2016
National Healthcare
Quality
and Disparities
Report

INTRODUCTION AND METHODS

AHRQ
Agency for Healthcare Research and Quality

National Healthcare Quality and Disparities Report

Introduction and Methods

ACKNOWLEDGMENTS

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 14th year in a row, the Agency for Healthcare Research and Quality (AHRQ) has reported on progress and opportunities for improving health care quality and reducing health care 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 report is produced with the support of an HHS Interagency Work Group and guided by input from AHRQ's National Advisory Council (NAC) and the Institute of Medicine (IOM), now known as the Health and Medicine Division of the National Academies of Sciences, Medicine, and Engineering.

As in previous years, the 2016 report tracks more than 250 health care 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 2012-2015. An exception is rates of uninsurance, which we are able to track through the first half of 2016.

Organization of the 2016 National Healthcare Quality and Disparities Report and Related Chartbooks

The 2016 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, disparities, and priority areas can found in the report. Details for individual measures are found in the appendixes.

The report presents information on trends, disparities, changes in disparities over time, and initiatives across the country demonstrating innovative quality improvement programs. It includes the following sections:

- **Three Aims for Improving Health Care** that describes quality improvement goals for the Nation.
- **Variation in Health Care Quality and Disparities** that presents state differences in quality and disparities.
- **Access and Disparities in Access to Health Care** that tracks progress on making health care available to all Americans.
- **Trends in Quality of Health Care** that tracks progress on ensuring that all Americans receive appropriate services.

- **Trends in Disparities** that 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).
- **Looking Forward** that summarizes future directions for health care quality initiatives.

Additional information on each measure can be found in the Data Query section of the QDR Web site (http://nhqrnet.ahrq.gov/inhqrdr/data/query). At the bottom of 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 provides 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 Health Care

- **Purpose.** To assess access to care for the overall U.S. population and for priority populations, to track changes in access to care over time, and to identify aspects of access to care that are improving and aspects that are not improving.
- **Approach.** Factors that facilitate accessing health care, 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 health care 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. This panel includes measures that are widely considered important for accessing health care, such as having health insurance and a usual source of care and getting care in a timely manner. The panel excludes measures with less clear interpretation. For example, having public health insurance is tracked but not included in the panel because rising rates could reflect falling rates of uninsurance, which would be desirable, or falling rates of private health insurance, which would be undesirable. Similarly, use of emergency departments as a usual source of care is not included in the panel because rising rates could reflect meeting a previously unmet community need, which would be desirable, or problems getting care in provider offices, which would be undesirable.

Quality of Health Care

- **Purpose.** To assess quality care for the overall U.S. population and for priority populations, to identify disparities among socioeconomic groups, to track changes in quality of care over time, and to 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:

  - The **Institute of Medicine** (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.
  - **Calls for Measures** were issued by IOM and AHRQ and 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.
  - This yielded an **Initial Measure Set** that included 147 measures from two dozen data sources in 2003.

- **Types of Quality Measures.** Most measures tracked in the report reflect processes of care, outcomes of care, and patient perceptions of care. A few measures track structural elements that are important for quality health 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 health care, 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.
  - **Infrastructure.** These measures generally represent the availability of different health care resources. They are often difficult to interpret; are there fewer resources because needs are not met or because the resources are not needed? Hence, they are only included when measures of processes, outcomes, and patient perceptions are not available. They are generally not included in summaries of measures.

- **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 Interagency Work Group 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 health care quality and include measures of processes, outcomes, and patient perceptions. 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. Dozens of data sources are used in the report to provide a comprehensive assessment of access to health care and quality and disparities of health care 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 health care and include patient 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.

Descriptive summary statistics are generated from the micro data by data experts from contributing agencies or organizations for the QDR measures and population groups of interest. For particular measures, summary statistics are directly downloaded 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 error larger than 30% were 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 MEPS and HCUP data. Some contributing agencies informed the team about the changes and the noncomparable data were removed from the

database. While the team has been trying to keep consistency of all data, there is a small fraction of data with minor changes over the years.

Only data sources that are regularly reported 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

The *National Healthcare Quality and Disparities Report* is a comprehensive national overview of quality of health care in the United States. The report also examines disparities in health care among priority populations, such as racial and ethnic minority groups. The report is compiled from multiple federal, state, and private data sources, including databases and surveys.

