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SAMPLE

2014-2016 Cohort 17

MEDICARE ADVANTAGE ORGANIZATION

PERFORMANCE MEASUREMENT REPORT

MEDICARE HEALTH

OUTCOMES SURVEY

CENTERS FOR MEDICARE & MEDICAID SERVICES

HEALTH SERVICES ADVISORY GROUP

DEPARTMENT OF HEALTH & HUMAN SERVICES
Centers for Medicare & Medicaid Services
7500 Security Boulevard
Baltimore, Maryland 21244-1850

July 2017

Medicare Advantage Organizations,

The Centers for Medicare & Medicaid Services (CMS) is pleased to provide you with your Medicare Advantage Organization's (MAO) performance measurement results for *2014-2016 Cohort 17* of the Medicare Health Outcomes Survey (HOS). The *2014-2016 Cohort 17 Performance Measurement* Report includes results from the Medicare HOS Versions 2.5 and 3.0. The report presents performance measurement results for MAOs based on data from the Medicare HOS *2014 Cohort 17 Baseline* and *2016 Cohort 17 Follow Up* surveys describing changes in health status over time for beneficiaries. CMS encourages MAOs to examine their results for use in quality improvement activities.

The Performance Measurement Report is distributed to help MAOs understand and find their HOS results for key health indicators. Information on the HOS measures used in the Medicare Star Ratings, as well as additional resources to assist MAOs in their quality improvement efforts, is included in the report. The *2014-2016 Cohort 17 Performance Measurement* Report also includes a Reader's Guide, What's New in the HOS, as well as trend information over recent years for your individual MAO.

For more program information, you may submit inquiries to hos@HCQIS.org or contact Health Services Advisory Group (HSAG) through the HOS Information and Technical Support telephone line at (888) 880-0077, and you may visit the CMS HOS website at https://www.cms.gov/Research-Statistics-Data-and-Systems/Research/HOS/index.html.

Sincerely,

Elizabeth Goldstein, PhD
Director
Division of Consumer Assessment & Plan Performance

MEDICARE HEALTH OUTCOMES SURVEY SAMPLE MAO REPORT

The following is a **sample** version of the *Cohort 17* Performance Measurement Report made available to all Medicare Advantage Organizations (MAOs) participating in the *2014 Cohort 17 Baseline* and *2016 Cohort 17 Follow Up* Medicare Health Outcomes Surveys.

The figures, tables, and text in this document contain example MAO and state level data; however, all references to the *HOS Total* reflect **actual** data.

The Medicare HOS Information and Technical Support Telephone Line (1-888-880-0077), as well as the HOS email address (*hos@HCQIS.org*), are available to provide assistance with report questions and interpretation. A full description of the HOS program may be found at *www.HOSonline.org*.
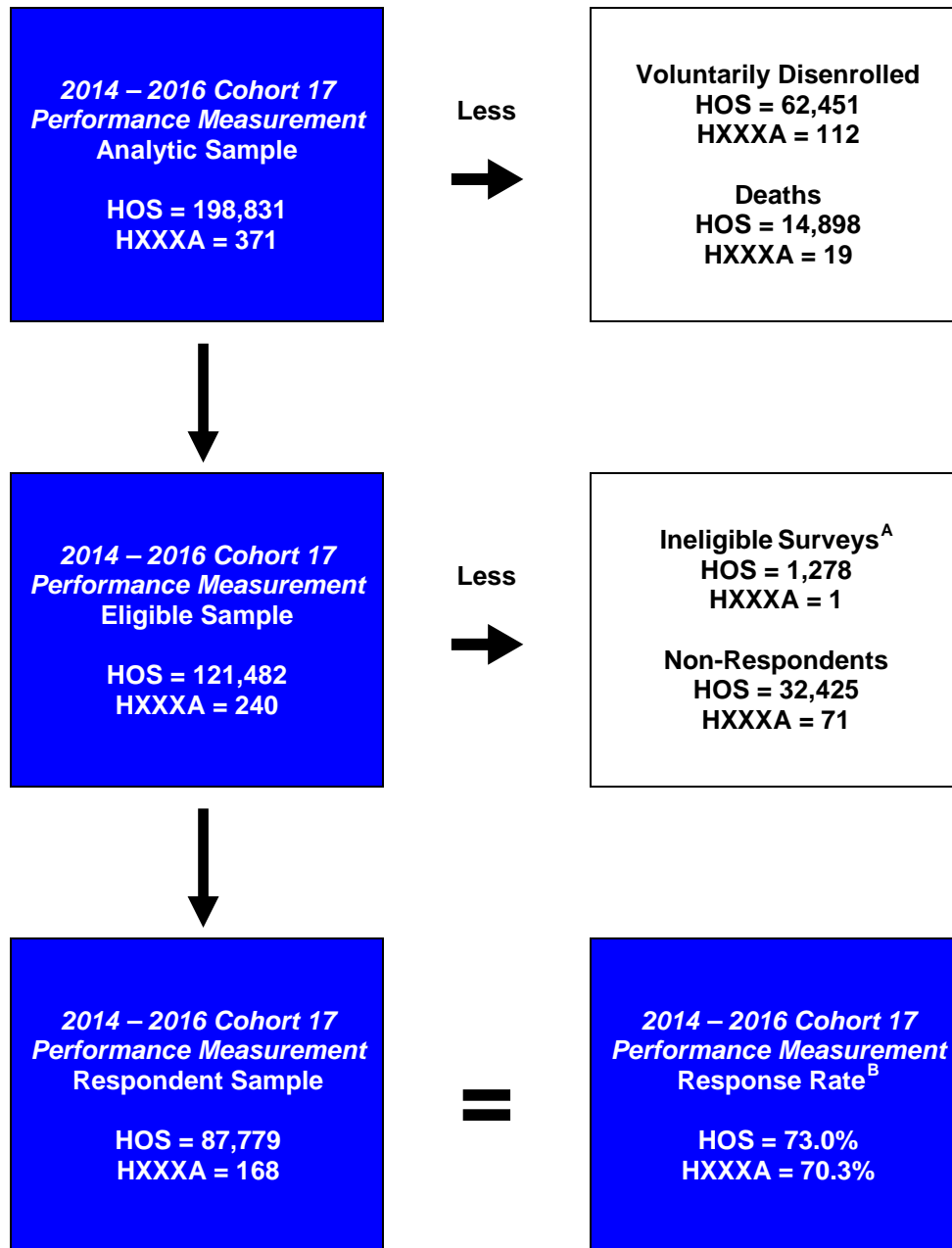
Table of Contents

Executive Summary

This Medicare Health Outcomes Survey (HOS) *2014-2016 Cohort 17 Performance Measurement* Report presents aggregate results for participating Medicare Advantage Organizations (MAOs), as well as specific results for MAO HXXXA based on data from the HOS *2014 Cohort 17 Baseline* and *2016 Cohort 17 Follow Up* surveys. The HOS performance measurement results describe change in health status over time for beneficiaries. The *2014 Cohort 17 Baseline* included a random sample of 575,422 beneficiaries, consisting of both the aged and disabled, from 491 MAOs. Of the 575,422 individuals sampled, 45.5% (261,638) completed the baseline survey. A completed survey was defined as one that could be used to calculate a physical component summary (PCS) or mental component summary (MCS) score. Of the 261,638 respondents, 219,050 were seniors (age 65 or older) who returned a completed survey. During the two years between the baseline and follow up surveys, several MAOs discontinued offering managed care to Medicare beneficiaries or consolidated with other MAOs. As a result of these changes, there remained 349 contract reporting units (MAOs), comprising 198,831 baseline respondents in the HOS *Cohort 17*. This group of 198,831 seniors comprises the *Cohort 17 Performance Measurement* analytic sample.

At the time of follow up, 121,482 beneficiaries were seniors who had completed a baseline survey and were still enrolled in their original MAO. These beneficiaries are referred to as the *Cohort 17 Performance Measurement* eligible sample since they were alive and eligible for remeasurement. After removing 1,278 beneficiaries who were determined to be ineligible at follow up, 120,204 beneficiaries remained. A total of 87,779 beneficiaries returned a follow up survey with a calculable PCS or MCS score, yielding a follow up response rate of 73.0%. These 87,779 beneficiaries comprise the *Cohort 17 Performance Measurement* respondent sample. Figure 1 on the following page depicts the distribution of the sample and the response rates for the national HOS sample and your MAO.

On the following pages of this Executive Summary, the reader will find results for MAO HXXXA, StateXX, and the HOS Total respondent sample across key indicators of beneficiary health status. For instance, the primary physical and mental health results are included as well as trend results for the current and previous two cohorts. In addition, the Executive Summary provides the distribution of beneficiary responses at baseline and follow up for general and comparative health, chronic medical conditions, healthy days, and obesity measures. More detailed information about the results is provided in the *Cohort 17 Performance Measurement* Results section of the report. For MAOs with a small number of respondents, caution should be exercised when drawing conclusions from the results throughout this follow up report. Note that the state level statistics in any figures and tables are *not applicable* (NA) for Regional Preferred Provider Organization (RPPO) and Private Fee-for-Service (PFFS) contracts. For reporting purposes, these types of plans are not included in any specific state numbers; however, they are included in the HOS Total number.

Figure 1: Distribution of the Performance Measurement Sample and Response Rates for HOS Total and MAO HXXXA

2014 – 2016 Cohort 17 Performance Measurement Analytic Sample **HOS = 198,831** **HXXXA = 371**	**Less** →	**Voluntarily Disenrolled** **HOS = 62,451** **HXXXA = 112** **Deaths** **HOS = 14,898** **HXXXA = 19**
↓		
2014 – 2016 Cohort 17 Performance Measurement Eligible Sample **HOS = 121,482** **HXXXA = 240**	**Less** →	**Ineligible Surveys[A]** **HOS = 1,278** **HXXXA = 1** **Non-Respondents** **HOS = 32,425** **HXXXA = 71**
↓		
2014 – 2016 Cohort 17 Performance Measurement Respondent Sample **HOS = 87,779** **HXXXA = 168**	**=**	**2014 – 2016 Cohort 17 Performance Measurement Response Rate[B]** **HOS = 73.0%** **HXXXA = 70.3%**

[A] Beneficiaries with ineligible surveys at follow up met one of the following criteria: not enrolled in the MAO; had an incorrect address and phone number; or had a language barrier.

[B] Response Rate = [Respondent Sample/(Eligible Sample-Ineligible Surveys)] x 100%.

HOS Performance Measurement Results

The HOS national average, also referred to as the HOS Total, is based on all MAOs that participated in performance measurement. Outliers are those MAOs that performed significantly better or significantly worse than expected when compared to the national average. MAOs may be outliers on a measure of physical health, mental health, or both. The overall measure of change in physical health is calculated by combining death status and PCS score. Change in mental health is calculated with the MCS score.

For the *2014-2016 Cohort 17 Performance Measurement*, statistical assessment of the case-mix adjusted results for mortality and PCS revealed 34 outlier MAOs. There were 11 outlier MAOs designated as "better than expected" and 23 outlier MAOs designated as "worse than expected" compared to the national average. For MCS, statistical assessment of the case-mix adjusted results revealed 24 outlier MAOs. There were 6 outlier MAOs designated as "better than expected" and 18 outlier MAOs designated as "worse than expected" compared to the national average. More performance measurement results and details are provided in Tables 1 and 2 below and in the *Cohort 17 Performance Measurement* Results section.

Trends in Performance Measurement Results for MAO HXXXA

Table 1 presents the trends in the physical health performance measurement results for your MAO. The current cohort results are provided and, when available, results for the past two cohorts are also shown for comparison. Note that the Medicare Star Ratings measure for *Improving or Maintaining Physical Health* is derived from the combined "Percent Better+Same" result in Table 1. You can find more information about the Medicare Star Ratings in the HOS and the Star Ratings section.

Table 1: Trends in Physical Health Results over Three Cohorts for MAO HXXXA

	Percent Better*	Percent Same*	Percent Worse*	Percent Better+Same*	Performance Results**
2014-2016 Cohort 17	15.65%	52.56%	31.79%	68.21%	⇔
2013-2015 Cohort 16	16.56%	50.26%	33.18%	66.82%	⇔
2012-2014 Cohort 15	17.24%	49.84%	32.92%	67.08%	⇔

NA indicates that the MAO did not have results for the specified cohort.
* The percent better, same, worse, or better+same refers to beneficiary health status within an MAO.
** The statistical significance of each performance result for the MAO is indicated by one of the following symbols:
    ⬆ MAO performed significantly better than expected (higher than the national average)
    ⬇ MAO performed significantly worse than expected (lower than the national average)
    ⇔ MAO performed as expected (the same as the national average)

Table 2 below presents the trends in the mental health performance measurement results for your MAO. Results for the current cohort and, when available, the past two cohorts are shown. Note that the Medicare Star Ratings measure for *Improving or Maintaining Mental Health* is the combined "Percent Better+Same" result in Table 2.

Table 2: Trends in Mental Health Results over Three Cohorts for MAO HXXXA

	Percent Better*	Percent Same*	Percent Worse*	Percent Better+Same*	Performance Results**
2014-2016 Cohort 17	21.66%	63.11%	15.22%	84.78%	⇔
2013-2015 Cohort 16	21.52%	62.45%	16.03%	83.97%	⇔
2012-2014 Cohort 15	19.17%	58.94%	21.88%	78.12%	⇔

NA indicates that the MAO did not have results for the specified cohort.
Please note: There were changes to the survey format beginning with the 2015 HOS 3.0 that resulted in an increase in MCS scores for the Cohort 17 Follow Up mail mode administration.
* The percent better, same, worse, or better+same refers to beneficiary health status within an MAO.
** The statistical significance of each performance result for the MAO is indicated by one of the following symbols:
    ⬆ MAO performed significantly better than expected (higher than the national average)
    ⬇ MAO performed significantly worse than expected (lower than the national average)
    ⇔ MAO performed as expected (the same as the national average)

Health Status Summary for MAO HXXXA

General Health and Comparative Health

Table 3 describes baseline and follow up results for the general and comparative health status of beneficiaries in your MAO HXXXA, StateXX, and the HOS Total. Populations with increases in the proportion of beneficiaries from baseline to follow up who indicated that their *general health* was "Fair" or "Poor" or that their *physical* or *mental health compared to one year ago* was "Slightly worse" or "Much worse" may assume greater risk for mortality.[1,2]

Table 3: *2014-2016 Cohort 17 Performance Measurement* Distributions of Beneficiaries with Worse Self-Rated General and Comparative Health Status for MAO HXXXA, StateXX, and HOS Total

	General Health Fair or Poor		Comparative Physical Slightly Worse or Much Worse		Comparative Mental Slightly Worse or Much Worse	
	Baseline	Follow Up	Baseline	Follow Up	Baseline	Follow Up
HXXXA	15.1%	19.5%	20.4%	24.4%	6.7%	13.0%
StateXX	21.5%	24.5%	24.6%	25.3%	12.1%	11.7%
HOS Total	21.6%	24.7%	23.2%	26.0%	10.9%	11.4%

Sample Medicare HOS 2014-2016 Cohort 17 Performance Measurement Results
July 2017
    Sample MAO Data
    Page 4

Chronic Medical Conditions

Table 4 shows the percentage of beneficiaries with multiple (i.e., two or more) chronic medical conditions at baseline and follow up for your MAO HXXXA, StateXX, and the HOS Total. Research demonstrates that having a greater number of chronic conditions increases the risks of the following outcomes: mortality, poor functional status, unnecessary hospitalizations, adverse drug events, duplicative tests, and conflicting medical advice.[3] It may be useful to compare the relative differences in the results from baseline to follow up for your MAO HXXXA, StateXX, and the HOS Total.

Table 4: *2014-2016 Cohort 17 Performance Measurement* Distribution of Beneficiaries with Multiple Chronic Medical Conditions[§] for MAO HXXXA, StateXX, and HOS Total

	Multiple Chronic Medical Conditions[§]	
	Baseline	Follow Up
HXXXA	76.8%	77.0%
StateXX	77.5%	78.8%
HOS Total	74.8%	77.1%

§ Multiple chronic medical conditions are defined as having two or more conditions.

Healthy Days Measures

Table 5 shows the percentages of beneficiaries in your MAO HXXXA, StateXX, and the HOS Total with 14 or more days of poor *physical health*, *mental health*, or *activity limitations in the past 30 days*. In general, 14 or more days of poor health or activity limitations are considered indicative of poor well-being.[4] Healthy Days Measures serve as indicators of populations with greater risk for disease or injury. MAOs may use responses to Healthy Days Measures to identify beneficiaries in poor health who may have undiagnosed conditions or are having difficulty managing their chronic diseases. It may be useful to compare the relative differences in the results for your MAO HXXXA, StateXX, and the HOS Total.

Table 5: *2014-2016 Cohort 17 Performance Measurement* Distribution of Beneficiaries with Worse Health for the Healthy Days Measures for MAO HXXXA, StateXX, and HOS Total

	14 or More Days of Poor Physical Health		14 or More Days of Poor Mental Health		14 or More Days of Activity Limitations	
	Baseline	Follow Up	Baseline	Follow Up	Baseline	Follow Up
HXXXA	16.6%	16.0%	6.2%	10.6%	9.2%	12.2%
StateXX	17.6%	17.3%	10.0%	9.5%	11.0%	13.2%
HOS Total	16.3%	18.8%	9.1%	9.7%	10.9%	12.7%

Clinical Measures

Table 6 illustrates the distribution of underweight, overweight, and obese beneficiaries across baseline and follow up for your MAO HXXXA, StateXX, and the HOS Total. These Body Mass Index (BMI) categories are considered unhealthy and are associated with increased chronic diseases, and in the case of the underweight, increased mortality for the elderly. It may be useful to compare the proportion of beneficiaries who are in these unhealthy BMI categories for your MAO HXXXA, StateXX, and the HOS Total.

Table 6: *2014-2016 Cohort 17 Performance Measurement* **Distribution of Beneficiaries in Extreme Categories of the BMI Measures for MAO HXXXA, StateXX, and HOS Total**

	Underweight (BMI < 20)		Overweight (BMI 25 to 29.99)		Obese (BMI ≥ 30)	
	Baseline	**Follow Up**	**Baseline**	**Follow Up**	**Baseline**	**Follow Up**
HXXXA	6.1%	4.5%	35.6%	36.4%	35.6%	35.7%
StateXX	5.0%	5.9%	37.8%	38.3%	31.3%	28.4%
HOS Total	4.1%	4.9%	39.0%	37.7%	29.8%	29.8%

Reader's Guide

This Reader's Guide is provided to assist Medicare Advantage Organizations (MAOs) in the use of their Medicare Health Outcomes Survey (HOS) Performance Measurement Report information. This section will guide the reader to identify key topics, such as the Centers for Medicare & Medicaid Services (CMS) Medicare Star Ratings, and answer general questions about the report and data. For further assistance, please refer to the Technical Assistance information below. Additionally, the What's New section in this report has information about new website content, webinars, and HOS program updates.

Technical Assistance

The Medicare HOS Information and Technical Support Telephone Line (1-888-880-0077) and the Email Address (hos@HCQIS.org) are available to provide assistance with report questions and interpretation. Additionally, the CMS HOS website provides general information on the program (https://www.cms.gov/Research-Statistics-Data-and-Systems/Research/HOS/index.html). A full description of the HOS program is available at www.HOSonline.org.

How to Use the Information Contained in this Report

This report is designed to assist MAOs in identifying opportunities to reduce health disparities and explore potential programmatic interventions aimed at maintaining or improving the overall health of their Medicare population. Health status indicators are displayed within demographic groups to emphasize where beneficiaries are doing poorly. This additional detail is included to help plans identify potential areas for further investigation.

What information can I find in this Performance Measurement Report?
The results for key health indicators derived from the cohort of beneficiaries at baseline and the two-year follow up are provided in this report. Please refer to the description of each report section below and to the Table of Contents for the specific section pages.

- **Executive Summary:** highlights the sample distribution and response rates. Physical and mental health results describing changes over time, and baseline and follow up results for other key indicators are provided. Additionally, the MAO reports contain trend tables with the results for the most recent three cohorts, where available.

- **What's New in the HOS:** introduces new and updated HOS program information, self-paced training webinars, and website resources for MAOs and other data users.

- **HOS and the Star Ratings:** discusses the HOS measures that are currently used by CMS for the Medicare Star Ratings. Three of the measures are reported in the HOS Baseline Report and two of the measures are reported in the HOS Performance Measurement Report. Please note that the MAO *Improving Bladder Control* (MUI Treat Rate) measure in the baseline report was revised in 2015 and was not reported in the 2016 or 2017 Medicare Star Ratings; however, the revised measure will be reported in the 2018 Medicare Star Ratings. Beginning with the 2012 Medicare Star Ratings, the *Osteoporosis*

Testing in Older Women measure was moved to the display measures on the CMS website and is not part of the Star Ratings.

- *Cohort 17* **Distribution of the Sample and Response Rates**: summarizes the number of participating beneficiaries and the response rates at the MAO and national levels.

- *Cohort 17 Performance Measurement* **Results:** provides detailed result tables for the primary physical and mental health outcomes measures and other health indicators. Data estimates are provided to the second decimal place for the change score measures (better, same, and worse results) as these estimates are used in the Medicare Star Ratings. This section also provides demographic tables with values highlighted in **red** to indicate sub-groups that are worse off at follow up compared to their baseline. Question numbers in the measure definitions are from the 2016 HOS 3.0 at follow up and may differ from those in the 2014 HOS 2.5 at baseline.

- **Appendix 1:** describes the program, the questions used in the calculation of physical component summary (PCS) and mental component summary (MCS) scores, and the case-mix adjusted outcomes for the performance measurement results.

- **Appendix 2:** displays graphs for selected survey questions. Please note that the percentages in the graphs may not add to 100% due to rounding.

- **Appendix 3:** includes information about the HOS Partners involved in the survey management, instrument design, sampling, administration, report production, and research activities.

- **References:** lists journal articles, technical reports, and website references that are provided throughout the report.

Where can I find additional HOS Program information, such as sampling methodology, and timelines for the reporting and data distribution?
An overview of the HOS Program, the sampling schedule, and program timelines are available on the Program page of the HOS website. A table of MAO report and data distribution is provided on the Data page of the website.

Are HOS measures part of the CMS Medicare Star Ratings?
HOS measures are included in the Medicare Star Ratings, which CMS developed to provide consumer information about MAOs and to reward high performing health plans. CMS displays MAO information in the Medicare Plan Finder (MPF) tool on the http://www.medicare.gov/find-a-plan website and awards quality bonus payments to high performing health plans. For information about the Star Ratings, refer to the HOS and the Star Ratings section in this report.

How are the Performance Measurement Reports distributed?
All reports are distributed electronically to participating MAOs through the CMS Health Plan Management System (HPMS), which requires an HPMS User ID. Downloads of the MAO report include summary-level data in a CSV file that can be opened in Excel and contains contract-level survey responses, demographic data, and the two HOS functional health measures from the Medicare Star Ratings. If assistance is required regarding HPMS access, please contact CMS at hpms_access@cms.hhs.gov.

When will MAOs receive beneficiary level data for *Cohort 17 Performance Measurement*?
The merged baseline and follow up beneficiary level data will be distributed to MAOs in the Fall of 2017. After distribution of their reports, MAOs are notified via the HPMS about the availability of their merged data and how to request it.

Where can I find overall survey results information for earlier HOS cohorts that can be compared to the information in this report?
The Survey Results section under the Survey page on the HOS website provides a table depicting general status information at the national HOS level, including sample sizes, completed surveys, and response rates, for the baseline and follow up cohorts administered and reported to date. Participating MAOs may also access their earlier reports through the HPMS.

Where can I find the 2016 NCQA HEDIS® Measure results?
The 2016 National Committee for Quality Assurance (NCQA) Healthcare Effectiveness Data and Information Set (HEDIS)[5] results for four measures are reported in the NCQA HEDIS Measures section in the HOS *2016 Cohort 19 Baseline* Report. Specific elements of these measures are used for the Medicare Star Ratings. Additional information about the Medicare Star ratings is also available in the HOS and the Star Ratings section of the report.

Need More Help?

- MAOs are encouraged to contact the HOS Technical Support Team at Health Services Advisory Group at hos@HCQIS.org with questions.

- Additional information about peer-reviewed articles, technical reports, and manuals related to the HOS is available on the Resources page of the HOS website (www.HOSonline.org). Consult the Home page for a listing of new reports and general updates.

- A glossary consisting of definitions relevant to the Medicare HOS may be accessed from the "Glossary" link at the bottom of site webpages.

- The Medicare 2014 HOS 2.5 and 2016 HOS 3.0 questionnaires may be downloaded from the Survey page of the HOS website. In addition, the 2016 HOS questionnaire is found in the NCQA HEDIS 2014 and 2016, Volume 6 Specifications for the Medicare Health Outcomes Survey manuals.[6,7] The 2016 manual can be downloaded from the Survey Administration section on the Program page of the HOS website. Copies of other HEDIS Volume 6 publications may be purchased by calling the NCQA Customer Support Telephone Line at 1-888-275-7585 or via NCQA's Secure Online Order Center (www.ncqa.org).

What's New in the HOS

Implementation of HOS 3.0

The 2016 survey administration used the HOS 3.0 that was implemented in 2015. Like the previous versions (HOS 2.0 and 2.5), the HOS 3.0 uses the Veterans RAND 12-Item Health Survey (VR-12) as the core physical and mental health outcomes measures and the four HEDIS Effectiveness of Care measures are the *Osteoporosis Testing in Older Women, Physical Activity in Older Adults, Management of Urinary Incontinence in Older Adults,* and *Fall Risk Management* measures. Modifications from the HOS 2.5 included: changes to questions about leakage of urine, osteoporosis testing in older women, sleep duration and quality, and primary language spoken in the home. In 2015, a formatting change in the survey uses a two column layout for each page. The 2016 HOS 3.0 is available on the Survey page of the HOS website (www.HOSonline.org).

