

# Full Measure Submission to Partnership for Quality Measurement

## Scientific Acceptability

### *Risk Adjustment*

**Attach a conceptual model that illustrates the pathway between the social and/or functional status-related risk factors, patient clinical factors, quality of care, and the measured outcome. Please explain the rationale for the model.\***

The Medicaid HCBS population is diverse and includes many participants with social and/or functional status-related risk factors. Nearly two-thirds of participants are eligible for HCBS due to a disability, and around half are not white (MACPAC, 2018) (Peebles et al., 2017).<sup>1,2</sup>





Participants are also generally low income and have lower levels of high school or college education. These factors place them at greater levels of risk for conscious and unconscious bias in the healthcare system, according to the National Institute on Minority Health and Health Disparities Research Framework (National Institute on Minority Health and Health Disparities, 2017).

The combination of individual factors listed above, in addition to the caregiver and community aspects of HCBS, as well as the societal policies and structures that often marginalize HCBS participants, can all influence the quality of care that participants receive. The HCBS CAHPS Survey can monitor and evaluate these disparities, as the survey's data allow for stratified analyses on social risk factors (e.g., disability, race, ethnicity, gender, primary language, and education).

These factors are captured in the risk model below (see **Exhibit 47**).

**Exhibit 47. Risk-Adjustment Conceptual Model**

**National Institute on Minority Health and Health Disparities  
Research Framework**

		Levels of Influence*			
		Individual	Interpersonal	Community	Societal
Domains of Influence <i>(Over the Lifecourse)</i>	Biological	Biological Vulnerability and Mechanisms	Caregiver–Child Interaction Family Microbiome	Community Illness Exposure Herd Immunity	Sanitation Immunization Pathogen Exposure
	Behavioral	Health Behaviors Coping Strategies	Family Functioning School/Work Functioning	Community Functioning	Policies and Laws
	Physical/Built Environment	Personal Environment	Household Environment School/Work Environment	Community Environment Community Resources	Societal Structure
	Sociocultural Environment	Sociodemographics Limited English Cultural Identity Response to Discrimination	Social Networks Family/Peer Norms Interpersonal Discrimination	Community Norms Local Structural Discrimination	Social Norms Societal Structural Discrimination
	Health Care System	Insurance Coverage Health Literacy Treatment Preferences	Patient–Clinician Relationship Medical Decision-Making	Availability of Services Safety Net Services	Quality of Care Health Care Policies
Health Outcomes		 Individual Health	 Family/ Organizational Health	 Community Health	 Population Health

National Institute of Minority Health and Health Disparities, 2018  
\*Health Disparity Populations: Racial and Ethnic Minority Groups (defined by OMB Directive 15), People with Lower Socioeconomic Status, Underserved Rural Communities, Sexual and Gender Minority Groups, People with Disabilities  
Other Fundamental Characteristics: Sex and Gender, Disability, Geographic Region

**Detail the statistical results of the analysis used to test and select risk factors for inclusion in or exclusion from the risk model/stratification.\***

The goals of case-mix adjustment are to correct or remove the effects of individual participant characteristics, which may affect ratings at an entity level, and remove effects that might be considered spurious (i.e., that reflect something other than quality of care). To ensure consistency with the original package evaluated by the consensus-based entity in 2016, the measure developer maintained a similar approach to the methodology implemented for field testing eight years ago.

The variables for case-mix adjustment were determined based on the following three conditions:

- Case-mix variables reflect characteristics that are brought to the HCBS program by the participant (e.g., age, education, race); they are not traits that result from the participant's

experience with, or assessment of, the HCBS program (e.g., number of visits with a case manager).

- Case-mix variables have reasonable correlation with measures or items within entities. Specifically, the approach to adjustment evaluates whether the variables have sufficient predictive power in relation to the outcomes (e.g., older adult participants give higher ratings of their care when compared to younger participants).
- There is variation between entities for these predictor variables, which is referred to as *heterogeneity*. One HCBS program, for example, may have participants that tend to be much younger than the population served by another HCBS program.