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
- Hospital Inpatient Quality Reporting (HIQR) Program

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

Indian Health Service
- Indian Health Service 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)

For the 2016 report, we did not include the following NHSS HIV measures due to methodological changes:

- New HIV cases per 100,000 population age 13 and over
- New AIDS cases per 100,000 population age 13 and over
- Percentage of persons living with HIV who know their serostatus

Professional Organization Sources of Data

Federal data sources are supplemented by data from other organizations that collect national data. Nonfederal databases used in the report include:

- American Hospital Association (AHA) Annual Survey Information Technology Supplement, which provides information on adoption of health information technologies by hospitals.
- Commission on Cancer and American Cancer Society (ACS) National Cancer Data Base (NCDB), which provides information on quality of cancer treatment.

Subnational Data

Some aspects of health care quality and disparities are not covered well by national data, both federal and nonfederal, but are covered by subnational data. Such unique subnational data collections are included in the report to illustrate the potential value of improving national data collection.

Populations

Overall U.S. Population

- **Purpose.** A key function of the QDR and related chartbooks is to assess access to health care 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 health care 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. Typical priority population definitions 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 Other Pacific Islander, American Indian or Alaska Native, and more than one race.[i]
  - Ethnicity: Hispanic and non-Hispanic.[ii]
  - Income: Poor, low income, middle income, and high income.[iii]
  - Education: People with less than a high school education,[iv] high school graduates, and people with any college.
  - Health insurance, ages 0-64: Any private insurance, public insurance[v] only, and no insurance.

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[i] Asian includes the former category of Asian or Pacific Islander prior to Office of Management and Budget guidelines, when information was not collected separately by group.

[ii] 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).

[iii] 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.

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

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

- ■ Health insurance, age 65 and over: Medicare and any private insurance, Medicare and other public insurance, and Medicare only.
- ■ Disabilities: Basic activity limitations 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 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 (ADA) and other federal program definitions of disability.
- ■ Children with special health care needs (CSHCN): Children ages 0-17 with activity limitations or with the need or use of more health care or other services than is usual for most children of the same age. Question sequences[vi] 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 in 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 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 National Center for Health Statistics Urban-Rural Classification Scheme.

- **Special Analyses**. Other important groups have been more difficult to identify in health care data:

  - ■ Beginning in the 2011 reports, information on lesbian, gay, bisexual, and transgender people has been included, but few databases support these analyses.
  - ■ Beginning in the 2012 reports, contrasts by granular racial subgroups have been included. Information on populations identified as Mexican, Puerto Rican, Cuban, other Hispanic/Latino/Spanish origin, Asian Indian, Chinese, Filipino, Japanese, Korean, Vietnamese, other Asian, Native Hawaiian, Guamanian or Chamorro, Samoan, and other Pacific Islander have been sought, but no health care database that identifies all of these subgroups has been found.
  - ■ Beginning in 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

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[vi] 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, see: Bethel 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.

they cannot access high-quality health care and to develop effective interventions to help them overcome these barriers.

■ While the reports do not address social determinants directly, analyses of disparities in health care related to family income and education are at the core of the QDR and demonstrate the importance of socioeconomic status on quality of and access to health care.

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 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 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. For example, male, ages 18-44, non-Hispanic White, White, high income, any college education, adults without any activity limitation, large fringe metropolitan, private insurance, Medicare, and private insurance are used as reference groups.

For the ethnic comparisons, Hispanic was compared only with non-Hispanic White, instead of White from the race category where White includes Hispanics.

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 (Kim, 2000). Note that 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. This year, we have 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 2015; 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).

- **Interpretation.**

  - ■ **Improving** = Average annual percentage change >1% per year in a favorable direction and p <0.10.[vii]
  - ■ **Worsening** = Average annual percentage change >1% per year in an unfavorable direction and p <0.10.
  - ■ **No Change** = Average annual percentage change ≤1% per year or 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 summary over the panel of measures presented as:

  - ■ A stacked bar chart showing the percentage of measures that are Improving, Worsening, or No Change, by priority areas and by subgroups.

- **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.
- **Approach.** Average of best performing states.

  - ■ **Data Requirement.** 2013-2014 estimates for at least 30 states. Note that only about half of QDR measures meet this requirement.
  - ■ **Calculation.** Average of estimates from top 10% of states (e.g., average of top five states if estimates available on all 50 states and DC). Territories are included in the number of

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

top 10% state calculation and excluded from the top 10% states for the benchmark calculation because the estimates usually are associated with larger variance.

