and Disparities Report* (QDR) and modifications that have occurred over time. This document includes an overview of the methods used to generate estimates, measure trends, and examine disparities.

Background on the National Healthcare Quality and Disparities Report and Related Chartbooks

For the 16th year in a row, the Agency for Healthcare Research and Quality (AHRQ) has reported on progress and opportunities for improving healthcare quality and reducing healthcare disparities. As mandated by the U.S. Congress, the report focuses on "national trends in the quality of health care provided to the American people" (42 U.S.C. 299b-2(b)(2)) and "prevailing disparities in health care delivery as it relates to racial factors and socioeconomic factors in priority populations" (42 U.S.C. 299a-1(a)(6)).

The QDR is produced with the support of a Department of Health and Human Services (HHS) Interagency Work Group (IWG) and guided by input from AHRQ's National Advisory Council and the Institute of Medicine (IOM), now known as the Health and Medicine Division of the National Academies of Sciences, Medicine, and Engineering.

The 2018 report tracks more than 260 healthcare process, outcome, and access measures, covering a wide variety of conditions and settings. Data years vary across measures; most trend analyses include data points from 2000-2002 to 2013-2017. An exception is rates of uninsurance, which are reported through 2018.

Measures used in the QDR fall into three categories:

- Core measures: used in the main QDR, or "core report." These summarize the status of overall quality, status of disparities, and trends in quality and disparities. AHRQ receives these data regularly and the IWG has approved the measures for inclusion.
- Noncore measures: used in the QDR measure set and available in the Data Query Tool but not discussed in the core report.
- Supplemental measures: used in QDR products occasionally, as available. They are used once or infrequently due to limited data collection. Most of the supplemental measures are available in the Data Query Tool.

Changes to the National Healthcare Quality and Disparities Report

The QDR was significantly shaped by several IOM reports. Two of these reports, *Crossing the Quality Chasm* (IOM, 2001) and *To Err Is Human* (Kohn, et al., 2000), raised awareness about gaps in the quality of healthcare and patient safety. The extensive literature review included in a third report, *Unequal Treatment* (IOM, 2003), drew attention to disparities in the care rendered to racial and ethnic populations, low-income populations, and other vulnerable groups. Since the report's inception as the *National Healthcare Quality Report* (NHQR) and *National Healthcare Disparities Report* (NHDR) in 2003, AHRQ has worked over time to enhance and refine the QDR measure set and methodology. These enhancements include introducing core measures and composite measures and refining the methods of analysis. In addition, the area of patient safety was expanded to include sections on healthcare-associated infections and patient safety culture. The QDR team also added sections on lifestyle modification and care coordination.

In response to IOM recommendations, the QDR team produced a single Highlights chapter that integrated findings from the NHQR and NHDR. In addition, we introduced measure-specific benchmarks that reflect the high level achieved by the best performing states. To address the three quality improvement aims of better care, healthy people, and affordable care (also known as the Triple Aim[i]), we organized the reports into six priority areas (e.g., Patient Safety, Healthy Living) that could help achieve the three aims.

In 2014, the NHQR and NHDR were combined to provide a more complete and integrated assessment of access to and quality of healthcare, as well as disparities. The new QDR also included measures related to other key populations, including women, children, older adults, people with disabilities and at the end of life, and residents of rural areas and inner cities.

Most recently, the QDR added maps showing overall quality of care by state and average differences in quality of care between racial and ethnic minority groups and Whites. In addition, the report added summary charts showing trends in access and disparities. Last year's report added measures for preventive dental service for children and adults, as well as opioid-related hospitalizations and opioid-related emergency department visits, in response to HHS's focus on the opioid crisis.

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[i] More information on the Triple Aim is available from the Institute for Healthcare Improvement at http://www.ihi.org/Engage/Initiatives/TripleAim/Pages/default.aspx.

Organization of the 2018 National Healthcare Quality and Disparities Report and Related Chartbooks

The 2018 report and chartbooks are organized around the concept of access to care, quality of care, disparities in care, and six priority areas, including patient safety, person-centered care, care coordination, effective treatment, healthy living, and care affordability. Summaries of the status of access, quality, and disparities can be found in the report. Details for individual measures are found in the appendixes.

The report presents information on trends, disparities, and changes in disparities over time, as well as federal initiatives to improve quality and reduce disparities. It includes the following:

- **Overview of U.S. Healthcare System Landscape** describes the healthcare system, encounters, and workers; disease burden; and healthcare costs.
- **Access to Healthcare and Disparities in Access** tracks progress on making healthcare available to all Americans.
- **Trends in Quality of Healthcare** tracks progress on ensuring that all Americans receive appropriate services.
- **Disparities in Healthcare** tracks progress in closing the gap between minority racial and ethnic groups and Whites, as well as income and geographic location gaps (e.g., rural/suburban disparities).
- **New Measures** show noncore measures recommended in new topic areas by the QDR Interagency Workgroup. This year, we examined cancer, dementia, opioid use, and maternal morbidity and mortality.
- **Looking Forward** summarizes future directions for healthcare quality initiatives.

