DEPARTMENT OF HUMAN SERVICES

AMHI Reform Funding Formula Workgroup: Area Deprivation Index and Rural Allocation

Please complete the following activity prior to the workgroup meeting on 10/27/21. This will be the basis of the discussion for the area deprivation index (ADI) and rural allocation variables.

Included in this document is information provided by Forma ACS in the final report to DHS as it relates to the Area Deprivation Index (ADI) and rural factor allocation. Also included is information about SDOH and Medical Risk Input and Population Input reviewed in prior meetings.

Pre-work Activity for 10/27/21 Meeting

1. Review the information on inputs 3 and 4, as provided by Forma ACS in a final report to DHS (see page 2)

2. Review the data sources used in the funding formula model (see page 4)
    a. Area Deprivation Index
    b. Rural factor allocation

3. In consultation with others from your region, identify strengths and assumptions of using ADI and a rural factor as variables. We will discuss this during the workgroup meetings.

4. From a statewide perspective, consider how much value should be placed on the ADI and rural factors in the AMHI funding formula.

5. After reviewing all reference materials, complete the survey

Formula Inputs 3 and 4 – Area Deprivation Index and Rural Allocation

This section was written by Forma ACS as part of a final report that was submitted to DHS.

Overview: Under the proposed framework, a portion of the funding could be allocated to the AMHIs that serve areas with greater levels of poverty, lower access to services, higher levels of unemployment, or other factors that might create additional need for services or increase the expense for delivering services. The model contains two factors that can adjust the amount received by the AMHIs to reflect these additional risk and cost considerations. One factor can allocate a portion of the funding to all AMHIs based on the relative level of deprivation in the county or region as indicated by the Area Deprivation Index (ADI). The second factor allocates additional funding on a per-capita basis to the AMHIs that are understood to serve large portions of the population living in rural areas of Minnesota.

Rationale: Additional risk factors beyond SDOH, medical conditions and Medicaid/Medicare status could drive differential service requirements. Although detail level data may not be readily available for some metrics, it is reasonable to expect that income, education, employment, and housing quality in a county or region would impact the relative service needs. Feedback from the AMHIs indicated that these issues, which could be more impactful to some rural areas of Minnesota, should be considered when determining the funding levels. It also is reasonable to expect that AMHIs that support large, rural areas may require additional funding due to access issues for their population or the additional expenses for delivering services (e.g. travel expenses), despite the lack of targeted, specific information in support of these expectations.

Methodology – ADI allocation: Each AMHI has been assigned an ADI score (on a 1 to 10 scale) reflecting the relative level of socioeconomic disadvantage within their county or region. Under the current model, each AMHI receives a portion of the ADI allocation, but the relative level of funding is scaled proportionally to the AMHI's relative ADI score. For example, an AMHI with an ADI of 7.0 would receive twice the per-capita ADI funding as an AMHI with a score of 3.5. The calculation is shown in the following table:

Table 1: ADI Allocation

	Population	ADI Score	Per Capita	Total
AMHI 1	320,000	7.0	$1.12	$358,000
AMHI 2	125,000	3.5	$0.56	$70,000
.....	...	...	...	...
Total Minnesota	4,350,000	4.8	$0.77	$3,350,000

In the example, $3.35M of AMHI funds are included in the ADI distribution. The average per capita amount to be distributed is based on the total allocation divided by the total number of adults ($3.35M / 4.35M = $0.77). The amount allocated to each AMHI is based on their relative ADI score, divided by the statewide average ADI score and multiplied by the number of adults in the region. Since AMHI 1 has an ADI score that is 1.46 times the statewide average (7.0/4.8) they receive a per capita allocation that is 146% of the $0.77 average ($1.12).