HOS Website Enhancements

To improve access, usability, and function, the HOS website has been migrated to an improved web content management platform with site design and navigability enhancements.

The HOS website is a resource that provides:
- Historical overview of the project
- Updates on project activities
- Reports of ongoing research efforts
- Access to public use files and supporting documentation
- Clearinghouse of electronic information about journal articles, bibliographies, and technical reports relating to the HOS
- Links to project partners

Semiannual HOS Newsletters

The HOS Newsletters contain information about HOS products, services, and timelines; program updates; self-paced training programs; and other relevant topics, such as sharing of best practices. HOS Newsletters are circulated semiannually via email, in winter and summer, to MAO contacts and users of the HOS technical support, and are posted on the HOS website. If you would like to receive the HOS Newsletters, contact the HOS Information and Technical Support team at hos@HCQIS.org.

Participating MAOs

The current MAO Performance Measurement Contract List can be downloaded from the Survey Results section on the Survey page of the HOS website (www.HOSonline.org).

CMS Approved Survey Vendors

The Survey Vendors section on the Program page of the HOS website provides a list of CMS approved survey vendors. There are six survey vendors approved to administer the HOS.

Frequently Asked Questions (FAQs)

The "FAQs" link at the bottom of site webpages (www.HOSonline.org) provides answers to frequently asked questions about the Medicare HOS. Examples are questions about where to find the current survey administration documents and HOS questionnaires, how MAOs may obtain their reports and data, and where to find quality improvement ideas. Information is also provided about the types of files available for researchers and how to obtain the files.

Self-Paced Training Webinars

A series of basic to advanced self-paced training webinars are available on the HOS website. The webinars run approximately 30 minutes in length and may be accessed at any time at the convenience of the user. To access the webinars, go to the Trainings section under the Resources page on the HOS website.

- **Introduction to the Medicare Health Outcomes Survey (HOS):** A basic training session appropriate for MAOs that are new to the HOS or those wanting to obtain an overview of the HOS. In addition, the introductory training program provides some practical guidance about how to obtain HOS reports and data.

- **Getting the Most from Your Medicare Health Outcomes Survey (HOS) Baseline Report:** An intermediate training session that builds on the information from the basic tutorial described above. The training discusses maximizing the use of the HOS Baseline Report to provide information on the health of beneficiaries and incorporating chronic care improvement programs (CCIPs) in quality improvement activities.

- **Using Your Medicare Health Outcomes Survey (HOS) Data:** An intermediate training session assisting MAOs with using their HOS data to identify priorities and assess the impact of interventions. It also demonstrates the advantages of linking HOS data with your own MAO data.

- **Understanding the Medicare Health Outcomes Survey (HOS) Performance Results Used in the MA Plan Ratings:** An advanced training session describing the methodology used in calculating the Performance Measurement Results. The tutorial discusses the primary health outcomes collected from the survey, the PCS and MCS scores, and how they are used to describe changes in the functional status of MAO beneficiaries over a two-year period. It also discusses how the HOS results are used in the Medicare Advantage (MA) Plan Ratings, also called the Medicare Star Ratings.

Veterans RAND 12-Item Health Survey (VR-12) Website

Information about the VR-36, VR-12, and VR-6D instruments is available on the Boston University School of Public Health website. The website offers details on development, applications, and references for the VR-12, which is the core health outcomes measure in the Medicare HOS and HOS-M. For information about the instruments and to request permission to use the documentation and scoring algorithms, go to: http://www.bu.edu/sph/research/research-landing-page/vr-36-vr-12-and-vr-6d.

National Cancer Institute (NCI) SEER-MHOS Linked Data Sets

The Surveillance, Epidemiology, and End Results (SEER) and the Medicare Health Outcomes Survey (MHOS) linked data sets are available for researchers. The data sets contain data from cancer patient surveillance linked with patient-reported outcome measures. These data provide researchers with the potential to investigate the health status and Health-Related Quality of Life (HRQOL) of older adults enrolled in MAOs with and without a cancer diagnosis. The SEER-MHOS data sets include SEER data linked with HOS data from baseline and follow up surveys collected during the same time period. Direct person identifiers (i.e., name, address, SSN, and the Medicare Health Insurance Claim number) and plan identifiers (i.e., contract number and plan name) are removed from the linked datasets. Researchers who are interested in using this linked data in their investigations may go to the following website for information: https://healthcaredelivery.cancer.gov/seer-mhos.

HOS and the Star Ratings

Medicare Star Ratings

CMS developed the Medicare Star Ratings to help consumers compare health plans and providers based on quality and performance, to make accurate data more transparent and standardized among plans, and to reward top-performing health plans. Consumers can use the Medicare Plan Finder (MPF) tool (www.medicare.gov/find-a-plan) to search for health plans in their geographic area and compare cost estimates and coverage information. CMS rates the relative quality of service and care provided by MAOs based on a five-star ratings scale that uses HOS measures combined with other measurement results. Up to 47 unique quality measures are included in the 2017 Medicare Part C and D Star Ratings. These measures include: providing preventive services, managing chronic illness, access to care, HEDIS measures, the Consumer Assessment of Healthcare Providers and Systems (CAHPS®) survey, and responsiveness.

The Medicare Part C Star Ratings include five contract level HOS measures: two measures of functional health and three HEDIS Effectiveness of Care measures. The HEDIS Effectiveness of Care measure *Improving Bladder Control* was not reported in the 2016 and 2017 Medicare Star Ratings due to revisions to the measure; however, the revised measure will be reported in the 2018 Medicare Star Ratings.

The functional health measures are reported in each MAO's annual HOS Performance Measurement Report. The results are derived from the VR-12 portion of the HOS, which serves as the core source for the PCS and MCS scores. The final measures are based on the case-mix adjusted PCS and MCS change scores between baseline and follow up surveys, as well as death status. The *Improving or Maintaining Physical Health* measure is the "Physical Health Percent Better or Same" result in the Performance Measurement Report, and the *Improving or Maintaining Mental Health* measure is the "Mental Health Percent Better or Same" result.

The HEDIS Effectiveness of Care measures are reported in each MAO's annual HOS Baseline Report. These measures are calculated from questions about information and care beneficiaries receive from their healthcare providers, using data for the baseline and follow up cohorts from the same measurement year (i.e., a round of data). Beneficiary responses are used to derive the HEDIS measures: Management of Urinary Incontinence in Older Adults, Physical Activity in Older Adults, Fall Risk Management, and Osteoporosis Testing in Older Women. CMS uses three components of these four measures for the Medicare Star Ratings. Further information is available in the NCQA HEDIS Measures section of the HOS Baseline Report:

- *Improving Bladder Control* is the Treatment of Urinary Incontinence rate (not reported in 2016 or 2017 Star Ratings; revised measure reported in 2018 Star Ratings)

- *Monitoring Physical Activity* measure is the Advising Physical Activity rate

- *Reducing the Risk of Falling* measure is the Managing Fall Risk rate

2017 and 2018 Medicare Part C Star Ratings

The HOS cohorts related to data collection, report dissemination, and CMS Medicare Part C Star Ratings results are provided in the Medicare HOS Survey Administration Timeline Table below. This information will guide MAOs in understanding the sources of data used for specific Medicare Star Ratings Measures.

The 2017 Medicare Part C Star Ratings will be used by CMS as the basis for quality bonus payments to reward high performing contracts in the MA program in the 2018 quality bonus payment year. The 2018 quality bonus payments are based on two HOS datasets (refer to the green highlighted section in the table below). For instance, the HOS *2013-2015 Cohort 16 Merged Baseline* and *Follow Up* dataset was used for the two PCS and MCS functional health measures, and the combined *2015 Cohort 18 Baseline* and *2015 Cohort 16 Follow Up* dataset was used for the two HEDIS Effectiveness of Care measures.

The 2018 Medicare Part C Star Ratings will be used by CMS as the basis for quality bonus payments in the 2019 quality bonus payment year (refer to the yellow highlighted section in the Table below). For the 2019 quality bonus payments, the *2014-2016 Cohort 17 Merged Baseline* and *Follow Up* dataset will be used for the two PCS and MCS functional health measures, and the combined *2016 Cohort 19 Baseline* and *2016 Cohort 17 Follow Up* dataset will be used for the three HEDIS Effectiveness of Care measures.

For more information about the Medicare Star Ratings, go to the CMS website at http://go.cms.gov/partcanddstarratings. For any questions related to Medicare Part C and D Star Ratings, you may send an email inquiry directly to PartCandDStarRatings@cms.hhs.gov. Please be sure to include your contract number in the email.

Medicare HOS Survey Administration and Star Ratings Timeline Table

Year	Baseline Data Collected	Follow Up Data Collected	Baseline Reports	Follow Up Reports	2-yr PCS/MCS Change for Star Ratings	HEDIS Measures for Star Ratings	Star Rating Year	Quality Bonus Payment Year
2019	*Cohort 22*	*Cohort 20*	*Cohort 21*	*Cohort 19*	*2015-2017 Cohort 18*	*2017 Cohort 20 Baseline & 2017 Cohort 18 Follow-up*	2019	2019
2018	*Cohort 21*	*Cohort 19*	*Cohort 20*	*Cohort 18*	*2014-2016 Cohort 17*	*2016 Cohort 19 Baseline & 2016 Cohort 17 Follow-up*	2018	2018
2017	*Cohort 20*	*Cohort 18*	*Cohort 19*	*Cohort 17*	*2013-2015 Cohort 16*	*2015 Cohort 18 Baseline & 2015 Cohort 16 Follow-up*	2017	2017
2016	*Cohort 19*	*Cohort 17*	*Cohort 18*	*Cohort 16*	*2012-2014 Cohort 15*	*2014 Cohort 17 Baseline & 2014 Cohort 15 Follow Up*	2016	2016
2015	*Cohort 18*	*Cohort 16*	*Cohort 17*	*Cohort 15*	*2011-2013 Cohort 14*	*2013 Cohort 16 Baseline & 2013 Cohort 14 Follow Up*	2015	2015

* Four HEDIS Effectiveness of Care Measures collected by the HOS are calculated from the combined round of baseline and follow up data by reporting year: Management of Urinary Incontinence in Older Adults; Physical Activity in Older Adults; Fall Risk Management; and Osteoporosis Testing in Older Women. Beginning with the 2012 Medicare Star Ratings, the Osteoporosis Testing in Older Women measure has moved to the display measures on the CMS website and is not part of the Star Ratings. **Note:** The MUI measure was revised in 2015 and was not reported for the 2016 or 2017 Medicare Star Ratings; however, the revised measure will be reported in the 2018 Medicare Star Ratings.

MAO Resources for Best Practices and the Star Ratings

A study titled "Analysis of Key Drivers of Improving or Maintaining Medicare Health Outcomes Survey (HOS) Scores" is available on the HOS website at http://www.hosonline.org/globalassets/hos-online/publications/key_drivers_medicare_hos_scores_2013.pdf.[8] The study describes how two-year mortality and two-year changes in the VR-12 items are associated with key HOS measures used in the Medicare Star Ratings. The HOS measures relate to maintaining and improving health and are derived from changes in the PCS and MCS scores. The results from this study clarify the properties of several CMS quality measures and identify which items most influence contract-level PCS and MCS scores.

A resource guide titled "Opportunities for Improving Medicare HOS Results through Practices in Quality Preventive Health Care for the Elderly" is available on the HOS website at http://hosonline.org/globalassets/hos-online/publications/opportunities_for_improving_medicare_hos_results_2012.pdf.[9] This guide helps MAOs develop and apply strategies that address the HOS items used in the CMS Medicare Part C Star Ratings, including an overview of the HOS, national performance results on HOS items included in the Medicare Part C Star Ratings, best practices in promoting quality preventive health care for the elderly, and HOS resources available to MAOs. Section 1 discusses the prevalence of conditions measured by the HOS items and summarizes national HOS results to highlight opportunities for improvement and intervention strategies. Section 2 provides examples of interventions that some MAOs have used to promote patient/physician communication, screening services, or maintenance of functional status among their beneficiaries.

A companion literature review titled "Functional Status in Older Adults: Intervention Strategies for Impacting Patient Outcomes" is available on the HOS website at http://www.hosonline.org/globalassets/hos-online/publications/functional_status_in_older_adults_2011.pdf.[10] This literature review synthesizes selected articles about functional status outcomes in older adults and supplements the resource guide. The articles include outcomes that target assessments of health from well-established questionnaires spanning the physical to psychological. In addition, outcome measures include Activities of Daily Living (ADLs) that capture functional limitations in MA recipients. The articles were selected because they describe interventions that could impact functional status outcomes in elderly populations.

All three documents are available on the Resources page; the study results may be found in the Applications section and both the resource guide and literature review may be downloaded from the Trainings section at www.HOSonline.org.

Cohort 17 Distribution of the Sample and Response Rates

The *Medicare HOS 2014 Cohort 17 Baseline* included a random sample of 575,422 beneficiaries, including both the aged and disabled, from 491 MAOs. Of those 575,422 individuals sampled, 45.5% (261,638) completed the baseline survey. A completed survey was defined as one that could be used to calculate a PCS or MCS score. Of those 261,638 respondents, 219,050 were seniors (age 65 or older) who returned a completed survey. During the two years between the *2014 Cohort 17 Baseline* survey and the *2016 Cohort 17 Follow Up* survey, several MAOs discontinued offering managed care to Medicare beneficiaries, or consolidated with other MAOs. As a result of these changes, 349 reporting units (MAOs), comprising 198,831 senior baseline respondents, remained in the HOS. For purposes of MAO comparisons, this group of 198,831 beneficiaries comprises the *Cohort 17 Performance Measurement* analytic sample.

The performance measurement results are based on the analytic sample of 198,831 seniors (see Figure 2) and not the entire population sampled at baseline and follow up. At the national level, 14,898 beneficiaries died between baseline and the two-year follow up. Another 62,451 beneficiaries voluntarily disenrolled from their MAOs during the same two-year period. The remaining 121,482 seniors were still alive and enrolled in their original MAO at the time of follow up. These beneficiaries are referred to as the *Cohort 17 Performance Measurement* eligible sample. From the eligible sample, 1,278 beneficiaries were determined to be ineligible at follow up.[C] Of the remaining 120,204 beneficiaries, 32,425 did not respond and 87,779 returned a follow up survey that could be used to calculate a PCS or MCS score. These 87,779 seniors comprise the *Cohort 17 Performance Measurement* respondent sample, yielding a follow up response rate of 73.0%.[D]

Focusing on the 349 reporting units (MAOs) at follow up, the average number of respondents per MAO was 252, with a range of 2 to 3,092 respondents. Twenty-five percent of MAOs had 303 or more respondents, while 25% had 132 or less. Ten percent of the MAOs had 418 or more respondents, and 10% had 59 or fewer respondents. Based on the analytic criteria, the mean MAO level response rate at follow up was 71.4%, with a range of 42.1% to 85.7%. Twenty-five percent of MAOs had a response rate of 75.1% or greater, while 25% had a response rate of 68.9% or less. Ten percent of the MAOs had a response rate of 78.0% or higher, and 10% had a response rate of 63.6% or lower.

MAOs with a small number of respondents should exercise **caution** when drawing conclusions from the results as the sample size may be insufficient to allow meaningful interpretation.

[C] Ineligible beneficiaries at follow up met one of the following criteria: not enrolled in the MAO; had an incorrect address and phone number; or had a language barrier.

[D] The overall baseline and follow up response rates in the report are calculated after data processing and score calculation. Initial overall survey completion rates were calculated by NCQA following each data collection and used the criteria of at least 80% completion of survey items and all 6 Activity of Daily Living (ADL) questions answered. These initial rates may be reported elsewhere and will differ from the overall response rates in this report.

MAO HXXXA

The original baseline sample size for your MAO HXXXA was 1,101; however, 730 beneficiaries were not included in the analytic sample because they did not complete the baseline survey, were not seniors, or were determined to be ineligible beneficiaries at baseline.[E] Therefore, your MAO's analytic sample size is 371. Of the 371 beneficiaries in your MAO's analytic sample, 112 voluntarily disenrolled from your MAO and 19 died between baseline and follow up. Of the 240 beneficiaries sent a follow up survey, one was determined to be ineligible. Of the remaining 239 beneficiaries, there were 71 who did not complete the survey and 168 who returned a completed follow up survey. This represented an overall follow up response rate of 70.3% for your MAO, as compared with the HOS follow up response rate of 73.0%.

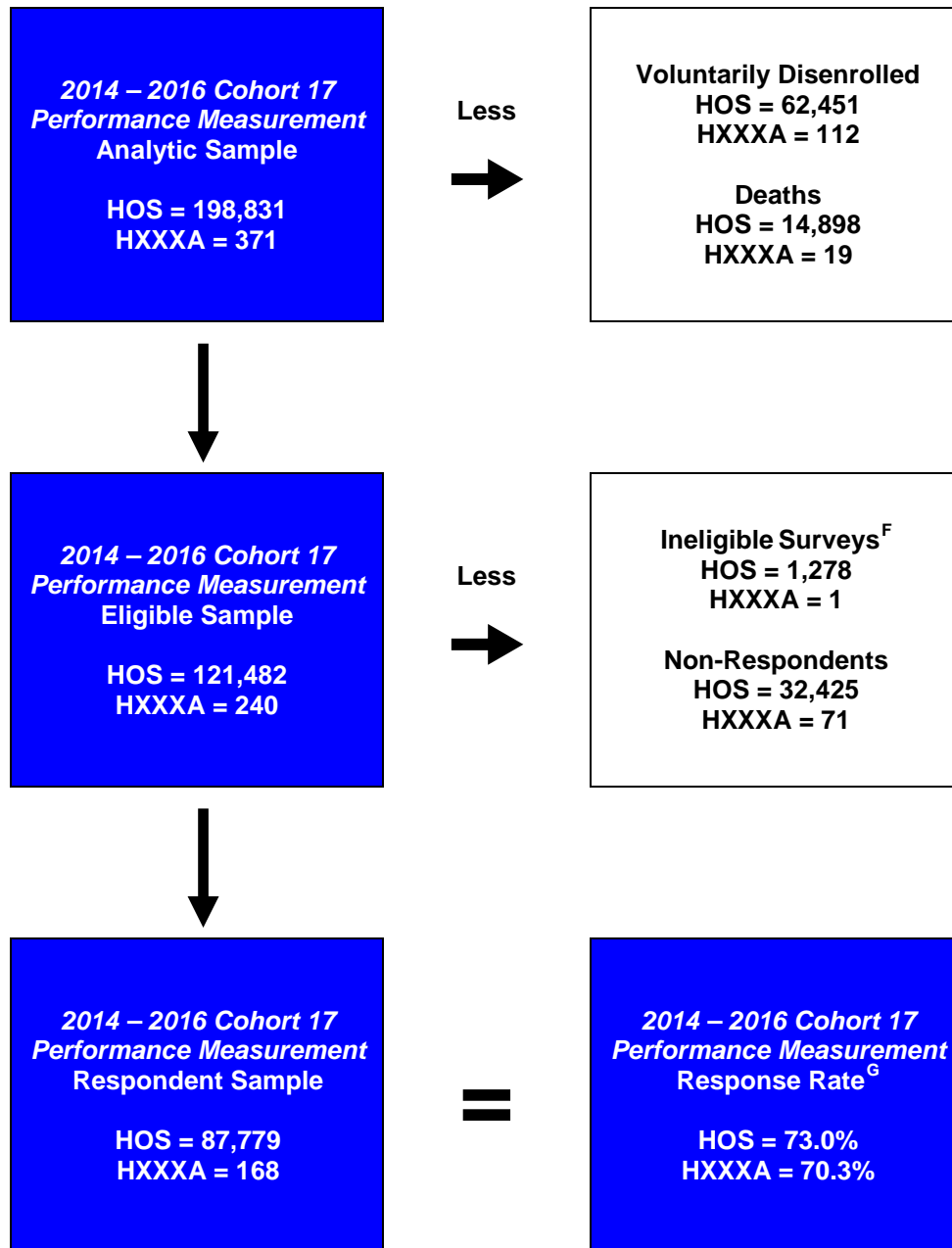On the following page, Figure 2 presents the Distribution of the Performance Measurement Sample and Response Rates for the HOS Total, as well as for your MAO HXXXA.

[E] Ineligible beneficiaries at baseline met one of the following criteria: deceased; not enrolled in the MAO; had an incorrect address and phone number; had a language barrier, or were removed from sample due to age less than 18 years.