Additional information on each measure can be found in the Data Query section of the QDR website (http://nhqrnet.ahrq.gov/inhqrdr/data/query). Below each table generated are links to:

- **Data Source,** which provides information about each database analyzed for the report, including data type, sample design, and primary content.
- **Measure Specifications,** which provide information about how measures are generated and analyzed for the report. Measures highlighted in the report are described, as well as other measures that were examined but not included in the text of the report.

Methods of the National Healthcare Quality and Disparities Report and Related Chartbooks

Measures

Access to Healthcare

- **Purpose.** Assess access to care for the overall U.S. population and priority populations; identify racial, ethnic, and socioeconomic disparities; track changes in access to care over time; and identify aspects of access to care that are improving and aspects that are not improving.
- **Approach.** Factors that facilitate accessing healthcare, including having health insurance and a usual source of care, have been tracked since the first reports. Measures of timeliness of care and infrastructure to provide healthcare to minority and low-income populations were added to the access measure set.
- **Summaries of Access.** At times, the report will present summary information across a panel of access measures, including measures widely considered important for accessing healthcare, such as getting care in a timely manner.

The access measures panel excludes measures with less clear interpretation. For example, people age 65 and over with Medicare and private insurance is tracked in the QDR database and is available through the QDR Data Query Tool. However, it is not included in the panel, because decreasing rates in Medicare and private insurance could reflect increasing rates of enrollment in Medicare Advantage plans. Medicare Advantage plans offer medical insurance coverage via health maintenance organizations, preferred provider organizations, and private fee-for-service plans. These plans also cover prescription drug costs.

Similarly, use of emergency departments as a usual source of care is not included in the access measures panel, because rising rates have multiple interpretations. They could reflect meeting a previously unmet community need, which would be desirable, or problems getting care in provider offices, which would be undesirable. Researchers, policymakers, and other users should explore these data further to understand the underlying causes.

Quality of Healthcare

- **Purpose.** Assess quality of care for the overall U.S. population and priority populations; identify disparities among racial, ethnic, and socioeconomic groups; track changes in quality of care over time; and identify aspects of quality of care that are improving and aspects that are not improving.

- **Initial Approach.** The selection of quality measures to include in the first reports involved several steps:

  - IOM provided criteria for the selection of quality measures in 2001: overall importance of the aspects of quality being measured, scientific soundness of the measures, and feasibility of the measures. It also provided criteria for the measure set as a whole: balance, comprehensiveness, and robustness.
  - IOM and AHRQ issued calls for measures that yielded hundreds of measures submitted by private and governmental organizations.
  - A Federal Measures Workgroup was convened to apply the IOM criteria to the measures submitted for consideration.
  - A preliminary measure set was published in the *Federal Register* for public comment; additional comments were obtained through a hearing organized by the National Committee on Vital and Health Statistics.
  - In 2003, this process yielded an initial measure set that included 147 measures from two dozen data sources.

- **Types of Quality Measures.** Most measures tracked in the report reflect processes of care, outcomes of care, and patient perceptions of care:

  - **Processes of Care.** These measures generally represent percentages of people receiving care that they need or percentages of people receiving care that they should not receive. Measures are specified so that everyone in the denominator needs the service and optimal care equals 100%. These measures are generally not adjusted for age and sex since need is captured in the specification of the denominator.
  - **Outcomes of Care.** These measures generally represent rates of adverse events or deaths. These measures are generally adjusted for age and sex; adjustment is also done for comorbidities when possible. Because death rates often reflect factors other than healthcare, only death rates with moderate ties to processes of care are tracked. For example, colorectal cancer death rates are tracked because they are related to rates of colorectal cancer screening.
  - **Patient Perceptions of Care.** These measures generally represent percentages of people who perceived problems with aspects of their care.

- **Refinement of the Measure Set.** Since the first reports in 2003, the measure set has been reviewed each year and changes made as needed. All changes are approved by the HHS IWG that supports the QDR.

  - **Additions** have been made to the measure set as new domains of quality, data, and measures have become available. For example, Care Coordination and Care

Affordability were not recognized quality domains when the reports started, and measures of these domains were identified and added after they were recognized.