Methodology – Rural Allocation: Currently, the model calculates the rural allocation based on the number of adults served by each AMHI defined as a "Rural AMHI" and a per capita amount based on the total allocation and the number of adults within all rural AMHIs. Under the current version of the model, the per capita amount does not vary by eligible AMHI. The calculation is shown in the table below:

Table 2: Rural Allocation

	Population	Per Capita	Total
AMHI 1 (rural)	110,000	$1.72	$189,200
AMHI 2 (rural)	60,000	$1.72	$103,200
AMHI 3 (non-rural)	800,000	$0.00	$0
.....	...	...	...
Rural AMHIs	1,950,000	$1.72	$3,350,000
Other AMHIs	2,400,000	$0.00	$0
Total Minnesota	4,350,000	$0.77	$3,350,000

Modeling Inputs and Decisions: The following decisions need to be made related to the **Area Deprivation Index** and **Rural Allocations**:

- What is the percentage of overall AMHI funding that will be dedicated to the ADI Allocation?
- How are the scores applied to determine the distribution? For example, does a 20% differential score indicate 20% more per-capita allocation or is the relative allocation based on a steeper or flatter scale?[1]
- Does the model include a separate pool for Rural Allocation?
- If so, how much?
- Which AMHIs should be eligible for the Rural Allocation and should all eligible AMHIs receive the same per-capita amount?[2]

ADI and Rural Allocations – Definitions and Information Sources

Area Deprivation Index (ADI): The Area Deprivation Index (ADI) was originally created by the US federal government from long-form Census data and primarily used at the county level to assess mortality and disease prevalence. Over time, the ADI has been refined to the census block group (i.e., "neighborhood") level. Currently, the University of Wisconsin School of Medicine and Public Health develops and publishes the metrics based on the American Community Survey (ACS) Five Year Estimates. Each census block group receives an area deprivation index (ADI), a composite measure of neighborhood socioeconomic disadvantage. The calculation combines 17 census measures capturing education, employment, income, poverty, and housing characteristics. For the model development, we used the 2018 ADI, based on ACS data for 2018, which is a 5-year average of ACS data obtained from 2014-2018.

AMHI-Specific ADI Score: Scores are published for nine-digit zip codes, which we combined and averaged to the five-digit zip code level. Based on these zip-code specific ADI scores and population levels by zip code, we developed population-weighted ADI scores for each AMHI.

[1] For ease of operation and development over the short-term, the model is based on the proportional allocation calculation described in this section. If DHS chooses to develop an alternate distribution strategy for the ADI allocation, the model can be readily adapted to support the preferred methodology.

[2] The current version of the model does not allow for changes to the counties defined as "rural" or variation of the per-capita rural allocation by AMHI. The model can be readily adapted if this functionality is determined to be necessary over time, although the adaptation of the model and the integration of the information would likely require additional input from or review by Forma ACS.

Rural AMHIs: Currently, all the regional AMHIs, those containing multiple counties, are considered "Rural AMHIs" for purposes of the allocation. None of the single county AMHIs receive a portion of the Rural Allocation.

Data Sources Summary

Area Deprivation Index, University of Wisconsin

- The ADI was included as a means of capturing the other factors that are typically harder to quantify, such as: geography, transportation and infrastructure, workforce shortages, housing, employment, etc. It was also selected because it has been assessed on more than one occasion, increasing the likelihood that it will continue to be updated regularly, responding to changes across communities over time.

Rural Allocation

- Definitions of rural are inconsistent, but there is general agreement that there are challenges faced by rural communities that metropolitan communities don't face. The rural allocation option within the formula is a way of building this acknowledgement into the model.
- Because there are inconsistent definitions, there isn't a specific data source that can be used to capture those differences. To apply the rural allocation, DHS and AMHI stakeholders need to agree on a definition for the rural allocation and to which regions it will apply.

Proposed Definition of "Rural"

The Minnesota State Demographic Center, Minnesota Department of Health, and Minnesota Department of Agriculture all define "rural" based on the rural-urban commuting area (RUCA) codes developed by the U.S. Health Resources and Services Administration, Office of Rural Health Policy in partnership with the U.S. Agriculture Department's Economic Research Service and the WWAMI Rural Health Research Center at the University of Washington. RUCAs classify U.S. census tracts using measures of population density, urbanization and daily commuting. RUCA codes 1-10 delineate metropolitan, micropolitan, small town and rural commuting areas based on the size and direction of the primary (largest) commuting flows.

For purposes of rural health grants, MDH use RUCA codes 1-3 to delineate urban parts of Minnesota and codes 4-10 to define rural. The Health Resources & Services Administration uses this same definition to determine eligibility for Rural Health Grants issued at the federal level.

For more information about the rural/urban populations in Minnesota, please read the 2017 report by the State Demographic Center, Greater Minnesota: Refined & Revisited. This report details the demographic and economic characteristics of Minnesota's residents using a four-tiered definition of an area's character - urban, large town, small town, and rural - based on population size and proximity to other communities (RUCA codes).

