

MHA Health Equity Dashboard Documentation

Date Revised: 4/7/2022

Introduction: During its February 2021 meeting, the Missouri Hospital Association Board of Directors established a standing Health Equity Committee comprised of leadership and experts in equity and inclusion from hospitals and health systems across the state. The committee is tasked with steering MHA's strategic initiatives surrounding health equity promotion, promulgating policies and best practices, and developing assistive research and analytic solutions to assist multisectoral stakeholders with identifying vexing health and social disparities within hyperlocal areas in Missouri.

"Health equity means that everyone has a fair and just opportunity to be as healthy as possible. This requires removing obstacles to health such as poverty, discrimination and their consequences, including powerlessness and lack of access to good jobs with fair pay, quality education and housing, safe environments, and health care." — Robert Wood Johnson Foundationⁱ

The ongoing COVID-19 pandemic has recast and magnified a spotlight on historical and contemporary health inequities for socially vulnerable Americans. Throughout the U.S., stakeholders are attempting to make sense of differences in health outcomes related to COVID-19 among disparate communities and populations. To draw meaningful conclusions, analysis of the limited data surrounding the novel virus warrants a lens that is nuanced by an understanding of how individual- and community-level social determinants of health affect COVID-19 trend lines. Furthermore, there is a need to identify the most salient protective factors related to risk of exposure to COVID-19 and account for the cultural-historical contexts of disparate communities within counties.

Understanding the disproportionate impact of COVID-19 and all conditions adversely influencing morbidity and mortality for socially vulnerable individuals and communities is an important first step toward disentangling the complex causal pathways between upstream SDOH and downstream health outcomes that result in generational health disparities. The aim of this suite of health equity-centered dashboards is assisting stakeholders across settings with such disentanglement. A guiding tenet of the MHA Health Equity Committee is that "you cannot meaningfully change what you do not meaningfully measure." The MHA Health Equity Dashboard was designed with that tenet in mind.

For optimal performance, these dashboards should be viewed in currently supported Google Chrome, Microsoft Edge or Firefox (may require disabled pop-up blockers) internet browsers. Contact Mat Reidhead, Vice President of Research and Analytics, with questions and suggestions at mreidhead@mhanet.com.

Date	Summary of Changes
10/11/21	Inaugural launch using FFY 2018-2020 data, including the Quick Start, Disparity Explorer, Risk-Adjusted and Community Composition Modules.
4/7/2022	Data refreshed to FFY 2019-2021; inclusion of several new variables, including the Maternal and Child Health categorical variable; release of the Social Vulnerability Explorer, Module 5.

Data Sources and Methods: The most recent three fiscal years of HIDI inpatient, outpatient and emergency department claims for Missouri residents are used to generate metrics covering the included domains of Health Outcomes and Health Factors, including the subdomains of Physical Health, Behavioral Health, Risk Behaviors, Social Determinants of Health and Frailty Markers. For the most recent study period, this represented more than 42 million individual claims (below) for over 5.4 million distinct Missouri residents, representing approximately 88% of the state's 6.1 million residents (not accounting for deaths or out migration). All metrics are reported in aggregate at the distinct patient level using HIDI's master patient index. Cells with fewer than 11 or 20 distinct patients (depending on sensitivity of the selected measure) are not reported to minimize reidentification risk. As a result, metrics for several population subgroups may be unavailable, particularly in sparsely populated and demographically homogenous geographic areas.

Distribution of Missouri Resident Hospital Claims Used in Current Dashboard by Setting and Year

Setting	FFY 2019	FFY 2020	FFY 2021	Total
Inpatient	799,090	741,936	750,227	2,291,253
Outpatient	10,529,393	10,424,735	11,947,195	32,901,323
Treat & Release ED	2,640,273	2,236,279	2,181,512	7,058,064
Total	13,968,756	13,402,950	14,878,934	42,250,640

Aside from the Risk-Adjusted Module, all data are reported as unadjusted univariate counts and rates. Reported prevalence metrics are calculated as the number of distinct patients diagnosed with the condition of interest as a percent of total distinct patients for the selected demographic group. Disparity Factors are calculated as the unadjusted ratio of prevalence rates for selected demographic groups and conditions.