Figure 2: Distribution of the Performance Measurement Sample and Response Rates for HOS Total and MAO HXXXA

```
┌─────────────────────────┐                    ┌─────────────────────────┐
│  2014 – 2016 Cohort 17  │                    │  Voluntarily Disenrolled│
│ Performance Measurement │      Less          │     HOS = 62,451        │
│    Analytic Sample      │  ─────────►        │     HXXXA = 112         │
│                         │                    │                         │
│    HOS = 198,831        │                    │        Deaths           │
│    HXXXA = 371          │                    │     HOS = 14,898        │
│                         │                    │     HXXXA = 19          │
└─────────────────────────┘                    └─────────────────────────┘
            │
            ▼
┌─────────────────────────┐                    ┌─────────────────────────┐
│  2014 – 2016 Cohort 17  │                    │  Ineligible Surveys^F    │
│ Performance Measurement │      Less          │     HOS = 1,278         │
│    Eligible Sample      │  ─────────►        │     HXXXA = 1           │
│                         │                    │                         │
│    HOS = 121,482        │                    │    Non-Respondents      │
│    HXXXA = 240          │                    │     HOS = 32,425        │
│                         │                    │     HXXXA = 71          │
└─────────────────────────┘                    └─────────────────────────┘
            │
            ▼
┌─────────────────────────┐                    ┌─────────────────────────┐
│  2014 – 2016 Cohort 17  │                    │  2014 – 2016 Cohort 17  │
│ Performance Measurement │       =            │ Performance Measurement │
│   Respondent Sample     │                    │   Response Rate^G        │
│                         │                    │                         │
│    HOS = 87,779         │                    │     HOS = 73.0%         │
│    HXXXA = 168          │                    │     HXXXA = 70.3%       │
└─────────────────────────┘                    └─────────────────────────┘
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[F] Beneficiaries with ineligible surveys at follow up met one of the following criteria: not enrolled in the MAO; had an incorrect address and phone number; or had a language barrier.
[G] Response Rate = [Respondent Sample/(Eligible Sample-Ineligible Surveys)] x 100%.

Cohort 17 Performance Measurement Results

The HOS *2014-2016 Cohort 17 Performance Measurement* results describe change in health status over time for beneficiaries in your MAO HXXXA. Health outcomes are assessed for a randomly selected set of beneficiaries from each participating MAO contract over a two-year interval, with a baseline measure and a two-year follow up. In general, functional health status, as measured by the PCS score, is expected to decline over time in older age groups, while mental health status as measured by the MCS score is not. The presence of one or more chronic medical conditions is associated with declines in both scores.[11] Though individual health status outcomes depend on individual medical care and personal circumstances, MAO performance may change over time, and is reported in the performance measurement results.

Case-mix variables of demographics and health as well as selected survey design variables are risk adjusted to make equitable health outcome comparisons across MAOs.[6] Risk-adjustment is a statistical technique that adjusts for variations in patient outcomes that stem from differences in existing patient characteristics rather than differences in performance between MAOs. The risk-adjusted outcomes are aggregated for the respondents in your MAO, and yield the MAO level performance measurement results.

The performance measurement analysis compares the percentages of beneficiaries in the MAO who are better, the same, or worse than expected at the two-year follow up in comparison to the national average for both physical and mental health. Death and PCS scores are combined into one overall measure of change in physical health, while mental health is measured by MCS scores alone. There are six main categories of actual health outcomes used in the performance measurement analysis:

1. Alive and physical health better

2. Alive and physical health the same

3. Dead or physical health worse

4. Mental health better

5. Mental health the same

6. Mental health worse

Beneficiaries who were seniors age 65 or older, and who completed the HOS at baseline with a calculable PCS or MCS score, were included in the performance measurement analysis. The MAO two-year death rate was determined from the performance measurement analytic sample. Beneficiaries who also had a calculable PCS or MCS score at follow up were included in the beneficiary level change score analysis.

Beneficiary level results were aggregated to derive the MAO and HOS national percentage values. The HOS national average is based on all MAOs that participated in performance measurement. Outliers are those MAOs that performed significantly better or significantly worse than expected when compared with the national average. MAOs may be outliers on a measure of physical health or on a measure of mental health. An MAO that differed from the HOS national average by less than ± 2 standard deviations over the two-year period (based on

case-mix adjusted results), is performing the same as expected. An MAO that had a significantly *higher* proportion of beneficiaries whose health remained stable or improved (Alive and PCS better or same; MCS better or same) over the two-year period is a positive outlier. An MAO that had a significantly *lower* proportion of beneficiaries whose health improved or remained stable over the two-year period is a negative outlier. For detailed information on the calculation of performance measurement results, see Appendix 1.

Physical Health

Performance measurement results for physical health combine risk-adjusted two-year mortality rates and changes in PCS scores for the primary physical health outcome (Alive and PCS better or same). Over the two-year follow up period, 16.14% of beneficiaries at the national level had better physical health than expected, 51.28% were the same as expected, and 32.58% were worse than expected, compared with the national average. The case-mix adjusted results for mortality and PCS reveal that at the national level, MAOs differed significantly on both the mortality and PCS measures. An overall F test showed that mortality differed significantly at the MAO level ($p < 0.0001$). "PCS better or same" differed significantly across all MAOs ($p = 0.0001$), as did "PCS better" ($p = 0.0003$).

Given that the physical health measures of both "Death" and "PCS better or same" differed significantly at the MAO level, an outlier analysis for the primary outcome (Alive and PCS better or same) was performed using t-tests. In the *Cohort 17 Performance Measurement* results, there were a total of 34 PCS outliers; 11 MAOs were identified as performing better than expected and 23 MAOs were identified as performing worse than expected, compared with the national average for physical health.

How Is Your MAO Doing?

On the next page, Table 7 depicts the Physical Health Performance Measurement results for your MAO HXXXA, each MAO in the state, the state, and HOS Total. Note that the Medicare Star Ratings measure for *Improving or Maintaining Physical Health* is derived from the combined "Percent Better+Same" results (67.42% for the HOS Total in the table).

In terms of <u>physical health</u>, your MAO performed as expected when compared to the HOS national average.

Table 7: *2014-2016 Cohort 17* **Physical Health Performance Measurement Results for MAOs in the state, StateXX and HOS Total**

	Percent Better*	Percent Same*	Percent Worse*	Percent Better+Same*	Performance Results**
HXXXA	15.65%	52.56%	31.79%	68.21%	⇔
HXXXB	14.93%	54.50%	30.57%	69.43%	⇔
HXXXC	15.04%	51.87%	33.09%	66.91%	⇔
HXXXD	16.64%	52.46%	30.89%	69.11%	⇔
HXXXE	16.37%	50.93%	32.70%	67.30%	⇔
StateXX	16.40%	51.81%	31.80%	68.20%	
HOS Total	16.14%	51.28%	32.58%	67.42%	

* The percent better, same, worse, or better+same refers to beneficiary health status within an MAO.

** The statistical significance of the performance result for the MAO is indicated by one of the following symbols:

⬆ MAO performed significantly better than expected (higher than the national average)

⬇ MAO performed significantly worse than expected (lower than the national average)

⇔ MAO performed as expected (the same as the national average)

Data estimates are provided to the second decimal place for PCS and MCS change score measures as these estimates are used in the Medicare Star Ratings.

Mental Health

Performance measurement results for mental health are based on risk-adjusted two-year changes in MCS scores for the primary mental health outcome (MCS better or same). Over the two-year follow up period for mental health (MCS) at the national level, 20.90% of beneficiaries were better than expected, 64.24% were the same as expected, and 14.86% were worse than expected. The case-mix adjusted results for MCS reveal that at the national level MAOs differed significantly on this measure also. An overall F test showed that "MCS better or same" differed significantly at the MAO level ($p = 0.0003$), as did "MCS better" ($p < 0.0001$).

Given that the primary mental health outcome measure (MCS better or same) differed significantly at the MAO level, outlier analysis for MCS was performed using t-tests. In the *Cohort 17 Performance Measurement* results, there were a total of 24 MCS outliers: 6 MAOs were identified as performing better than expected and 18 MAOs were identified as performing worse than expected compared with the national average for mental health.

The MCS may also be used as a screening tool for depression risk. Previous research suggested that individuals from a sample of the 1998 U.S. general population who have an MCS score of 42 or below are at increased risk for depression.[11] However, more recent results from a Medicare population suggest an MCS score of 48 or below provides a reasonably predictive cut-off for depression risk in the elderly Medicare population.[12]

How Is Your MAO Doing?

On the next page, Table 8 depicts the Mental Health Performance Measurement results for your MAO HXXXA, each MAO in the state, the state, and HOS Total. Note that the Medicare Star Ratings measure for *Improving or Maintaining Mental Health* is derived from the combined "Percent Better+Same" result (85.14% for the HOS Total in the table).

In terms of <u>mental health</u>, your MAO performed as expected when compared to the HOS national average.

Table 8: *2014-2016 Cohort 17* Mental Health Performance Measurement Results for MAOs in the state, StateXX and HOS Total

	Percent Better*	Percent Same*	Percent Worse*	Percent Better+Same*	Performance Results**
HXXXA	21.66%	63.11%	15.22%	84.78%	⇔
HXXXB	21.25%	63.69%	15.05%	84.95%	⇔
HXXXC	22.46%	63.64%	13.90%	86.10%	⇔
HXXXD	18.83%	66.35%	14.82%	85.18%	⇔
HXXXE	19.85%	63.03%	17.12%	82.88%	⇔
StateXX	20.90%	64.21%	14.89%	85.11%	
HOS Total	20.90%	64.24%	14.86%	85.14%	

Please note: There were changes to the survey format beginning with the 2015 HOS 3.0 that resulted in an increase in MCS scores for the Cohort 17 Follow Up mail mode administration.

* The percent better, same, worse, or better+same refers to beneficiary health status within an MAO.

** The statistical significance of the performance result for the MAO is indicated by one of the following symbols:

⬆ MAO performed significantly better than expected (higher than the national average)

⬇ MAO performed significantly worse than expected (lower than the national average)

⇔ MAO performed as expected (the same as the national average)

Data estimates are provided to the second decimal place for PCS and MCS change score measures as these estimates are used in the Medicare Star Ratings.

Demographics

Table 9 presents the distribution of beneficiaries' age, gender, race, marital status, educational level, annual household income, and Medicaid status at baseline and follow up for your MAO and the HOS Total respondent sample.

Table 9: *2014-2016 Cohort 17 Performance Measurement* Demographics for MAO HXXXA and HOS Total at Baseline and Follow Up

	MAO HXXXA		HOS Total	
	Baseline	**Follow Up**	**Baseline**	**Follow Up**
Age	(N=168)	(N=168)	(N=87,779)	(N=87,779)
65-69	25.0%	12.5%	29.6%	17.8%
70-74	26.2%	29.8%	28.1%	29.8%
75-79	23.8%	26.2%	20.1%	22.8%
80-84	16.1%	17.3%	13.2%	16.0%
85+	8.9%	14.3%	9.0%	13.7%
Gender	(N=168)	(N=168)	(N=87,779)	(N=87,779)
Male	39.3%	39.3%	41.2%	41.2%
Female	60.7%	60.7%	58.8%	58.8%
Race	(N=168)	(N=168)	(N=87,779)	(N=87,779)
White	81.5%	81.5%	84.1%	84.1%
Black	10.1%	10.1%	8.8%	8.8%
Other/Unknown	8.3%	8.3%	7.1%	7.1%
Marital Status	(N=168)	(N=165)	(N=86,608)	(N=84,721)
Married	61.9%	58.8%	56.0%	53.5%
Widowed	19.6%	23.6%	23.9%	26.8%
Divorced or Separated	14.3%	13.9%	15.7%	15.4%
Never Married	4.2%	3.6%	4.4%	4.3%
Education	(N=161)	(N=163)	(N=86,095)	(N=84,021)
Did Not Graduate HS	16.8%	21.5%	18.4%	18.1%
High School Graduate	37.3%	36.2%	33.2%	33.5%
Some College	22.4%	20.9%	25.1%	24.8%
4 Year Degree or Beyond	23.6%	21.5%	23.3%	23.6%
Annual Household Income	(N=157)	(N=150)	(N=80,248)	(N=78,030)
Less than $10,000	5.7%	9.3%	10.6%	10.6%
$10,000-$19,999	19.1%	19.3%	18.0%	17.2%
$20,000-$29,999	14.0%	14.0%	16.2%	16.0%
$30,000-$49,999	24.2%	22.0%	21.5%	21.6%
$50,000 or More	20.4%	26.0%	22.8%	23.7%
Don't Know	16.6%	9.3%	10.8%	10.9%
Medicaid Status	(N=168)	(N=168)	(N=87,778)	(N=87,775)
Medicaid	19.6%	19.0%	15.9%	16.6%
Non-Medicaid	80.4%	81.0%	84.1%	83.4%

General Health and Comparative Health

Definition of Measures

- General health status is a self-reported measure of health perception using ratings of "Excellent," "Very good," "Good," "Fair," or "Poor."[13] This measure is found in Question 1 of the 2016 HOS 3.0.
- Two measures of physical and mental health compared with one year ago use ratings of "Much better," "Slightly better," "About the same," "Slightly worse," or "Much worse." These measures are found in Questions 8 and 9.

General self-rated health status is a valid and reliable method for assessing health across different populations.[2] Individuals who indicate that their general health was "Fair" or "Poor," or that their physical or mental health compared with one year ago was "Slightly worse" or "Much worse," are known to be at increased risk for near future hospitalization, use of mental health services, and mortality.[2,14,15]

How Is Your MAO Doing?

Table 10 presents the distribution of beneficiaries across *self-rated general health*, *physical health compared to one year ago*, and *mental health compared to one year ago* for MAO HXXXA and the HOS Total respondent sample at baseline and follow up.

Table 10: *2014-2016 Cohort 17 Performance Measurement* Frequency of Self-Rated General and Comparative Health Responses for MAO HXXXA and HOS Total at Baseline and Follow Up

	MAO HXXXA		HOS Total	
	Baseline	**Follow Up**	**Baseline**	**Follow Up**
Self-Rated Health Status	**N (%)**	**N (%)**	**N (%)**	**N (%)**
General Health				
Excellent to Good*	141 (84.9%)	132 (80.5%)	67,969 (78.4%)	65,303 (75.3%)
Fair or Poor	25 (15.1%)	32 (19.5%)	18,689 (21.6%)	21,411 (24.7%)
Comparative Health-Physical				
Much Better to About the Same**	133 (79.6%)	124 (75.6%)	67,152 (76.8%)	63,399 (74.0%)
Slightly Worse or Much Worse	34 (20.4%)	40 (24.4%)	20,260 (23.2%)	22,228 (26.0%)
Comparative Health-Mental				
Much Better to About the Same**	154 (93.3%)	140 (87.0%)	76,968 (89.1%)	74,840 (88.6%)
Slightly Worse or Much Worse	11 (6.7%)	21 (13.0%)	9,424 (10.9%)	9,670 (11.4%)

* Categories for general health included "Excellent," "Very good," or "Good."
** Categories for comparative health included "Much better," "Slightly better," or "About the same."

Depression

Definition of Measures

- The HOS includes two questions (Questions 39a and 39b) that serve as a screening measure for depression.[H] Each question is assigned points depending on the response given, from 0 ("not at all") to 3 ("nearly every day"). Beginning with the 2013 HOS 2.5, a Medicare beneficiary is considered to have a positive depression screen when he or she scores three points or greater on the combined total points of the two depression questions, when both questions are answered.

Individuals with a positive depression screen may be at risk for depressive disorders. Depression is underdiagnosed in the elderly Medicare population, and is a significant health problem that has been linked to poor health outcomes.[12,16] Older adults may suffer mental distress associated with limitations in daily activities, physical impairments, grief from loss of loved ones, changes in living situations, or untreated mental illness.[17] Additionally, depression is significantly associated with other psychological dysfunction, as well as the presence of common chronic medical conditions, such as diabetes.[18,19]

Depression screening tools, such as the one used in the HOS, have been developed for use in clinical settings to rapidly identify individuals at risk for major depression. Those with positive depression screens should be followed-up by more comprehensive diagnostic evaluations to identify whether or not they have major depression.[20,21] Evidence-based programs have been developed to improve mental health among older adults. Social supports through local area agencies may also be effective.[17]

How Is Your MAO Doing?

Table 11 depicts the percentage of beneficiaries with a positive depression screen, and the distribution of responses to the two individual depression questions for MAO HXXXA, and the HOS Total respondent sample at baseline and follow up.

[H] Beginning with the 2013 HOS 2.5, two depression screening questions from the Patient Health Questionnaire-2 (PHQ-2) replaced the questions that served as the depression screening measure in previous versions of the HOS. Due to the new depression screening methodology, estimates of the proportion with positive depression screens in this report are not comparable to estimates produced using the HOS versions 1.0 or 2.0. (See Questions 36-39 on the 2012 HOS 2.0 Instrument at http://www.hosonline.org/en/survey-instrument/and the Glossary description of the depression screen at http://www.hosonline.org/en/glossary/.)

Table 11: *2014-2016 Cohort 17 Performance Measurement* **Frequency of Positive Depression Screen Responses for MAO HXXXA and HOS Total at Baseline and Follow Up**

Depression Screening Questions	MAO HXXXA		HOS Total	
	Baseline N (%)	Follow Up N (%)	Baseline N (%)	Follow Up N (%)
Little interest or pleasure in doing things in past two weeks				
Not at all (0 pt)	137 (82.5%)	119 (73.0%)	63,532 (73.8%)	59,565 (70.9%)
Several days (1 pt)	21 (12.7%)	30 (18.4%)	14,385 (16.7%)	15,684 (18.7%)