Formula Input 2 – Social Determinants of Health and Medical Risk

This section was written by Forma ACS as part of a final report that was submitted to DHS.

Overview: Under the proposed framework, a higher relative portion of AMHI dollars could be distributed to AMHIs who serve communities with higher levels of service needs. Population characteristics that might influence the relative service needs include the overall health status of the population (medical risk) and individual or environmental factors that can influence health outcomes (Social Determinants of Health).

Rationale: Higher-risk individuals might be more likely to need services and might require higher intensity or higher numbers of services. If an AMHI serves a population with higher relative risk, higher relative levels of funding could be allocated to support the additional service requirements. Feedback from the AMHIs indicated that the risk of the population served by the AMHI should be a significant consideration in determining the relative levels of funding and supported the use of Social Determinant of Health indicators (SDOH) and medical risk indicators to help identify populations of higher relative risk. Therefore, it is reasonable to consider increasing the Baseline Per-Capita amount to reflect greater relative resource requirements for populations with higher medical risk and a higher likelihood of having one or more social determinants of health.

Methodology: With the goal of directing portions of the AMHI dollars to counties or regions of the greatest need, the overall per-capita allocation includes a portion that is scaled to reflect higher or lower relative risk in the population served by the AMHI. The allocation is developed by dedicating a portion of the overall AMHI funding to the "SDOH/Risk Pool" and calculating the amount of the pool received by each AMHI to reflect *the size and relative risk* of the population. All AMHIs receive a per-capita amount to reflect their population risk, but populations with higher levels of relative risk receive a higher per-capita amount.

Although relative risk information is not available for the entire adult population, DHS has medical risk and SDOH data for the Medicaid-enrolled population. Because the Medicaid population represents a large portion of the population served by the AMHIs, this data provides credible information on the relative risk between the populations served by the AMHIs. In utilizing the information, DHS needs to determine whether to develop the relative per-capita levels based on the Medicaid population itself or assume that the risk of the Medicaid population is reasonably representative of risk for the overall population. If DHS chooses to determine the per-capita allocation based on the Medicaid population, the relative risk and relative numbers of Medicaid enrollees within a county or region would influence the per-capita amount of the allocation. If the Medicaid-based risk factors are assumed to be representative of the overall population risk, the relative proportion of Medicaid enrollees would have less influence on the calculation.

In addition, DHS needs to determine how best to blend the relative risk information. The distribution could be based on the broad risk metrics (e.g. simply counting the number of members with one or more SDOH) or based on different allocations for specific risk components of interest (25% Deep Poverty, 25% Medical Risk, etc.). Currently, the model calculates an AMHI-specific risk score for each SDOH based on the relative percentage of Medicaid enrollees with the SDOH in the county or region. For example, if the Medicaid enrollees within the county have 4% more members with an SDOH than the statewide average, the AMHI receives a risk score of 104% for that SDOH. Based on the chosen risk factors and the relative percentages of the total allocation (weights) assigned to each risk factor, the model calculates a blended risk score for each AMHI to determine the per-capita amount.

In theory, DHS could consider allocating a set amount of dollars for each SDOH and determining each AMHI's funding based on each Medicaid-enrolled member in their population with the SDOH. This methodology is reasonably easy to explain but may indicate a false level of precision in the allocation amount.[3] Mathematically, depending on the SDOH chosen, the model's methodology for blending the risk scores based on the Medicaid population (Blended SDOH risk score x AMHI Medicaid enrollees x Average Medicaid Per Person Allocation) results in the same allocation as set amounts dedicated each member with the chosen SDOH.[4] If DHS chooses to distribute on a Statewide basis, the blended risk score based on the Medicaid information is assumed to be representative of the relative risk of the AMHI's entire population. The blended risk score remains the same, but the allocation is based on the entire adult population in the county or region and an average allocation amount for all adults (Blended SDOH risk score x AMHI total population x Average Statewide Per Person Allocation).

