Appendix. Data Sources and Methods

The Medicare Consumer Assessment of Healthcare Providers and Systems Surveys

The Medicare Consumer Assessment of Healthcare Providers and Systems (CAHPS) surveys are mail surveys with telephone follow-ups based on a stratified random sample of Medicare beneficiaries, with states serving as strata for beneficiaries with fee-for-service (FFS) coverage who are not enrolled in a prescription drug plan and with contracts serving as strata for all others. The 2017 survey attempted to contact 870,242 Medicare beneficiaries and received responses from 348,215, a 40.3-percent response rate. The 2017 surveys represent all FFS beneficiaries, Medicare Advantage (MA) beneficiaries from 447 MA contracts that either were required to report (minimum of 600 eligible enrollees) or reported voluntarily (450 to 599 enrollees), and Prescription Drug Plan (PDP) beneficiaries from 55 PDP contracts with at least 1,500 eligible enrollees. The data presented in this report pertain to both FFS/PDP and MA beneficiaries.

The Healthcare Effectiveness Data and Information Set (HEDIS)

The Healthcare Effectiveness Data and Information Set (HEDIS) consists of 91 clinical care measures across six domains (National Committee for Quality Assurance [NCQA], 2017a). These domains are effectiveness of care, access/availability of care, experience of care, utilization, health plan descriptive information, and measures collected using electronic clinical data systems. HEDIS measures are developed, tested, and validated under the direction of the NCQA. Whereas CAHPS data are collected only through surveys, HEDIS data are gathered both through surveys and through medical charts and insurance claims for hospitalizations, medical office visits, and procedures (NCQA, 2017b). In selecting the HEDIS measures to include in this report, we excluded measures that underwent a recent change in specification, were similar to reported measures preferred by Centers for Medicare and Medicaid Services (CMS), or were designated as unsuitable for this application by CMS experts. HEDIS data are available only for MA beneficiaries.

Information on Rurality

Beneficiaries were classified as living in a rural or urban area based on the zip code of their mailing address and the corresponding Census Bureau core-based statistical area (CBSA). CBSAs consist of the county or counties or equivalent entities associated with at least one core (urbanized area or urban cluster) of at least 10,000 population, plus adjacent counties having a high degree of social and economic integration with the core as measured through commuting ties with the counties that make up the core. For this report, any beneficiary residing within a CBSA (which includes both metropolitan and micropolitan areas) was classified as an urban resident; any beneficiary living outside of a CBSA was classified as a rural resident.

Information on Race/Ethnicity

The 2017 CAHPS survey asked beneficiaries, “Are you of Hispanic or Latino origin or descent?” The response options were: “Yes, Hispanic or Latino” and “No, not Hispanic or Latino.” The survey then

asked, “What is your race? Please mark one or more,” with response options of “White,” “Black or African American,” “Asian,” “Native Hawaiian or other Pacific Islander,” and “American Indian or Alaska Native.” Following a U.S. Census approach, answers to these two questions were used to classify respondents into one of seven mutually exclusive categories: Hispanic, multiracial, American Indian/Alaska Native (AI/AN), Asian/Pacific Islander (API), Black, White, or unknown.

- Respondents who endorsed Hispanic ethnicity were classified as Hispanic regardless of races endorsed.
- Non-Hispanic respondents who endorsed two or more races were classified as multiracial, with a single exception: Those who selected both “Asian” and “Native Hawaiian or other Pacific Islander” but no other race were classified as API.
- Non-Hispanic respondents who selected exactly one race were classified as AI/AN, API, Black, or White, according to their responses.
- Respondents without data regarding race/ethnicity were classified as unknown.
- We do not include estimates for the multiracial and unknown subgroups in this report.
- We also do not include estimates for AI/AN or API subgroups because there were too few rural AI/AN and API respondents to permit making accurate rural-urban comparisons within these racial/ethnic groups.

HEDIS data, unlike CAHPS data, do not contain the patient’s self-reported race/ethnicity. Therefore, we imputed race/ethnicity for the HEDIS data using a methodology that combines information from administrative data, surname, and residential location (Martino et al., 2013). In 2017, there were 513 MA contracts that supplied the 14,654,890 HEDIS-measure records used.

Comparisons of rural-urban differences in patient experience by racial and ethnic group focus on Black, Hispanic, and White beneficiaries. Comparisons of rural-urban differences in clinical care by racial and ethnic group focus on these same three groups plus API beneficiaries. In each case, racial and ethnic groups were chosen based on the amount of information available to describe the care provided to rural and urban residents within a group.