- **Deletions** have been made when data collection for measures ceased or when new scientific information indicated that a measure did not represent high-quality care. In addition, process measures that achieve overall performance levels exceeding 95% are not tracked in the report. The success of these measures limits their utility for tracking improvement over time. Because these measures cannot improve to a significant degree, including them in the measure set creates a ceiling effect that may dampen quantification of rates of change over time. Data on retired measures continue to be collected and these measures will be added back to the report if their performance falls below 95%.
- **Modifications** have been made when clinical recommendations change. For example, clinical recommendations often set new target levels or recommended frequencies for specific services.

- **Summaries of Quality.** At times, the report will present summary information across a panel of quality measures. This panel includes measures that are widely considered important for healthcare quality, such as measures of processes, outcomes, and patient perceptions, as noted above. The panel excludes measures with less clear interpretation, typically measures of infrastructure and costs.

Data Sources

Overview of Data

The data included in the report were determined by the measures chosen for tracking by the IWG and the QDR team. The report is based on dozens of data sources to provide a comprehensive assessment of access to healthcare and quality and disparities of healthcare in the United States. Most are nationally representative or cover the entire U.S. population.

Different types of data are used to provide complementary perspectives of healthcare and include patient and population surveys, provider surveys, administrative data from facilities, medical records, registries, surveillance systems, and vital statistics. Settings of care covered include ambulatory care, health centers, emergency departments, hospitals, nursing homes, hospices, and home health.

Data experts from contributing agencies or organizations generate descriptive summary statistics from the micro data for the QDR measures and population groups of interest. For particular measures, the QDR team downloads summary statistics directly from trusted websites.

All survey design features are taken into account. The percentages or rates are weighted to represent the targeted population. Statistics with a sample size less than 30 or relative standard errors larger than 30% are suppressed for statistical reliability, data quality, or confidentiality.

The QDR team has maintained the data since 2003, the first year of the reports. Some survey designs, questionnaires, data collection methods, definitions, and data calculation methods have changed over the years. Some contributing agencies updated all of the back years' data so the data are consistent for all analysis, such as Medical Expenditure Panel Survey and Healthcare Cost and Utilization Project data. Some contributing agencies informed the team about the changes, and the noncomparable data were removed from the database. While the team has tried to keep consistency of all data, a small fraction of data has had minor changes over the years.

Only data sources that are regularly included in the report are listed below. Not included on the list are sources that do not collect data on a regular basis; such data are presented intermittently in the report when they address topics or populations not well covered by regular data collections.

Federal Sources of Data

Agency for Healthcare Research and Quality
- Healthcare Cost and Utilization Project (HCUP)
- Hospital Consumer Assessment of Healthcare Providers and Systems (HCAHPS)
- Home Health Consumer Assessment of Healthcare Providers and Systems (HHCAHPS)
- Medical Expenditure Panel Survey (MEPS)
- National CAHPS® Benchmarking Database (NCBD) – Health Plan Survey Database

Centers for Disease Control and Prevention
- Behavioral Risk Factor Surveillance System (BRFSS)
- National Ambulatory Medical Care Survey (NAMCS)
- National Health and Nutrition Examination Survey (NHANES)
- National Health Interview Survey (NHIS)
- National HIV Surveillance System (NHSS)
- National Hospital Ambulatory Medical Care Survey (NHAMCS)
- National Immunization Survey (NIS)
- National Program of Cancer Registries (NPCR)
- National Tuberculosis Surveillance System (NTSS)
- National Vital Statistics System—Linked Birth and Infant Death Data (NVSS-L)
- National Vital Statistics System—Mortality (NVSS-M)

- National Vital Statistics System—Natality (NVSS-N)

Centers for Medicare & Medicaid Services
- CAHPS® Hospice Survey
- Hospital Inpatient Quality Reporting (HIQR) Program
- Outcome and Assessment Information Set (OASIS)
- Minimum Data Set (MDS)

Health Resources and Services Administration
- Uniform Data System (UDS)
- HIV/AIDS Bureau - Ryan White HIV/AIDS Program

Indian Health Service
- Indian Health Service (IHS) National Data Warehouse (NDW)

National Institutes of Health
- United States Renal Data System (USRDS)

Substance Abuse and Mental Health Services Administration
- National Survey on Drug Use and Health (NSDUH)
- Substance Use Disorder Treatment Episode Data Set (TEDS)

Multi-Agency Data Sources
- Medicare Patient Safety Monitoring System (MPSMS)

Academic Institutions

University of Michigan
- University of Michigan Kidney Epidemiology and Cost Center (UMKECC)

Professional Organizations and Associations

American Hospital Association
- American Hospital Association Annual Survey Information Technology Supplement

Commission on Cancer and American Cancer Society
- National Cancer Data Base (NCDB)

Populations

Overall U.S. Population

- **Purpose.** A key function of the QDR and related chartbooks is to assess access to healthcare and quality of health for the overall U.S. population.