Modeling Inputs and Decisions: Recognizing that additional allocations will be determined for other risk factors (SDOH, Rural Allocation, Poverty Indices), the following decisions need to be made related to the **Social Determinants of Health and Risk Adjustment** amount:

- Percentage of AMHI funding to be allocated to the **SDOH/Risk Pool**
- The SDOH factors included in the pool distribution calculation
- The relative amounts allocated to each risk factor
- Whether the SDOH and medical risk for the AMHI-specific Medicaid populations are used as the basis for the distribution or;
- Whether the Medicaid populations are assumed to be representative of the overall population risk within an AMHI's county or region.

SDOH and Medical Risk – Definitions and Information Sources:

Data Sources: The SDOH and relative risk information for the Medicaid population was based on two data extracts developed by DHS. The first extract included county of residence, age, and medical risk information for all Medicaid enrollees in 2019. The other included SDOH and ethnicity information for 2019 Medicaid enrollees. These files were combined to develop the adult member counts, relative medical risk and SDOH data for each county-based or regional AMHI.

Severe Mental Illness (SMI): Indicator based on medical claims information in the DHS claims data warehouse. Indicator is assigned if enrollee has a claim within 24 months prior to the end of the analytic period with one of the following diagnoses: schizophrenia (ICD-9: 295.X, ICD-10: F20.X, F25.X), bipolar disorder (ICD-9: 296.0X, 296.4X, 296.5X, 296.6X, 296.7, 296.8X, ICD-10: F30.X, F31.X) , major depressive disorder (ICD-9: 286.2X, 296.3X, ICD-10: F32.X, F33.0 - F33.4X; F33.9), borderline personality disorder (ICD-9: 301.83, ICD-10: F60.3). Includes members with Severe and Persistent Mental Illness (SPMI).

[3] Because relative medical risk is a "score" (e.g. an AMHI may serve a population with 120% of the statewide average risk), the allocation for medical risk is calculated using a slightly different methodology. Under the "Medicaid Basis" calculation, the amount allocated to each AMHI for relative risk is a function of the number of all the Medicaid members in their county or region and the relative medical risk of their Medicaid population.

[4] Additional information around this calculation is included in the appendix.

Substance Use Disorder (SUD): Indicator based on medical claims information in the DHS claims data warehouse. Recipient is identified as having substance use disorder if they have a claim with a substance use disorder diagnosis within 24 months prior to the end of the analytic period. ICD 10 Diagnosis codes leading with F10.1, F10.2, F11.1, F11.2, F12.1, F12.2, F13.1, F13.2, F14.1, F14.2, F15.1, F15.2, F16.1, F16.2, F18.1, F18.2, F19.1, F19.2 are included.

Past Incarceration: Indicator developed based on individual level prison data received by DHS from the Minnesota Department of Corrections. Jail data is not included.

Deep Poverty: Indicator developed from applications for state programs where proof of income is needed to verify eligibility. Currently, income information is not available for approximately 20% of Medicaid enrollees.

Homelessness: Indicator included if recipients report homelessness during the reporting period.

Any SDOH: The count of Medicaid enrollees within each county or region with one or more of the SDOH included in our review. Members with multiple SDOH are only counted one time in determining the number of members with an SDOH in a county or region.

Total SDOH: The total count of the SDOH indicators for Medicaid enrollees within each county or region. All members with an SDOH are included in the totals, resulting in members with multiple SDOH being included multiple times in the total counts by county or region.

Medical Risk: The medical risk indicators are based on the John's Hopkins Adjusted Clinical Group® (ACG®) risk indictors. ACG is a population/patient case-mix adjustment system that measures health status by classifying people according to their age, sex and medical conditions. Based on demographic and diagnostic information, members are assigned to an ACG category, with each category of members assumed to have a similar need for health resources over a given period of time. The relative cost expectations used in the model are based on actual claims data for the Minnesota Medicaid population.[5] The average scores by county or region are normalized to the entire Medicaid population, meaning that a county or region with a score of "1.20" would be expected to have a population whose medical risk is 120% of the overall Medicaid population.

[5] The relative risk weights are based on 2017 medical claims experience for the PMAP population. The experience does not include claims for some services (e.g. long-term care), but includes inpatient facility, outpatient facility, professional services, pharmacy, mental health, and chemical dependency claims. The total per-member claims are capped at $200,000 when determining the relative risk weights.