More than half the days (2 pt)	5 (3.0%)	5 (3.1%)	4,649 (5.4%)	4,697 (5.6%)
Nearly every day (3 pt)	3 (1.8%)	9 (5.5%)	3,515 (4.1%)	4,060 (4.8%)
Feeling down, depressed, or hopeless in past two weeks				
Not at all (0 pt)	142 (86.1%)	131 (80.9%)	67,880 (78.9%)	64,955 (77.2%)
Several days (1 pt)	15 (9.1%)	22 (13.6%)	12,770 (14.8%)	14,003 (16.6%)
More than half the days (2 pt)	7 (4.2%)	4 (2.5%)	3,257 (3.8%)	3,037 (3.6%)
Nearly every day (3 pt)	1 (0.6%)	5 (3.1%)	2,109 (2.5%)	2,172 (2.6%)
Positive Depression Screen*	9 (5.5%)	15 (9.3%)	7,858 (9.2%)	8,338 (10.0%)

* A positive depression screen is defined as scoring 3 points or greater on the sum total of the two depression questions, when both questions are answered.

Pain

Definition of Measures

- The HOS includes three questions to measure self-reported pain over the previous seven days. Question 36 asks how much pain interfered with day-to-day activities and Question 37 asks how often pain kept the beneficiary from socializing. Both Questions 36 and 37 have five possible categorical responses. Question 38 asks the beneficiary to rate his/her average pain, ranging from 1 ("no pain") to 10 ("worst imaginable pain").

Self-reported pain is common among seniors. Without proper pain management, opioid abuse[22,23] and alcohol abuse[24] are increasing among seniors as they attempt to control their pain. Several organizations have published recommendations on what should be done to improve the safety of opioid prescribing, including decreasing the risk of addiction and abuse.[25]

Pain screening is the initial step in establishing an appropriate pain management program for elderly beneficiaries. In fact, The Joint Commission requires assessment of pain when clinically indicated for patients in accredited hospitals, clinics, and long-term care facilities.[25] Physical activity and complementary medicine techniques may be helpful alternatives in relieving certain types of pain.[26]

How Is Your MAO Doing?

Table 12 shows the distribution of self-rated pain scores, grouped into categories, for MAO HXXXA and the HOS Total respondent sample at baseline and follow up.

Table 12: *2014-2016 Cohort 17 Performance Measurement* Frequency of Self-Rated Pain Score for MAO HXXXA and HOS Total at Baseline and Follow Up

	MAO HXXXA		HOS Total	
	Baseline	**Follow Up**	**Baseline**	**Follow Up**
Pain Score	**N (%)**	**N (%)**	**N (%)**	**N (%)**
1 (None)	62 (38.0%)	54 (33.1%)	27,065 (31.5%)	23,777 (28.4%)
2-4	61 (37.4%)	68 (41.7%)	36,646 (42.6%)	37,422 (44.7%)
5-7	30 (18.4%)	28 (17.2%)	16,102 (18.7%)	16,290 (19.5%)
8-10	10 (6.1%)	13 (8.0%)	6,156 (7.2%)	6,202 (7.4%)

Table 13 illustrates the relationship between the reported extent that pain interfered with day-to-day activities and the mean unadjusted PCS score for MAO HXXXA and the HOS Total respondent sample at baseline and follow up.

Table 13: *2014-2016 Cohort 17 Performance Measurement* **Mean Unadjusted PCS Score at Baseline and Follow Up by Extent Pain Interfered with Day-to-Day Activities at Follow Up for MAO HXXXA and HOS Total**

	MAO HXXXA		HOS Total	
	Baseline	**Follow Up**	**Baseline**	**Follow Up**
Extent Pain Interfered with Day-to-Day Activities	**Mean (SD)**	**Mean (SD)**	**Mean (SD)**	**Mean (SD)**
Not at All	48.2 (9.4)	48.9 (8.3)	47.5 (9.0)	47.9 (8.6)
A Little Bit	39.7 (9.7)	36.6 (9.4)	41.3 (10.0)	39.9 (9.1)
Somewhat	38.0 (11.8)	32.8 (8.0)	35.1 (10.3)	31.9 (8.9)
Quite a Bit	27.2 (14.3)	24.4 (9.8)	29.9 (10.6)	25.2 (8.5)
Very Much	27.0 (7.7)	21.8 (10.0)	25.9 (10.7)	20.4 (8.9)

Table 14 shows the relationship between the reported extent that pain interfered with socialization with others and the mean unadjusted MCS score for MAO HXXXA and the HOS Total respondent sample at baseline and follow up.

Table 14: *2014-2016 Cohort 17 Performance Measurement* **Mean Unadjusted MCS Score at Baseline and Follow Up by Extent Pain Interfered with Socializing with Others at Follow Up for MAO HXXXA and HOS Total**

	MAO HXXXA		HOS Total	
	Baseline	**Follow Up**	**Baseline**	**Follow Up**
Extent Pain Interfered with Socializing with Others	**Mean (SD)**	**Mean (SD)**	**Mean (SD)**	**Mean (SD)**
Never	57.6 (7.0)	58.6 (5.9)	56.0 (8.0)	57.6 (7.0)
Rarely	49.8 (8.1)	51.3 (12.6)	51.6 (9.7)	52.5 (9.5)
Sometimes	49.2 (10.6)	48.7 (11.0)	47.4 (11.0)	47.2 (10.7)
Often	36.7 (14.0)	42.4 (19.7)	43.1 (12.3)	41.5 (12.2)
Always	46.2 (3.3)	34.1 (3.5)	40.2 (13.4)	36.2 (14.1)

Chronic Medical Conditions

Definition of Measures

- The chronic medical condition questions measure the prevalence of chronic disease across the beneficiary's lifespan. Chronic conditions are those that last a year or more, and require ongoing medical attention and/or limit ADLs. Fifteen measures are found in Questions 20-34.

For older adults, the presence of chronic medical conditions can reduce the quality of life, accelerate a decline in functioning, and lead to conflicting medical advice when care is not coordinated.[3] The increased cost associated with chronic disease is an important factor driving overall Medicare spending.[27] According to the U.S. Department of Health and Human Services, two of three adults over the age of 65 have two or more chronic conditions and the need for coordinated care.[28]

An important feature of the Medicare HOS is the ability to report and quantify self-reported chronic conditions in the MA population. A longitudinal study using HOS data concluded that multiple conditions at baseline and the 2-year follow up were associated with worse health in terms of ADLs and HRQOL, and are important outcomes for intervention to improve long-term health.[29] Research on chronic conditions in the Medicare managed care elderly found that arthritis of the hip/knee contributed to a greater decline in beneficiaries' physical health, compared with other chronic conditions in the HOS.[30] Increasing age is a risk factor for the development of Type 2 Diabetes Mellitus (DM), as well as for the development of complications of DM.[31] In addition, cardiovascular disease (CVD) is the leading cause of morbidity and mortality among diabetics.[32]

How Is Your MAO Doing?

Table 15 shows the prevalence of 15 chronic medical conditions for MAO HXXXA and the HOS Total respondent sample. Depression was added to the chronic condition list in 2013. The chronic medical conditions are quantified in the HOS when beneficiaries positively respond to the question, "Has a doctor ever told you that you had (the specified condition)?"

Table 15: *2014-2016 Cohort 17 Performance Measurement* **Prevalence of Chronic Medical Conditions for MAO HXXXA and HOS Total at Baseline and Follow Up**

Medical Conditions	MAO HXXXA Baseline N (%)	MAO HXXXA Follow Up N (%)	HOS Total Baseline N (%)	HOS Total Follow Up N (%)
Hypertension	120 (72.3%)	124 (76.1%)	58,029 (66.4%)	56,939 (66.9%)
Arthritis - Hip or Knee	67 (40.1%)	71 (43.6%)	35,923 (41.3%)	37,305 (44.0%)
Arthritis - Hand or Wrist	56 (33.7%)	58 (35.8%)	29,846 (34.4%)	31,017 (36.6%)
Diabetes	45 (27.1%)	43 (26.1%)	22,116 (25.4%)	22,257 (26.1%)
Sciatica	38 (23.3%)	46 (28.6%)	19,128 (22.1%)	20,440 (24.1%)
Other Heart Conditions	36 (21.6%)	31 (19.1%)	17,297 (19.9%)	18,650 (22.0%)
Osteoporosis	32 (19.4%)	39 (23.9%)	16,642 (19.2%)	17,692 (20.9%)
Pulmonary Disease	23 (13.9%)	16 (9.8%)	13,145 (15.1%)	14,672 (17.2%)
Depression	18 (10.8%)	19 (11.7%)	14,015 (16.1%)	13,873 (16.4%)
Any Cancer (except skin cancer)	30 (17.9%)	23 (14.2%)	13,397 (15.4%)	13,253 (16.1%)
Coronary Artery Disease	19 (11.5%)	21 (13.0%)	10,334 (11.9%)	11,396 (13.5%)
Myocardial Infarction	13 (7.8%)	14 (8.6%)	7,171 (8.3%)	7,467 (8.8%)
Congestive Heart Failure	9 (5.4%)	13 (8.0%)	5,952 (6.9%)	7,251 (8.6%)
Stroke	8 (4.8%)	9 (5.6%)	5,939 (6.8%)	6,355 (7.5%)
Gastrointestinal Disease	6 (3.6%)	7 (4.3%)	4,264 (4.9%)	4,070 (4.8%)

An earlier study of HOS beneficiaries found that beneficiaries with multiple chronic conditions and risk for depression had the largest mental health decline over the two-year follow up period. In this study, people with multiple chronic conditions had greater risks for mortality, poor functional status, unnecessary hospitalizations, adverse drug events, duplicative tests, and conflicting medical advice.[30]

Table 16 presents the frequencies of beneficiaries who reported none, one, two, three, or four or more chronic medical conditions at baseline and follow up for your MAO and the HOS Total respondent sample.

Table 16: *2014-2016 Cohort 17 Performance Measurement* **Number of Chronic Medical Conditions for MAO HXXXA and HOS Total at Baseline and Follow Up**

Number of Conditions	MAO HXXXA Baseline N (%)	MAO HXXXA Follow Up N (%)	HOS Total Baseline N (%)	HOS Total Follow Up N (%)
None	11 (6.5%)	12 (7.3%)	7,621 (8.7%)	6,676 (7.8%)
1 Condition	28 (16.7%)	26 (15.8%)	14,534 (16.6%)	12,947 (15.1%)
2 Conditions	35 (20.8%)	27 (16.4%)	17,178 (19.6%)	16,083 (18.8%)
3 Conditions	29 (17.3%)	32 (19.4%)	15,517 (17.7%)	14,997 (17.5%)
4 or More Conditions	65 (38.7%)	68 (41.2%)	32,929 (37.5%)	35,061 (40.9%)

In Table 17, the means and standard deviations (SD) for unadjusted PCS and MCS scores at follow up are presented, grouped by the number of chronic medical conditions reported, for your MAO and the HOS Total respondent sample.

Table 17: *2014-2016 Cohort 17 Performance Measurement* **Mean Unadjusted PCS and MCS Scores at Follow Up by Number of Chronic Medical Conditions at Follow Up for MAO HXXXA and HOS Total**

| | Mean (SD) Unadjusted PCS | | Mean (SD) Unadjusted MCS | |
| | MAO HXXXA | HOS Total | MAO HXXXA | HOS Total |
Number of Conditions†	**Mean (SD)**	**Mean (SD)**	**Mean (SD)**	**Mean (SD)**
None	52.8 (4.3)	49.5 (8.1)	58.3 (6.7)	57.6 (6.4)
1 Condition	48.2 (11.2)	47.0 (9.3)	55.8 (9.9)	57.1 (7.1)
2 Conditions	42.6 (13.7)	43.9 (10.3)	57.5 (9.1)	56.3 (8.0)
3 Conditions	37.2 (11.8)	40.4 (11.1)	53.9 (11.0)	55.2 (9.2)
4 or More Conditions	35.6 (10.9)	33.3 (11.6)	55.1 (9.7)	51.1 (11.7)

† If no beneficiaries reported for a category, the result is *not applicable* (NA). If only one member reported in a category, the standard deviation (SD) was *not calculated* (NC).

Activities of Daily Living

Definition of Measures

- ADLs refer to a set of common daily tasks that are necessary for personal self-care and independent living.[33] ADLs include bathing, dressing, eating, getting in or out of chairs, walking, and using the toilet. These measures are found in Question 10. Impairment with ADLs is defined as beneficiaries who reported either difficulty or inability to perform the specific ADL ("Yes, I have difficulty" or "I am unable to do this activity").
- Instrumental Activities of Daily Living (IADLs) assess independent living skills that are more complex than ADLs.[34,35] IADLs include preparing meals, managing money, and taking medications. These measures are in Question 11. For IADLs, impairment is defined as beneficiaries who reported difficulty performing the specific IADL ("Yes, I have difficulty").

Six ADLs are included in the HOS to examine reported difficulty with the performance of daily tasks. Like the Healthy Days Measures, ADLs are considered foundational health indicators; therefore, they are tracked by the federal Healthy People 2020 program.[13] There are three IADLs in the HOS that examine reported difficulty with the performance of tasks of independence.

How Is Your MAO Doing?

Table 18 shows the numbers and percentages of beneficiaries with impairment in each of the six ADLs and three IADLs for your MAO and the HOS Total respondent sample at baseline and follow up.

Table 18: *2014-2016 Cohort 17 Performance Measurement* **Prevalence of Impaired ADLs and IADLs for MAO HXXXA and HOS Total at Baseline and Follow Up**

	MAO HXXXA		HOS Total	
	Baseline	**Follow Up**	**Baseline**	**Follow Up**
Impairment Type	**N (%)**	**N (%)**	**N (%)**	**N (%)**
Activities of Daily Living				
Ability Walking	44 (26.2%)	52 (31.7%)	22,466 (25.6%)	27,031 (31.7%)
Ability Getting In/Out of Chairs	25 (14.9%)	34 (20.6%)	14,808 (16.9%)	17,359 (20.3%)
Ability Bathing	16 (9.5%)	20 (12.1%)	8,868 (10.1%)	11,301 (13.2%)
Ability Dressing	17 (10.1%)	14 (8.5%)	7,126 (8.1%)	8,472 (9.9%)
Ability Using the Toilet	11 (6.5%)	6 (3.7%)	5,200 (5.9%)	6,088 (7.1%)
Ability Eating	4 (2.4%)	3 (1.8%)	2,624 (3.0%)	3,540 (4.1%)
Instrumental Activities of Daily Living*				
Preparing Meals	9 (5.7%)	11 (7.3%)	6,454 (8.0%)	7,444 (9.6%)
Managing Money	5 (3.1%)	5 (3.2%)	3,499 (4.2%)	3,453 (4.3%)
Taking Medications as Prescribed	5 (3.1%)	6 (3.8%)	3,197 (3.8%)	3,314 (4.1%)

* Respondents who indicated "I don't do this activity" to IADL questions were removed from the denominator.

Table 19 presents the frequencies of ADL and IADL impairments at baseline and follow up for your MAO and the HOS Total respondent sample. The ability to perform ADLs is predictive of current disease status and mortality risk,[36,37] while IADLs recognize earlier changes in functioning, and can indicate the need for intervention or further medical work-up.[35]

Table 19: *2014-2016 Cohort 17 Performance Measurement* **Number of ADL and IADL Impairments for MAO HXXXA and HOS Total at Baseline and Follow Up**

	MAO HXXXA		HOS Total	
	Baseline	Follow Up	Baseline	Follow Up
Number of Impairments	N (%)	N (%)	N (%)	N (%)
Activities of Daily Living				
None	119 (70.8%)	99 (60.0%)	61,734 (70.3%)	54,888 (63.8%)
1 ADL Impairment	17 (10.1%)	34 (20.6%)	10,311 (11.7%)	12,360 (14.4%)
2 ADL Impairments	15 (8.9%)	16 (9.7%)	7,031 (8.0%)	8,013 (9.3%)
3 or More ADL Impairments	17 (10.1%)	16 (9.7%)	8,703 (9.9%)	10,738 (12.5%)
Instrumental Activities of Daily Living*				
None	149 (90.9%)	146 (89.6%)	76,936 (88.7%)	73,565 (87.1%)
1 IADL Impairment	12 (7.3%)	13 (8.0%)	7,291 (8.4%)	8,294 (9.8%)
2 IADL Impairments	2 (1.2%)	3 (1.8%)	1,752 (2.0%)	1,835 (2.2%)
3 IADL Impairments	1 (0.6%)	1 (0.6%)	785 (0.9%)	749 (0.9%)

*Respondents who indicated "I don't do this activity" to IADL questions were removed from the denominator.

Table 20 presents means and SDs for unadjusted PCS and MCS scores by the number of ADL and IADL impairments at follow up for your MAO and the HOS Total respondent sample. Multiple impairments are associated with substantially lower PCS and MCS scores for the HOS respondents.

Table 20: *2014-2016 Cohort 17 Performance Measurement* **Mean Unadjusted PCS and MCS Scores at Follow Up by Number of ADL and IADL Impairments at Follow Up for MAO HXXXA and HOS Total**

	Mean (SD) Unadjusted PCS		Mean (SD) Unadjusted MCS	
Impairment Type†	MAO HXXXA	HOS Total	MAO HXXXA	HOS Total
Activities of Daily Living				
None	47.4 (8.8)	45.8 (8.9)	57.2 (7.1)	56.6 (7.5)
1 ADL Impairment	32.9 (10.3)	33.5 (9.6)	57.7 (8.7)	53.8 (10.3)
2 ADL Impairments	29.8 (7.9)	29.2 (9.0)	54.3 (9.3)	51.5 (11.1)
3 or More ADL Impairments	23.3 (8.1)	24.2 (8.7)	42.4 (15.4)	44.3 (13.2)
Instrumental Activities of Daily Living*				
None	42.0 (11.7)	42.0 (11.2)	57.0 (7.8)	55.8 (8.5)
1 IADL Impairment	27.4 (12.5)	27.0 (10.3)	46.9 (15.6)	46.6 (12.1)
2 IADL Impairments	24.1 (15.3)	26.9 (9.5)	40.3 (15.4)	41.0 (11.9)
3 IADL Impairments	31.7 (NC)	26.9 (8.9)	34.6 (NC)	38.0 (11.9)

† If no beneficiaries reported for a category, the result is *not applicable* (NA). If only one member reported in a category, the standard deviation (SD) was *not calculated* (NC).
* Respondents who indicated "I don't do this activity" to IADL questions were removed from the denominator.

Healthy Days Measures

Definition of Measures

- Physically unhealthy days is a self-reported measure of the number of days during the past 30 days when physical health was not good. The measure is found in Question 12.
- Mentally unhealthy days is a self-reported measure of the number of days during the past 30 days when mental health was not good. The measure is found in Question 13.
- Days with activity limitations is a self-reported measure of the number of days during the past 30 days when poor physical or mental health kept the beneficiary from usual activities. The measure is found in Question 14.

Healthy Days Measures provide key information on the functional status of vulnerable sub-populations, and are used to assess the HRQOL[38] across the U.S. As sentinel indicators of present and future disease and injury risk, MAOs can use Healthy Days Measures to identify vulnerable sub-populations for effective preventative care and disease management. According to the CDC, "In recent years, several organizations have found these Healthy Days Measures useful at the national, state, and community levels for (1) identifying health disparities, (2) tracking population trends, and (3) building broad coalitions around a measure of population health compatible with the World Health Organization's definition of health."[39] The CDC HRQOL program considers 14 or more unhealthy days in the past 30 days an indicator of poor well-being.[4]

How Is Your MAO Doing?

Table 21 provides the frequency distributions of Healthy Days Measures for your MAO and HOS Total respondent sample.

Table 21: *2014-2016 Cohort 17 Performance Measurement* **Distribution of Healthy Days Measures for MAO HXXXA and HOS Total at Baseline and Follow Up**

Healthy Days Measures	MAO HXXXA		HOS Total	
	Baseline	**Follow Up**	**Baseline**	**Follow Up**
Physically Unhealthy Days	(N=163)	(N=156)	(N=84,520)	(N=82,081)
None	60.7%	64.1%	57.7%	55.4%
1-13	22.7%	19.9%	26.0%	25.8%
14-30	16.6%	16.0%	16.3%	18.8%
Mentally Unhealthy Days	(N=161)	(N=160)	(N=84,800)	(N=82,333)
None	77.6%	74.4%	70.6%	69.8%
1-13	16.1%	15.0%	20.3%	20.5%
14-30	6.2%	10.6%	9.1%	9.7%
Days with Activity Limitations	(N=163)	(N=156)	(N=84,715)	(N=82,765)
None	80.4%	75.0%	74.2%	71.5%
1-13	10.4%	12.8%	14.9%	15.8%
14-30	9.2%	12.2%	10.9%	12.7%

Table 22 presents the mean unadjusted MCS scores at baseline and follow up for your MAO and the HOS Total respondent sample by the number of mentally unhealthy days at follow up.

Table 22: *2014-2016 Cohort 17 Performance Measurement* **Mean Unadjusted MCS Scores at Baseline and Follow Up by Number of Mentally Unhealthy Days at Follow Up for MAO HXXXA and HOS Total**

	MAO HXXXA		HOS Total	
Mentally Unhealthy Days	**Baseline MCS Mean (SD)**	**Follow Up MCS Mean (SD)**	**Baseline MCS Mean (SD)**	**Follow Up MCS Mean (SD)**
None	57.7 (6.7)	59.7 (5.1)	56.1 (8.0)	58.2 (6.5)
1-13 Days	48.6 (9.2)	46.7 (7.5)	49.3 (9.8)	49.2 (8.3)
14-30 Days	44.4 (13.0)	38.4 (11.3)	42.0 (12.3)	37.1 (10.9)

Figure 3 presents the results of the Healthy Days Measures as the mean number of unhealthy days in the previous 30 days for each of the three measures that were reported by beneficiaries at follow up for your MAO and the HOS Total respondent sample.

Figure 3: *2014 Cohort 17 Performance Measurement* **Mean Number of Unhealthy Days for the Healthy Days Measures for MAO HXXXA and HOS Total at Follow Up**
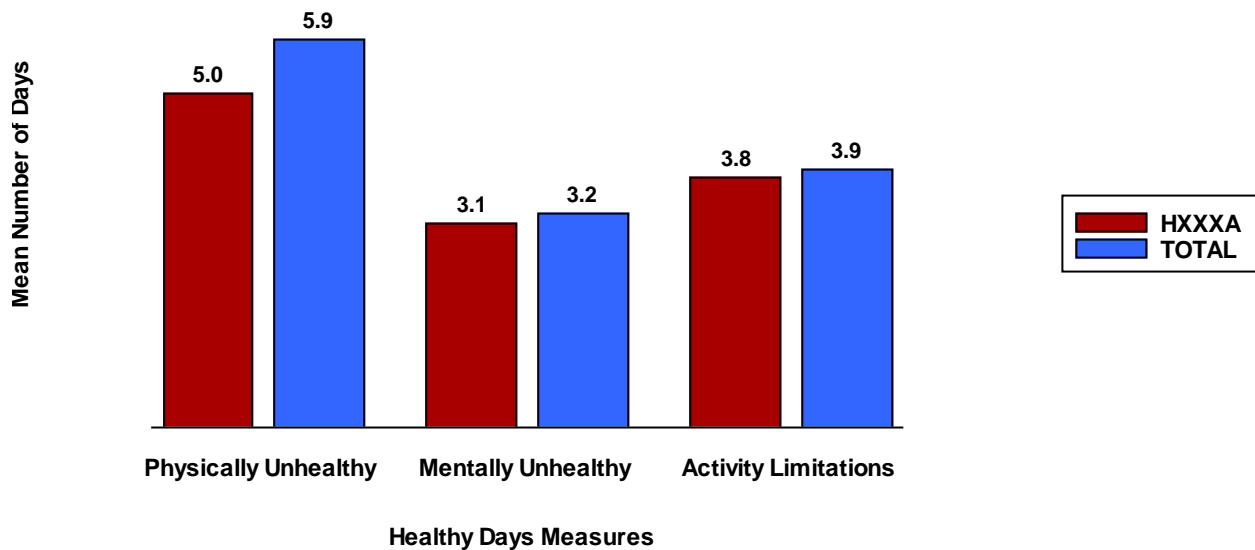
Body Mass Index

Definition of Measures

- Self-reported height and weight values are used to calculate BMI,[I] a measure that correlates with the amount of body fat in adult men and women. BMI is derived from Questions 55 and 56.[J]

