

Appendix D: Technical Notes

Risk Adjustment

Health care processes of care, outcomes, and member attributes do not always occur randomly across all plans. For example, certain risk factors, such as age or level of functioning, may be disproportionate across plans and beyond the plans' control. Risk adjustment is used to account for and reduce the effects of these confounding factors that may influence a plan's rate. Therefore, risk-adjusted rates allow for a fairer comparison among the plans. The risk-adjusted measures in this report were chosen because they are important outcomes representing plan performance. Following is a description of the methodologies.

Observed Rate

The observed rate is the plan's numerator divided by the plan's denominator for each measure.

Expected Rate

The expected measure rate is the rate a plan would have if the plan's member mix were identical to the member mix of the state.

Risk-adjusted Rate

The plan-specific, risk-adjusted rate is the ratio of observed to expected measure rates multiplied by the overall statewide measure rate.

Methodology of "Current Plan Performance" Measures

To compute the risk-adjusted rates for these outcomes, a logistic regression model was developed for each current plan performance outcome. These models predicted a binary (yes/no) response for each outcome. The independent variables included in the final models are listed below.

1. No Severe Daily Pain

- ADL Scale result of 3 or greater (yes/no)
- Age (less than 55, 55-64, 65-74, 75-84, 85 and over)
- Any dyspnea (yes, no)
- Chronic obstructive pulmonary disease (COPD) present (yes, no)
- Congestive Heart Failure (CHF) present (yes, no)
- Coronary heart disease present (yes, no)
- Depression Rating Scale result of 3 or greater (yes, no)
- Dizziness present (yes, no)
- Gender (male, female)
- No days outside in the last 3 days (yes, no)
- Sadness reported within the last 3 days (yes, no)
- Self-reported health status poor (yes, no)
- Stroke (yes, no)
- Usually through never understood (yes, no)
- Walks with assistive device, uses wheelchair, or is bedbound (yes, no)

2. **Pain Controlled**

- Age (less than 55, 55-64, 65-74, 75-84, 85 and over)
- Any dyspnea (yes, no)
- Chronic obstructive pulmonary disease (COPD) present (yes, no)
- Conditions or diseases make cognitive, mood, or behavior patterns unstable (yes, no)
- Congestive Heart Failure (CHF) present (yes, no)
- Depression Rating Scale result of 3 or greater (yes, no)
- Falls (yes, no)
- Gender (male, female)
- Minimally or more impaired in cognitive skills for daily decision making (yes, no)
- No days outside in the last 3 days (yes, no)
- Not independent in cognitive skills for daily decision making (yes, no)
- Sadness reported within the last 3 days (yes, no)
- Walks with assistive device, uses wheelchair, or is bedbound (yes, no)

3. **Not Lonely or Not Distressed**

- ADL Scale result of 4 or greater (yes, no)
- Age (less than 55, 55-64, 65-74, 75-84, 85 and over)
- Any dyspnea (yes, no)
- Chronic obstructive pulmonary disease (COPD) present (yes, no)
- Conditions or diseases make cognitive, mood, or behavior patterns unstable (yes, no)
- Congestive Heart Failure (CHF) present (yes, no)
- Depression Rating Scale result of 3 or greater (yes, no)
- Falls (yes, no)
- No days outside in the last 3 days (yes, no)
- Not independent in cognitive skills for daily decision making (yes, no)
- Pain daily (yes, no)
- Sadness reported within the last 3 days (yes, no)
- Self-reported health status poor (yes, no)
- Stroke (yes, no)
- Supervision through total dependence in locomotion (yes, no)

4. **No Falls with Injury**

- Age (less than 55, 55-64, 65-74, 75-84, 85 and over)
- Any dyspnea (yes, no)
- Any pain (yes, no)
- Chronic obstructive pulmonary disease (COPD) present (yes, no)
- Conditions or diseases make cognitive, mood, or behavior patterns unstable (yes, no)
- Congestive Heart Failure (CHF) present (yes, no)
- Depression Rating Scale result of 3 or greater (yes, no)
- Diabetes mellitus present (yes, no)
- Dizziness present (yes, no)
- Gender (male, female)
- Made negative statements within the last 3 days (yes, no)
- Not independent in cognitive skills for daily decision making (yes, no)
- Sadness reported within the last 3 days (yes, no)
- Self-reported health status poor (yes, no)
- Short-term memory problem (yes, no)
- Stroke (yes, no)
- Walks with assistive device, uses wheelchair, or is bedbound (yes, no)