- **Approach.** National data are used as collected without additional exclusions. Common population limitations include the following:

  - Most federal health surveys are limited to the civilian noninstitutionalized population and do not include people on active duty in the military or who reside in nursing homes or penal or mental institutions.
  - Many facility data collections do not include federal facilities run by the Departments of Defense or Veterans Affairs or by IHS.

Priority Populations

- **Purpose.** Another key function of the QDR and related chartbooks is to assess access to healthcare and quality of health for select populations defined by age, sex, race, ethnicity, income, education, health insurance, activity limitations, and geographic location.
- **Approach.** To the extent supported by data collection, definitions of priority populations are standardized across different data sources. The QDR also includes categories beyond those specified by the statute identifying priority populations. While the statute includes low-income groups, it does not mention other social determinants of health, such as insurance status and education. The QDR includes these categories in addition to income, as analyses of disparities in these areas demonstrate the impact of socioeconomic factors on quality of and access to healthcare.

  Typical definitions for the population categories in the QDR that are available in multiple databases include:

  - Age: 0-17, 18-44, 45-64, and 65 and over.
  - Sex: Male and female.
  - Race: White, Black, Asian, Native Hawaiian or Pacific Islander, American Indian or Alaska Native, and more than one race.[ii]
  - Ethnicity: Hispanic and non-Hispanic White.[iii]

[ii] Asian includes the former category of Asian or Pacific Islander prior to 1997 Office of Management and Budget guidelines, when information was not collected separately by group. Go to https://www.gpo.gov/fdsys/granule/FR-1997-10-30/97-28653 for more information.

[iii] Not all data sources collect information by race and ethnicity separately. In such cases, comparisons are made by combining racial/ethnic group categories (e.g., comparing non-Hispanic Blacks and Hispanics with non-Hispanic Whites).

- Income: Poor, low income, middle income, and high income.[iv]
- Education: People with less than a high school education,[v] high school graduates, and people with any college.
- Health insurance, ages 0-64: Any private insurance, public insurance[vi] only, and no insurance.
- Health insurance, age 65 and over: Medicare and any private insurance, Medicare and other public insurance, and Medicare only.
- Disabilities: Basic activity limitations, which include problems with mobility, self-care (activities of daily living), domestic life (instrumental activities of daily living), and activities that depend on sensory functioning (limited to people who are blind or deaf); complex activity limitations, which include limitations experienced in work and in community, social, and civic life. For the purpose of the QDR, adults with disabilities are those with physical, sensory, and/or mental health conditions that can be associated with a decrease in functioning in such day-to-day activities as bathing, walking, doing everyday chores, and engaging in work or social activities. The paired measure is intended to be consistent with statutory definitions of disability, such as the first criterion of the 1990 Americans With Disabilities Act and other federal program definitions of disability.
- Children with special health care needs (CSHCN): Children ages 0-17 with activity limitations or need or use of more healthcare or other services than is usual for most children of the same age. Question sequences[vii] are asked about the following five health consequences: the need or use of medicines prescribed by a doctor; the need or use of more medical care, mental health care, or education services than is usual for most children; limitations or inability to do things most children can do; the need or use of special therapy, such as physical, occupational, or speech therapy; and the need or use of treatment or counseling

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[iv] Unless otherwise indicated, throughout this report, poor is defined as having family income less than 100% of the federal poverty level (FPL); low income refers to income of 100% to 199% of the FPL; middle income refers to income of 200% to 399% of the FPL; and high income refers to income of 400% of the FPL and above. These are based on U.S. census poverty thresholds for each data year, which are used for statistical purposes.

[v] Less than a high school education refers to people who did not complete high school.

[vi] Public insurance includes Medicaid, Children's Health Insurance Program, state-sponsored or other government-sponsored health plans, Medicare, and military plans.

[vii] A CSHCN Screener instrument was developed through a national collaborative process as part of the Child and Adolescent Health Measurement Initiative coordinated by the Foundation for Accountability. For more information, refer to Bethell CD, Read D, Stein REK, et al. Identifying children with special health care needs: development and evaluation of a short screening instrument. Ambul Pediatr 2002 Feb;2(1):38-48. https://www.ncbi.nlm.nih.gov/pubmed/11888437. Accessed May 23, 2019.

for emotional, developmental, or behavioral problems. Children with responses to at least one of the five health consequences were identified as having a special health care need.

