Unmet Need Score (UNS) Resource Guide

Description of Service Area Needs Assessment Methodology (SANAM) and Resulting UNS

January 2019

U.S. Department of Health and Human Services
Health Resources and Services Administration

The publication was produced for the U.S. Department of Health and Human Services, Health Resources and Services Administration, under contract number HHSM500201200008I/HHSH250201600008U.

Suggested Citation: U.S. Department of Health and Human Services, Health Resources and Services Administration, Unmet Need Score (UNS) Resource Guide. Rockville, Maryland: U.S. Department of Health and Human Services, 2019.

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1 Background

This resource guide is designed to provide information on the Health Resources and Services Administration (HRSA) Service Area Needs Assessment Methodology (SANAM), a methodology that generates a quantitative assessment of unmet need for primary and preventive health care. This guide describes how the SANAM calculates an Unmet Need Score (UNS), the measures and measure weights used in the calculation, and data sources from which the measures are derived. It also provides the conceptual model and evidence-based methodology that guided the design of the SANAM.

The HRSA Health Center Program has historically used a variety of methods to evaluate the unmet need for primary and preventive health care services. In circumstances where an objective quantification of unmet need can be of value, the SANAM provides a standard, transparent, verifiable, and automated methodology. The SANAM leverages publicly available data to quantify the overall need for primary and preventive health care at the ZIP Code level,[1] which allows for the quantification of an UNS for any combination of ZIP Codes that health centers are proposing to serve through the addition of one or more service delivery sites. The SANAM automates and standardizes the calculation of an UNS and facilitates assessment of unmet primary and preventive health care needs across different service areas to assist the Health Center Program in targeting its resources.

For the SANAM and UNS, need is defined as the relative disparities in population health status exhibited across health center service areas, as well as the upstream and downstream determinants that lead to disparate health outcomes. The SANAM was designed to objectively capture aspects of this need that are particularly relevant to the Health Center Program. For more information on the development, testing, and selection of the SANAM, see Appendix A, Appendix B, and Appendix C.

The SANAM and resulting UNS for the 50 States and the District of Columbia is described in the main body of this resource guide. Differences in availability of data and key drivers of mortality and morbidity necessitated the development of UNS calculations specific to Puerto Rico, the other U.S. Territories, and the Freely Associated States, which are discussed in Appendix D.

[1] In this document, ZIP Code refers to a ZIP Code Tabulation Area (ZCTA), which is a construction of the U.S. Census Bureau to represent the U.S. Postal Service ZIP Code service area.

2 Description of Measures used to Calculate the UNS

The UNS is the weighted sum of measure values. The calculation details are given in Section 4. The 24 measures used in the calculation are listed in Figure 1, along with a number representing the measure weight. The measure weight indicates the relative importance of the measure in estimating unmet need. Each measure weight is presented as a percentage of the total weight. The total weight allocated across all measures is 100.

The measures are organized in measure groups under the health determinants and health status measure categories. All the health determinants measures focus on access, except for Violent Crime which primarily impacts health outside the pathway of access to health care. The access outcome measure group captures retrospective information about outcomes related to access, while the access barrier measure group captures information on impediments that could potentially impact timely access to care. Six of the nine access barrier measures are indicators of socioeconomic status and are key social determinants of health. These six measures also serve as proxy measures of health status. The direct measures of health status provide direct information on mortality and morbidity as well as top behaviors driving morbidity and mortality. For more on this organizing conceptual framework, see Appendix A.1.

