

Medicare Health Outcomes Survey (HOS)
2020-2022 Cohort 23 Case-Mix Adjustment
August 2023

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The longitudinal outcomes for the Medicare HOS 2020-2022 Cohort 23 Performance Measurement analysis are based on risk-adjusted mortality rates, changes in physical health as measured by the physical component summary (PCS) score, and changes in mental health as measured by the mental component summary (MCS) score for the participating Medicare Advantage Organizations (MAOs). For reporting purposes, death and PCS outcomes are combined into one overall measure of change in physical health. Thus, there are two primary outcomes: (1) Alive and PCS Better + Same (vs. PCS Worse or Death) and (2) MCS Better + Same (vs. MCS Worse). For the Medicare Part C Star Ratings, the primary outcomes are reported as the percentage of respondents within an MAO who are “*Improving or Maintaining Physical Health*” and the percentage within an MAO who are “*Improving or Maintaining Mental Health*” over the two-year period, after adjustment for case-mix.

The analysis of death outcomes for the HOS performance measurement includes beneficiaries who are 65 years or older at baseline, completed the HOS at baseline with a calculable PCS or MCS score, and whose MAO participated in the HOS at follow up. Beneficiaries are included in the analysis of PCS and MCS change scores if they are 65 years or older at baseline, alive at follow up, enrolled in their original MAO when the follow up sample was drawn, and completed the HOS with calculable PCS and MCS scores at baseline and follow up. HOS outcomes are analyzed by calculating the national averages, and the differences between actual and expected contract-level results for death, PCS, and MCS over two years. The expected results are adjusted for the case-mix of beneficiaries within an MAO to control for pre-existing baseline differences across MAOs with respect to covariates, such as baseline measures of sociodemographic characteristics, chronic medical conditions, and functional health status. The PCS results are combined with the percentage remaining alive in the MAO. An adjusted contract-level percentage for each of the two primary outcomes (PCS and MCS change scores) is calculated by combining the national average and the MAO difference score, using a logit transformation.

Table 1 below includes one multivariate logistic regression model for each of three outcomes (i.e., death, PCS, and MCS) that are used to case-mix adjust HOS outcomes, and to calculate expected outcomes for each beneficiary. Beginning in 2022 for the 2024 Star Ratings display page, CMS updated the case-mix specifications for the expected outcomes of the HOS performance measures from a multi-model approach requiring non-missing values for all covariates in each model to a single model for each outcome that uses the Contract-Mean Imputation (CMI) method for covariates with missing data. Under the CMI approach, a missing case-mix adjuster (covariate) for a beneficiary is replaced with the mean value for that adjuster for other beneficiaries in the same contract who have responses contributing to the longitudinal PCS and MCS measures: *Improving or Maintaining Physical Health* and *Improving or Maintaining Mental Health*. Since the change to the case-mix specifications is substantive, the two measures are on display for the 2024 and 2025 Star Ratings and will return to the Star Ratings program in 2026.

The coefficients in the table report the log-odds for beneficiaries with a given characteristic having the expected outcome compared to beneficiaries in the reference category for that characteristic, controlling for all other model characteristics. In Table 1: HOS Model Covariates at Baseline (Death, PCS Better + Same, and MCS Better + Same models), the coefficient for “Female” in the PCS Better + Same Model is -0.092569, indicating a lower probability of PCS Better + Same for female compared to male respondents (the reference category), who otherwise have the same demographic and health characteristics. However, the coefficient for age and gender interaction in the PCS Better + Same Model is 0.001137, indicating a very small positive difference in the expected outcome between females and males of the same age.

More information about the calculation of HOS outcomes at the beneficiary and MAO contract levels is available on the HOS website at www.hosonline.org.

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Table 1: HOS Model Covariates at Baseline (Death, PCS Better + Same, and MCS Better + Same models)

Death Model Covariates	Death Model	PCS Model	MCS Model
Sociodemographic Variables			
Constant	-5.757432	1.789367	1.911023
Age (linear)	0.047875	-0.009973	-0.003416
Age 75+	0.042356	-0.026552	-0.037774
Age 85+	0.014193	0.026640	0.013292
Age and gender interaction	-0.003937	0.001137	0.001177
Female	-0.191463	-0.092569	-0.101869
Hispanic only	-0.448478	0.042071	-0.153148
Asian only	-0.823074	0.042194	-0.127139
Native Hawaiian or Pacific Islander only	-0.085218	0.116559	-0.663766
Black only	-0.171002	0.011701	-0.117457
American Indian or Alaskan Native only	-0.056802	-0.259699	0.040669
Multiracial	0.028947	-0.125228	-0.150830
Married	-0.155506	-0.024671	-0.110211
Receive Medicaid	0.141222	-0.025063	-0.143179
Eligible for SSI	0.016701	-0.085972	-0.241238
Homeowner	-0.136808	0.091178	0.149906
High school graduate or greater	-0.044259	0.102074	0.270158
Annual Household Income	0.073343	-0.059944	-0.268121
Baseline Functional Status			
One-item measure of General Health compared to others	0.186611		
Physical Functioning/Activities of Daily Living Scale	-0.019031		
General Health item	0.186510		
Physical Functioning item (limitations in moderate activities)	-0.016273		
Physical Functioning item (limitations climbing several flights of stairs)	0.058295		
Role Physical item (accomplished less than would like)	0.039502		
Role-Physical item (limited in the kind of work or other activities)	0.047501		
Role-Emotional item (accomplished less than would like)	0.025849		
Role-Emotional item (did not do work or other activities as carefully)	-0.014349		
Bodily Pain item (pain interfered with normal work)	-0.084922		
Mental Health item (felt calm and peaceful)	-0.016842		
Vitality item (had a lot of energy)	0.062707		
Mental Health item (felt downhearted and blue)	0.017387		
Social Functioning item (health interfered with social activities)	-0.038970		
Chronic Medical Conditions			
Hypertension	-0.058874		
Angina/coronary artery disease	0.009891		
Congestive heart failure	0.520019		
Myocardial infarction	0.100652		
Other heart conditions	0.015470		
Stroke	0.162474		

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Death Model Covariates	Death Model	PCS Model	MCS Model
Pulmonary disease	0.234773		
Gastrointestinal disorders	-0.184121		
Arthritis of hip or knee	-0.252593		
Arthritis of hand or wrist	-0.140741		
Sciatica	-0.241266		
Diabetes	0.125898		
Depression	-0.097489		
Any cancer other than skin cancer	0.391686		
Colon cancer treatment	0.217433		
Breast cancer treatment	-0.125623		
Prostate cancer treatment	-0.262481		
Lung cancer treatment	0.979874		