Reportability of Information

Sample size criteria were used to determine whether a score on a measure was reportable for a particular group. Scores based on 400 or more observations were considered sufficiently precise for reporting unflagged. Scores based on more than 99 but fewer than 400 observations were considered low in precision and were flagged as such. In the report, flagged scores are shown unbolded with a superscript symbol appended; the symbol links to a note at the bottom of the page that cautions about the precision of the score. Scores based on 99 or fewer observations are suppressed (i.e., not reported). When a score is suppressed for a particular group, a note appears at the bottom of the relevant chart saying that there were not enough data from that group to make a rural-urban comparison on the measure. The table that appears on the last two pages of this appendix shows which measures are reportable for which groups of beneficiaries. It also shows which reportable measures required flagging for possible low precision. Flagged scores should be regarded as tentative information.

Analytic Approach

The CAHPS measures presented in this report are composite measures that summarize, through averaging, the answers to two or more related CAHPS survey questions, or items. The annual flu vaccine measure is included in the CAHPS survey and is thus grouped with other CAHPS measures in this report. It is, however, considered to be a HEDIS measure. This is a single-item measure rather than a composite.

CAHPS estimates for rural and urban residents are from case-mix adjusted linear regression models that contained health contract intercepts, an indicator of rural residence (urban was the reference group), and the following case-mix adjustors: age, education, self-rated health and mental health, dual eligibility/low-income subsidy, and proxy status. No adjustment was made for survey language. CAHPS estimates for rural and urban residents of different racial/ethnic backgrounds are from case-mix adjusted linear regression models, stratified by racial/ethnic group, that contained health contract intercepts, an indicator of rural residence, and the same set of case-mix adjustors used in the overall rural-urban models.

Predicted probabilities of race/ethnicity were used as weights to develop HEDIS-measure estimates for racial/ethnic subgroups (Elliott et al., 2009). None of the HEDIS measures reported (including the annual flu vaccine measure) is case-mix adjusted.

Cases with missing data on outcome measures were excluded from the analysis. There were no missing data on predictors (race/ethnicity and rural/urban residence) included in the analyses of HEDIS measures. For analyses of CAHPS measures, cases with missing information on race/ethnicity (about 4%) were excluded from the analysis, and missing data on case-mix adjustors were imputed using the health contract mean. There were no missing data on rural/urban residence.

Statistical significance tests were used to compare the model-estimated scores for rural residents with the score for urban residents. A difference in scores is denoted as statistically significant if there is less than a 5-percent chance that the difference could have resulted due to sampling error alone. Differences that are statistically significant and larger than 3 points on a 0–100 scale (CAHPS) or 3 percentage points (HEDIS) are further denoted as practically significant. That is, in the charts that present national data on rural-urban differences in patient experience (CAHPS) and clinical care (HEDIS), differences that are not statistically significant or are statistically significant but less than 3 points in magnitude are distinguished (using symbols and labeling) from differences that are both statistically significant and 3 points in magnitude or larger. The 3-point criterion was selected because a difference of this size is considered to be of moderate magnitude (Paddison et al., 2013).

References

Elliott, M. N., P. A. Morrison, A. Fremont, D. M. McCaffrey, P. Pantoja, and N. Lurie, "Using the Census Bureau's Surname List to Improve Estimates of Race/Ethnicity and Associated Disparities," *Health Services and Outcomes Research Methodology*, Vol. 9, No. 2, 2009, pp. 69–83.

Martino, S., R. Weinick, D. E. Kanouse, J. Brown, A. M. Haviland, E. Goldstein, J. L. Adams, K. Hambarsoomian, and M. N. Elliott, "Reporting CAHPS and HEDIS Data by Race/Ethnicity for Medicare Beneficiaries," *Health Services Research*, Vol. 48, No. 2, 2013, pp. 417–434.

National Committee for Quality Assurance, "HEDIS & Performance Measurement," 2017a. As of June 15, 2018:
http://www.ncqa.org/hedis-quality-measurement

National Committee for Quality Assurance, "HEDIS 2017 Volume 2: Technical Specifications for Health Plans," Washington, D.C., 2017b.

NCQA—*See* National Committee for Quality Assurance.

Paddison, C. A., M. N. Elliott, A. M. Haviland, D. O. Farley, G. Lyratzopoulos, K. Hambarsoomian, J. W. Dembosky, and M. O. Roland, "Experiences of Care Among Medicare Beneficiaries with ESRD: Medicare Consumer Assessment of Healthcare Providers and Systems (CAHPS) Survey Results, *American Journal of Kidney Diseases*, Vol. 61, No. 3, 2013, pp. 440–449.