- ■ **Updating.** Selected 2014 data for the calculation first. If a measure does not have 2014 data, 2013 data are used. Benchmark is not calculated if a measure's latest data year is 2012 or earlier. 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 a 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 2016, the latest available data were used as the current year disparities. For the 2016 report, current year disparities used the latest available data since 2013. 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 $p < 0.05$.
  - **Worse** = Priority population estimate less favorable than reference group estimate by at least 10% and with $p < 0.05$.
  - **Same** = Priority population and reference group estimates differ by 10% or less or $p \geq 0.05$.

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

Trends in Disparities Between Two Subpopulations

- **Purpose.** To observe whether 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. Note that before 2015, weighted regressions were used with weight = (1/v), where v is the variance. For 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, estimates were divided by the earliest estimate of the reference group so that earliest indexed estimate equaled one and subsequent indexed estimates were relative to the earliest estimate. For 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 2015 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 absolute annual percentage change (APC). 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 + (−1) = 49 in 2001, and 49 + (−1) = 48 in 2002. It means the rate decreased by 1 point per year.

♦ Calculated the absolute difference in the annual percentage change between the priority population group and the reference group and the standard error:

♦ Absolute difference in APC = APC (priority population group) – APC (reference group).

♦ The standard errors from the regression coefficients were used to calculate the standard error of the absolute difference.

- **Interpretation.**

  ■ Because the rates were aligned to the negative direction, a negative APC value indicates a measure/subgroup has been improving over the years, and a positive value indicates the subgroup has been worsening over the years. Taking the "hospital admissions for uncontrolled diabetes without complications per 100,000 population" measure as an example, if the Black rate decreased by 2.9% per year (APC = −2.9) and the White rate decreased by 0.4% per year (APC = −0.4), the difference is (−2.9)−(−0.4) = −2.5. The difference indicates that the Black rate has been improving faster than the White rate or the disparity between Blacks and Whites is improving.

  ■ **Improving** = Average annual change of the priority population and reference group differs by more than 1% per year in a favorable direction and p <0.10.
  ■ **Worsening** = Average annual change of the priority population and reference group differs by more than 1% per year in an unfavorable direction and p <0.10.
  ■ **No Change** = Average annual change of the priority population and reference group differs by 1% per year or less or p ≥0.10.

- **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, Worsening, or No Change for priority populations compared with a reference group. The charts before 2016 included all subgroups regardless of baseline disparities. For the 2016 report, the charts only 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.

QDR Website

Contents

The integrated 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 five 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.

Measures

All primary measures and measures using NCBD state data are included in the public website. Some primary measures that are not included in the charts in the report for various reasons are also counted as a measure on the website.

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, available at https://statesnapshots.ahrq.gov/snaps10. 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 a 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 Size of Differences method is used for the comparison. 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.

State 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: $0 \leq score < 20$
- Weak: $20 \leq score < 40$
- Average: $40 \leq score < 60$
- Strong: $60 \leq score < 80$
- Very Strong: $80 \leq score \leq 100$

State Maps

State maps included in the report and chartbooks are usually grouped in quartiles. Data are excluded from territories with a large variation or that looked like outliers.

Other Analyses

- **Purpose.** For ease of interpretation, most analyses presented in the report focus on one characteristic at a time. However, on occasion, bivariate and multivariate analyses are presented to highlight specific characteristics or interactions of characteristics.
- **Approaches.**

  - **Stratified analyses.** Whenever supported by databases, estimates of race and ethnicity stratified by income, education, and health insurance and of income and education stratified by race and ethnicity are collected. These data are typically shown when patterns of racial or ethnic disparities differ for different socioeconomic groups.
  - **Regressions**. Logistic or linear regression models are sometimes created for specific measures[1] to quantify the unique contribution of specific characteristics to disparities. In examining the relationship of race and ethnicity with a measure, for example, multivariate regression analyses are sometimes performed to control for differences in the distribution of income, education, insurance, age, gender, and geographic location. Results are typically presented as adjusted percentages, which quantify the magnitude of disparities after controlling for a number of confounding factors.

SAS programming is used for all data analysis.[viii]

Reporting Conventions

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

  - 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.

Reference

1. 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).

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