In general, the risk-adjusted readmission and mortality measures are estimated with hierarchical generalized logistic regression models using the Centers for Medicare & Medicaid Services and Yale-Center for Outcomes Research and Evaluation model specifications. The replicated models were run in SAS using modified SAS Packs as supplied by CMS/Yale-CORE. The HGLMs are designed to control for nested data by modeling patient and hospital-level effects that may contribute to the patient's probability of experiencing the modeled outcome during the 30 days following an index admission. The models estimate the patient's log odds of being readmitted, as explained by the included patient-level covariates alongside a hospital-specific intercept term that estimates the impact each hospital has on the log odds a patient will be readmitted. Importantly, the models included in the Risk-Adjusted Module are not adjusted for race or SDOH, so disparities between individual demographic groups are not explained away by direct parameterization. For each individual, the HGLMs derive estimates of the predicted rate and the expected rate. The risk standardized ratios and the risk standardized rates are calculated using the average predicted and expected probabilities for each demographic group within selected geographic areas. Additional information is available on the QualityNet website.ⁱⁱ

The Community Composition Module draws from demographic and social factor data provided by the U.S. Census Bureau's annual American Community Survey, five-year estimates.ⁱⁱⁱ The most recent 10 years (2010 – 2019) are included for trending purposes.

All data will be updated annually in the first quarter to coincide with the release of new Census ACS data. A detailed data dictionary is available [online](#).

Description of Modules:

Health Disparity Priority Guide: This section provides a summary of the largest observed disparities in hospital claims-based health outcomes and health factors between different demographic groups within defined geographic areas. Users can specify individual or groups of counties most reflective of their primary services area, in addition to selecting two demographic groups for comparative purposes.

HINTS: Hold down the control key when selecting multiple counties dynamically from the map; individual or multiple counties also can be selected from the drop-down menu; if a drop-down menu automatically collapses, click the “clear selections” button that will appear when hovering over the top right corner of the drop-down menu.

Following dynamic selections of geographic areas and demographic groups, data are populated in the table in descending order of the disparity factor column, which is the ratio of the prevalence of each condition between the two selected demographic groups. For example, if the prevalence of hospital-diagnosed asthma in the selected geographies for demographic group one is 5% and 10% for demographic group two, the disparity factor equals 2.0 ($0.1/0.05 = 2.0$). Arranging the data in this fashion allows users to quickly identify the largest observed (i.e., non-risk-adjusted) disparities at the county level in their primary service area. In addition to the disparity factor, the tabular data include the number of distinct patients included within the selected geographies for the selected demographic groups, in addition to the prevalence of hospital-based diagnosis for each condition included in the tabular data.

This module is intended to help users quickly identify the most pronounced disparities for prioritizing deeper analyses using the more detailed modules.

Data Stratification Available in Module:

Geographic	County-level, individual or agglomerated
Race	American Indian/Alaskan Native, Asian, Black or African American, Multi-Racial, Native Hawaiian/Pacific Islander, Other Race, Unknown/Refused, White
Ethnicity	Hispanic, Non-Hispanic

Health Disparity Explorer: This section provides a detailed depiction of differences in health outcomes and health factors diagnosed in a hospital setting for finite population groups and geographic areas. From the drop-down menus, users are able to select from a list of 29 behavioral or mental health factors such as prevalence of hospital-based diagnosis for acute major depression or suicide attempt and ideation; 15 frailty markers such as prevalence of diagnosis for Alzheimer’s disease, or hip and pelvic fractures; 6 health outcomes measures such as in-hospital mortality rates or rates of hospital superutilization; 34 physical health conditions such as the prevalence of hospital-diagnosed asthma, cancer or transient ischemic stroke; 11 risk behavior markers such as rates of alcohol and substance use disorders, obesity or tobacco use; and 11 SDOH factors such as rates of housing or employment instability, or Medicaid and uninsured payer status.

Next, users can specify individual or groups of counties to include in the analysis by using the drop-down menu or dynamic selections by clicking counties on the maps.

HINTS: Hold down the control key when selecting multiple counties dynamically from the maps; individual or multiple counties must be selected from the drop-down menu to pass the selection on to the ZIP code-level drill-through feature of the Health Disparity Explorer

module; if a drop-down menu automatically collapses, click the “clear selections” button that will appear when hovering over the top right corner of the drop-down menu.

Users then can select reference and comparison demographic groups to complete the analysis. The demographic selections can be further stratified by age, gender and payer status using the additional drop-down menus included in each demographic group selection box.

Upon completion of the specified queries, data are populated dynamically in the maps, top-line data boxes, table and tree map. The color ramps in the maps depict observed prevalence of hospital-based diagnosis for the selected condition and demographic groups — darker shades indicate higher rates and gray shading indicates data are unavailable due to fewer than 11 or 20 (depending on sensitivity of the selected measure) individual observations.