Individual characteristics (i.e., age, race, ethnicity, education, language, living arrangements, general health status, and mental health status) are defined by the Centers for Medicare & Medicaid Services and the Agency for Healthcare Research and Quality as having strong and consistent associations with consumer feedback in other Consumer Assessment of Healthcare Providers Surveys. Field testing for the 2016 HCBS CAHPS consensus-based-entity submission also identified several design characteristics—survey administration mode (i.e., in person, via phone), response option (i.e., standard, alternate), proxy status (i.e., whether another party completed the survey on behalf of the respondent), and assistance with the survey (i.e., whether another party helped the respondent complete the survey) as important factors. The survey design and administration data to which the measure developer currently has access only includes information on proxy and assistance status. Thus, the measure developer used these respondent and survey-design characteristics as potential case-mix adjusters for the HCBS CAHPS measures.

To complete case-mix selection and reporting, the measure developer followed four steps:

1. Select potential case-mix adjusters for each measure;
2. Estimate measure and case-mix adjuster heterogeneity;
3. Estimate predictive power of the selected adjusters; and
4. Estimate the impact of each adjuster.

To select potential case-mix adjusters for each measure, the measure developer used stepwise regression (i.e., a forward-selection method) to select the potential case-mix adjusters for each HCBS CAHPS measure. The stepwise regression analyses evaluated the strength of the relationship of each potential adjuster to the three global rating and six scale measures in separate models, in which each measure was regressed on all of the potential adjusters. In the stepwise regression models, the potential adjuster variables were added individually to the model. For a variable to remain in the model, its F-statistic had to be significant at the  $p < 0.10$  level. Adjuster variables selected in any of the models formed a core set of potential case-mix adjusters eligible for final selection.

To estimate measure and case-mix-adjuster heterogeneity, the measure developer evaluated the heterogeneity of outcome variables across entities—the ratio of between-entity to within-entity variance of the residuals when each variable was regressed on the entity in a random effects model. Heterogeneity of the predictor variables across entities was measured as the

ratio of between-entity to within-entity variance of the residuals when each variable was regressed on all other potential case-mix adjusters in a random effects model, where the entity was included in the model as a random effect.

To estimate predictive power of the selected adjusters, the measure developer evaluated predictive power as the incremental amount of variance explained by the predictor (represented as the partial  $r^2 \times 1,000$ ) in stepwise regression analyses, controlling for the other potential case-mix adjusters.

To measure explanatory power, which considers both the predictive power of each potential adjuster and the heterogeneity of the adjusters across programs, the measure developer multiplied the predictive power by the adjuster heterogeneity factor.

Finally, the measure developer calculated the impact factor, which standardizes explanatory power with respect to the overall variance in the outcome being assessed as explanatory power/outcome heterogeneity. Variables that had an impact factor  $>1.0$  are considered as candidates for potential case-mix adjusters. The heterogeneity of the measures across entities, heterogeneity of the selected case-mix adjusters, predictive power of selected case-mix adjusters for each relevant measure, and whether the adjuster has potential impact are shown in **Exhibit 48** through **Exhibit 50**.

**Exhibit 48. Parameter Estimates and Selection Status for Variable Selection Models for the Personal Care Assistant and Behavioral Health Staff, Homemaker, and Case Manager Global Rating Measures**