■ Geographic location: Large central metropolitan, large fringe metropolitan, medium metropolitan, small metropolitan, micropolitan, and noncore areas based on the 2013 National Center for Health Statistics Urban-Rural Classification Scheme (https://www.cdc.gov/nchs/data_access/urban_rural.htm).

● **Special Analyses.** Other important groups have been more difficult to identify in healthcare data:

■ Beginning with the 2012 reports, contrasts by granular racial/ethnic subgroups have been included when available. The QDR team has not yet found a healthcare database that includes all the subgroups of interest, because sample sizes have been too small to yield statistically reliable data. Thus, limited data have been presented for Hispanic subgroups (Mexican, Puerto Rican, Cuban, other Hispanic/Latino/Spanish origin), Asian subgroups (Asian Indian, Chinese, Filipino, Japanese, Korean, Vietnamese, other Asian), Native Hawaiian and Other Pacific Islander subgroups (Native Hawaiian, Guamanian or Chamorro, Samoan, and other Pacific Islanders).

■ Beginning with the 2013 reports, analyses by number of multiple chronic conditions have been included, but databases differ in the chronic conditions that can be identified. Improving measurement and data for these groups is critical to understand the reasons people with multiple chronic conditions cannot access high-quality healthcare and to develop effective interventions to help them overcome these barriers.

Analyses

All QDR analyses mainly include size of disparities, trend, trend in disparities, and benchmark. The summary results of the analysis are summarized in charts, tables, and maps and are posted on the QDR website. The source data for all these analyses are the summary statistics, either percentages or rates, at the national or subgroup level, instead of micro data.

Data Preparation

For all analyses, estimates were aligned to the negative direction. For measures where higher estimates are desirable, the estimates are usually percentages. The percentages were flipped to negative by deducting the percentage from 100%. For example, 87% of

people under age 65 had health insurance coverage was aligned to 13% of people under age 65 did not have insurance coverage. The flipped estimate will be mentioned as the aligned rate or framed rate in the text below.

For the disparities in current year and change in disparities over time analysis, comparisons are typically made between a priority population group and a reference group. The largest subgroup or the subgroup that often received the best healthcare is used as the reference group. Examples of specific reference groups are included in the table below.

Variable Category	Reference Group
Sex	Males
Age	18-44 years
Ethnicity	Non-Hispanic White
Race	White
Income	High income
Education	Any college education
Activity Limitations	Adults without any activity limitation
Residence Location	Large fringe metropolitan (suburb)
Insurance	Private insurance

For comparisons among racial groups, if a measure had data for separate racial categories, racial data were used. If a measure only had a combined race/ethnicity category, non-Hispanic White, non-Hispanic Black, and Hispanic were used.

Trends in Quality

- **Purpose.** To assess change over time considering both magnitude of change and statistical significance. Magnitude of change was considered important because large databases could have trends that were statistically significant but not large enough to be clinically meaningful.
- **Approach.** Unweighted log-linear regression. The rates are assumed to change at a constant percentage of the rate of the previous year. For example, if the annual percentage change is 1%, and the rate is 50 per 1,000 in 2000, then the expected rate is 50 x 1.01 = 50.5 in 2001 and 50.5 x 1.01 = 51.005 in 2002. Rates that change at a constant percentage every year change linearly on a log scale.[viii]

[viii] More information is available in Kim HJ, Fay MP, Feuer EJ, et al. Permutation tests for joinpoint regression with applications to cancer rates. Stat Med 2000;19:335-51 (correction: 2001;20:655).

In previous years, regression weights were used with w = (M^2/v), where M^2 is the square of the measure value and v is the variance. We recently changed to unweighted regression to be more consistent with methods used in the CMS National Impact Assessments and because analyses demonstrated few differences between weighted and unweighted regressions.

- **Data requirement.** Estimates for at least four time points between 2000 and the most recent year; fewer than four time points were deemed insufficient to calculate slopes of regression lines.
- **Model.** $\ln(M) = \beta_0 + \beta_1 Y$, where $\ln(M)$ is the natural logarithm of the aligned rate, β_0 is the intercept or constant, and β_1 is the coefficient corresponding to year Y (e.g., the average annual percentage change = 100 x ($\exp(\beta)$-1).

- **Interpretation:**

  - **Improving** = Average annual percentage change >1% per year in a favorable direction and p <0.10.[ix]
  - **Not Changing** = Average annual percentage change ≤1% per year or p ≥0.10.
  - **Worsening** = Average annual percentage change >1% per year in an unfavorable direction and p <0.10.

- **Summaries of Trends.** Trends across panels of measures can be summarized in a variety of ways. The average annual percentage change of each measure is calculated and the summary over the panel of measures is presented as a stacked bar chart showing the percentage of measures that are Improving, Not Changing, or Worsening, by priority area and by subgroup.
- **Measures With Extreme Trends.** To help identify measures that are changing the most quickly, measures are sorted by average annual percentage change.