Appendix Table: Reportability of Measures for Overall Rural-Urban Comparisons and Rural-Urban Comparisons Within Race and Ethnicity

	Overall Rural-Urban		Rural-Urban Within Race and Ethnicity							
			API		Black		Hispanic		White	
	Reportable	Rural Score Flagged for Low Precision	Reportable	Rural Score Flagged for Low Precision	Reportable	Rural Score Flagged for Low Precision	Reportable	Rural Score Flagged for Low Precision	Reportable	Rural Score Flagged for Low Precision
CAHPS measures										
Getting Needed Care	X				X		X		X	
Getting Appointments and Care Quickly	X				X		X		X	
Customer Service	X				X	X	X		X	
Doctors Who Communicate Well	X				X		X		X	
Care Coordination	X				X		X		X	
Getting Needed Prescription Drugs	X				X		X		X	
Annual Flu Vaccine	X				X		X		X	
HEDIS measures										
Colorectal Cancer Screening	X				X		X		X	
Breast Cancer Screening	X		X		X		X		X	
Diabetes Care: Blood Sugar Testing	X				X		X		X	
Diabetes Care: Eye Exam	X				X		X		X	
Diabetes Care: Kidney Disease Monitoring	X		X	X	X		X		X	
Diabetes Care: Blood Pressure Controlled	X				X		X		X	
Diabetes Care: Blood Sugar Controlled	X				X		X		X	
Statin Use in Patients with Diabetes	X		X		X		X		X	
Medication Adherence for Diabetes—Statins	X		X		X		X		X	
Adult BMI Assessment	X				X	X	X		X	
Controlling Blood Pressure	X				X		X		X	
Statin Use in Patients with Cardiovascular Disease	X		X	X	X		X		X	
Medication Adherence for Cardiovascular Disease—Statins	X		X	X	X		X		X	
Continuous Beta-Blocker Treatment	X				X	X	X		X	
Asthma Medication Ratio in Older Adults	X				X	X	X		X	
Testing to Confirm COPD	X				X		X		X	

Note. API=Asian or Pacific Islander. DDIs=Drug-Disease Interactions. CBSA type used to define rural and nonrural. No CAHPS measures are reportable for API beneficiaries.

Appendix Table (continued): Reportability of Measures for Overall Rural-Urban Comparisons and Rural-Urban Comparisons Within Race and Ethnicity

	Overall Rural-Urban		Rural-Urban Within Race and Ethnicity							
			API		Black		Hispanic		White	
	Reportable	Rural Score Flagged for Low Precision	Reportable	Rural Score Flagged for Low Precision	Reportable	Rural Score Flagged for Low Precision	Reportable	Rural Score Flagged for Low Precision	Reportable	Rural Score Flagged for Low Precision
HEDIS measures (continued)										
Pharmacotherapy Management of COPD Exacerbation—Systemic Corticosteroid	X				X		X		X	
Pharmacotherapy Management of COPD Exacerbation—Bronchodilator	X				X		X		X	
Rheumatoid Arthritis Management	X				X		X		X	
Osteoporosis Management in Women Who Had a Fracture	X				X	X	X		X	
Appropriate Monitoring of Patients Taking Long-Term Medications	X		X		X		X		X	
Avoiding Use of High-Risk Medications in the Elderly	X		X		X		X		X	
Avoiding Potentially Harmful DDIs in Elderly Patients with Chronic Renal Failure	X				X		X		X	
Avoiding Potentially Harmful DDIs in Elderly Patients with Dementia	X		X	X	X		X		X	
Avoiding Potentially Harmful DDIs in Elderly Patients with a History of Falls	X		X	X	X		X		X	
Older Adults' Access to Preventive/Ambulatory Services	X		X		X		X		X	
Medication Reconciliation After Hospital Discharge	X				X		X		X	
Antidepressant Medication Management—Acute Phase Treatment	X		X	X	X		X		X	
Antidepressant Medication Management—Continuation Phase Treatment	X		X	X	X		X		X	
Follow-Up Visit After Hospital Stay for Mental Illness (within 7 days of discharge)	X				X	X	X		X	
Follow-Up Visit After Hospital Stay for Mental Illness (within 30 days of discharge)	X				X	X	X		X	
Initiation of Alcohol or Other Drug Treatment	X				X		X		X	
Engagement of Alcohol or Other Drug Treatment	X				X		X		X	

Note. API=Asian or Pacific Islander. DDIs=Drug-Disease Interactions. CBSA type used to define rural and nonrural. No CAHPS measures are reportable for API beneficiaries.