		PCA and Behavioral Health Rating		Homemaker Rating		Case Manager Rating	
		Outcome Heterogeneity=0.065		Outcome Heterogeneity=0.066		Outcome Heterogeneity=0.069	
Case-Mix Adjustment Variables	Adjuster Heterogeneity	Predictive Power*	Impact Factor** >1.0	Predictive Power*	Impact Factor* >1.0	Predictive Power*	Impact Factor** >1.0
Age 18 to 24	0.11	0.70	Yes	0.69	Yes	—	—
Age 25 to 34	0.18	0.45	Yes	0.53	Yes	—	—
Age 35 to 44	0.08	—	—	—	—	0.62	—
Age 55 to 64	0.03	—	—	—	—	—	—
Age 65 to 74	0.19	2.02	Yes	2.02	Yes	0.82	Yes
Age 75+	0.35	1.11	Yes	0.91	Yes	—	—
8th Grade or Less	—	0.59	—	0.65	—	—	—
Less than High School	—	0.76	—	0.79	—	1.03	—
High School	—	0.62	—	0.61	—	—	—
College and Higher	—	—	—	—	—	—	—
Not Hispanic	0.45	—	—	—	—	—	—
Lives Alone	0.07	—	—	—	—	—	—
Poor Health Status	0.09	—	—	—	—	—	—
Other Language	0.07	—	—	—	—	—	—
Spanish Language	0.11	2.36	Yes	2.32	Yes	—	—

		PCA and Behavioral Health Rating		Homemaker Rating		Case Manager Rating	
		Outcome Heterogeneity=0.065		Outcome Heterogeneity=0.066		Outcome Heterogeneity=0.069	
Case-Mix Adjustment Variables	Adjuster Heterogeneity	Predictive Power*	Impact Factor** >1.0	Predictive Power*	Impact Factor* >1.0	Predictive Power*	Impact Factor** >1.0
Good–Excellent Mental Health	—	1.18	—	1.15	—	—	—
Used Proxy	0.11	—	—	—	—	—	—
Black	0.18	5.68	Yes	5.61	Yes	40.66	Yes
Other Race	0.04	20.57	Yes	21.41	Yes	—	—

\* Predictive power=partial R<sup>2</sup>\*1000.

\*\* Impact factor=(Adjuster Heterogeneity x (R<sup>2</sup> x 1,000)) / (Outcome heterogeneity).

\*\*\* Em dashes (—) indicate that the variable was not selected into the stepwise model.

### Exhibit 49. Parameter Estimates and Selection Status for Variable Selection Models— Reliable and Helpful, Communication, and Case Management Scale Measures

		Reliable and helpful		Communication		Case Management	
		Outcome Heterogeneity=0.074		Outcome Heterogeneity=0.054		Outcome Heterogeneity=0.019	
Case-Mix Adjustment Variables	Adjuster Heterogeneity	Predictive Power*	Impact Factor** >1.0	Predictive Power*	Impact Factor** >1.0	Predictive Power*	Impact Factor** >1.0
Age 18 to 24	0.12	0.93	—	1.17	Yes	—	—
Age 25 to 34	0.18	—	—	—	—	—	—
Age 35 to 44	0.08	—	—	—	—	—	—
Age 55 to 64	0.02	—	—	—	—	—	—
Age 65 to 74	0.17	2.80	Yes	5.16	Yes	3.22	Yes
Age 75+	0.34	5.10	Yes	2.97	Yes	—	—
8th Grade or Less	0.01	5.60	Yes	3.33	—	1.85	Yes
Less than High School	0.03	—	—	0.66	—	—	—
High School	0.01	—	—	—	—	—	—
College and Higher	0.01	—	—	—	—	—	—
Not Hispanic	0.33	—	—	—	—	—	—
Lives Alone	0.08	—	—	0.43	—	—	—
Poor Health Status	0.09	—	—	—	—	—	—
Spanish Language	0.42	—	—	—	—	0.56	Yes
Other Language	0.36	—	—	—	—	—	—
Poor Mental Health	0.91	—	—	4.58	Yes	—	—
Good Mental Health	0.99	3.90	Yes	—	—	—	—
Used Proxy	0.12	16.64	Yes	—	—	—	—
Black	0.19	—	—	12.09	Yes	2.96	Yes
Other Race	0.03	—	—	2.35	Yes	—	—

\* Predictive power=partial R<sup>2</sup>\*1000.

\*\* Impact factor=(Adjuster Heterogeneity x (R<sup>2</sup> x 1,000)) / (Outcome heterogeneity).