A BMI of 30 or higher is considered obese and increases risk for several chronic conditions including: hypertension, dyslipidemia, type 2 diabetes, coronary heart disease, stroke, gallbladder disease, osteoarthritis, sleep apnea, and some cancers.[40] Being overweight (BMI 25-29.9) or obese has also been shown to accelerate the aging process.[41] Physical activity, diet, age, gender, ethnicity, and educational status are known to influence the risk for obesity.[42] For instance, females are at higher risk of developing morbid obesity than males. The prevalence of obesity among older adults has risen significantly over the past 30 years.[43,44] A BMI under 20 is considered underweight. Rapid weight loss often indicates an underlying disease and can accelerate the loss of muscle mass, which naturally occurs with the aging process.[45]

A study using the HOS *2006-2008 Cohort 9 Merged Baseline* and *Follow Up* data explored the prevalence of obesity in MA beneficiaries age 65 or older.[46] In this study, most of the reported health conditions were significantly more prevalent among obese than normal weight beneficiaries, in particular, high blood pressure (75.8% of obese vs. 53.9% of normal weight), diabetes (34.8% vs. 12.7%), and arthritis of the hip or knee (55.3% vs. 31.3%). Exceptions were osteoporosis and stroke. Osteoporosis was significantly less prevalent among the obese (16.1% vs. 26.9%). The prevalence of stroke increased only slightly with BMI (7.9% vs. 7.3%). The results also indicated that obese beneficiaries had substantially greater limitations with ADLs than normal weight beneficiaries.[46]

How Is Your MAO Doing?

Table 23 shows the distribution of BMI categories by gender, including underweight (BMI less than 20), normal weight (BMI of 20-24.99), overweight (BMI of 25-29.99), and obese (BMI of 30 or more) for MAO HXXXA and the HOS Total respondent sample.

[I] BMI is calculated as: BMI = [weight in pounds / (height in inches)^2] x 703, which uses the height and weight to produce the standard measure of kg/m^2 units.
[J] Beginning in 2012, questions for weight and height changed from categorical responses to open ended responses.

Table 23: *2014-2016 Cohort 17 Performance Measurement* Distribution of BMI Categories by Gender for MAO HXXXA and HOS Total at Baseline and Follow Up

| | MAO HXXXA | | HOS Total | |
| | Baseline | Follow Up | Baseline | Follow Up |
BMI Category	N (%)	N (%)	N (%)	N (%)
Male				
Underweight (<20)	2 (3.1%)	1 (1.7%)	792 (2.3%)	916 (2.8%)
Normal (20-24.99)	18 (27.7%)	18 (30.0%)	8,476 (24.1%)	8,304 (25.2%)
Overweight (25-29.99)	23 (35.4%)	24 (40.0%)	16,106 (45.8%)	14,573 (44.3%)
Obese (30-34.99)	19 (29.2%)	13 (21.7%)	6,901 (19.6%)	6,346 (19.3%)
Morbid Obesity (≥35)	3 (4.6%)	4 (6.7%)	2,876 (8.2%)	2,793 (8.5%)
Female				
Underweight (<20)	8 (8.2%)	6 (6.4%)	2,655 (5.4%)	2,984 (6.4%)
Normal (20-24.99)	19 (19.4%)	18 (19.1%)	14,431 (29.2%)	13,571 (29.3%)
Overweight (25-29.99)	35 (35.7%)	32 (34.0%)	16,864 (34.1%)	15,363 (33.1%)
Obese (30-34.99)	29 (29.6%)	29 (30.9%)	9,348 (18.9%)	8,774 (18.9%)
Morbid Obesity (≥35)	7 (7.1%)	9 (9.6%)	6,102 (12.4%)	5,701 (12.3%)

Sleep Measures

Definition of Measures

- Sleep duration is a self-reported measure of the average number of hours of actual sleep at night during the past month. The measure is found in Question 53.
- Sleep quality is a self-reported measure that rates the overall sleep quality during the past month. The measure is found in Question 54.

Two sleep questions that were new in the 2015 HOS 3.0 were drawn from the Pittsburgh Sleep Quality Index (PSQI). The questions focus on "habitual" (i.e., past month) sleep duration and quality, rather than past week measures, in order to capture more chronic sleep disturbances. The PSQI has a high test-retest reliability and good validity in patients with insomnia.[47]

Over half of older adults suffer from symptoms of insomnia, a common problem related to aging.[48] Sleep disorders in the elderly can be caused by a number of factors, including medication, diseases, poor sleeping habits, and age-related changes in circadian sleep/wake regulation. There is substantial evidence linking insufficient sleep duration and poor sleep quality to mental and physical health morbidity and mortality.[49] Various epidemiologic findings associate sleep duration with obesity, diabetes, impaired glucose tolerance, hypertension, and mortality. People who report fair or poor health are less likely to overestimate sleep hours and report shorter sleep hours on average than those with better self-rated health.[50] These observations provide a basis for future studies on weight control interventions and maintenance of daily routines in sleep habits to increase the quantity and quality of sleep.

How Is Your MAO Doing?

Table 24 provides frequency distributions of sleep duration ("less than 5," "5–6," "7–8," and "9 or more hours") and sleep quality ("Very good," "Fairly good," "Fairly bad," and "Very bad") for MAO HXXXA and the HOS Total at Follow Up.

Table 24: *2016 Cohort 17* Distributions of Sleep Duration and Quality for MAO HXXXA and HOS Total at Follow Up

	MAO HXXXA		HOS Total	
	Baseline	**Follow Up**	**Baseline**	**Follow Up**
Sleep Questions	**N (%)**	**N (%)**	**N (%)**	**N (%)**
Hours of actual sleep				
Less than 5 hours	NA	13 (7.9%)	NA	5,645 (6.7%)
5-6 hours	NA	68 (41.2%)	NA	31,546 (37.4%)
7-8 hours	NA	80 (48.5%)	NA	41,919 (49.7%)
9 or more hours	NA	4 (2.4%)	NA	5,175 (6.1%)
Overall sleep quality				
Very Good	NA	41 (24.6%)	NA	21,870 (25.8%)
Fairly Good	NA	105 (62.9%)	NA	50,777 (60.0%)
Fairly Bad	NA	19 (11.4%)	NA	10,059 (11.9%)
Very Bad	NA	2 (1.2%)	NA	1,971 (2.3%)

Health Status by Baseline Demographic Groups for MAO HXXXA

Evidence from recent studies suggests the differences in health among Medicare eligible beneficiaries by age, gender, racial, and socioeconomic groups.[51,52,53,54] The following tables show differences in health status by demographic categories, including potential disparities within your MAO, and illustrate changes from baseline to follow up measurement. Groups are defined by the sub-categories for a demographic characteristic (e.g., the 65-69 age group or White race).

Table 25: *2014-2016 Cohort 17 Performance Measurement* **Distribution of Mean Unadjusted PCS and MCS Scores* at Baseline and Follow Up by Baseline Demographic Group for MAO HXXXA**

	Unadjusted PCS		Unadjusted MCS	
Baseline Demographic	**Baseline Mean (SD)**	**Follow Up Mean (SD)**	**Baseline Mean (SD)**	**Follow Up Mean (SD)**
MAO HXXXA Total	41.7 (12.5)	40.1 (12.6)	54.8 (9.2)	55.6 (9.7)
Age				
65-69	45.8 (12.5)	45.4 (10.8)	54.0 (8.8)	55.5 (8.7)
70-74	39.9 (11.9)	38.0 (13.3)	54.6 (8.9)	54.5 (9.8)
75-79	44.0 (12.4)	41.1 (11.8)	55.6 (8.9)	57.4 (9.3)
80-84	37.2 (12.5)	37.2 (13.4)	56.7 (8.5)	55.6 (10.2)
85+	37.7 (11.0)	34.5 (11.7)	52.0 (13.1)	53.8 (12.3)
Gender				
Male	42.7 (12.8)	41.0 (12.9)	55.0 (9.3)	54.9 (9.6)
Female	41.1 (12.3)	39.6 (12.5)	54.7 (9.2)	56.0 (9.7)
Race				
White	42.4 (12.0)	40.7 (12.2)	55.6 (8.5)	56.6 (9.0)
Black	37.6 (15.5)	37.0 (13.8)	51.5 (11.2)	53.9 (10.2)
Other/Unknown	39.9 (12.7)	38.9 (15.5)	50.7 (12.1)	47.5 (12.2)
Marital Status				
Married	41.9 (13.2)	40.7 (12.6)	55.8 (8.7)	56.5 (9.2)
Widowed	40.3 (10.9)	37.1 (13.4)	53.1 (10.5)	54.8 (9.9)
Divorced or Separated	42.2 (12.2)	40.9 (11.7)	53.2 (9.5)	54.2 (9.0)
Never Married	43.8 (11.9)	43.4 (12.7)	52.2 (9.4)	49.8 (15.8)
Education				
Did Not Graduate HS	35.3 (12.2)	31.8 (10.9)	48.2 (12.2)	51.5 (11.8)
High School Graduate	44.8 (10.3)	42.5 (11.4)	57.0 (6.7)	57.2 (9.0)
Some College	42.1 (13.3)	41.3 (14.1)	54.4 (9.2)	55.6 (9.6)
4 Year Degree or Beyond	42.2 (13.9)	42.5 (12.0)	56.5 (8.8)	57.1 (7.5)
Annual Household Income				
Less than $10,000	35.6 (15.1)	36.5 (14.6)	52.6 (8.4)	51.3 (10.1)
$10,000-$19,999	41.1 (10.9)	40.0 (12.9)	52.0 (12.2)	52.5 (12.1)
$20,000-$29,999	36.9 (12.4)	32.8 (12.4)	55.3 (7.9)	58.5 (8.9)
$30,000-$49,999	44.5 (12.5)	43.2 (12.7)	56.3 (8.4)	57.7 (8.6)
$50,000 or More	47.9 (8.9)	46.7 (8.5)	57.0 (7.3)	56.7 (5.7)
Don't Know	37.7 (11.4)	35.6 (11.4)	52.9 (8.7)	53.6 (11.7)
Medicaid Status				
Medicaid	37.2 (12.2)	36.0 (12.1)	50.3 (10.1)	49.6 (11.7)
Non-Medicaid	42.8 (12.3)	41.2 (12.6)	55.9 (8.7)	57.0 (8.6)

* Mean unadjusted PCS and MCS scores are the raw scores used to determine the final adjusted change scores in the *Cohort 17 Performance Measurement* Results section. Beneficiaries are displayed according to their baseline demographic group.

Table 26: *2014-2016 Cohort 17 Performance Measurement* Distribution of Self-Rated General Health Status, and Physical and Mental Health Status Compared to One Year Ago at Baseline and Follow Up by Baseline Demographic Group for MAO HXXXA

Baseline Demographic	General Health Status Poor or Fair		Comparative Health-Physical Slightly Worse or Much Worse		Comparative Health-Mental Slightly Worse or Much Worse	
	Baseline N (%)	Follow Up* N (%)	Baseline N (%)	Follow Up* N (%)	Baseline N (%)	Follow Up* N (%)
MAO HXXXA Total	25 (15.1%)	32 (19.5%)	34 (20.4%)	40 (24.4%)	11 (6.7%)	21 (13.0%)
Age						
65-69	5 (11.9%)	6 (14.3%)	6 (14.3%)	5 (11.9%)	2 (5.1%)	4 (9.5%)
70-74	7 (15.9%)	10 (22.7%)	8 (18.2%)	10 (23.8%)	2 (4.5%)	7 (17.1%)
75-79	4 (10.5%)	6 (15.0%)	11 (28.2%)	10 (25.0%)	1 (2.5%)	3 (7.5%)
80-84	4 (14.8%)	4 (16.0%)	5 (18.5%)	9 (36.0%)	4 (14.8%)	3 (12.5%)
85+	5 (33.3%)	6 (46.2%)	4 (26.7%)	6 (40.0%)	2 (13.3%)	4 (28.6%)
Gender						
Male	8 (12.1%)	13 (20.3%)	16 (24.2%)	14 (22.2%)	6 (9.2%)	10 (15.9%)
Female	17 (17.0%)	19 (19.0%)	18 (17.8%)	26 (25.7%)	5 (5.0%)	11 (11.2%)
Race						
White	18 (13.1%)	20 (14.9%)	26 (19.1%)	35 (26.3%)	7 (5.2%)	15 (11.5%)
Black	3 (18.8%)	6 (35.3%)	4 (23.5%)	2 (11.8%)	1 (6.3%)	2 (12.5%)
Other/Unknown	4 (30.8%)	6 (46.2%)	4 (28.6%)	3 (21.4%)	3 (21.4%)	4 (28.6%)
Marital Status						
Married	12 (11.5%)	15 (14.6%)	22 (21.2%)	25 (25.0%)	9 (8.8%)	11 (11.1%)
Widowed	8 (25.8%)	12 (38.7%)	6 (18.8%)	9 (27.3%)	1 (3.0%)	5 (16.1%)
Divorced or Separated	4 (16.7%)	3 (13.0%)	5 (20.8%)	4 (16.7%)	1 (4.3%)	4 (16.7%)
Never Married	1 (14.3%)	2 (28.6%)	1 (14.3%)	2 (28.6%)	0	1 (14.3%)
Education						
Did Not Graduate HS	9 (34.6%)	15 (55.6%)	9 (33.3%)	7 (25.9%)	1 (3.8%)	6 (23.1%)
High School Graduate	2 (3.3%)	5 (8.6%)	9 (15.3%)	14 (23.7%)	3 (5.1%)	6 (10.2%)
Some College	5 (13.9%)	6 (16.7%)	5 (13.9%)	7 (19.4%)	4 (11.4%)	5 (13.9%)
4 Year Degree or Beyond	4 (10.8%)	4 (10.5%)	7 (18.4%)	11 (29.7%)	0	4 (11.4%)
Annual Household Income						
Less than $10,000	2 (22.2%)	3 (37.5%)	2 (22.2%)	2 (22.2%)	0	2 (22.2%)
$10,000-$19,999	8 (27.6%)	9 (31.0%)	6 (20.0%)	8 (27.6%)	4 (13.3%)	5 (17.9%)
$20,000-$29,999	4 (18.2%)	8 (36.4%)	4 (18.2%)	6 (27.3%)	0	2 (9.5%)
$30,000-$49,999	4 (10.5%)	4 (10.5%)	6 (16.2%)	9 (23.7%)	2 (5.4%)	4 (10.8%)
$50,000 or More	0	0	5 (15.6%)	5 (16.1%)	1 (3.1%)	3 (9.7%)
Don't Know	6 (24.0%)	6 (25.0%)	7 (26.9%)	4 (16.7%)	3 (12.5%)	2 (8.3%)
Medicaid Status						
Medicaid	10 (32.3%)	13 (40.6%)	10 (30.3%)	6 (18.8%)	2 (6.1%)	6 (18.8%)
Non-Medicaid	15 (11.1%)	19 (14.4%)	24 (17.9%)	34 (25.8%)	9 (6.8%)	15 (11.6%)

* Percentages for demographic groups in the follow up column(s) highlighted in **red** are greater by ten percentage points or more compared to the baseline columns. Estimates highlighted in **red** indicate groups that were worse off at follow up compared to baseline. Beneficiaries are displayed according to their baseline demographic group.

Table 27: *2014-2016 Cohort 17 Performance Measurement* Distribution of Positive Depression Screens at Baseline and Follow Up by Baseline Demographic Group for MAO HXXXA

Baseline Demographic	Positive Depression Screen	
	Baseline N (%)	Follow Up* N (%)
MAO HXXXA Total	9 (5.5%)	15 (9.3%)
Age		
65-69	2 (4.9%)	3 (7.1%)
70-74	3 (7.0%)	4 (10.3%)
75-79	1 (2.6%)	2 (5.1%)
80-84	2 (7.4%)	3 (11.1%)
85+	1 (6.7%)	3 (21.4%)
Gender		
Male	3 (4.5%)	4 (6.2%)
Female	6 (6.1%)	11 (11.5%)
Race		
White	5 (3.7%)	7 (5.4%)
Black	2 (11.8%)	2 (11.8%)
Other/Unknown	2 (14.3%)	6 (42.9%)
Marital Status		
Married	5 (4.9%)	7 (6.9%)
Widowed	1 (3.1%)	6 (20.0%)
Divorced or Separated	2 (8.3%)	1 (4.3%)
Never Married	1 (16.7%)	1 (14.3%)
Education		
Did Not Graduate HS	5 (18.5%)	8 (32.0%)
High School Graduate	1 (1.7%)	3 (5.2%)
Some College	0	2 (5.6%)
4 Year Degree or Beyond	2 (5.4%)	0
Annual Household Income		
Less than $10,000	3 (33.3%)	2 (25.0%)
$10,000-$19,999	2 (7.1%)	5 (18.5%)
$20,000-$29,999	0	1 (4.5%)
$30,000-$49,999	1 (2.7%)	1 (2.6%)
$50,000 or More	0	1 (3.2%)
Don't Know	3 (11.5%)	4 (16.7%)
Medicaid Status		
Medicaid	3 (9.7%)	6 (20.7%)
Non-Medicaid	6 (4.5%)	9 (6.8%)

* Percentages for demographic groups in the follow up column highlighted in **red** are greater by ten percentage points or more compared to the baseline column. Estimates highlighted in **red** indicate groups that were worse off at follow up compared to baseline. Beneficiaries are displayed according to their baseline demographic group.

Table 28: *2014-2016 Cohort 17 Performance Measurement* **Distribution of Multiple Chronic Conditions§ at Baseline and Follow Up by Baseline Demographic Group for MAO HXXXA**

Baseline Demographic	Multiple Chronic Medical Conditions§	
	Baseline	Follow Up*
	N (%)	N (%)
MAO HXXXA Total	129 (76.8%)	127 (77.0%)
Age		
65-69	31 (73.8%)	29 (70.7%)
70-74	34 (77.3%)	35 (81.4%)
75-79	29 (72.5%)	28 (70.0%)
80-84	23 (85.2%)	23 (88.5%)
85+	12 (80.0%)	12 (80.0%)
Gender		
Male	51 (77.3%)	50 (76.9%)
Female	78 (76.5%)	77 (77.0%)
Race		
White	105 (76.6%)	102 (76.1%)
Black	12 (70.6%)	12 (70.6%)
Other/Unknown	12 (85.7%)	13 (92.9%)
Marital Status		
Married	80 (76.9%)	76 (75.2%)
Widowed	23 (69.7%)	26 (78.8%)
Divorced or Separated	22 (91.7%)	21 (87.5%)
Never Married	4 (57.1%)	4 (57.1%)
Education		
Did Not Graduate HS	24 (88.9%)	26 (96.3%)
High School Graduate	47 (78.3%)	46 (76.7%)
Some College	26 (72.2%)	24 (66.7%)
4 Year Degree or Beyond	27 (71.1%)	26 (72.2%)
Annual Household Income		
Less than $10,000	7 (77.8%)	7 (77.8%)
$10,000-$19,999	24 (80.0%)	24 (80.0%)
$20,000-$29,999	20 (90.9%)	20 (90.9%)
$30,000-$49,999	27 (71.1%)	25 (65.8%)
$50,000 or More	21 (65.6%)	21 (67.7%)
Don't Know	22 (84.6%)	20 (83.3%)
Medicaid Status		
Medicaid	25 (75.8%)	26 (81.3%)
Non-Medicaid	104 (77.0%)	101 (75.9%)

* Percentages for demographic groups in the follow up column highlighted in **red** are greater by ten percentage points or more compared to the baseline column. Estimates highlighted in **red** indicate groups that were worse off at follow up compared to baseline. Beneficiaries are displayed according to their baseline demographic group.
§ Multiple chronic medical conditions are defined as having two or more conditions (maximum of 15).

Table 29: *2014-2016 Cohort 17 Performance Measurement* **Distribution of Multiple ADL Impairments§ at Baseline and Follow Up by Baseline Demographic Group for MAO HXXXA**

Baseline Demographic	Multiple ADL Impairments§	
	Baseline N (%)	Follow Up* N (%)
MAO HXXXA Total	32 (19.0%)	32 (19.4%)
Age		
65-69	6 (14.3%)	4 (9.5%)
70-74	6 (13.6%)	9 (21.4%)
75-79	6 (15.0%)	4 (10.0%)
80-84	7 (25.9%)	8 (30.8%)
85+	7 (46.7%)	7 (46.7%)
Gender		
Male	10 (15.2%)	13 (20.3%)
Female	22 (21.6%)	19 (18.8%)
Race		
White	23 (16.8%)	24 (17.9%)
Black	5 (29.4%)	3 (17.6%)
Other/Unknown	4 (28.6%)	5 (35.7%)
Marital Status		
Married	15 (14.4%)	18 (17.8%)
Widowed	12 (36.4%)	9 (27.3%)
Divorced or Separated	3 (12.5%)	4 (16.7%)
Never Married	2 (28.6%)	1 (14.3%)
Education		
Did Not Graduate HS	10 (37.0%)	8 (29.6%)
High School Graduate	8 (13.3%)	9 (15.0%)
Some College	7 (19.4%)	7 (19.4%)
4 Year Degree or Beyond	6 (15.8%)	6 (16.2%)
Annual Household Income		
Less than $10,000	3 (33.3%)	3 (33.3%)
$10,000-$19,999	5 (16.7%)	4 (13.8%)
$20,000-$29,999	8 (36.4%)	7 (31.8%)
$30,000-$49,999	5 (13.2%)	6 (15.8%)
$50,000 or More	1 (3.1%)	3 (9.7%)
Don't Know	7 (26.9%)	7 (28.0%)
Medicaid Status		
Medicaid	11 (33.3%)	10 (31.3%)
Non-Medicaid	21 (15.6%)	22 (16.5%)

* Percentages for demographic groups in the follow up column highlighted in **red** are greater by ten percentage points or more compared to the baseline column. Estimates highlighted in **red** indicate groups that were worse off at follow up compared to baseline. Beneficiaries are displayed according to their baseline demographic group.
§ Multiple ADL impairments are defined as having two or more impairments.

Table 30: *2014-2016 Cohort 17 Performance Measurement* **Mean Number of Unhealthy Physical, Mental, and Activity Limitation Days by Baseline Demographic Group for MAO HXXXA**

Baseline Demographic	Physically Unhealthy Number of Days		Mentally Unhealthy Number of Days		Activity Limitations Number of Days	
	Baseline Mean (SD)	Follow Up* Mean (SD)	Baseline Mean (SD)	Follow Up* Mean (SD)	Baseline Mean (SD)	Follow Up* Mean (SD)
MAO HXXXA Total	4.9 (9.1)	5.0 (9.2)	2.0 (5.7)	3.1 (7.0)	2.6 (7.0)	3.8 (8.5)
Age						
65-69	3.6 (7.7)	3.7 (8.1)	2.3 (6.1)	2.9 (6.2)	2.4 (6.2)	4.3 (9.0)
70-74	6.5 (10.4)	6.3 (10.4)	2.8 (6.3)	4.4 (8.8)	2.6 (6.1)	4.1 (9.1)
75-79	4.1 (7.5)	3.5 (7.4)	1.2 (4.9)	1.4 (4.5)	2.1 (6.4)	2.3 (6.0)
80-84	5.0 (10.0)	4.3 (7.7)	0.9 (3.0)	2.8 (6.3)	2.8 (8.1)	3.3 (8.4)
85+	5.4 (10.8)	11.2 (13.7)	3.1 (8.1)	5.0 (9.6)	4.6 (10.8)	6.2 (11.4)
Gender						
Male	4.6 (9.2)	5.1 (9.5)	1.5 (5.4)	3.1 (7.6)	2.1 (6.3)	4.0 (9.2)
Female	5.0 (9.0)	5.0 (9.1)	2.3 (5.9)	3.1 (6.6)	2.9 (7.4)	3.6 (8.0)
Race						
White	4.5 (8.6)	4.0 (7.9)	1.7 (5.3)	2.5 (6.4)	2.1 (6.1)	2.2 (6.0)
Black	5.9 (10.6)	10.0 (12.8)	2.0 (5.3)	4.7 (8.9)	5.1 (10.0)	8.8 (12.6)
Other/Unknown	7.9 (11.3)	9.3 (12.9)	5.4 (9.6)	6.7 (9.3)	6.0 (10.8)	12.3 (14.4)
Marital Status						
Married	4.4 (8.8)	4.4 (8.6)	2.0 (5.9)	2.8 (7.2)	2.1 (6.3)	3.2 (8.2)
Widowed	5.8 (10.4)	7.7 (11.6)	2.7 (6.8)	3.0 (6.1)	3.2 (8.5)	4.8 (9.5)
Divorced or Separated	6.0 (9.2)	4.8 (8.4)	1.0 (1.8)	2.4 (4.5)	4.0 (7.8)	2.7 (5.9)
Never Married	4.1 (6.0)	3.5 (7.2)	3.0 (6.0)	9.3 (12.4)	3.6 (7.5)	10.1 (13.1)
Education						
Did Not Graduate HS	6.7 (10.2)	10.1 (12.7)	3.8 (7.7)	7.0 (10.2)	6.7 (10.1)	8.6 (12.7)
High School Graduate	2.9 (6.8)	4.0 (7.7)	0.8 (1.9)	2.2 (5.7)	1.0 (4.4)	2.4 (5.3)
Some College	3.8 (9.0)	4.1 (8.9)	1.8 (5.6)	2.2 (5.5)	1.7 (5.6)	1.9 (5.7)
4 Year Degree or Beyond	6.0 (9.4)	3.2 (6.6)	1.4 (4.2)	1.6 (5.6)	2.4 (6.5)	2.7 (7.7)
Annual Household Income						
Less than $10,000	3.0 (5.6)	10.6 (13.1)	2.6 (6.6)	6.8 (10.9)	7.9 (11.7)	7.9 (12.0)
$10,000-$19,999	3.7 (5.9)	3.7 (6.7)	3.7 (8.3)	4.6 (7.9)	2.6 (7.0)	4.4 (8.8)
$20,000-$29,999	8.0 (11.5)	8.6 (11.5)	0.7 (1.7)	1.2 (3.7)	4.0 (8.2)	3.1 (7.0)
$30,000-$49,999	2.5 (7.5)	2.5 (7.0)	2.2 (6.0)	2.4 (7.1)	1.5 (5.5)	1.0 (5.0)
$50,000 or More	2.8 (6.5)	1.9 (4.5)	0.8 (1.5)	1.7 (3.9)	0.9 (3.6)	1.8 (4.7)
Don't Know	8.8 (11.5)	7.5 (10.9)	3.0 (7.6)	5.0 (9.5)	3.8 (9.0)	7.7 (12.3)
Medicaid Status						
Medicaid	7.8 (10.4)	9.5 (12.1)	5.8 (10.2)	5.9 (8.3)	5.1 (9.3)	8.6 (12.1)
Non-Medicaid	4.1 (8.6)	4.0 (8.1)	1.0 (3.2)	2.4 (6.5)	2.0 (6.2)	2.7 (7.0)