  - **Improving Quickly** = Average annual percentage change >10% per year in a favorable direction and p <0.10.

Achievable Benchmarks

- **Purpose.** To define a high level of performance that has been attained to help readers understand national and state performance and to serve as an achievable quality improvement goal.

[ix] A probability of 0.10 was selected as the significance level because the magnitude of the standard errors varied considerably by type of data.

- **Approach.** Average of the top 10% best performing states:

  - **Data Requirement.** Estimates for 2015 or 2014 are required for at least 30 states. About half of QDR measures meet this requirement.
  - **Calculation.** Average of estimates from the top 10% of states (e.g., average of top five states if estimates are available on all 50 states and DC). Territories are included in the calculation of the number of states in the top 10% (e.g., top 5 of 50) but are excluded from the top 10% of states for the benchmark calculation because the estimates usually are associated with larger variance.
  - **Updates.** Data from 2015 are preferred for the benchmark calculation to use more recent data. If a measure does not have 2015 data, 2016 data or 2014 data are used. A benchmark is not calculated if a measure's latest data year is 2013 or earlier, except for the Patients with treated chronic kidney failure who received a transplant within 3 years of date of renal failure measure. The overall state-level benchmark calculated above is used for all comparisons under the National View and State View on the QDR website. Benchmark for each priority population group is not calculated.

- **Interpretation:**

  - **Figures.** When available, benchmarks are shown as dashed red lines on figures.
  - **Time to Benchmark.** When data support analysis of trends (see above), time to benchmark is calculated to quantify the distance from the benchmark. The average annual percentage change is used to extrapolate forward to the time when the benchmark will be achieved. Time to benchmark is not reported if:

    - Average annual percentage change is less than 1% (interpreted as no change).
    - Time to benchmark of all groups is estimated at 25 or more years.
    - Trends show movement away from the benchmark.
    - Direction of trend changes over time.

    On the QDR website, performance of measures or subgroups is compared with the benchmark. The results are grouped into three categories:

    - **Far away from benchmark.** The value for a measure has not achieved 50% of the benchmark.
    - **Close to benchmark.** The value for a measure is between 50% and 90% of a benchmark (i.e., worse than the benchmark but has achieved at least half of the benchmark but not as much as 90% of the benchmark).

♦ **Achieved benchmark or better.** The value for a measure is no worse than 90% of the benchmark value. This category also includes the case in which the measure's value is equal to or better than the benchmark.

Size of Disparities Between Two Subpopulations

- **Purpose.** To assess whether access or quality differs between two subpopulations for the most recent data year. Comparisons are typically made between a priority population group and a reference group within a population characteristic (e.g., Blacks vs. Whites within the race characteristic). The best performing subgroup is typically used as the reference group. Before the 2016 report, the latest available data were used for the current year disparities. For the 2017 report, current year disparities used the latest available data since 2015, except 2013 data were used for the Patients with treated chronic kidney failure who received a transplant within 3 years of date of renal failure measure. Baseline disparities used the earliest available data since 2000 and before 2013. The baseline disparities are only used to subset measures for the Trends in Disparities analysis.

- **Approach.** Two criteria are applied to determine whether the difference between two groups is meaningful:

  - The absolute difference between the priority population group and the reference group must be statistically significant with $p < 0.05$ on a two-tailed test.
  - The relative difference between the priority population group and the reference group must be at least 10% when framed positively or negatively. ($[p1 - p2]/p2 > 0.1$ OR $[(1 - p1) - (1 - p2)]/(1 - p2) > 0.1$).

- **Interpretation:**

  - **Better** = Priority population estimate more favorable than reference group estimate by at least 10% and with $p < 0.05$.
  - **Same** = Priority population and reference group estimates differ by less than 10% or $p \geq 0.05$.
  - **Worse** = Priority population estimate less favorable than reference group estimate by at least 10% and with $p < 0.05$.

- **Summaries of Disparities**. Disparities across panels of measures are usually summarized as stacked bar charts showing the percentage of measures that are Better, Same, or Worse for priority populations compared with a reference group.

Trends in Disparities Between Two Subpopulations

- **Purpose.** To observe whether the difference in access or quality between two subpopulations has changed over time. Comparisons are typically made between a priority population group and a reference group within a population characteristic (e.g., Blacks vs. Whites within the race characteristic).
- **Approach.** Unweighted linear regression. Before 2015, weighted regressions were used with weight = (1/v), where v is the variance. With the 2015 report, we changed to unweighted regression on the indexed rate to be more consistent with methods used in the CMS National Impact Assessments and because analyses demonstrated few differences between weighted and unweighted regressions.