5. **No Emergency Room Visits**

- ADL Scale result of 3 or greater (yes, no)
- Age (less than 55, 55-64, 65-74, 75-84, 85 and over)
- Any dyspnea (yes, no)
- Chronic obstructive pulmonary disease (COPD) present (yes, no)
- Conditions or diseases make cognitive, mood, or behavior patterns unstable (yes, no)
- Congestive Heart Failure (CHF) present (yes, no)
- Depression Rating Scale result of 3 or greater (yes, no)
- Diabetes mellitus present (yes, no)
- Falls (yes, no)
- Gender (male, female)
- Pain daily (yes, no)
- Sadness reported within the last 3 days (yes, no)
- Self-reported health status poor (yes, no)
- Stroke (yes, no)
- Usually through never understands (yes, no)

Methodology for “Performance Over Time” Measures

The nine longitudinal outcomes below were risk-adjusted. To compute the risk-adjusted rates for these outcomes, a logistic regression model was developed for each outcome. These models predicted a binary (yes/no) response for each outcome. For all over time measures, stability or improvement versus a decrease in the rate over the measurement period was used as the outcome of interest. The independent variables included in the models and specified below were taken from baseline CHA conducted for the June 2021 through December 2022 enrollment period.

1. Nursing Facility Level of Care (NFLOC)

- Age (less than 55, 55-64, 65-74, 75-84, 85 and over)
- Alzheimer's disease present (yes, no)
- Any dyspnea (yes, no)
- Chronic obstructive pulmonary disease (COPD) present (yes, no)
- Coronary heart disease present (yes, no)
- Depression Rating Scale result of 3 or greater (yes, no)
- Diabetes mellitus present (yes, no)
- Falls (yes, no)
- Gender (male, female)
- Made negative statements within the last 3 days (yes, no)
- No days outside in the last 3 days (yes, no)
- Not independent in cognitive skills for daily decision making (yes, no)
- Nursing Facility Level of Care score of 34 or more (yes, no)
- Pain daily (yes, no)
- Sadness reported within the last 3 days (yes, no)
- Self-reported health status poor (yes, no)
- Short-term memory problem (yes, no)

2. Activities of Daily Living (ADL)

- Age (less than 55, 55-64, 65-74, 75-84, 85 and over)
- Alzheimer's disease present (yes, no)
- Any dyspnea (yes, no)
- Chronic obstructive pulmonary disease (COPD) present (yes, no)
- Conditions or diseases make cognitive, mood, or behavior patterns unstable (yes, no)
- Coronary heart disease present (yes, no)
- Diabetes mellitus present (yes, no)
- Falls (yes, no)
- Gender (male, female)
- No days outside in the last 3 days (yes, no)
- Not independent in cognitive skills for daily decision making (yes, no)
- Pain daily (yes, no)
- Sadness reported within the last 3 days (yes, no)
- Self-reported health status poor (yes, no)
- Short-term memory problem (yes, no)
- Supervision through total dependence in locomotion (yes, no)
- Total dependence in ADL locomotion, hygiene, and bathing (yes, no)

3. Locomotion

- ADL Scale result of 4 or greater (yes/no)
- Age (less than 55, 55-64, 65-74, 75-84, 85 and over)
- Alzheimer's disease present (yes, no)
- Any pain (yes, no)
- Chronic obstructive pulmonary disease (COPD) present (yes, no)
- Conditions or diseases make cognitive, mood, or behavior patterns unstable (yes, no)
- Congestive Heart Failure (CHF) present (yes, no)
- Coronary heart disease present (yes, no)
- Diabetes mellitus present (yes, no)
- End-stage disease, 6 or fewer months to live (yes, no)
- Falls (yes, no)
- No days outside in the last 3 days (yes, no)
- Not independent in bathing (yes, no)
- Not independent in cognitive skills for daily decision making (yes, no)
- Sadness reported within the last 3 days (yes, no)
- Self-reported health status poor (yes, no)
- Short-term memory problem (yes, no)
- Stroke (yes, no)
- Supervision through total dependence in locomotion (yes, no)

4. Urinary Continence

- ADL Scale result of 2 or greater (yes, no)
- Age (less than 55, 55-64, 65-74, 75-84, 85 and over)
- Alzheimer's disease or other dementia present (yes, no)
- Any dyspnea (yes, no)
- Any pain (yes, no)
- Coronary heart disease present (yes, no)
- Diabetes mellitus present (yes, no)
- Dizziness present (yes, no)
- Extensive assistance through total dependence in locomotion (yes, no)
- Falls (yes, no)
- No days outside in the last 3 days (yes, no)
- Not independent in bathing (yes, no)
- Stroke (yes, no)