* Means for demographic groups in the follow up column(s) highlighted in **red** are greater by ten percent or more compared to the baseline columns. Estimates highlighted in **red** indicate groups that were worse off at follow up compared to baseline. Beneficiaries are displayed according to their baseline demographic group.

Table 31: *2014-2016 Cohort 17 Performance Measurement* **Distribution of BMI Categories by Baseline Demographic Group for MAO HXXXA**

Baseline Demographic	Underweight (<20 BMI)		Obese (≥30 BMI)	
	Baseline N (%)	**Follow Up*** N (%)	**Baseline** N (%)	**Follow Up*** N (%)
MAO HXXXA Total	10 (6.1%)	7 (4.5%)	58 (35.6%)	55 (35.7%)
Age				
65-69	3 (7.5%)	3 (7.3%)	17 (42.5%)	20 (48.8%)
70-74	3 (7.0%)	1 (2.5%)	21 (48.8%)	22 (55.0%)
75-79	1 (2.6%)	1 (2.8%)	9 (23.7%)	4 (11.1%)
80-84	0	0	9 (33.3%)	7 (29.2%)
85+	3 (20.0%)	2 (15.4%)	2 (13.3%)	2 (15.4%)
Gender				
Male	2 (3.1%)	1 (1.7%)	22 (33.8%)	17 (28.3%)
Female	8 (8.2%)	6 (6.4%)	36 (36.7%)	38 (40.4%)
Race				
White	8 (6.0%)	6 (4.8%)	48 (36.1%)	43 (34.1%)
Black	0	0	7 (43.8%)	9 (56.3%)
Other/Unknown	2 (14.3%)	1 (8.3%)	3 (21.4%)	3 (25.0%)
Marital Status				
Married	7 (6.9%)	5 (5.3%)	35 (34.3%)	29 (30.5%)
Widowed	2 (6.3%)	2 (6.7%)	13 (40.6%)	14 (46.7%)
Divorced or Separated	1 (4.5%)	0	8 (36.4%)	10 (43.5%)
Never Married	0	0	2 (28.6%)	2 (33.3%)
Education				
Did Not Graduate HS	3 (11.5%)	1 (4.3%)	12 (46.2%)	12 (52.2%)
High School Graduate	1 (1.7%)	1 (1.7%)	21 (36.2%)	17 (28.8%)
Some College	5 (14.3%)	5 (15.2%)	13 (37.1%)	14 (42.4%)
4 Year Degree or Beyond	1 (2.7%)	0	9 (24.3%)	10 (30.3%)
Annual Household Income				
Less than $10,000	1 (11.1%)	0	6 (66.7%)	5 (55.6%)
$10,000-$19,999	2 (6.9%)	1 (4.2%)	8 (27.6%)	7 (29.2%)
$20,000-$29,999	0	0	12 (54.5%)	10 (45.5%)
$30,000-$49,999	3 (7.9%)	3 (8.6%)	11 (28.9%)	12 (34.3%)
$50,000 or More	2 (6.5%)	2 (6.7%)	9 (29.0%)	8 (26.7%)
Don't Know	2 (8.3%)	1 (4.2%)	10 (41.7%)	10 (41.7%)
Medicaid Status				
Medicaid	3 (9.4%)	2 (6.9%)	11 (34.4%)	10 (34.5%)
Non-Medicaid	7 (5.3%)	5 (4.0%)	47 (35.9%)	45 (36.0%)

* Percentages for demographic groups in the follow up column(s) highlighted in **red** are greater by ten percentage points or more compared to the baseline columns. Estimates highlighted in **red** indicate groups that were worse off at follow up compared to baseline. Beneficiaries are displayed according to their baseline demographic group.

Appendix 1

Program Background

This section introduces the Medicare HOS, survey administration, and the calculation of outcomes for the performance measurement. A complete description of the HOS program, the program timeline, the HOS 2.5 instrument, the HOS 3.0 instrument, previous survey results, and supporting documents are available on the HOS website at www.HOSonline.org.

CMS is committed to monitoring the quality of care provided by MAOs. The HOS results continue to be an important part of the CMS quality improvement activities, ensuring that medical care paid for under the Medicare program meets professionally recognized standards of health care. Section 722 of the Medicare Prescription Drug, Improvement, and Modernization Act of 2003 (MMA) mandates collecting, analyzing, and reporting health outcomes information. This legislation also specifies that data collected on quality, outcomes, and beneficiary satisfaction to facilitate consumer choice and program administration must use the same types of data that were collected prior to November 1, 2003. Collected since 1998, the Medicare HOS is the first patient-reported outcomes measure in Medicare managed care, and therefore remains a critical part of assessing MAO quality. In addition, CMS includes the HOS results as one component of their performance assessment program.

The goal of the Medicare HOS program is to gather valid and reliable clinically meaningful data for uses such as: targeting quality improvement activities and resources; monitoring health plan performance; rewarding top-performing health plans; helping beneficiaries make informed health care choices; and advancing the science of functional health outcomes measurement. This Performance Measurement Report is part of a larger CMS effort to increase the health care industry's capacity to improve the health status of its Medicare population. The results are intended to help MAOs identify areas for potential improvement. The HOS Performance Measurement Report is made available to all participating MAOs after each annual follow up cohort data collection is completed.

2014-2016 Medicare Advantage Organization Participation

MAOs with Medicare contracts in effect on or before January 1, 2013, and a minimum enrollment of 500 beneficiaries were required to report the Baseline HOS in 2014:

- All coordinated care plans, including local and regional preferred provider organizations (RPPO), health maintenance organizations (HMO), and contracts with Special Needs Plan (SNP) benefit packages
- Section 1876 cost contracts, even if closed for enrollment
- Private Fee-for-Service (PFFS) contracts
- Medical savings account (MSA) contracts
- Employer/union only contracts

MAOs that administered the HOS Baseline Survey in 2014 were required to administer the HOS Follow-Up Survey in 2016. Refer to the list of participating MAO contracts available in the Survey Results section on the Survey page of the HOS website (www.HOSonline.org).

All Program of All-Inclusive Care for the Elderly (PACE) organizations with Medicare contracts in effect on or before January 1, 2015, and with a minimum enrollment of 30

beneficiaries as of October 1, 2015, were required by CMS to administer the HOS-Modified (HOS-M) in 2016.

MAOs sponsoring Fully Integrated Dual Eligible (FIDE) SNPs within Medicare contracts in effect on or before January 1, 2015, and with a minimum enrollment of 50 beneficiaries could elect to report the 2016 HOS at the FIDE SNP level to determine eligibility for a frailty adjustment payment, similar to those payments provided to PACE programs that use HOS-M data. Voluntary reporting is in addition to standard HOS requirements for quality reporting at the contract level.

Cohort 17 Baseline Sampling

- MAOs with fewer than 500 beneficiaries were not required to report HOS.
- For MAOs with populations of 500 to 1,200 beneficiaries, all eligible beneficiaries were included in the sample.
- For MAOs with more than 1,200 beneficiaries and less than 3,000 beneficiaries, a simple random sample of 1,200 beneficiaries was selected for the baseline survey.
- For MAOs with 3,000 or more beneficiaries, beneficiaries who responded to the previous year's baseline survey were excluded from the random sample of 1,200 for the current year.
- Beneficiaries were defined as eligible if they were 18 years or older on the date the sample was drawn. The six months enrollment requirement was waived beginning in 2009, and beneficiaries with End Stage Renal Disease (ESRD) were no longer excluded from the sampling beginning in 2010.

Cohort 17 Follow Up Sampling

- Beneficiaries were eligible for remeasurement if they had sufficient data to derive PCS or MCS scores at baseline.
- Beneficiaries were excluded from follow up if they disenrolled from their MAO or died after the baseline survey. Although deceased beneficiaries were excluded from the sample, CMS includes deceased baseline respondents when calculating the HOS performance measurement results.[6]

Survey Administration

- MAOs contracted with a CMS approved survey vendor to administer the surveys following the protocols specified in the HEDIS 2014 and 2016, Volume 6, Specifications for the Medicare Health Outcomes Survey Manuals. The manuals detailed the methods for mail, telephone, and mixed methods of data collection.
- The mail component of the surveys used prenotification letters, a standardized questionnaire, survey letters, and reminder/thank you postcards. Sample respondents completed the HOS in English, Spanish, or Chinese language versions of the mail survey.
- Survey vendors attempted telephone follow up in English or Spanish (with at least six attempts) in those instances when beneficiaries failed to respond after the second mail survey or returned an incomplete mail survey, in order to obtain responses for missing items. A standardized version of an Electronic Telephone Interviewing System script was used to collect telephone interview data for the survey.

- Survey vendors performed initial data cleaning and follow up with survey respondents, as necessary.

Additional information about *Cohort 17* sampling and survey administration can be found in the NCQA HEDIS 2014 and 2016 Volume 6 manuals.[6,7]

HOS Data Collection Tools

The core HOS health status items were collected with the same instrument for the *2014 Cohort 17 Baseline* and *2016 Cohort 17 Follow Up*. Since 2006, the HOS has incorporated the Veterans RAND 12-Item Health Survey (VR-12).

Medicare HOS 2.5 and 3.0 Instruments

The 2014 survey administration used the HOS 2.5 that was implemented in 2013. The HOS 2.5 evaluates the HRQOL of MA beneficiaries by measuring their physical and mental health status using the VR-12. [55] The HOS contains questions about socio-demographics, ADLs, IADLs, chronic medical conditions, self-rated health, number of unhealthy days in the past 30 days, depression risk, cognitive functioning, memory, pain, living arrangements, and self-reported height and weight used for calculation of BMI. Four HEDIS Effectiveness of Care measures are included to evaluate management of urinary incontinence, physical activity, osteoporosis testing, and fall risk management. Questions regarding race, ethnicity, sex, primary language, and disability status comply with standards established by Section 4302 of the Affordable Care Act. In 2014, the HOS 2.5 was further modified by revising eight questions and removing six questions. All versions of the HOS instruments listed by year are available on the Survey page of the HOS website (www.HOSonline.org).

The 2016 survey administration used the HOS 3.0 that was implemented in 2015. The HOS 3.0 evaluates the HRQOL of MA beneficiaries by measuring their physical and mental health status using the VR-12.[55] Modifications in the HOS 3.0 from the previous version (HOS 2.5) included: changes to questions about leakage of urine, osteoporosis testing in older women, sleep duration and quality, and primary language spoken in the home. In a formatting change, the survey uses a two column layout for each page. The VR-12 was derived from the Veterans RAND 36-Item Health Survey (VR-36).[56,57,58] The VR-12 is a generic, multipurpose health survey, which consists of the 12 most important items from the VR-36 for construction of the physical and mental health summary scores (Q1-Q7) and two items that assess change in physical and emotional health compared with one year ago (Q8 and Q9) that are not used in the calculation of the summary scores. The shorter instrument was adopted to reduce response burden and survey costs, while maintaining comparability of HOS results over time. The body of literature supports the shorter survey as a reliable and valid substitute for the 36-item health survey. In addition, conversion formulas have been developed and validated to relate the VR-12 with the earlier 36-item survey that allow reliable comparisons of HOS 1.0 results with results from HOS 2.0 and later versions.[59]

In comparison with the earlier 36-item survey, two modifications were made in the VR-12. The first modification was an increase in the number of response choices for the items used for role limitations due to physical problems (Q3a and Q3b) and role limitations due to emotional problems (Q4a and Q4b) from a two-point choice of "Yes" or "No" to a five-point Likert scale ("No, none of the time," "Yes, a little of the time," "Yes, some of the time," "Yes, most of the

time," and "Yes, all of the time"). The role-physical questions assess whether respondents' physical health limits them in the kind of work or other usual activities they perform, while the role-emotional questions assess whether emotional problems have caused respondents to accomplish less in their work or other usual activities. The second modification was that two questions were used to assess health change, one focusing on physical health (Q8) and one on emotional problems (Q9), in contrast to the one general change item in the 36-item survey.[60,61]

The VR-12 measures the same eight health domains as the 36-item health survey: 1) Physical Functioning, 2) Role-Physical, 3) Role-Emotional, 4) Bodily Pain, 5) Social Functioning, 6) Mental Health, 7) Vitality, and 8) General Health. Each domain aggregates one or two items and all eight domains are used to calculate the two summary measures, as illustrated in the VR-12 mapping model that follows in Figure 4.

Figure 4: Mapping of HOS VR-12 to 8 Health Domains and 2 Summary Measures
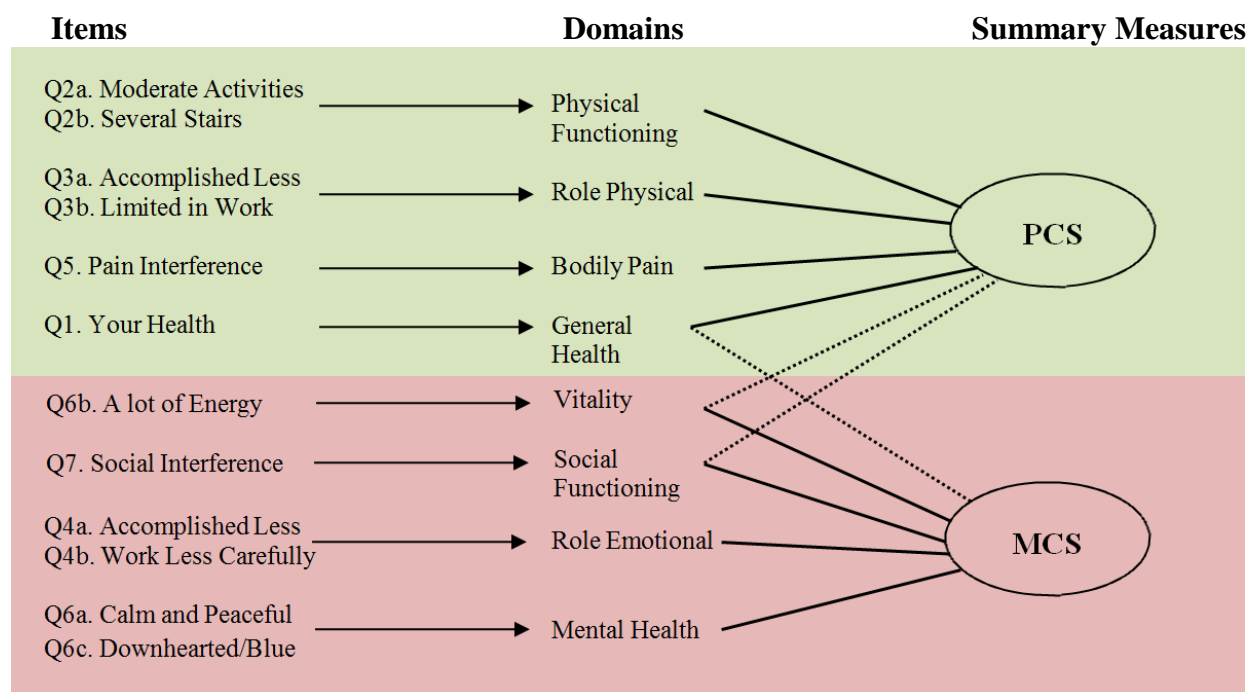
Note: Domains contributing the most to each summary measure are indicated by a solid line. Domains contributing to a lesser degree are indicated by a broken line; however, all domains contribute to some extent to the scoring of both summary measures (PCS and MCS).

Physical and Mental Component Summary Scores

The PCS and MCS scores were calculated from the VR-12 using the Modified Regression Estimate (MRE) for scoring and imputation of missing data.[55] For those beneficiaries with complete responses across the VR-12, the following steps[62] were taken to calculate the scores:
- Step One: New variables were created for each response level choice with one level omitted. Using the 59 total response categories across the VR-12 questions, 47 indicator variables were created.
- Step Two: Aggregate PCS and MCS scores were created separately from a regression equation that weighted each of the 47 indicator variables. The weights were derived from

the Veterans SF-36 PCS and MCS Scales using the 1999 Large Health Survey of Veteran Enrollees.[63]

- Step Three: A constant was added to each of the estimates obtained from Step Two. The scores were then standardized using normative values from a 1990 U.S. general population. Therefore a mean score of 50 represents the national average, a 10-point difference above and below the mean score is one standard deviation, and with few exceptions, the scores have a range of 0 through 100 (higher being better).

PCS and MCS scores were imputed using the MRE when beneficiary data was missing across the VR-12 items. Using the MRE algorithm, PCS and MCS scores can be calculated in as many as 90% of the cases in which one or more VR-12 responses are missing.[64] Depending on the pattern of missing item responses for a beneficiary, a different set of regression weights was required to compute that individual's PCS and/or MCS scores.[62] For each combination of missing data, the beneficiaries' data were merged with the stored regression weights and the PCS or MCS scores were computed and then standardized using the normative values from MRE Step Three.

Beneficiary PCS and MCS results were mode adjusted for the impact of telephone administration compared to the reference mode of mail administration. Comparisons across the VR-12 of matched HOS and Veterans Administration surveys for the same respondents showed that PCS and MCS scores were, on average, 1.9 and 4.5 points greater respectively for telephone compared with mail administered surveys.[65] Therefore, for telephone surveys, 1.9 points were subtracted from the PCS score and 4.5 points were subtracted from the MCS score.

For the physical health summary measure, very high scores indicate no physical limitations, disabilities, or decline in well-being; high energy level; and a rating of health as "excellent." For the mental health summary measure, very high scores indicate frequent positive affect, absence of psychological distress, and no limitations in usual social and role activities due to emotional problems.

Data Evaluation and Processing

The entire HOS data file was reviewed to verify the presence of unique beneficiary records. Additional reviews of the data are performed using the complete HOS data file, as well as subsets of the data (e.g., mode of administration and survey vendor).

- Data consistency checks are performed to identify:
  - Out of range dates and response values
  - Duplicate Beneficiary Link Keys, Health Insurance Claim (HIC) numbers and Social Security Numbers (SSN)
  - Data shifts in value assignment
  - Inconsistencies in data distributions of survey response values among survey vendors
  - Discrepancies in the percent complete and survey disposition codes
  - Inconsistent assignment of survey variables (such as survey disposition, round number, and survey language)
- Response consistency checks between related items are performed to validate the integrity of the data.

- Date variables are converted to a SAS®K date format to facilitate the calculation of duration of enrollment and age, which are then stored in the data file.
- For the performance measurement, baseline and follow up data are evaluated and merged, and additional variables are calculated or obtained from other CMS data sources.

Calculation of Outcomes

The *2014-2016 Cohort 17 Performance Measurement* Report incorporates results from the 2014 HOS 2.5 for the baseline and the 2016 HOS 3.0 for the follow up survey administrations. The outcomes of the performance measurement analysis were death, change in physical health as measured by the PCS score, and change in mental health as measured by the MCS score. For the HOS results, death and PCS outcomes were combined into one overall measure of change in physical health. Thus, there are two primary outcomes: (1) Alive and PCS better or same (vs. PCS worse or death), and (2) MCS better or same (vs. MCS worse). These outcomes are designated as the primary outcomes of interest since health maintenance, rather than improvement, is a realistic clinical goal for many seniors.

Multivariate logistic regression models were used for case-mix adjustment, and to calculate expected outcomes for each beneficiary. Case-mix adjustments were used so that all MAOs were as comparable as possible in terms of socio-demographic characteristics (age, gender, race, etc.), chronic conditions, baseline health status, and other design variables. All beneficiaries age 65 or older, who completed the HOS at baseline with a PCS or MCS score, and whose MAO participated in the HOS at follow up were included in the analysis of death outcomes (i.e., analytic sample). Beneficiaries age 65 or older, who completed the HOS at baseline and follow up, for whom PCS and MCS scores could be computed at both time points, and who remained in their original MAO at follow up were included in the analysis of PCS and MCS outcomes (i.e., respondent sample).

For expected outcomes, the probability of being better or worse was calculated using statistical models that take into account the demographic and socioeconomic variables and other covariates. The expected outcomes were death, "PCS better or same," and "MCS better or same." For calculating expected outcomes, separate case-mix models were warranted for death, PCS scores, and MCS scores.