Values presented in the top-line boxes show the prevalence of hospital-based diagnosis for the selected condition for each of the selected demographic groups, in addition to the disparity factor combined across all selected geographies. All prevalence metrics are calculated as the number of distinct patients within each demographic group diagnosed with the selected condition as a percent of total distinct patients in each demographic group during the three-year study period (i.e., for each demographic group, the numerator is the distinct number of patients diagnosed with each condition in a hospital setting, while the denominator is the total number of distinct patients with a hospital encounter).

Data are populated in the table in descending order of the disparity factor column, which is the ratio of the prevalence of the selected condition between the two selected demographic groups within each of the selected geographic areas. Arranging the data in this fashion allows users to quickly identify which counties and ZIP codes have the largest observed (i.e., non-risk-adjusted) disparities in their primary service area for the selected demographic groups and condition of interest. In addition to the disparity factor, the tabular data include the number of distinct patients included within the selected geographies for the selected demographic groups, in addition to the prevalence of hospital-based diagnosis for the selected condition for each demographic group.

Data in the tree map at bottom are included to convey a sense of the magnitude of diagnosis rates for the selected condition and geographies across several demographic segments. The relative size of each cell in the tree map depicts the prevalence for each demographic group relative to other groups. Stratification options include race by age, race by payer, race by gender by age and race by gender by payer.

Data Stratification Available on Module:

Geographic	County-level, individual or agglomerated; ZIP code-level
Race	American Indian/Alaskan Native, Asian, Black or African American, Multi-Racial, Native Hawaiian/Pacific Islander, Other Race, Unknown/Refused, White
Ethnicity	Hispanic, Non-Hispanic
Gender	Female, Male, Unknown
Age Groups	0 to 19, 20 to 39, 40 to 64, 65 to 74, 75 to 84, and 85+
Payer	Commercial, Medicaid, Medicare, Other, Uninsured, Worker’s Compensation

Risk-Adjusted Health Outcomes Module: This module is designed to provide risk-adjusted comparative analyses for several hospitalwide and condition-specific health outcome measures related to 30-day readmissions and mortality. According to CMS:^{iv}

“The purpose of risk adjustment is to decompose the measured entity-level variation into factors that are and are not correlated with (that is, are independent of) the quality construct. Risk adjustment refers to the inclusion of risk factors associated with a measure score in a statistical model of measured entity performance captured at the person, facility, community or other levels. Measure developers often risk adjust outcome measures; however, not all outcome measures need risk adjustment.

Risk adjustment at the person level, also referred to as case-mix adjustment, aims to answer the question: ‘How would the performance of various units compare if hypothetically they had the same mix of patients?’^v Thus, risk adjustment increases the likelihood of fair comparison of measured entity performance, which is to compare ‘apples with apples.’ It involves controlling for confounding factors — meaning systematic differences within the population of interest — in the modeling of measured entity performance. Confounding factors may be clinical (e.g., types, number or severity of conditions), demographic (e.g., age, gender), and/or socioeconomic (e.g., race, ethnicity, income) in nature.”

The outcomes included in the Risk-Adjusted Module are based on measures used by CMS to assess hospital performance in the Readmission Reduction and Value-Based Purchasing Programs, in addition to public reporting on the Hospital Compare website. The risk-adjustment methodology employs hierarchical generalized logistic regression models that are designed to account for patient- and provider-level risk. All modeling was conducted in SAS version 9.4 (Cary, NC) using modified SAS packs provided by CMS and applied to the most recent 36 months of HIDI inpatient claims data. Additional information on the methods employed is available on the [CMS QualityNet](#) website.^{vi}

From the drop-down menus, users can select from a list of 19 risk-adjusted measures, including 30-day readmissions and mortality for acute myocardial infarction, congestive heart failure, pneumonia, chronic obstructive pulmonary disease, coronary artery bypass graft, hip and knee arthroplasty, hospitalwide, and stroke. Following selection of the outcome of interest, users can stratify the risk-adjusted estimates by race, age, gender and payer status for reference and comparison demographic groups to evaluate differences in risk-adjusted outcomes for various population segments. The geographic extent of the analysis can be filtered to individual or multiple counties using dynamic selection within the maps.

HINTS: Hold down the control key when selecting multiple counties dynamically from the maps; if a drop-down menu automatically collapses, click the “clear selections” button that will appear when hovering over the top right corner of the drop-down menu.