\*\*\* Em dashes (—) indicate that the variable was not selected into the stepwise model.

### Exhibit 50. Parameter Estimates and Selection Status for Variable Selection Models— Choosing your Services, Transportation, and Community Inclusion Scale Measures

Case-Mix Adjustment Variables	Adjuster Heterogeneity	Choosing your Services Outcome Heterogeneity=0.187		Transportation Outcome Heterogeneity=0.115		Personal Safety Outcome Heterogeneity=0.154		Community Inclusion Outcome Heterogeneity=0.152	
		Predict Power*	Impact Factor** >1.0	Predict Power*	Impact Factor** >1.0	Predict Power*	Impact Factor** >1.0	Predict Power*	Impact Factor** >1.0
Age 18 to 24	0.12	1.41	—	—	—	3.61	Yes	—	—
Age 25 to 34	0.18	1.22	Yes	—	—	—	—	0.52	—
Age 35 to 44	0.08	—	—	1.04	—	2.16	Yes	0.95	—
Age 55 to 64	0.02	—	—	—	—	—	—	0.90	—
Age 65 to 74	0.17	3.23	Yes	—	—	—	—	—	—
Age 75+	0.34	—	—	—	—	1.65	Yes	—	—
8th Grade or Less	0.01	6.26	—	—	—	1.52	—	1.40	—
Less than High School	0.01	—	—	—	—	5.39	—	2.97	—
High School	0.01	0.48	—	—	—	—	—	8.71	—
College and Higher	0.03	—	—	6.70	Yes	0.74	—	0.85	—
Not Hispanic	0.33	—	—	76.56	Yes	94.43	Yes	—	—
Lives Alone	0.08	—	—	—	—	—	—	—	—
Fair -Poor Health Status	0.09	—	—	—	—	1.02	—	—	—
Spanish Language	0.42	0.57	Yes	—	—	—	—	—	—
Other Language	0.36	5.43	Yes	0.72	Yes	1.10	Yes	—	—
Poor Mental Health	0.91	1.05	Yes	—	—	—	—	—	—
Good Mental Health	0.99	2.53	Yes	—	—	1.54	Yes	40.56	Yes
Used Proxy	0.12	9.68	Yes	0.66	—	6.00	Yes	—	—
Black	0.19	0.86	—	1.71	Yes	—	—	—	—
Other Race	0.03	2.50	—	—	—	1.44	—	1.79	—

\* Predictive power=partial R<sup>2</sup>\*1000.

\*\* Impact factor=(Adjuster Heterogeneity x (R<sup>2</sup> x 1,000)) / (Outcome heterogeneity).

\*\*\* Em dashes (—) indicate that the variable was not selected into the stepwise model.

Based on the results displayed in **Exhibit 48** through **Exhibit 50**, case-mix adjusters appear to have a significant impact, depending on the measure type. Distribution of participant age varied significantly across entities, which demonstrates higher heterogeneity when compared to other case-mix adjusters; these variables were significant factors for most measures. Participant age bands, education, and race were important case-mix adjusters for measures evaluating homemaker and case-manager services. Though educational achievement status was not captured in the 2016 version of the HCBS CAHPS Survey and (and, thus, its testing for inclusion in case-mix adjustment), these variables have an impact on scale measures (e.g., *Staff are reliable and helpful*, *Staff listen and communicate*, and *Access to medical transportation*).

Race appears to have an impact on evaluation of the personal care assistant or behavioral health staff, homemaker, and case manager services, as well as several scale measures (e.g., *Staff listen and communicate*, *Case management*, and *Access to medical transportation*). Both sets of health status variables (for general health and mental health) have a significant impact on certain measures (e.g., *Staff reliable and helpful*, *Choosing services that matter to you*, *Personal safety*, and *Community inclusion*). Use of a proxy by participants has a significant impact on multiple measures (e.g., *Staff reliable and helpful*, *Choosing services that matter to you*, and *Personal safety*).

---