A series of 12 different models (six death models, three PCS models and three MCS models) were applied, since not all beneficiaries had data for all of the independent variables that could be used to calculate an expected score. In other words, each expected outcome for a beneficiary was based on those variables for which the beneficiary had data. For example, if a beneficiary had all of the required independent variables for Model A (the model containing the highest number of independent variables), then their expected score was calculated using that model. If not, then Model B (the model containing the second highest number of independent variables) was used if all of the required independent variables for this model were available, and so on. One model was used to calculate an expected outcome for each beneficiary.

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Death Models

Models used to predict the probability of death for each beneficiary included variables to control for baseline differences in demographic and socioeconomic characteristics, chronic medical conditions, and functional status. Demographic and socioeconomic variables included age, gender, race, education, marital status, annual household income, home ownership, Medicaid status, and eligibility for Supplemental Security Income (SSI). Chronic medical conditions were measured with a checklist of 14 conditions and four indicators of current cancer treatment. Conditions were grouped into four categories that were strong, moderate, weak, and negative predictors of death, for models in which the individual chronic medical condition data were incomplete. Additional variables considered for the models included the baseline item about general health compared to others, the six ADL items, the individual VR-12 response items, and the baseline PCS and MCS scores. For example, functional status was measured using a combined VR-12 physical functioning/ADL scale, the individual VR-12 response items, and the baseline item about general health compared to others. Baseline PCS and MCS were used when VR-12 response items were incomplete (see Table A1 in this Appendix for detailed information about covariates used in each of the six death models).

PCS and MCS Models

Models used to predict expected change in PCS and MCS scores (e.g., PCS better or same) used a set of exogenous demographic and socioeconomic variables at baseline, such as age, gender, race, education, marital status, annual household income, home ownership, Medicaid status, and SSI (see Table A2 in this Appendix for detailed information about the three PCS models and three MCS models). Because each beneficiary served as his or her own control for the PCS and MCS analysis, substantial case-mix was already reflected in the baseline PCS or MCS scores. Sensitivity analyses determined that further adjustment for chronic medical conditions at baseline was not warranted, because errors in disease reporting were correlated with functioning.

Calculation of MAO-Level Results

Calculation of the overall MAO-level results was completed by creating an actual death indicator for each beneficiary in the MAO analytic sample who died during the two-year follow up (actual death=1) and who survived (actual death=0). The actual physical and mental health indicators were also created for each beneficiary in the MAO respondent sample, to indicate whether the PCS score and MCS score were better, the same, or worse at the two-year follow up. The PCS score is considered to be the same if it changed by less than 5.66 points (plus or minus) between baseline and follow up survey administrations. A change greater than 5.66 points (plus or minus) is outside of the 95% confidence interval for an individual beneficiary, as estimated from the standard deviation and reliability of the PCS score. The MCS score is considered to be the same if it changed by less than 6.72 points (plus or minus). For the MAO level, the mean actual death rate (A_d), mean actual "PCS better or same" rate (A_{psb}) and mean actual "MCS better or same" rate (A_{msb}) were then summarized for the MAO. The mean actual "Alive and PCS better or same" rate is $(1-A_d)*A_{psb}$.

An expected death rate, an expected PCS better or same rate, and an expected MCS better or same rate were calculated for each beneficiary within the MAO respondent sample using logistic regression models for the case-mix adjustment. To summarize data for the outcome "Alive and PCS better or same," the mean expected death rate (E_d) was calculated, along with the mean expected "PCS better or same" rate (E_{psb}). The mean expected "Alive and PCS better or same"

rate for the MAO is $(1-E_d)*E_{psb}$. For the MAO level, data were summarized for the mean expected "MCS better or same" rate (E_{msb}). Expected outcomes for "PCS better" and "MCS better" were also needed to calculate the percentage of beneficiaries who were better, the same, or worse on each measure. The percentage of beneficiaries who were worse at follow up is calculated as 1 minus the percentage who were better or the same.

HOS outcomes were analyzed by calculating the national averages, and the differences between actual and expected MAO level results for death, PCS, and MCS over two years. For example, the difference between actual and expected results indicates the percentage points by which the MAO's actual "Alive and PCS better or same" rate was higher (for a positive difference) or lower (for a negative difference) than expected results. A *t* statistic, expressing the significance of the MAO differences from the average national results, was calculated by dividing the MAO deviation by the standard error. A *t* statistic plus or minus 2.0 or larger was considered significant, as long as an overall *F* test indicated that the MAOs differed on the outcome of interest (discussed below). An adjusted MAO percentage of "Alive and PCS better or same" also was calculated by combining the overall (national) results and the MAO deviation score, using a logit transformation. Similar logic was used to calculate adjusted MAO percentages for "Alive and PCS better," "MCS better or same," and "MCS better."

Tests of Significance for MAO-Level Differences

For physical health (mortality and PCS) over the two-year follow up period, overall *F* tests are conducted to determine if mortality, "PCS better or same" and "PCS better" are significantly different at the MAO level. If both "Death" and "PCS better or same," which when combined are specified *a priori* as the primary physical health outcome of "Alive and PCS better or same," differ significantly at the MAO level, an outlier analysis for PCS is warranted. The PCS outlier analysis is performed using a *t* test at the MAO level. MAOs with a *t* statistic ≥ 2.0 are designated as a better than expected outlier for the physical health measure, while MAOs with a *t* statistic ≤ -2.0 are identified as a worse than expected outlier, compared to the national average. If the *F* test for "Death" or "PCS better or same" is not significant, the *t* tests are not warranted and all MAOs are designated as the same, when compared to the national average. Note that the "Alive and PCS better or same" measure is the combined Physical Health Percent Better+Same result in Table 7 in the *Cohort 17 Performance Measurement* Results section and is used as the Medicare Star Ratings measure for *Improving or Maintaining Physical Health*.

For the two-year follow up period for mental health (MCS), an overall *F* test is conducted to determine if "MCS better or same" and "MCS better" are significantly different at the MAO level. If "MCS better or same," which is specified *a priori* as the primary mental health outcome, differs significantly at the MAO level, an outlier analysis for MCS is warranted. The MCS outlier analysis is also performed using a *t* test at the MAO level. MAOs with a *t* statistic ≥ 2.0 are designated as a better than expected outlier for the mental health measure, while MAOs with a *t* statistic ≤ -2.0 are identified as a worse than expected outlier, compared to the national average. If the *F* test for "MCS better or same" is not significant, the *t* tests are not warranted and all MAOs are designated as the same, when compared to the national average. Note that the "MCS better or same" measure is the combined Mental Health Percent Better+Same result in Table 8 in the *Cohort 17 Performance Measurement* Results section and is used as the Medicare Star Ratings measure for *Improving or Maintaining Mental Health*.

Table A1: Covariates Used in Estimation of Expected Mortality

Death Model Covariates	Death Model					
	A	B	C	D	E	F
Demographic and Socioeconomic Variables at Baseline						
Age (linear), Age 75+, Age 85+	√	√	√	√	√	√
Gender	√	√	√	√	√	√
Age and Gender interaction	√	√	√	√	√	√
HOS Race/Ethnicity (Asian, Black/African-American, Hispanic, Native American, Pacific Islander, Multiracial)	√	√				
CMS Race/Ethnicity (Asian, Black/African-American, Hispanic, Native American, Other, Unknown)			√	√	√	√
Receive Medicaid or do not receive Medicaid	√	√	√	√	√	√
Eligible or not for Supplemental Security Income (SSI) due to disability	√	√	√	√	√	√
Home owner or non-home owner	√	√				
High school graduate or not high school graduate	√	√				
Married or not married (single, divorced, widowed, separated)	√	√				
Annual household income less than $20,000 or annual household income of $20,000 or greater	√	√				
Chronic Medical Conditions at Baseline						
Presence or absence of each of 14 chronic medical conditions: hypertension, myocardial infarction, angina/coronary artery disease, congestive heart failure, other heart conditions, stroke, pulmonary disease, gastrointestinal disorders, arthritis of hip or knee, arthritis of hand or wrist, sciatica, diabetes, depression, any cancer other than skin cancer	√					
Treatment or non-treatment for 4 cancer types: colon/rectal, lung, breast, prostate	√					
Mean number of conditions in 4 groups with varying relations to death: 1. Strong relationship (congestive heart failure, any cancer, lung cancer, colon/rectal cancer) 2. Moderate relationship (pulmonary disease, stroke, diabetes, myocardial infarction) 3. Weak relationship (angina/coronary artery disease, breast cancer, depression, hypertension, other heart conditions) 4. Negative relationship (gastrointestinal disorders, arthritis [both types], sciatica, prostate cancer)		√	√	√		
Baseline Functional Status						
Physical Functioning/Activities of Daily Living Scale	√	√	√			
General Health item (health is excellent, very good, good, fair, poor)	√	√	√			
Physical Functioning item (limitations in moderate activities)	√	√	√			
Physical Functioning item (limitations climbing several flights of stairs)	√	√	√			
Role-Physical item (accomplished less than would like)	√	√	√			
Role-Physical item (limited in the kind of work or other activities)	√	√	√			
Role-Emotional item (accomplished less than would like)	√	√	√			
Role-Emotional item (didn't do work or other activities as carefully)	√	√	√			
Bodily Pain item (pain interfered with normal work)	√	√	√			
Mental Health item (felt calm and peaceful)	√	√	√			
Vitality item (had a lot of energy)	√	√	√			
Mental Health item (felt downhearted and blue)	√	√	√			
Social Functioning item (health interfered with social activities)	√	√	√			
One-item measure of General Health compared to others	√	√	√			
Baseline PCS and MCS				√	√	

Table A2: Covariates Used in Estimation of Change in PCS and MCS Scores

PCS/MCS Model Covariates at Baseline	PCS Model			MCS Model		
	A	B	C	A	B	C
Age (linear), Age 75+, Age 85+	√	√	√	√	√	√
Gender	√	√	√	√	√	√
Age and Gender interaction	√	√	√	√	√	√
HOS Race/Ethnicity (Asian, Black/African-American, Hispanic, Native American, Pacific Islander, Multiracial)	√	√		√	√	
CMS Race/Ethnicity (Asian, Black/African-American, Hispanic, Native American, Other, Unknown)			√			√
Receive Medicaid or do not receive Medicaid	√	√	√	√	√	√
Eligible or not for Supplemental Security Income (SSI) due to disability	√	√	√	√	√	√
Home owner or non-home owner	√	√		√	√	
High school graduate or not high school graduate	√	√		√	√	
Married or not married (single, divorced, widowed, separated)	√	√		√	√	
Annual household income less than $20,000 or annual household income of $20,000 or greater	√			√		

Appendix 2

2016 Cohort 17 Follow Up Survey Field Frequencies for MAO HXXXA

The frequency graphs on the following pages are available for most questions for your MAO's *Cohort 17 Performance Measurement* respondent sample at follow up, with the exception of demographic information in Q55 - Q68, which is provided in the Demographics and BMI tables in the Performance Measurement Results section.[L] Please note that the percentages in the graphs may not add to 100% due to rounding.

The response frequencies for questions used in the four HEDIS Effectiveness of Care measures (Q42-Q52) are displayed for the *2016 Cohort 17 Follow Up* fields only, and not the combination of the complete round of data (*2016 Cohort 19 Baseline* and *2016 Cohort 17 Follow Up* data), as reported in the NCQA HEDIS Measures section of the *2016 Cohort 19 Baseline* Report.

Q1. In general, would you say your health is:

(N=164)

Excellent	7.9%
Very Good	31.1%
Good	41.5%
Fair	14.0%
Poor	5.5%
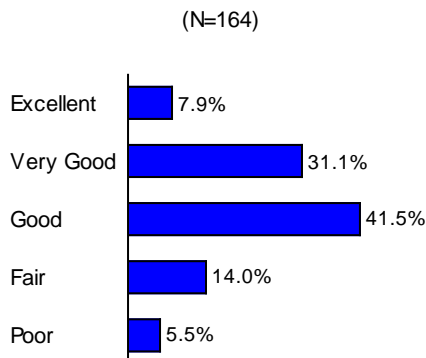
Q2a. Does your health now limit you in moderate activities, such as moving a table, pushing a vacuum cleaner, bowling, or playing golf?

(N=167)

Yes, limited a lot	19.2%
Yes, limited a little	35.3%
No, not limited at all	45.5%
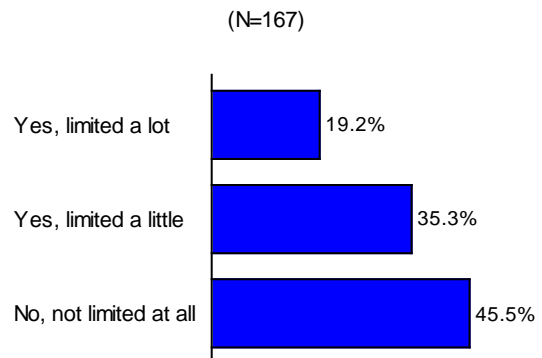
Q2b. Does your health now limit you in climbing several flights of stairs?
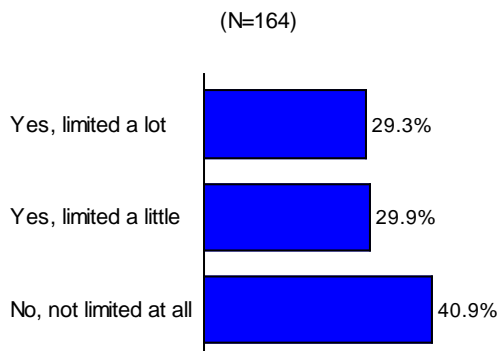
(N=164)

Yes, limited a lot	29.3%
Yes, limited a little	29.9%
No, not limited at all	40.9%

Q3a. During the past 4 weeks, have you accomplished less than you would like with your work or other regular daily activities as a result of your physical health?

(N=165)

Yes, all of the time	6.1%
Yes, most of the time	7.3%
Yes, some of the time	23.6%
Yes, a little of the time	27.9%
No, none of the time	35.2%
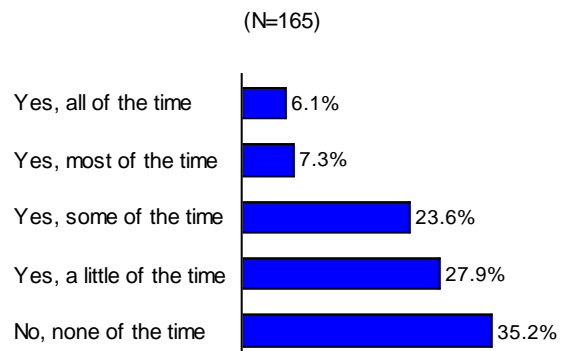
[L] The actual phrasing for the 2016 Medicare HOS 3.0 survey is available on the Health Outcomes Survey website at http://www.hosonline.org/en/survey-instrument/.

Q3b. During the past 4 weeks, were you limited in the kind of work or other activities as a result of your physical health?

(N=167)

Yes, all of the time	7.8%
Yes, most of the time	6.0%
Yes, some of the time	22.2%
Yes, a little of the time	26.9%
No, none of the time	37.1%
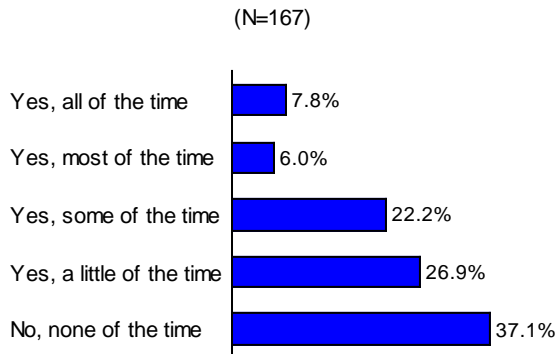
Q4a. During the past 4 weeks, have you accomplished less than you would like with your work or other regular daily activities as a result of any emotional problems?

(N=165)

Yes, all of the time	1.8%
Yes, most of the time	3.6%
Yes, some of the time	5.5%
Yes, a little of the time	14.5%
No, none of the time	74.5%
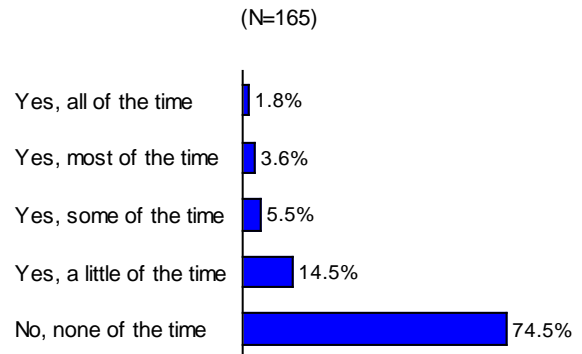
Q4b. During the past 4 weeks, did you not do work or other activities as carefully as usual as a result of any emotional problems?

(N=164)

Yes, all of the time	1.2%
Yes, most of the time	3.7%
Yes, some of the time	4.9%
Yes, a little of the time	11.6%
No, none of the time	78.7%
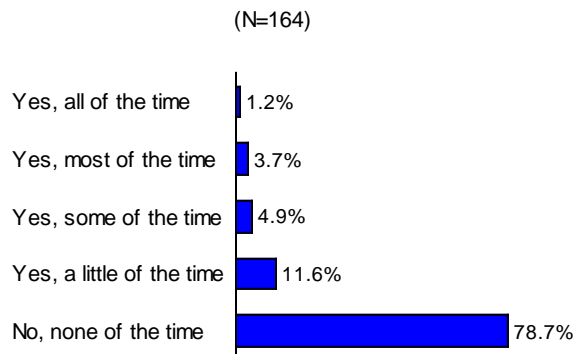
Q5. During the past 4 weeks, how much did pain interfere with your normal work (including both work outside the home and housework)?

(N=163)

Extremely	3.7%
Quite a bit	12.9%
Moderately	17.8%
A little bit	27.6%
Not at all	38.0%
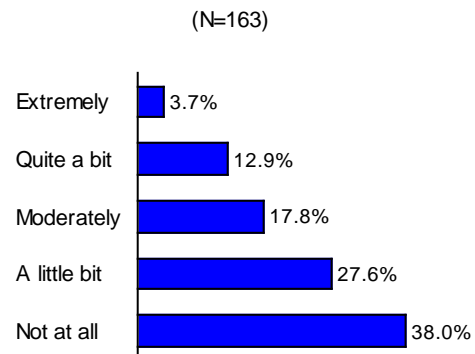
Q6a. How much of the time during the past 4 weeks: Have you felt calm and peaceful?

(N=162)

All of the time	17.3%
Most of the time	53.7%
A good bit of the time	13.0%
Some of the time	12.3%
A little of the time	2.5%
None of the time	1.2%
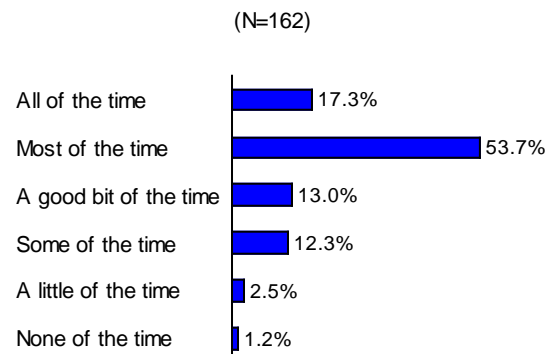
Q6b. How much of the time during the past 4 weeks: Did you have a lot of energy?

(N=163)

All of the time	9.8%
Most of the time	35.0%
A good bit of the time	19.6%
Some of the time	24.5%
A little of the time	8.0%
None of the time	3.1%
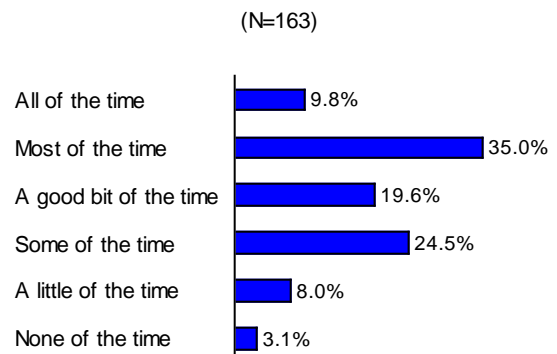
Q6c. How much of the time during the past 4 weeks: Have you felt downhearted and blue?

(N=163)

All of the time	0.0%
Most of the time	3.1%
A good bit of the time	3.7%
Some of the time	12.9%
A little of the time	30.7%
None of the time	49.7%
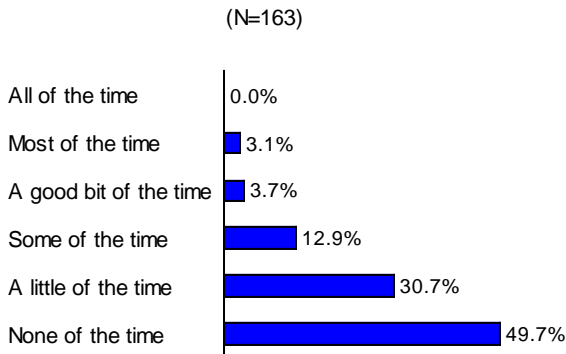
Q7. During the past 4 weeks, how much of the time has your physical health or emotional problems interfered with your social activities (like visiting with friends, relatives, etc.)?

(N=164)

All of the time	3.7%
Most of the time	4.3%
Some of the time	14.0%
A little of the time	11.6%
None of the time	66.5%
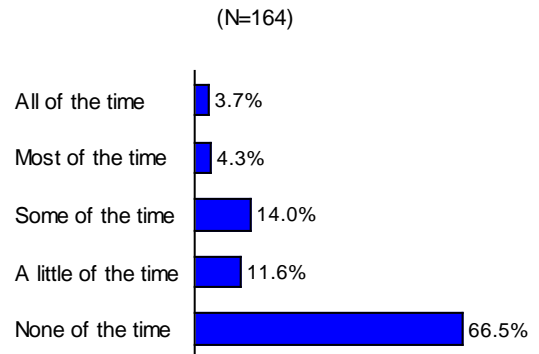
Q8. Compared to one year ago, how would you rate your physical health in general now?

(N=164)

Much better	6.7%
Slightly better	9.8%
About the same	59.1%
Slightly worse	21.3%
Much worse	3.0%
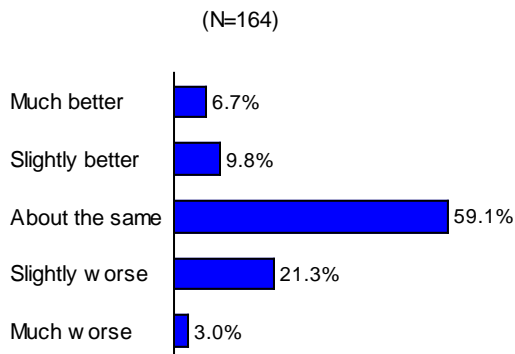
Q9. Compared to one year ago, how would you rate your emotional problems (such as feeling anxious, depressed or irritable) in general now?

(N=161)

Much better	16.8%
Slightly better	7.5%
About the same	62.7%
Slightly worse	10.6%
Much worse	2.5%
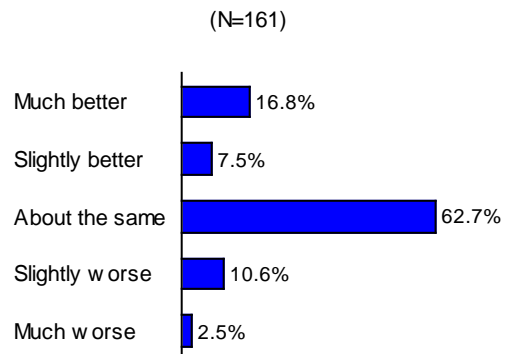
Q10a. Because of a health or physical problem, do you have any difficulty doing the following activities without special equipment or help from another person: Bathing?

(N=165)

I am unable to do this activity	3.0%
Yes, I have difficulty	9.1%
No, I do not have difficulty	87.9%
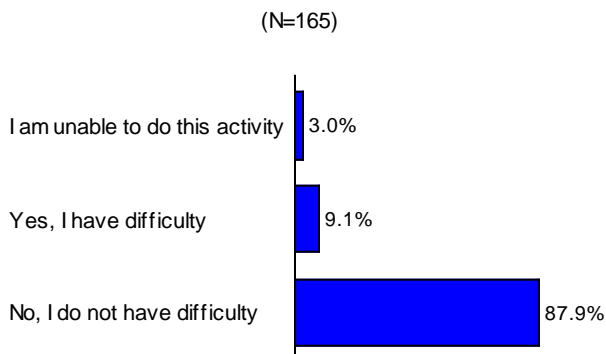
Q10b. Because of a health or physical problem, do you have any difficulty doing the following activities without special equipment or help from another person: Dressing?

(N=164)

I am unable to do this activity	1.2%
Yes, I have difficulty	7.3%
No, I do not have difficulty	91.5%
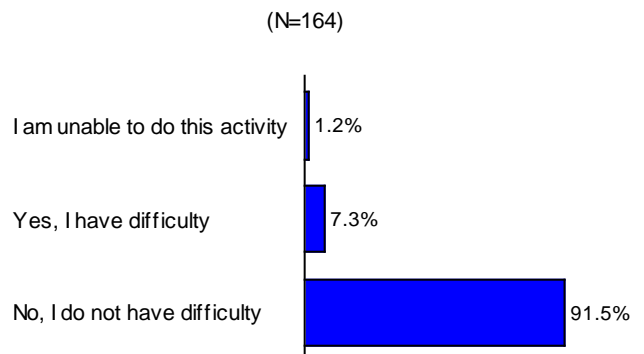
Q10c. Because of a health or physical problem, do you have any difficulty doing the following activities without special equipment or help from another person: Eating?

(N=164)

I am unable to do this activity | 0.6%

Yes, I have difficulty | 1.2%

No, I do not have difficulty | 98.2%
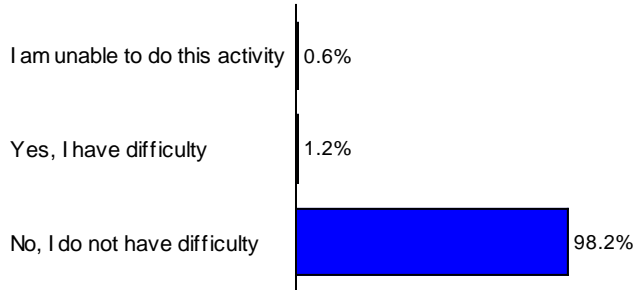
Q10d. Because of a health or physical problem, do you have any difficulty doing the following activities without special equipment or help from another person: Getting in or out of chairs?

(N=165)

I am unable to do this activity | 1.8%

Yes, I have difficulty | 18.8%

No, I do not have difficulty | 79.4%
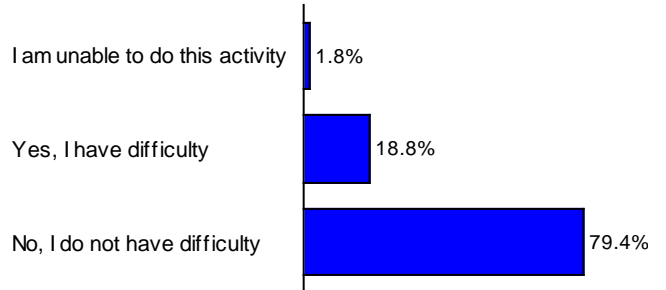
Q10e. Because of a health or physical problem, do you have any difficulty doing the following activities without special equipment or help from another person: Walking?