Data Sources Summary

Social Determinants of Health (SDOH)
DHS Health Care Administration

- These data were analyzed and included in the funding formula as a way of capturing more detail on service needs and prevalence of mental illness in a community. Their inclusion recognizes that population data do not tell the full story and miss important nuances.
- Based on feedback from AMHI Stakeholders, the initial modeling of the formula places more weight on SMI/SPMI and SUD social determinants of health, followed by deep poverty. However, the other SDOHs are also included in the model for review and discussion. This allows the workgroup to review all of the included SDOHs and make a final recommendation to DHS.
- While there are other social determinants of health that could be included, it is important to remember that fewer variables makes the formula stronger. If too many variables are included, there is the potential that they will cancel each other out.
- The SDOH data are compiled and analyzed by DHS Health Care Administration data staff, based off existing Medicaid data found in the DHS data warehouse. The SDOH that are captured within these data include: severe mental illness, severe and persistent mental illness, substance use disorder, deep poverty, incarceration, and homelessness.

Medical risk data, ACG scores in Medicaid data
DHS Health Care Administration

- The purpose of these data is to recognize that there are other risk factors that impact a person's mental health and their service needs or use. It is another variable that can make the formula more sensitive to the need for mental health services across the state, since different parts of the state will have different percentages of medical risk. Medical risk combined with SDOH allows the formula to be more sensitive than if it focused on straight population metrics.
- ACG scores refers to Johns Hopkins Adjusted Clinical Group (ACG) scores, which are based on diagnostic codes and other population data. From that, a relative risk score is assigned.
- The ACG scores data are available within the DHS data warehouse. The ACG information looks at all medical risk factors, not just mental health or chemical dependency.

Formula Input 1 – Population, Adjusted Bassline Per-Capita Amount

This section was written by Forma ACS as part of a final report that was submitted to DHS.

Overview: Under the proposed framework, a portion of the AMHI dollars will be distributed on a per capita basis. Specifically, a baseline per-adult-per-year amount (***Baseline Per-Capita***) will be allocated to each AMHI based on the number of adults within the county or multi-county region served by the AMHI. The Baseline Per-Capita amount may be adjusted for the relative number of Medicare or Medicaid adults by increasing the per-capita allocation for each of these categories of adults (***Medicare and Medicaid Adjustment*****)**.

Rationale: With the goal of developing general equity in the distribution of the AMHI dollars, the core allocations are based on the relative population sizes in the areas served by the AMHIs. In addition, feedback from the AMHIs indicated that a significant portion of clients receiving services are enrolled in either Medicare or Medicaid. Given the potential for greater relative service utilization from these groups, it is reasonable to consider increasing the Baseline Per-Capita amount to reflect greater relative resource requirements for populations with larger portions of Medicare and Medicaid enrollees.

Methodology: Based on the amount of the AMHI funds allocated to the Baseline Per-Capita amount, DHS can determine whether a portion will be used to increase the allocation for Medicare and/or Medicaid members. In the example below, 70% of the AMHI fund is allocated to the Baseline Per-Capita amount, with 10% used to increase the relative distributions for AMHIs with higher proportions of Medicare- and Medicaid-enrolled adults. Based on the population sizes and allocations for population segments, the overall (Statewide) and supplemental (Medicare and Medicaid) per capita amounts are calculated and combined to form the segment specific allocations.

Table 1: Adjusted Baseline Per-Capita Amount – Per Capita Allocation

Population	Pool %	Pool Size	Population	Per Capita	Total
Statewide	**60.0%**	20,004,410	4,336,475	$4.61	**$4.61**
Medicare	**5.0%**	1,667,034	946,997	$1.76	**$6.37**
(Medicaid	**5.0%**	1,667,034	911,179	$1.83	**$6.44**
Baseline Per-Capita	**100%**	23,338,479			

In the example, the $6.37 per-capita amount for Medicare enrollees is the combined amount of the $4.61 Statewide average and the $1.76 Medicare enrollee allocation. For each AMHI, the Adjusted Baseline Per-Capita amount is based on the relative population sizes (Medicare enrollees, Medicaid enrollees and adults not enrolled in either program) and the corresponding per-capita amounts. The calculation for a sample AMHI is shown below:

Table 2: Adjusted Baseline Per-Capita Amount – Sample AMHI

Population	Adults	Rate	Total	Adj Per Capita
Medicare	71,653	$6.37	$456,673	
Medicaid	60,104	$6.44	$387,226	
Other Adults	116,673	$4.61	$538,219	
Total Base Rate	**248,430**		$1,382,118	**$5.56**