  To calculate the index, we divided estimates by the earliest estimate of the reference group so that the earliest indexed estimate equaled one and subsequent indexed estimates were relative to the earliest estimate. Starting with the 2016 report, we changed to unweighted regression on the aligned rate without taking the index.

  - **Data Requirement.** Estimates for at least four time points between 2000 and the most recent data year for both the priority population and reference group; fewer than four time points were deemed insufficient to calculate slopes of regression lines.
  - **Model.** $M = \beta_0 + \beta_1 Y$, where M is the aligned rate of a subgroup, β_0 is the intercept or constant, and β_1 is the coefficient corresponding to year Y.

    - The coefficient is the average annual change (AAC). For example, if the average annual change is −1, and the mean rate is 50 per 1,000 in 2000, then the expected mean rate is 50 + (−1) = 49 in 2001 and 49 + (−1) = 48 in 2002. It means the mean rate decreased by 1 unit per year.
    - We calculated the difference in the average annual change between the priority population group and the reference group and the standard error:

      Difference in AAC = AAC (priority population group) – AAC (reference group).

    - We used standard errors from the regression coefficients to calculate the standard error of the absolute difference.

- **Interpretation:**

  - Improving = The difference in the AAC of the priority population and reference group is <−1 (in a favorable direction) and p <0.10 for testing that regression coefficients are the same.

- Not Changing = Absolute value of the difference in the AAC of the priority population and reference group is <1 or the absolute value of the difference in the AAC of the priority population and reference group is >1 and p ≥0.10 for testing that regression coefficients are the same.
- Worsening = The difference in the AAC of the priority population and reference group is >1 (in an unfavorable direction) and p <0.10 for testing that regression coefficients are the same.
- Example: Because the rates were aligned to the negative direction, a negative AAC value indicates a measure/subgroup's mean has been decreasing (improving) over the years, and a positive value indicates the subgroup's mean has been increasing (worsening) over the years. Taking the "hospital admissions for uncontrolled diabetes without complications per 100,000 population" measure as an example, if the average annual change in the Black mean rate is −2.9 and the average annual change in the White mean is −0.4, the difference is (−2.9) − (−0.4) = −2.5. This difference indicates that the Black mean rate has been improving (decreasing) faster than the White mean rate or the disparity between Blacks and Whites is improving (i.e., narrowing).

- **Summaries of Trends in Disparities.** Trends in disparities across panels of measures are usually summarized as stacked bar charts showing the percentage of measures that are Improving, Not Changing, or Worsening for priority populations compared with a reference group. The summary charts in the 2017 report include subgroups with baseline disparities.
- **Measures With Extreme Trends in Disparities.** To help identify measures with disparities that are changing the most quickly for each priority population, measures are sorted by the difference in average annual change between the priority population and reference group.

  - **Disparities Eliminated** = Disparity improving and priority population estimates reached or surpassed reference group estimate.

Analyses Limitations

Data Limitations With Healthcare Cost and Utilization Project (HCUP) Data

In the 2017 QDR, all available HCUP measures that were included in the report and QDR database had trend data. Those same measures are not represented in this report due to the limited availability of HCUP data. HCUP converted all measures from International Classification of Diseases, Ninth Revision (ICD-9) to Tenth Revision (ICD-10) codes, thus changing the outcomes of these measures. Therefore, we cannot trend the data at this time.

Within the 2018 QDR, the report shows size difference analyses demonstrating disparities within the latest data year. HCUP trend data are available for opioid measures that use ICD-9 codes and ICD-9 to ICD-10 codes in the last 2 data years (2015-2016).

Historically, the QDR and derivative products such as the State Snapshots have included state-specific estimates for selected AHRQ Quality Indicators (QIs) based on HCUP data. The 2018 QDR does not include state-specific QI estimates based on 2016 HCUP data. This decision was made in part because the International Classification of Diseases, Tenth Revision, Clinical Modification/Procedure Coding System version of the QI software used in this year's report does not include risk adjustment. State-specific QIs may be reported in future QDRs when the estimates can be risk adjusted.

General Limitations

Some common limitations affect analyses of multiple data sources. For example, data are not available for relatively small subpopulations, such as Native Hawaiians, Pacific Islanders, and some rural communities. In addition, while most national surveys conduct data collections annually, not all modules are completed each year. Thus, data are missing for some measures included in the report.

Timeliness of national data for national surveys and data systems are also an issue since it takes time to process and ensure data quality for reporting, resulting in about a 2-year lag between the year the data are collected and the year they can be used.