(N=164)

I am unable to do this activity | 1.8%

Yes, I have difficulty | 29.9%

No, I do not have difficulty | 68.3%
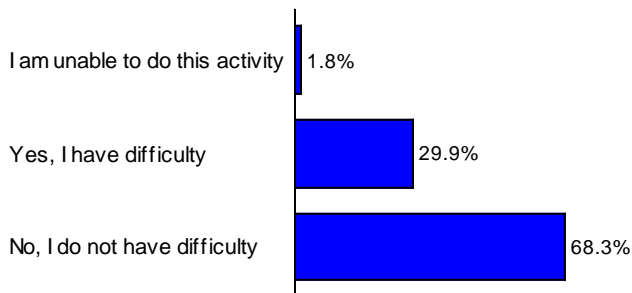
Q10f. Because of a health or physical problem, do you have any difficulty doing the following activities without special equipment or help from another person: Using the toilet?

(N=163)

I am unable to do this activity | 1.2%

Yes, I have difficulty | 2.5%

No, I do not have difficulty | 96.3%
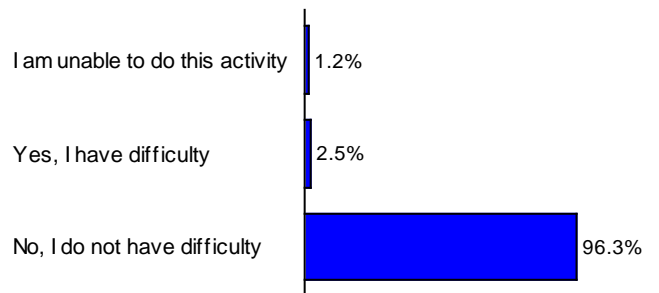
Q11a. Because of a health or physical problem, do you have any difficulty preparing meals?

(N=165)

I do not do this activity | 8.5%

Yes, I have difficulty | 6.7%

No, I do not have difficulty | 84.8%
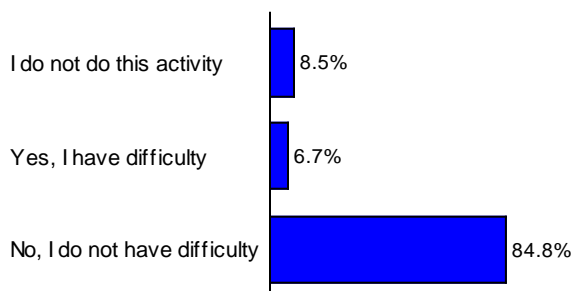
Q11b. Because of a health or physical problem, do you have any difficulty managing money?

(N=165)

I do not do this activity | 6.1%

Yes, I have difficulty | 3.0%

No, I do not have difficulty | 90.9%
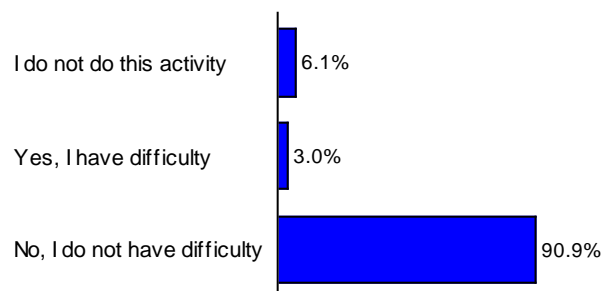
Q11c. Because of a health or physical problem, do you have any difficulty taking medication as prescribed?

(N=164)

- I do not do this activity — 2.4%
- Yes, I have difficulty — 3.7%
- No, I do not have difficulty — 93.9%
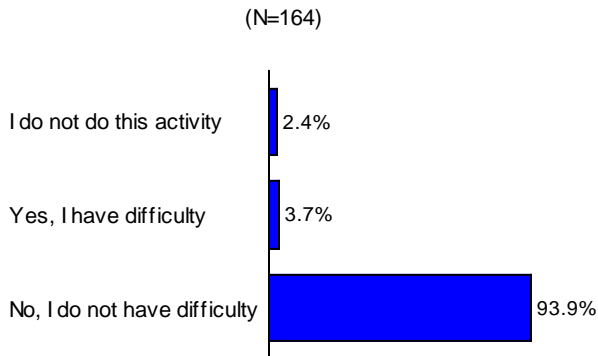
Q12. Now thinking about your physical health, which includes physical illness and injury, for how many days during the past 30 days was your physical health not good?

(N=156)

- 0 days — 64.1%
- 1-13 days — 19.9%
- 14-30 days — 16.0%
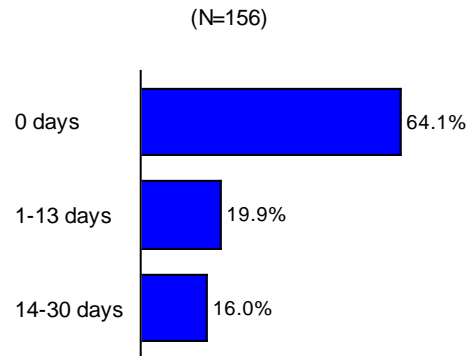
Q13. Now thinking about your mental health, which includes stress, depression, and problems with emotions, for how many days during the past 30 days was your mental health not good?

(N=160)

- 0 days — 74.4%
- 1-13 days — 15.0%
- 14-30 days — 10.6%
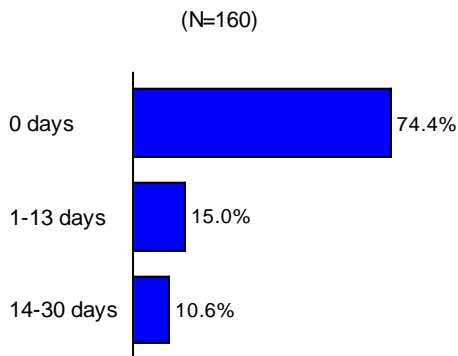
Q14. During the past 30 days, for about how many days did poor physical or mental health keep you from doing your usual activities, such as self-care, work, or recreation?

(N=156)

- 0 days — 75.0%
- 1-13 days — 12.8%
- 14-30 days — 12.2%
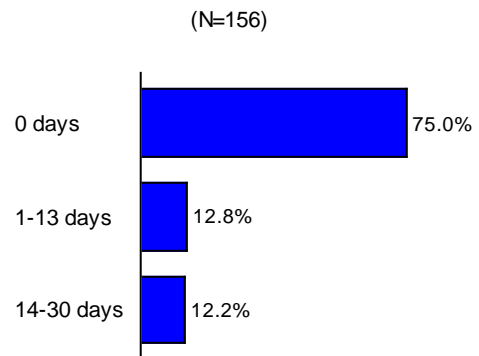
Q15. Are you blind or do you have serious difficulty seeing, even when wearing glasses?

(N=164)

- Yes — 11.6%
- No — 88.4%
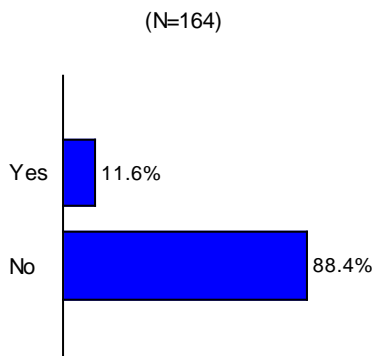
Q16. Are you deaf or do you have serious difficulty hearing, even with a hearing aid?

(N=164)

- Yes — 14.0%
- No — 86.0%
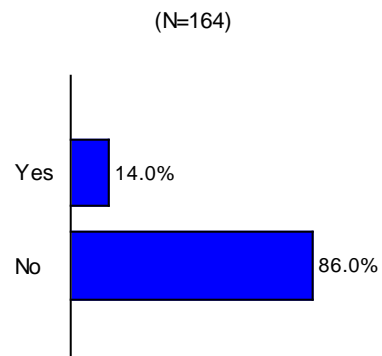
Q17. Because of a physical, mental, or emotional condition, do you have serious difficulty concentrating, remembering or making decisions?

(N=165)

Yes 13.9%

No 86.1%
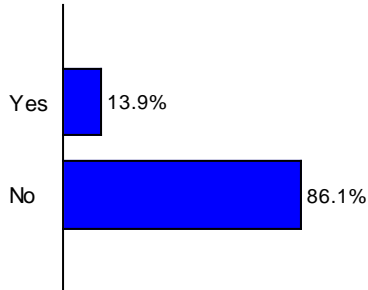
Q18. Because of a physical, mental, or emotional condition, do you have difficulty doing errands alone such as visiting a doctor's office or shopping?

(N=165)

Yes 13.9%

No 86.1%
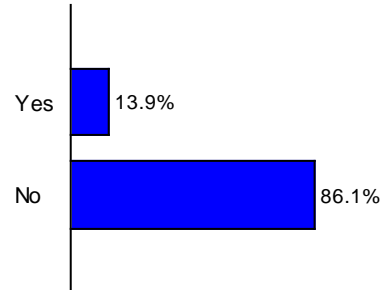
Q19. In the past month, how often did memory problems interfere with your daily activities?

(N=163)

Every day 3.7%

Most days 1.2%

Some days 8.6%

Rarely 27.6%

Never 58.9%
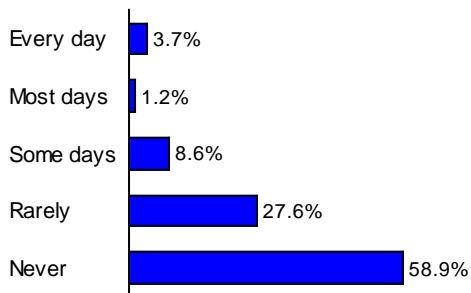
Q20. Has a doctor ever told you that you had: Hypertension or high blood pressure?

(N=163)

Yes 76.1%

No 23.9%
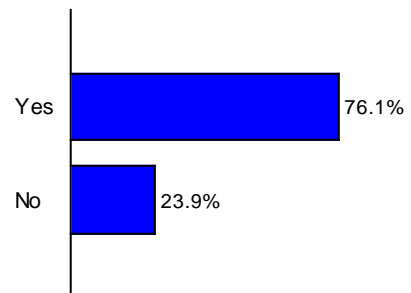
Q21. Has a doctor ever told you that you had: Angina pectoris or coronary artery disease?

(N=162)

Yes 13.0%

No 87.0%
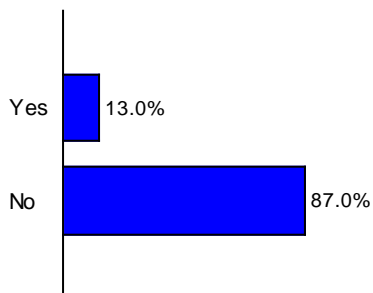
Q22. Has a doctor ever told you that you had: Congestive heart failure?

(N=163)

Yes 8.0%

No 92.0%
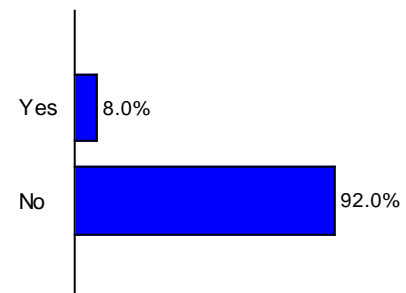
Q23. Has a doctor ever told you that you had:
A myocardial infarction or heart attack?

(N=163)

Yes 8.6%

No 91.4%
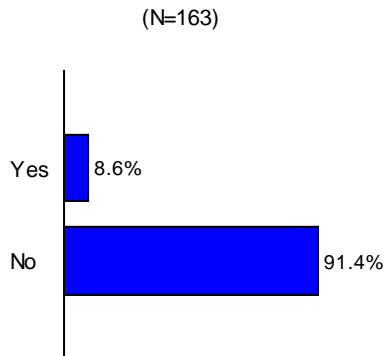
Q24. Has a doctor ever told you that you had:
Other heart conditions, such as problems with heart valves or the rhythm of your heartbeat?

(N=162)

Yes 19.1%

No 80.9%
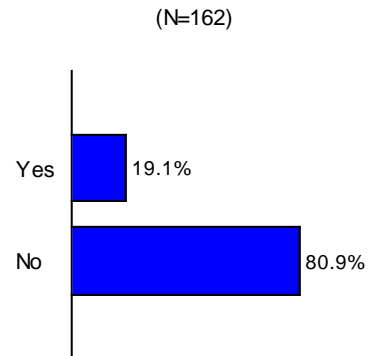
Q25. Has a doctor ever told you that you had:
A stroke?

(N=162)

Yes 5.6%

No 94.4%
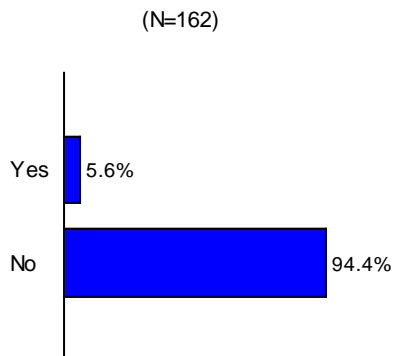
Q26. Has a doctor ever told you that you had:
Emphysema, or asthma, or COPD (chronic obstructive pulmonary disease)?

(N=163)

Yes 9.8%

No 90.2%
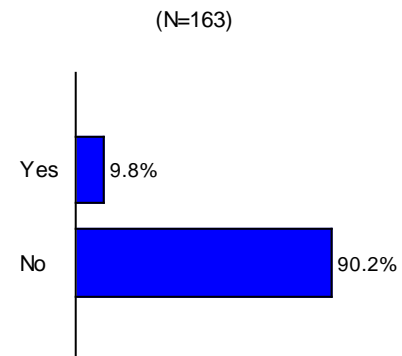
Q27. Has a doctor ever told you that you had:
Crohn's disease, ulcerative colitis, or inflammatory bowel disease?

(N=164)

Yes 4.3%

No 95.7%
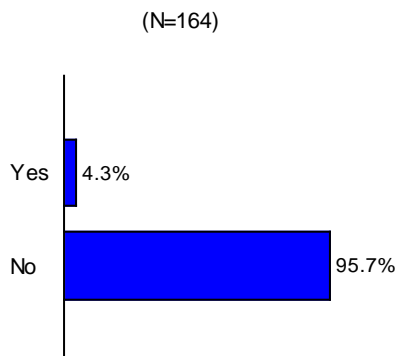
Q28. Has a doctor ever told you that you had:
Arthritis of the hip or knee?

(N=163)

Yes 43.6%

No 56.4%
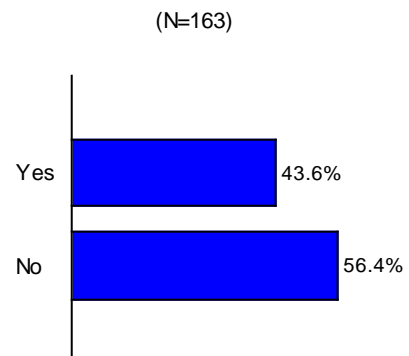
Q29. Has a doctor ever told you that you had:
Arthritis of the hand or wrist?

(N=162)

Yes ▌35.8%

No ▌64.2%
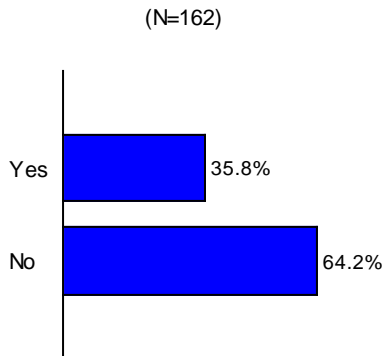
Q30. Has a doctor ever told you that you had:
Osteoporosis, sometimes called thin or brittle bones?

(N=163)

Yes ▌23.9%

No ▌76.1%
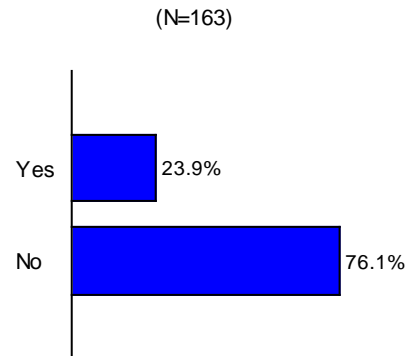
Q31. Has a doctor ever told you that you had:
Sciatica (pain or numbness that travels down your leg
to below your knee)?

(N=161)

Yes ▌28.6%

No ▌71.4%
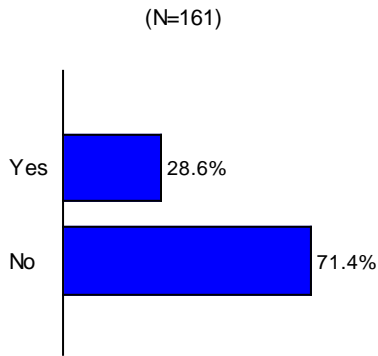
Q32. Has a doctor ever told you that you had:
Diabetes, high blood sugar, or sugar in the urine?

(N=165)

Yes ▌26.1%

No ▌73.9%
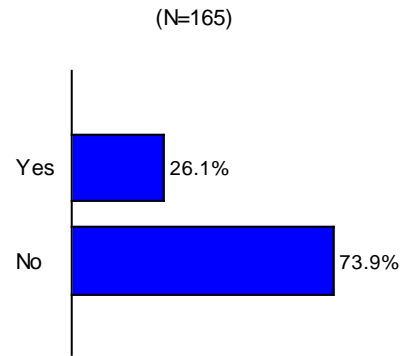
Q33. Has a doctor ever told you that you had:
Depression?

(N=163)

Yes ▌11.7%

No ▌88.3%
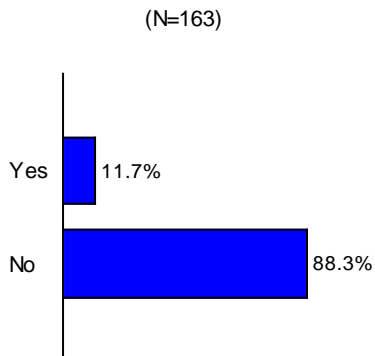
Q34. Has a doctor ever told you that you had:
Any cancer (other than skin cancer)?

(N=162)

Yes ▌14.2%

No ▌85.8%
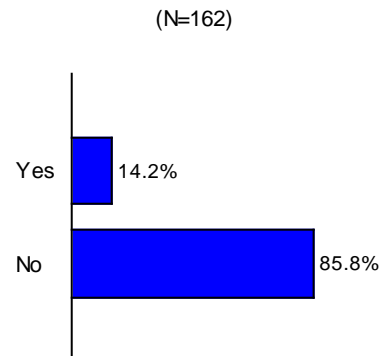
Q35a. Are you currently under treatment for: Colon or rectal cancer?

(N=70)

Yes 0.0%

No 100.0%
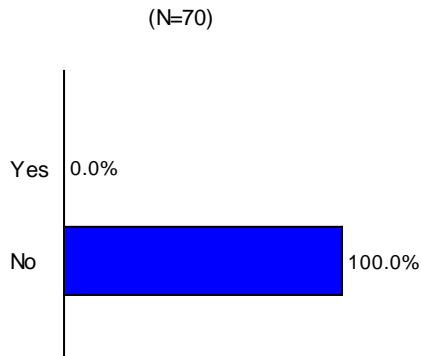
Q35b. Are you currently under treatment for: Lung cancer?

(N=70)

Yes 1.4%

No 98.6%
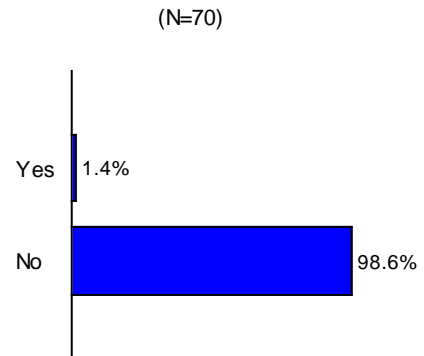
Q35c. Are you currently under treatment for: Breast cancer?

(N=69)

Yes 4.3%

No 95.7%
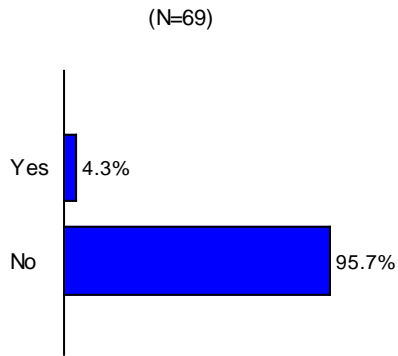
Q35d. Are you currently under treatment for: Prostate cancer?

(N=65)

Yes 3.1%

No 96.9%
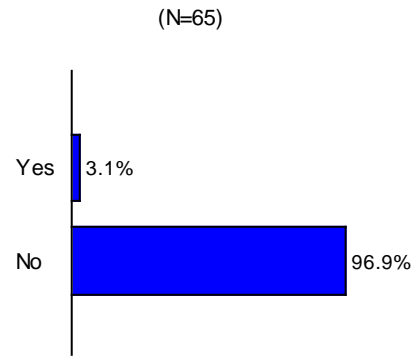
Q35e. Are you currently under treatment for: Other cancer (other than skin cancer)?

(N=70)

Yes 5.7%

No 94.3%
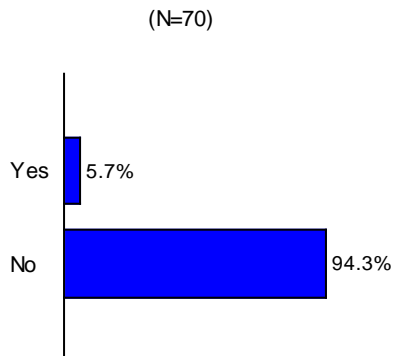
Q36. In the past 7 days, how much did pain interfere with your day to day activities?

(N=165)

Not at all 47.3%

A little bit 27.9%

Somew hat 11.5%

Quite a bit 10.9%

Very much 2.4%
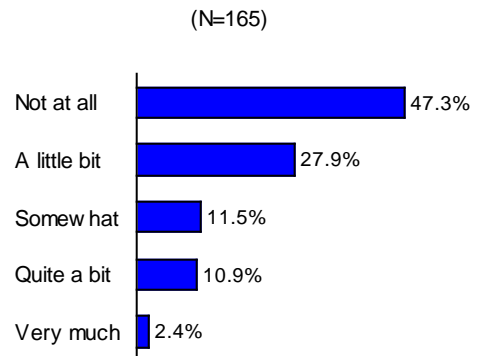
Q37. In the past 7 days, how often did pain keep you from socializing with others?

(N=164)

Never	69.5%
Rarely	11.0%
Sometimes	15.2%
Often	3.0%
Always	1.2%
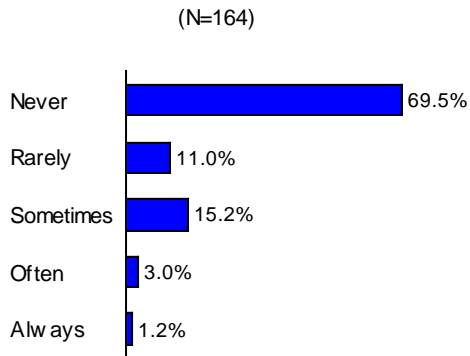
Q38. In the past 7 days, how would you rate your pain on average?

(N=163)

1	33.1%
2-4	41.7%
5-7	17.2%
8-10	8.0%
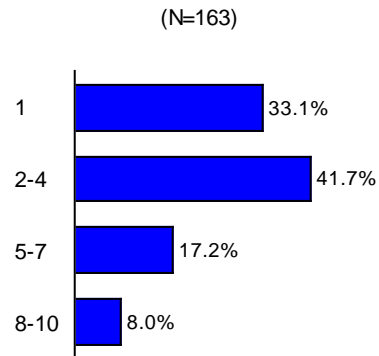
Q39a. Over the past 2 weeks, how often have you had little interest or pleasure in doing things?

(N=163)

Not at all	73.0%
Several days	18.4%
More than half the days	3.1%
Nearly every day	5.5%
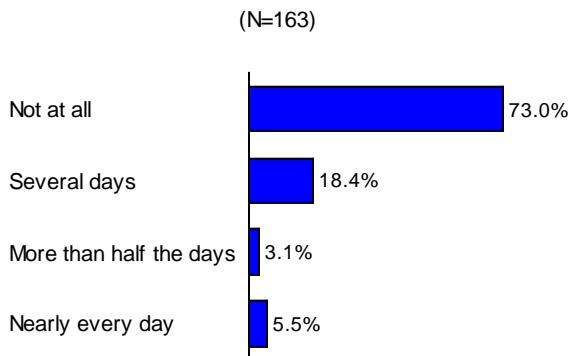
Q39b. Over the past 2 weeks, how often have you felt down, depressed or hopeless?

(N=162)

Not at all	80.9%
Several days	13.6%
More than half the days	2.5%
Nearly every day	3.1%
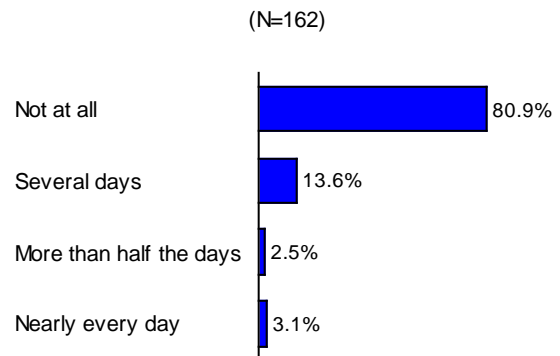
Q40. In general, compared to other people your age, would you say that your health is:

(N=161)

Excellent	17.4%
Very Good	36.0%
Good	32.9%
Fair	9.9%
Poor	3.7%
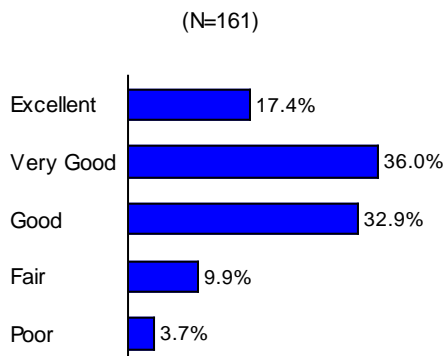
Q41. Do you now smoke every day, some days, or not at all?

(N=162)

Every day	4.3%
Some days	3.7%
Not at all	92.0%
Don't Know	0.0%
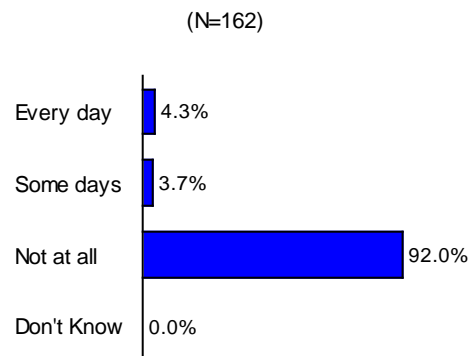
Q42. Many people experience leakage of urine, also called urinary incontinence. In the past six months, have you experienced leaking of urine?

(N=159)

Yes — 27.0%
No — 73.0%
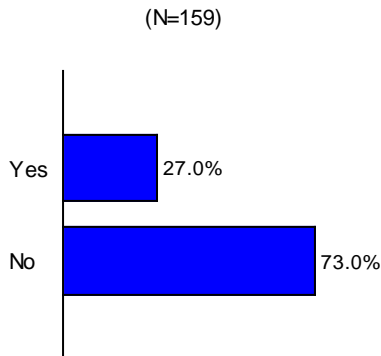
Q43. During the past six months, how much did leaking of urine make you change your daily activities or interfere with your sleep?

(N=67)

A lot — 4.5%
Somewhat — 40.3%
Not at all — 55.2%
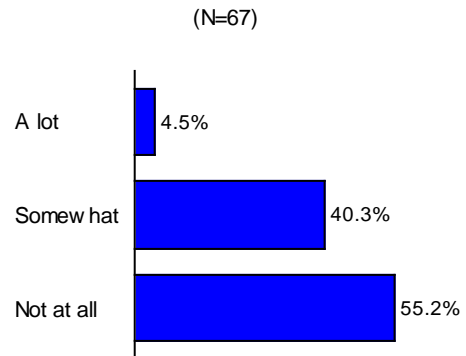
Q44. Have you ever talked with a doctor, nurse or other health care provider about leaking of urine?

(N=68)

Yes — 36.8%
No — 63.2%
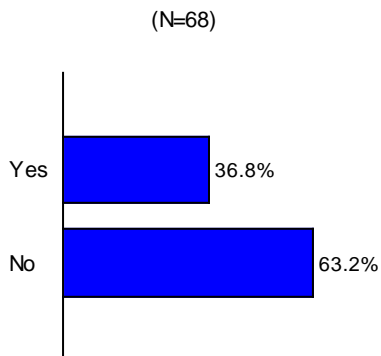
Q45. Have you ever talked with a doctor, nurse, or other health care provider about any of these approaches? (bladder training, exercises, medication, surgery)

(N=71)

Yes — 23.9%
No — 76.1%
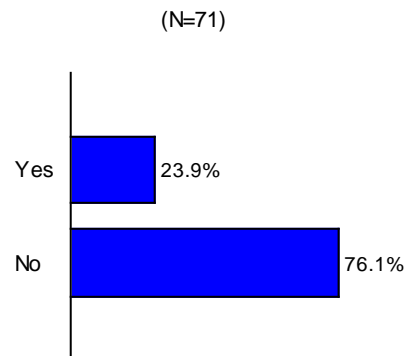
Q46. In the past 12 months, did you talk with a doctor or other health provider about your level of exercise or physical activity?

(N=160)

Yes — 50.0%
No — 46.3%
No visits — 3.8%
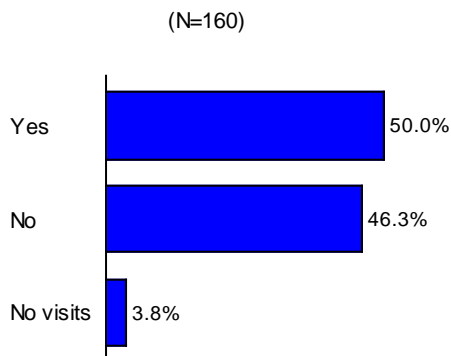
Q47. In the past 12 months, did a doctor or other health provider advise you to start, increase or maintain your level of exercise or physical activity?

(N=157)

Yes — 50.3%
No — 49.7%
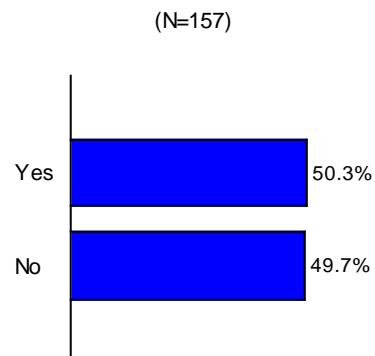
Q48. A fall is when your body goes to the ground without being pushed. In the past 12 months, did you talk with your doctor or other health provider about falling or problems with balance or walking?

(N=165)

Yes	22.4%
No	75.2%
No visits	2.4%
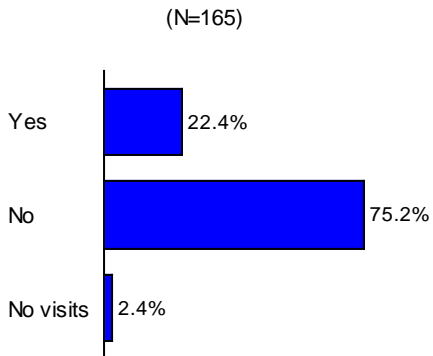
Q49. Did you fall in the past 12 months?

(N=166)

Yes	22.3%
No	77.7%
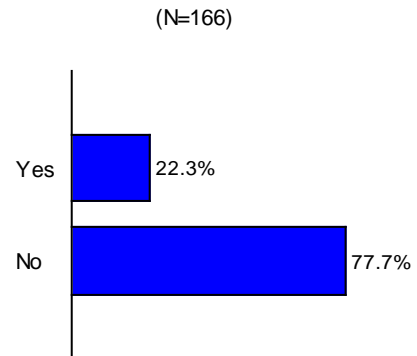
Q50. In the past 12 months, have you had a problem with balance or walking?

(N=163)

Yes	35.6%
No	64.4%
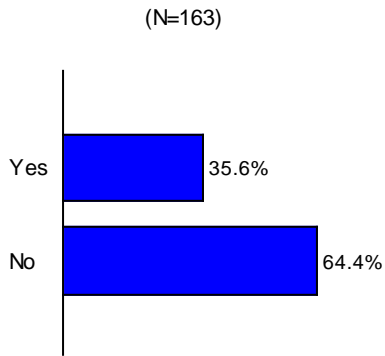
Q51. Has your doctor or other health provider done anything to help prevent falls or treat problems with balance or walking?

(N=163)

Yes	31.9%
No	64.4%
No visits	3.7%
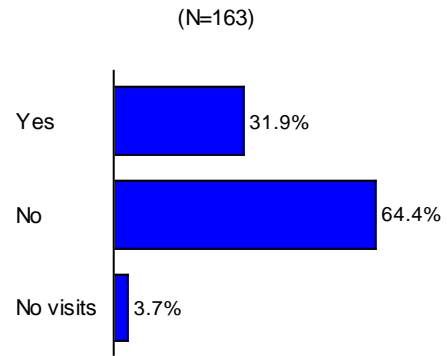
Q52. Have you ever had a bone density test to check for osteoporosis, sometimes thought of as 'brittle bones'?

(N=165)

Yes	56.4%
No	43.6%
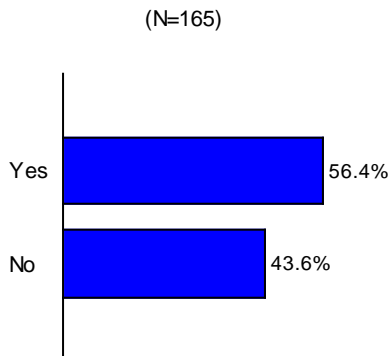
Q53. During the past month, on average, how many hours of actual sleep did you get at night?

(N=165)

Less than 5 hours	7.9%
5-6 hours	41.2%
7-8 hours	48.5%
9 or more hours	2.4%
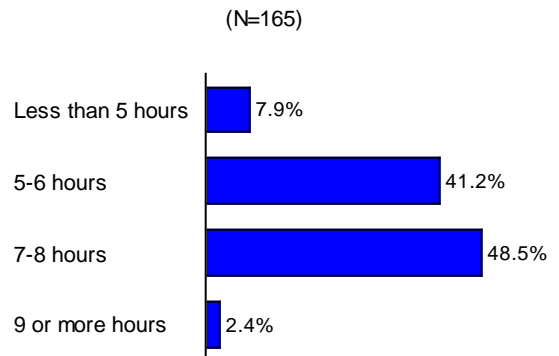
Q54. During the past month, how would you rate your
overall sleep quality?

(N=167)

Very Good	24.6%
Fairly Good	62.9%
Fairly Bad	11.4%
Very Bad	1.2%
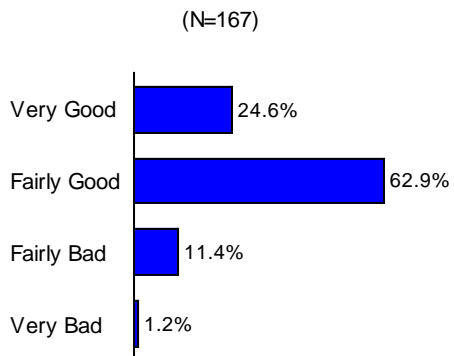
Appendix 3

HOS Partners

CENTERS FOR MEDICARE & MEDICAID SERVICES (CMS)

Address:
7500 Security Boulevard
Baltimore, MD 21244-1850

HOS websites:
https://www.cms.gov/Research-Statistics-Data-and-Systems/Research/HOS/index.html

www.HOSonline.org

HOS Email:
hos@cms.hhs.gov

The Health Outcomes Survey (HOS) Team at the Centers for Medicare & Medicaid Services (CMS) is responsible for leadership, oversight, coordination, and successful implementation of the national Medicare Health Outcomes Survey Program.

The HOS team directs and coordinates the work of various program partners. The survey implementation and operations contractors include the National Committee for Quality Assurance (NCQA), Research Triangle Institute (RTI) International, and the Center for the Assessment of Pharmaceutical Practices (CAPP), formerly Health Outcomes Technologies Program (HOT), of the Boston University School of Public Health. The data analysis, dissemination, education, and applied research contractor is Health Services Advisory Group (HSAG).

CENTER FOR THE ASSESSMENT OF PHARMACEUTICAL PRACTICES (CAPP), FORMERLY HEALTH OUTCOMES TECHNOLOGIES PROGRAM (HOT)

Health Policy & Management Department, Boston University School of Public Health

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Survey website:
http://www.bu.edu/sph/research/research-landing-page/vr-36-vr-12-and-vr-6d/

The Center for the Assessment of Pharmaceutical Practices (CAPP) at the Boston University (BU) School of Public Health was launched in 1998. The principal goals of CAPP are to advance the use of patient-centered assessments of health to improve health outcomes and to advance research efforts in the areas of health outcomes, cost-effectiveness analysis, technology assessment, disease management, pharmaceutical administration, and health care policy. CAPP has integrated patient-centered measures with extensive pharmaceutical and health services databases. CAPP has led several major projects in the VA involving the development of the Veterans RAND 36-Item Health Survey (VR-36), which is modified from the MOS SF-36 to provide greater precision and reliability than the original version. Well over 2 million administrations of the VR-36 have occurred in the VA since 1996. A shorter version of the VR-36, the Veterans RAND 12-Item Health Survey (VR-12), has also been developed by CAPP and administered to over 3.0 million users both inside and outside the VA. These assessments have contributed to the outcomes management system in the VA. The VR-12 is the principal outcome in HOS.

The work of the CAPP program is driven by an increased demand for new patient-based assessment tools and methodologies that can be used for clinical management and for monitoring the quality, efficiency, and effectiveness of patient care.

CAPP's staff have been engaged in several collaborative projects for the HOS, including comparisons of health outcomes between the HOS and the VA. The purpose of this study was to examine the differences in the outcomes of care for the HOS compared with the VA. Analyses included psychometric comparisons of a 36-item Health Survey between HOS and VA, and an examination of the differences of the disease burden of patients seen in the HOS systems of care compared with those veterans seen within the VA. A recent study examined the quality of care using medication data from the Medicare Part D data base merged with VR-12 outcomes from the HOS survey. The group has also developed imputation programs for the HOS to deal with missing values using the MOS SF-36 Version 1.0, the VR-36, and the VR-12, as well as risk adjustment models.

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Health Services Advisory Group, Inc. (HSAG) is a diversified, Arizona-based Quality Innovation Network-Quality Improvement Organization (QIN-QIO) and External Quality Review Organization (EQRO). Established in 1979 by a group of medical professionals, HSAG served as the Arizona QIO since 1979. In 2003, HSAG acquired the Florida QIO (FMQAI) and in 2008, HSAG was selected as the QIO for California (HSAG in California). In 2014, HSAG was awarded the new QIN-QIO contract for the states of Arizona, California, Florida, Ohio, and the U.S. Virgin Islands.

As a designated QIN-QIO, HSAG implements projects focused on improving the quality of healthcare services for Medicare beneficiaries. As an EQRO, HSAG is nationally recognized for its extensive experience with Medicaid programs and their populations.

HSAG is licensed by the National Committee for Quality Assurance (NCQA) to conduct HEDIS Compliance Audits™ and is an NCQA Certified HEDIS/CAHPS® Survey Vendor. Nationally accredited by the American Accreditation Healthcare Commission/URAC since 1993, HSAG also performs medical reviews for private and government clients.

HSAG has been CMS' data analysis, dissemination, education, and applied research contractor for the Medicare HOS program since 1998.

NATIONAL COMMITTEE FOR QUALITY ASSURANCE (NCQA)

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The National Committee for Quality Assurance (NCQA) has served as the Centers for Medicare & Medicaid Services (CMS) contractor for implementing the Healthcare Effectiveness Data and Information Set (HEDIS®) Medicare Health Outcomes Survey (HOS) since the survey's inception in 1997. In this capacity, NCQA:

- Manages the data collection and transmittal of the HOS.
- Evaluates CMS-approved HOS survey vendors and conducts ongoing quality assurance of the survey process.
- Develops, evaluates, and refines quality measures for the HOS.
- Publishes the *HEDIS, Volume 6 Specifications for the Medicare Health Outcomes Survey*, which contains the technical specifications for the measure and survey protocol.
- Furnishes CMS, Medicare Advantage Organizations (MAOs), and interested parties with training, technical assistance, and materials related to the HOS measures.

NCQA is a private, non-profit organization dedicated to improving health care quality. NCQA's website (www.ncqa.org) contains information to help consumers, employers and others make more informed health care choices.

NCQA accredits and certifies a wide range of health care organizations, recognizes clinicians and clinician groups in key areas of performance and manages the evolution of HEDIS, the tool the nation's MAOs use to measure and report on their performance. There are more than 70 different measures in HEDIS, which provide purchasers and consumers with the information they need to reliably compare the performance of managed care plans.

HEDIS is a registered trademark of the National Committee for Quality Assurance (NCQA).

RESEARCH TRIANGLE INSTITUTE (RTI) INTERNATIONAL

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RTI International is an independent, nonprofit research institute based in Research Triangle Park, North Carolina. Established in 1958 as the Research Triangle Institute, RTI has a distinguished history of scientific achievement in the areas of health and pharmaceuticals, education and training, surveys and statistics, advanced technology, international development, economic and social policy, energy and the environment, and laboratory testing and chemical analysis. RTI's staff of more than 2,800 supports projects in more than 40 countries.

The organization was founded by a joint action of the University of North Carolina at Chapel Hill, Duke University, and North Carolina State University as the first scientific organization in the Research Triangle Park (RTP), North Carolina. RTI today comprises four research units, of which the largest encompasses statistics, health and social policy and survey research.

RTI staff have extraordinary depth of expertise in collecting, assessing, and reporting policy-oriented information and conducting health services research in many areas, including payment system design, risk adjustment, cost estimation and cost-effectiveness analysis, as well as state health care reform and Medicaid program evaluation. In addition, RTI possesses substantial capabilities in the analysis of large databases. Staff members are highly regarded in their respective areas of expertise and they have testified before the U.S. Congress, MedPAC (and its predecessor agencies ProPAC and PPRC), and various state commissions.

RTI's main campus is located on 180 acres in North Carolina's RTP. In addition, RTI maintains well-staffed research facilities at sites in Washington, DC; Rockville, Maryland; Waltham, Massachusetts; Chicago, Illinois; Atlanta, Georgia; and at numerous project locations in the United States and abroad.

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