Upon selection of geographic and demographic filters, data are populated in the maps where darker colors represent larger standardized risk ratios, which are the predicted over expected rates estimated by the HGLMs for each demographic group. A ratio over one represents higher than expected risk-adjusted rates for the selected condition and population segment. Data in the demographic group

summary tables include index admissions, 30-day readmissions or deaths, the observed (unadjusted) rate, the standardized risk ratio, and the risk-standardized rate. The top-line boxes show the calculated disparity factors for each statistic between the two selected demographic groups within the selected geographic area. Trended risk-standardized ratios for each demographic group are included in the time series chart. The tabular data at bottom-right contain odds ratios, P-values, frequencies and disparity factors for each covariate included in the models. While MHA [does provide](#) modified risk-adjusted results accounting for sociodemographic factors, race and SDOH are not parameterized in the models included in the Risk-Adjusted Module, so the calculated disparity factors are not explained away statistically.

Data Stratification Available on Module:

Geographic	County-level, individual or agglomerated
Race	American Indian/Alaskan Native, Asian, Black or African American, Native Hawaiian/Pacific Islander, Other Race, Unknown/Refused, White
Ethnicity	Hispanic, Non-Hispanic
Gender	Female, Male
Age Groups	18 to 29, 30 to 49, 50 to 64, and 65+
Payer	Commercial, Medicaid, Medicare, Other, Uninsured, Unknown, Worker's Compensation

Community Diversity Module: This module is designed to provide a comprehensive summary of community composition using several demographic and social factors included in the U.S. Census Bureau's annual American Community Survey, five-year estimates program. The module is intended to assist users with identifying county- and sub-county-level differences in demographic and social characteristics for populations within their primary service areas, in addition to providing census data on community composition for comparison to individual hospital case mixes. Ideally, hospital social and demographic case mixes are reflective of the underlying populations in the communities served.

From the drop-down menus, users can choose from the ACS vintage of interest from the most recent 10 years of data available, the demographic or social condition of interest, and whether the selected variable should be presented as rates or counts.

HINTS: Hold down the control key when selecting multiple counties dynamically from the maps; if a drop-down menu automatically collapses, click the "clear selections" button that will appear when hovering over the top right corner of the drop-down menu.

Upon query selection, data are populated in the maps where darker shades indicate higher counts or percentages for the selected variable. Users also can toggle the bottom map display between census tract and ZIP code. Distributional charts are provided by gender, race, ethnicity and age for the selected geographies, which are selected dynamically from the maps.

Data Stratification Available on Module:

Geographic	County-level, individual or agglomerated, Census Tract, ZIP Code
Race	American Indian/Alaskan Native, Asian, Black or African American, Multiple Races, Native Hawaiian/Pacific Islander, Other Race, White
Ethnicity	Hispanic, Non-Hispanic
Gender	Female, Male
Age Groups	0 to 4, 5 to 9, 10 to 14, 15 to 19, 20 to 24, 25 to 34, 35 to 44, 45 to 54, 55 to 59, 60 to 64,

65 to 74, 75 to 84, 85+

Social Vulnerability Explorer Module: This module is designed to analyze linear associations between the Centers for Disease Control and Prevention's Social Vulnerability Index and health-related data at the county and census tract levels in Missouri.^{vii} Users can correlate SVI with five select health outcomes, six high-prevalence physical health conditions, four behavioral health and risk behaviors, and 12 social determinants of health. Users can select individual and groups of counties, including census tracts contained within the selection using dynamic select in the map, or by using the drop-down menu. County- and census tract-level data are displayed spatially in maps and in scatter plots. The scatter plots are accompanied by the R² statistic, which quantifies the amount of variation in the selected hospital claims-based indicator that is explained by the SVI (R² is bound by 0 and 1 where the latter represents perfect fit). The county-level scatter plot also depicts the relative size of the population in each county using bubble size.

HINTS: The SVI is based on a composite measure of four distinct social subdomains presented as percentiles, where 100% depicts the greatest social vulnerability. The subdomains include composite measures of socioeconomic, household/disability, minority status/language and housing type/transportation using ACS data. Users can right-click on any point in the census tract scatter plot to drill through to a map and data table for tracts included in each percentile that contains vulnerability percentiles for each subdomain.

Data Stratification Available on Module:

Geographic	County-level, Census Tract
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Planned Enhancements: The development of MHA's Health Equity Dashboard was guided by a focus group of subject matter experts from hospitals and health systems across the state, including BJC HealthCare, Children's Mercy Kansas City, Cox Health, SSM Health, St. Luke's Kansas City, Sullivan County Memorial Hospital, Truman Medical Centers and University of Missouri Health. Members of the focus group were nominated by colleagues serving on MHA's Health Equity Committee. The diverse set of perspectives and expertise included physicians, quality directors, health equity directors, the Missouri Kidney Program director, sr. informatics strategists, vice presidents of community health and population health, community health improvement directors, strategy and transformation directors, chief analytics officers, and community health improvement managers.