5. Medication Administration

- ADL Scale result of 2 or greater (yes, no)
- ADL Scale result of 4 or greater (yes, no)
- Age (less than 55, 55-64, 65-74, 75-84, 85 and over)
- Alzheimer's disease present (yes, no)
- Any pain (yes, no)
- Conditions or diseases make cognitive, mood, or behavior patterns unstable (yes, no)
- Coronary heart disease present (yes, no)
- Falls (yes, no)
- Gender (male, female)
- Minimally or more impaired in cognitive skills for daily decision making (yes, no)
- Not independent in bathing (yes, no)
- Not independent in cognitive skills for daily decision making (yes, no)
- Sadness reported within the last 3 days (yes, no)

6. Cognition

- ADL Scale result of 2 or greater (yes, no)
- ADL Scale result of 4 or greater (yes, no)
- Age (less than 55, 55-64, 65-74, 75-84, 85 and over)
- Alzheimer's disease present (yes, no)
- Any dyspnea (yes, no)
- Any pain (yes, no)
- Chronic obstructive pulmonary disease (COPD) present (yes, no)
- Congestive Heart Failure (CHF) present (yes, no)
- Coronary heart disease present (yes, no)
- Falls (yes, no)
- Not independent in cognitive skills for daily decision making (yes, no)
- Sadness reported within the last 3 days (yes, no)
- Self-reported health status poor (yes, no)
- Short-term memory problem (yes, no)

7. Pain Intensity

- Age (less than 55, 55-64, 65-74, 75-84, 85 and over)
- Any dyspnea (yes, no)
- Chronic obstructive pulmonary disease (COPD) present (yes, no)
- Conditions or diseases make cognitive, mood, or behavior patterns unstable (yes, no)
- Congestive Heart Failure (CHF) present (yes, no)
- Depression Rating Scale result of 3 or greater (yes, no)
- Diabetes mellitus present (yes, no)
- Dizziness present (yes, no)
- Falls (yes, no)
- Gender (male, female)
- Not independent in cognitive skills for daily decision making (yes, no)
- Sadness reported within the last 3 days (yes, no)

- Self-reported health status poor (yes, no)
- Stroke (yes, no)
- Supervision through total dependence in locomotion (yes, no)

8. Mood

- ADL Scale result of 3 or greater (yes, no)
- Age (less than 55, 55-64, 65-74, 75-84, 85 and over)
- Alzheimer's disease or other dementia present (yes, no)
- Any dyspnea (yes, no)
- Any pain (yes, no)
- Chronic obstructive pulmonary disease (COPD) present (yes, no)
- Conditions or diseases make cognitive, mood, or behavior patterns unstable (yes, no)
- Congestive Heart Failure (CHF) present (yes, no)
- Coronary heart disease present (yes, no)
- Dizziness present (yes, no)
- Falls (yes, no)
- Gender (male, female)
- Mood scale result of 4 or more (yes, no)
- Not independent in cognitive skills for daily decision making (yes, no)
- Stroke (yes, no)

9. Shortness of Breath

- ADL Scale result of 2 or greater (yes, no)
- ADL Scale result of 4 or greater (yes, no)
- Age (less than 55, 55-64, 65-74, 75-84, 85 and over)
- Alzheimer's disease present (yes, no)
- Chronic obstructive pulmonary disease (COPD) present (yes, no)
- Congestive Heart Failure (CHF) present (yes, no)
- Depression Rating Scale result of 3 or greater (yes, no)
- Falls (yes, no)
- Minimally or more impaired in cognitive skills for daily decision making (yes, no)
- No days outside in the last 3 days (yes, no)
- Not independent in cognitive skills for daily decision making (yes, no)
- Pain daily (yes, no)
- Sadness reported within the last 3 days (yes, no)
- Self-reported health status poor (yes, no)

Methodology of “Satisfaction” Measures

Satisfaction ratings that are based on the respondent's perception may differ by respondent attributes, which may vary across plans and are beyond the plans' control. To reduce the effect of these differences, these measures were adjusted for age (18-44, 45-64, 65-74, 75-84, 85 and over), education in years (0-8, 9-11, 12, 13-15, 16, 17 and over), and self-reported health status (poor, fair, good, very good, excellent). Age, education, and self-reported health status have been found to be important satisfaction survey control variables that are widely accepted and used in satisfaction survey analysis.

Additionally, Rating of Home Health Aide and Timeliness of Home Health Aide were also adjusted for cognition (independent or modified independence, any level of impairment). To compute the risk-adjusted rates for these outcomes, a logistic regression model was developed for each satisfaction measure. These models predicted a binary (yes/no) response for each outcome.

Methodology of “Potentially Avoidable Hospitalization” Measure

Risk-adjusted rates were calculated by developing a multinomial logistic regression model to predict the number of potentially avoidable hospitalizations. The independent variables included in the final model are listed below. To determine whether the risk-adjusted plan rate is significantly above or below the statewide rate, a z-score was calculated for each plan.