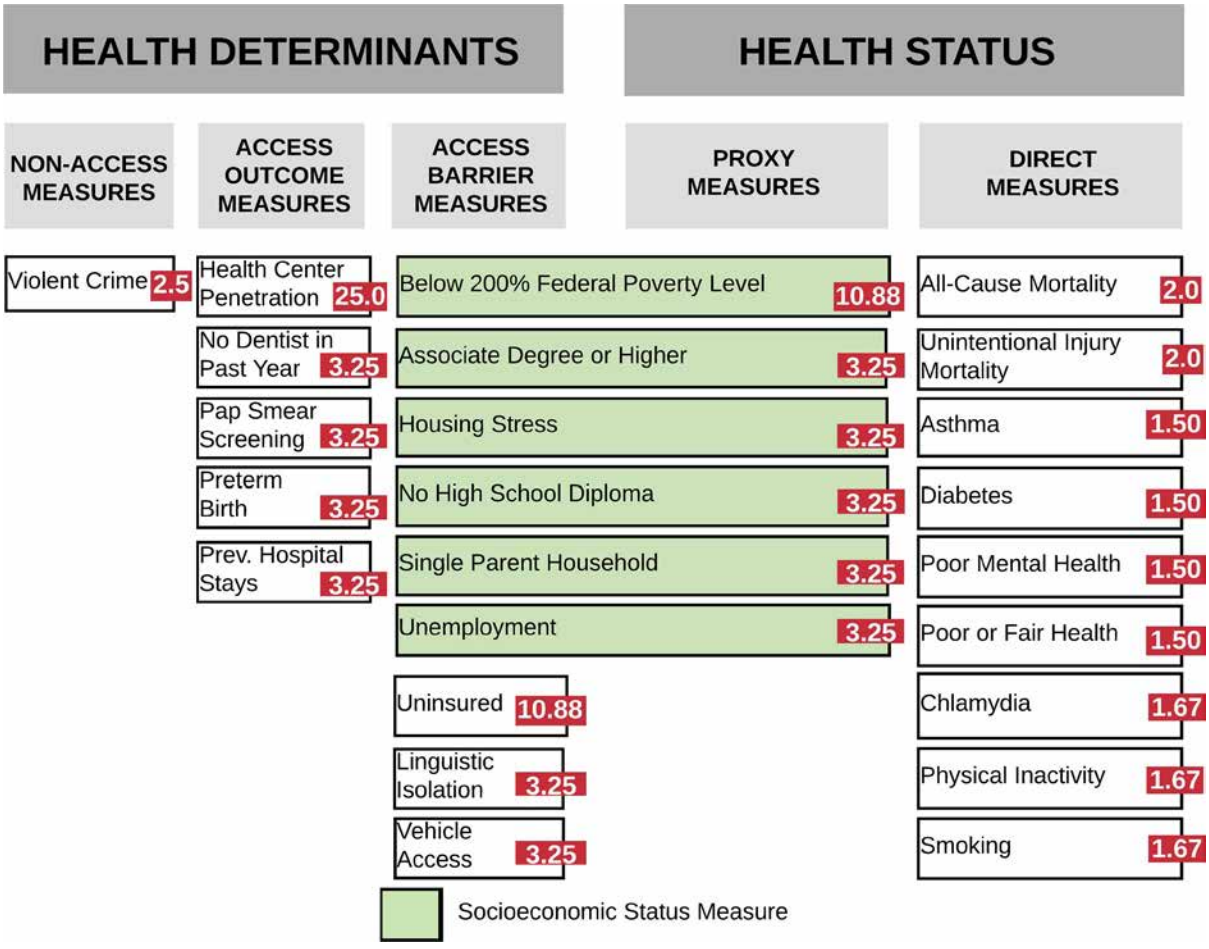

Figure 1. The Measures and Measure Weights Used in the UNS Calculation

Table 1 provides a definition for each measure, the weight assigned to the measure, and a summary of the rationale for the measure's inclusion. The selection process prioritized measures used by reputable needs assessment instruments that make important and unique contributions to measuring area-level unmet need for primary and preventive health care. Further information on the conceptual framework that guided the selection of measures used to calculate the UNS can be found in Appendix A and Appendix B. Additionally, Appendix C includes a discussion of the final selection process that led to these 24 measures. A list of the key reports and articles consulted to develop the conceptual framework and to evaluate, select, and weight the measures can be found in Appendix E.