The focus groups yielded rich information on data sources and limitations commonly faced when evaluating health disparities. In addition to the four modules included in the inaugural release of MHA's Health Equity Dashboards, the focus group members offered recommendations for continued enhancements and additional modules, including a dedicated SDOH module, data depicting the differential impacts of the ongoing COVID-19 pandemic for vulnerable populations, and trended data on health factors and outcomes, as well as the potential for secure (i.e., nonpublic) hospital-specific information on interrater reliability of race and ethnicity reporting in claims data and comparative analyses of hospital case mix compared to community composition data from the U.S. Census Bureau.

With this guidance in mind, the focus group recommended an incremental and iterative approach to planned enhancements and future modules. All changes will be captured in future versions of this document.

Limitations: The health-related data included in the MHA Health Equity Dashboard are hospital claims-based and do not include information from nonhospital-affiliated, community-based primary care, and other clinics or health care settings such as Federally Qualified Health Centers, Community Mental Health Centers and private physician practices. As a result, numerators and denominators are confined to individuals who had one or more hospital inpatient, outpatient or ED encounter during the three-year study period. Compared to other information on health disparities (i.e., the CMS Office of Minority Health's Mapping Medicare Disparities Dashboard^{viii}), HIDI hospital claims data include patients of all ages and payer types, including self-pay and charity care patients.

Because patients commonly churn between health insurance carriers throughout the course of three years and individual hospitals sometimes identify the same patient's race and ethnicity differently, mutual exclusivity across the demographic strata included in the dashboard is not possible. As a result, individual patients with changed insurance status or who were coded multiple races and ethnicities can be included in multiple population segments.

All claims data submitted to HIDI subscribe to Universal Billing - 04 standards, which rely on dated U.S. Office of Management and Budget definitions of race, ethnicity and gender identity. MHA currently is advocating for enhanced data collection for race, ethnicity and language (REaL) by adopting contemporary hierarchical definitions used by the CDC^{ix} in addition to standardizing the collection of sexual orientation and gender identity data (SOGI). Until then, data are limited to broad definitions of race and binary definitions of ethnicity and gender identity.

Cells with fewer than 11 or 20 distinct patients (depending on sensitivity of the selected measure) are not reported to minimize reidentification risk. As a result, metrics for several population subgroups may be unavailable, particularly in sparsely populated and demographically homogenous geographic areas.

ⁱ Braveman, P., Arkin, E., Orleans, T., Proctor, D. & Plough, A. (2017, May 1). What is Health Equity? Retrieved from <https://www.rwjf.org/en/library/research/2017/05/what-is-health-equity-.html>

ⁱⁱ QualityNet. (n.d.). Readmissions Measures Overview. Centers for Medicare & Medicaid Services. Retrieved from <https://qualitynet.cms.gov/inpatient/measures/readmission>

ⁱⁱⁱ U.S. Census Bureau. (n.d.). American Community Survey. Retrieved from <https://www.census.gov/programs-surveys/acs.html>

^{iv} Centers for Medicare & Medicaid Services. (2021, September). Risk Adjustment in Quality Measurement. Retrieved from <https://www.cms.gov/files/document/blueprint-risk-adjustment.pdf>

^v National Quality Forum. (2014, August 15). *Risk Adjustment for Socioeconomic Status or Other Sociodemographic Factors*. U.S. Department of Health and Human Services. Retrieved from https://www.qualityforum.org/Publications/2014/08/Risk_Adjustment_for_Socioeconomic_Status_or_Other_Sociodemographic_Factors.aspx

^{vi} QualityNet. (n.d.). Readmission Measures Methodology. Centers for Medicare & Medicaid Services. Retrieved from <https://qualitynet.cms.gov/inpatient/measures/readmission/methodology>

^{vii} CDC/ATSDR Social Vulnerability Index (2018). Retrieved from:
<https://www.atsdr.cdc.gov/placeandhealth/svi/index.html>

^{viii} CMS Office of Minority Health. (2021, April). Mapping Medicare Disparities. Retrieved from
<https://www.cms.gov/About-CMS/Agency-Information/OMH/OMH-Mapping-Medicare-Disparities>

^{ix} Centers for Disease Control and Prevention. (2000, March). Race and Ethnicity Code Set Version 1.0. Retrieved from <https://www.cdc.gov/phin/resources/vocabulary/documents/CDC-Race-Ethnicity-Background-and-Purpose.pdf>