- Age (less than 55, 55-64, 65-74, 75-84, 85 and over)
- Alzheimer's disease present (yes, no)
- Any dyspnea (yes, no)
- Any pain (yes, no)
- Bipolar (yes, no)
- Cancer present (yes, no)
- Chronic obstructive pulmonary disease (COPD) present (yes, no)
- Conditions or diseases make cognitive, mood, or behavior patterns unstable (yes, no)
- Congestive Heart Failure (CHF) present (yes, no)
- Coronary heart disease present (yes, no)
- Decline in ADL status compared to 90 days ago (yes, no)
- Diabetes mellitus present (yes, no)
- Disruptive behavior present (yes, no)
- Dizziness present (yes, no)
- Extensive assistance through total dependence in locomotion (yes, no)
- Falls (yes, no)
- Feelings of guilt about drinking or drug use in the last 90 days (yes, no)
- Felt need to cut down on drinking or drug use in the last 90 days (yes, no)
- Gender (male, female)
- Hip fracture (yes, no)
- No days outside in the last 3 days (yes, no)
- Not independent in bathing (yes, no)
- Other fracture during last 30 days (yes, no)
- Sadness reported within the last 3 days (yes, no)
- Schizophrenia (yes, no)
- Self-reported health status poor (yes, no)
- Stroke (yes, no)
- Supervision through total dependence in managing medications (yes, no)
- Usually through never understood (yes, no)
- Walks with assistive device, uses wheelchair, or is bedbound (yes, no)

Limitations of the Risk-Adjusted Data

The risk-adjusted methodology allows for more accurate comparisons among plans. Nevertheless, it has some limitations. If important risk factors are not included in the model as independent variables, the model can potentially overestimate or underestimate a plan's risk-adjusted rate. Although the limitations presented here are an important consideration in interpreting the risk-adjusted outcomes, comparisons between plans are much more accurate when outcomes are risk-adjusted than when they are not.

Different Significance Results for the Same Measure Result

It is possible for plans to have the same measure result with different significance results for the following reasons:

1. Rates are first calculated, then significance tested, and lastly, rounded for presentation. A rate before rounding may be slightly higher or slightly lower than the rounded rate presented.
2. Significance testing for population- (community health assessment) based measures uses analysis of proportions decision limits (DL) about the statewide rate. DL are influenced by the plan denominator and are specific to each plan. The plan rate is compared to DL about the statewide rate to determine whether there is a significant difference between the statewide and plan rates. Nelson's H statistic and Analysis of Proportions (ANOP) methodology are used in the following formulas.

Halpna = The quantile from the t distribution based on a probability

$$= 1 - \left(\frac{1 - (1 - 0.05)^{\left(\frac{1}{\text{Number of Plans}}\right)}}{2} \right)$$

Degrees of Freedom = Statewide Denominator – Plan Denominator

$$\text{Upper DL} = \text{Statewide Rate} + \text{Halp} \alpha * \sqrt{\frac{\text{Statewide Rate} * (1 - \text{Statewide Rate})}{\text{Statewide Denominator} * \text{Plan Denominator}}}$$

$$\text{Lower DL} = \text{Statewide Rate} - \text{Halp} \alpha * \sqrt{\frac{\text{Statewide Rate} * (1 - \text{Statewide Rate})}{\text{Statewide Denominator} * \text{Plan Denominator}}}$$

3. Significance testing for sample- (satisfaction survey) based measures uses a 95% confidence interval (CI) about the risk-adjusted plan mean. CI are influenced by the plan denominator and are specific to each plan. The statewide rate is compared to a 95% CI about the plan rate to determine whether there is a significant difference between the statewide and plan rates. A Z statistic is used in the following formulas.

$$\text{Upper CI} = \text{Plan Rate} + 1.96 * \sqrt{\frac{\text{Plan Rate} * (1 - \text{Plan Rate})}{\text{Plan Denominator}}}$$

$$\text{Lower CI} = \text{Plan Rate} - 1.96 * \sqrt{\frac{\text{Plan Rate} * (1 - \text{Plan Rate})}{\text{Plan Denominator}}}$$

4. Significance testing for Potentially Avoidable Hospitalizations (PAH) uses a z-score. The z-score is influenced by plan member days and is specific to each plan. A z-score from -1.96 through +1.96 is not significantly different from the statewide rate. A z-score less than -1.96 or greater than +1.96 is significantly lower or higher than the statewide rate, respectively. A z-score test statistic is calculated for each plan risk-adjusted rate using the following formula.

$$\text{z-score} = \frac{\text{Plan Risk Adjusted Rate} - \text{Statewide Rate}}{\sqrt{\frac{\text{Statewide Rate} * (1 - \text{Statewide Rate})}{\text{Plan Number of Member Days}}}}$$