Modeling Inputs and Decisions: Recognizing that additional allocations will be determined for other risk factors (SDOH, Rural Allocation, Poverty Indices), the following decisions need to be made related to the **Adjusted Baseline Per Capita** amount:

- Percentage of AMHI funding to be allocated to the **Baseline Per-Capita** amount
- Whether a portion of those funds will be used to increase the amount allocated to the relative number of Medicare and Medicaid enrollees
- The amount of allocation for Medicare and Medicaid enrollees, if any

Adjusted Baseline Per-Capita Amount – Definitions and Information Sources:

Statewide population: U.S. Census Bureau, Population Estimates Program (PEP), updated annually. Population and Housing Unit Estimate, July 1, 2019, (V2019)

Medicare population: Based on the Medicare Geographic Variation Public Use File. Includes population totals for Medicare Advantage and FFS enrollees by county in 2018.

Medicaid population: Based on data submitted by DHS from the claims and enrollment data warehouse. The extract included county of residence and age for all Medicaid enrollees in 2019.

Data Sources Summary

US Census Data

- Census data was included as one measure of service population. It is recognized that this is a broad measure and may lack the detail to best capture mental health service need and prevalence of mental illness in a community.
- The US Census collects population data every 10 years. This information is public and can be found by anyone doing a simple search of statewide, county, and city population data.
- Census data informs the formula by identifying how many people potentially could be using the services provided by AMHIs. While it provides information on overall potential service population in an area, it does not take into account differential need or more detailed information on individuals using mental health services.

DHS Health Care Administration Medical Assistance (MA) data

- Because mental health prevalence data do not readily exist in a format that can be used time and again, the project team looked to DHS's data on MA enrollment. This was identified as one reliable data source that could provide a proxy for mental health prevalence or service need as it provides information about claims related to mental health services.
- Medicaid or MA is the primary source of coverage for people who need long-term care services. This data source provides information on what portion of the overall statewide population may be using or needing mental health services and supports. This allows the formula to take into account differential needs across the state and make some assumptions on prevalence of mental illness.
- As provided by the DHS Health Care Administration Healthcare Research and Quality (HRQ) team: The Medicaid-specific claims and enrollment information come from multiple sources. The State's Medicaid Management Information System (MMIS) is the largest health care payment system in Minnesota, and one of the largest payment systems in the nation. Health care providers throughout the county, as well as DHS and county staff, use MMIS to pay the medical bills and managed care payments for Minnesotans enrolled in Minnesota Health Care Programs (i.e. MA, SNBC, MA-EPD, PMAP). In addition to information from the MMIS, claims information from the DHS-contracted managed care organizations (MCOs) is integrated into the DHS claims data warehouse to create a comprehensive "warehouse" of the claims, diagnoses and demographic characteristics of the Medicaid-enrolled population.
- The population data are based on enrollment numbers from claims data. While there are assumptions made when using enrollment information, it does provide a measure of what portion of the population in a given area may have greater need.
- The data used and incorporated into the funding formula model are specific to adult enrollees in Medicaid.
- DHS fact sheet about Medicaid/MA
- DHS data and information about Medicaid usage

CMS public data on Medicare

- Based on feedback from AMHI stakeholders that AMHI grant service recipients may be on Medicare instead of MA., the project team also included Medicare data as another proxy for mental health prevalence and service need.
- This data source is a compliment to the MA data.
- Medicare data is another way of getting more specific than overall census population data, and is another attempt at capturing differential needs across the state.
- The population data are based on enrollment information. While there are assumptions made when using enrollment information, it does provide a measure of what portion of the population in a given area may have greater need.
- The data used and incorporated into the funding formula model are specific to adult enrollees in Medicare.
- According to CMS: "The Centers for Medicare & Medicaid Services (CMS) has developed a public use file that enables researchers and policymakers to evaluate trends in health care utilization and spending by geography for the Medicare fee-for-service population. The Geographic Variation Public Use File includes demographic, spending, utilization, and quality indicators at the state level (including the District of Columbia, Puerto Rico, and the Virgin Islands), hospital referral region (HRR) level, and county level."
- Public Use File | CMS