Case-Mix Coefficients and National Means for 2019 MA & PDP CAHPS

**Approach to Case-mix Adjustment**

Certain respondent characteristics, such as education, are not under the control of the contract, but are related to the sampled member’s survey responses. In general, for example, individuals with less education and those who report better general and mental health provide more positive ratings and reports of care than others in the same contracts. The distribution of these variables is called the case mix of the contract. To ensure that comparisons between contracts reflect differences in performance rather than differences in case mix, CMS adjusts for such respondent characteristics using linear regression models when comparing contracts in preview reports and public reporting.

Case-mix adjustment is implemented via linear regression models predicting CAHPS measures from case-mix adjustors and contract indicators. The case-mix model used for analyzing the 2019 MA & PDP CAHPS Survey data includes the following variables:

- Education
- Self-reported general health status
- Self-reported mental health status
- Proxy assistance or completion of the survey form
- Dual eligibility*
- Low income subsidy*
- Age*
- Asian (Chinese and Vietnamese) language survey completion

*CMS Administrative Data*

In these models, missing case-mix adjustors are imputed as the contract mean. Adjusted means represent the predicted mean that would be obtained for a given contract if the average of each case-mix variable for that contract were equal to the national average across all contracts.

Respondent data for each contract are weighted by the ratio of survey-eligible enrollment in the contract to respondents. Some MA contracts include both one or more plans with a Part D benefit and one or more MA-only plans. In some such contracts with moderately low proportions of MA-PD enrollees, higher sampling rates are applied to MA-PD than MA-only enrollees in order to improve measurement for Part D measures; these two subgroups are therefore differentially weighted in scoring and case-mix calculations for Part C (MA) measures in such contracts.

In MCAHPS analyses, each item is adjusted separately and then adjusted scores for items of a composite are combined to obtain an adjusted composite score. The following three components are needed for case-mix adjustment of each item at the contract level:

- Weighted contract means of each case-mix variable for respondents who answered the item being adjusted;
- Weighted national means of each case-mix variable for respondents who answered the item being adjusted;
Individual-level coefficients for each case-mix variable in the model predicting individual responses, conditional on contract dummy (indicator) variables.

In the formula:

\[ \text{Adjusted Score} = \text{Raw Score} - \text{Net Adjustment}, \]

the net adjustment is the sum of a series of products, one for each case-mix (predictor) variable, of the form:

\[ (\text{National mean} - \text{Contract mean}) \times \text{Model Coefficient}. \]

To illustrate how the contract mean for a given case-mix variable is calculated, consider the case of calculation of an adjustment for a single variable, age. The table below shows age data for a hypothetical contract with 7 respondents. Seven indicator (0 or 1) age variables are created for each of the 5 age range groups. The age 70-74 category is not shown because it serves as the reference category.

<table>
<thead>
<tr>
<th>Survey ID</th>
<th>Actual age at time of finalizing survey</th>
<th>Age 64 and under</th>
<th>Age 65-69</th>
<th>Age 75-79</th>
<th>Age 80-84</th>
<th>Age 85 and older</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
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<td>0</td>
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<td>0</td>
<td>1</td>
<td>0</td>
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<td>0</td>
</tr>
</tbody>
</table>

For this contract, the mean of each of the 5 age range variables is calculated as follows:

\[ H_{64} = \frac{0+1+0+0+0+1+0}{7} = \frac{2}{7} = 0.29 \]
\[ H_{65-69} = \frac{1+0+0+0+0+1+0}{7} = \frac{2}{7} = 0.29 \]
\[ H_{75-79} = \frac{0+0+0+0+0+0+0}{7} = \frac{0}{7} = 0.00 \]
\[ H_{80-84} = \frac{0+0+1+0+0+0+0}{7} = \frac{1}{7} = 0.14 \]
\[ H_{85+} = \frac{0+0+0+1+0+0+0}{7} = \frac{1}{7} = 0.14 \]

Case-mix adjustment is performed by CMS contractors. The case-mix coefficients are re-estimated each year based on new data. The case-mix coefficients for 2020 Star Ratings were estimated from CAHPS data collected in 2019 and can be found in the Excel spreadsheets \textit{ma_coef_2019_final.xlsx} for MA and \textit{pdp_coef_2019_final.xlsx} for PDP contracts. The coefficients indicate how much higher or lower people with a given characteristic tend to respond compared to otherwise similar others with the baseline value for that characteristic, on the 0-100 scale.
scale used in consumer reports.

For example, for the item “Rating of Health Care”, the model coefficient for "age 80-84" is -0.0219, indicating that respondents in that age range tend to score their contracts 0.0219 points lower than otherwise similar people in the 70-74 age range (the baseline or reference category). Similarly, respondents with very good self-reported mental health tend to respond 0.1938 points higher on this item than otherwise similar respondents who report the baseline response (“good”) on this item. Contracts with higher proportions of respondents who are in the 80-84 age range will be adjusted upwards to compensate for the negative response tendency of their respondents on this item. Similarly, contracts with higher proportions of respondents reporting very good mental health will be adjusted downwards to compensate for their respondents’ positive response tendency. The case-mix patterns are not always consistent across measures.

In the MA & PDP CAHPS case-mix adjustment model, every variable is coded as a dummy (indicator) variable for a categorical response. Consequently, every case-mix mean represents the weighted rate for a particular option or category. Weighted national means of each case-mix adjustment variable in 2019 are displayed in table ma_means_2019_final.xlsx for MA and pdp_means_2019_final.xlsx for PDP contracts. In these tables there is a separate column for each outcome (assessment variable or survey item). This is needed because the respondent set for each item will in general be different and hence the national means for item respondents will also be different.

A table of national means for all respondents to the MA survey appears in the 2019 National Means of Case-Mix Variables. This table is purely descriptive and can be used to compare the sample distribution of respondent characteristics for a contract to the national distribution. It cannot be used for adjustment because it does not correspond to the distribution for respondents to any particular item.

An example of the calculation of the adjustment of Rating of Care for a fictitious contract appears in the spreadsheet 2019_example.xlsx. Coefficients and national means are taken from the respective tables as described above, and contract means for each adjustment variable are calculated as described above after coding all variables consistent with standards in vendor training materials. The calculated adjustment is on the original scale of the item responses, as in the plan reports, except on the last line where it is converted to the consumer report scale. This spreadsheet may be used as a template for case-mix adjustment of other items and contracts by substituting the appropriate columns of means and coefficients.

Each composite consists of multiple items, each of which is adjusted separately before combining the adjusted scores into a composite score. In the tables we report the coefficients and national means for each of the items. To replicate the adjustment calculations performed by the CMS contractor, it is necessary to adjust each of these several items and then combine the adjusted scores to obtain an adjusted composite score.