Finally, for various reasons (e.g., data collection was discontinued), data for all years for all measures are not available. For example, we have nursing home and home health data for the 2018 report but not for the 2016 and 2017 reports. We also exclude measures for which data will not available in the future. Lack of data for some measures affects the measure numbers in the summary figures, such as trends in quality.

QDR Website

Content

The QDR website provides a unified web tool for investigating information presented in the *National Healthcare Quality and Disparities Report.* It allows users to drill down from the broadest picture of healthcare quality and disparities on the national and state levels. The site has six panels:

- The Reports panel allows users to view or download the current report and previous reports, chartbooks, fact sheets, and appendixes.

- The Data Query panel allows users to search data across measures and obtain information on the data source and specifications for each measure. The national tables contain all available back-years' data, while the disparities tables only include the most recent year's data. Users can download the original Excel tables.
- The National View panel displays national summaries categorized by measure categories and priority population groups. The "Benchmark" page compares a subgroup's performance with the national benchmark. The "Trend" page displays trend results for each measure or subgroup.
- The State View panel displays state-level summaries categorized by measure categories and priority population groups. The "Dashboard" page compares a state's performance with the benchmark. The "Snapshot" page compares a state's performance with the nation's overall performance.
- The Resources panel provides additional information about tools, guides, and other materials related to collecting and analyzing data on quality and disparities and identifying best practices to address issues.
- The Opioid panel provides original data and trend results at the national, state, and subgroup level as well as charts and state quartile maps.

Measures

The website includes all primary measures and measures using National CAHPS Benchmarking® Database (NCBD) state data on the National View and State View pages. A few primary measures that are not included in the charts in the report for various reasons are also counted as a measures on the website. As of the 2017 report, supplemental measures are included on the Data Query page under "Supplemental measures" and composite measures are added into related subject areas.

Methods

Trend Analysis

The trend analysis method is the same as described above, but the measures included are slightly different from the measures in the report.

The **Benchmark Comparison** method is the same for both the "National View" and the "State View." The method was adapted from the NHQR State Snapshots website (refer to the methods page at https://nhqrnet.ahrq.gov/inhqrdr/resources/methods). The benchmark was calculated from the top 10% states' rates as described before. The relative difference between a subgroup and the benchmark was calculated as:

$$\text{Relative\_diff} = (\text{Rate of subgroup} - \text{Benchmark})/\text{Benchmark} * 100\%$$

The categories of achievement have been standardized based on the relative difference across the measure definitions so that:

- **Far away from benchmark** = value for a measure has not achieved 50% of the benchmark.
- **Close to benchmark** = value for a measure is between 50% and 90% of a benchmark (i.e., worse than the benchmark but has achieved at least half of the benchmark but not as much as 90% of the benchmark).
- **Achieved benchmark or better** = value for a measure is no worse than 90% of the benchmark value. This category also includes the case in which the measure's value is equal to or better than the benchmark.

The horizontal bar chart displays the summary results from all measures/subgroups for each measure category or priority population group.

Snapshot Page

The Snapshot page compares performance between a state or priority population group within each state with the national overall rate on the current year and baseline year. Most measures have the national overall rates estimated from micro data. Averages of state rates were used as the national rate for measures without the overall data, and the standard error of the state average was used as the standard error.

The method for estimating current disparities is used for the comparison between a state and national overall rate. Each state receives a performance score for individual measures per year based on the differences result as follows:

- 1 point for each measure that was better than average.
- 0.5 point for each measure that was average.
- 0 points for each measure that was worse than average.

The state's overall score is calculated by summing the individual scores over all measures and then dividing by the total number of measures.

After the state score is calculated, the overall score is assigned to one of five categories as follows for visual discrimination on the 180-degree semicircle:

- Very Weak: 0 ≤ score <20
- Weak: 20 ≤ score <40
- Average: 40 ≤ score <60
- Strong: 60 ≤ score <80
- Very Strong: 80 ≤ score ≤100

Reporting Conventions

For ease of reporting, some shorthand is used in presenting results. Unless otherwise specified:

- State maps are usually grouped in quartiles. Data are excluded from territories with a large variation or that looked like outliers.
- Results presented in text or bullets meet our criteria for magnitude and statistical significance.
- Children are ages 0-17, adults are age 18 and over, and older adults are age 65 and over.
- "Blacks" indicates individuals who identify their race as Black or African American.
- "Hispanics" indicates individuals who identify their ethnicity as Hispanic, Latino/a, or Spanish origin and includes all races.
- "Measure improved" indicates performance on the measure improved; "measure got worse" indicates performance on the measure showed worsening.
- "Disparities improved" indicates the disparity narrowed. "Disparities worsened" indicates the disparity widened.