For the health determinants measures involving access, the summary rationale presented in Table 1 includes a discussion of the following interrelated "access dimensions" that when combined form a comprehensive and evidence-based assessment of access to health care:

Availability/Accommodation: ability to reach health care
Affordability: ability to pay for health care
Approachability: ability to identify health care services that address needs
Acceptability: ability to seek health care services based on social and cultural factors
Appropriateness: ability to receive timely quality health care (also termed "access outcome" or "realized access")

Table 1. Information for Measures Used in Calculation of UNS

Measure	Definition	Weight	Rationale
Non-Access Measures (Total Weight = 2.5%)			
Violent Crime	Number of violent crimes per 100,000 population.	2.50%	High crime rates negatively influence physical and mental well-being by affecting stress levels and contributing to stress-related disorders, in addition to discouraging participation in healthy behaviors such as exercise and socialization. Violent Crime is the only measure in this group.
Access Outcome Measures (Total Weight = 38%)			
Health Center Penetration	Ratio of the population served by a health center to the population with household income below 200% of the Federal Poverty Level (FPL). Health Center Penetration is capped at a value of one.	25.00%	This measure helps capture multiple dimensions of access (acceptability, affordability, availability, and appropriateness), and has been used in previous New Access Point (NAP) opportunities to award priority points. This ratio provides insight into the extent of the unmet need for health services among underserved populations in a ZIP Code. Relative to other access measures, it is the most specific to the Health Center Program in that it approximates the degree to which the Health Center Program potential patient populations have already achieved access to existing health center sites. It is also one of the most "actionable" measures for the Health Center Program in that funding and site approval decisions can directly affect the measure's numerator—the population that has accessed services at a health center. Consequently, this measure carries the most weight.
No Dentists in Past Year	Fraction of adults who did not visit a dentist or dental clinic within the past year.	3.25%	This measure helps capture multiple dimensions of access (acceptability, affordability, availability, appropriateness). Oral health is essential to general health and well-being. This measure provides a more complete and reliable assessment of a service area population's access to dental care than other measures that are publicly available and cover this area of health-related need (e.g., "Population to Dentist Ratio" only partially captures the dimensions of access).
Pap Smear Screening	Percentage of women ages 21 to 64 years who had screening for cervical cancer (Pap test) in past three years	3.25%	This measure helps capture the appropriateness dimension of access and is used to assess population's receipt of quality and timely preventive care. Underserved populations have lower rates of pap smear screenings and are at higher risk for behaviors that negatively impact reproductive health. Of the publicly available measures commonly used to assess population receipt of quality and timely preventive screenings, this measure was best suited for incorporation based on data accessibility and the ability to extrapolate to small geographic areas.

Measure	Definition	Weight	Rationale
Preterm Births	Fraction of babies born before 37 weeks gestation.	3.25%	This measure helps capture the appropriateness dimension of access. Preterm birth is the principal contributor to low birthweight and the main underlying cause of stillbirth and infant mortality. The overwhelming consensus by authoritative bodies is to directly examine the proportion of preterm births in the population (over low birthweight and infant mortality) if data quality and availability allow.
Preventable Hospital Stays	Number of discharges for ambulatory care-sensitive conditions per 1,000 Medicare enrollees.	3.25%	This measure helps capture the appropriateness dimension of access. Preventable hospitalization is often a consequence of the failure to receive timely quality primary care, and it indicates the costly overuse of hospitals as a main source of care. Although the data source for this measure predominantly includes individuals who are 65 years and older, the measure is the best available assessment used by authoritative bodies to evaluate realized access and effectiveness of primary health care.
Access Barrier Measures and Proxy Measures of Health Status (Total Weight = 44.5%)			
Below 200% Federal Poverty Level (FPL)	Fraction of the area's population living in households with income below 200% of the FPL.	10.875%	This measure helps capture the affordability dimension of access. This measure contributes to a robust assessment of socioeconomic status, one of the main drivers of population health disparities. The measure approximates the proportion of the potential population of Health Center Program patients in a ZIP Code, in addition to being one of the most common determinants of access, quality of care, and health status among populations served by the Health Center Program. This measure is highly actionable to the Health Center Program because it identifies the proportion of a population in a defined area that could benefit from the sliding scale care payment structure offered by health centers. Therefore, the measure has a higher weight.
Associate Degree or Higher	Fraction of the population age 25 and older whose highest level of education attained is an Associate-level degree or higher.	3.25%	This measure helps capture the approachability dimension of access. In addition to serving as a measure of educational attainment, this measure serves as a proxy for occupational status in needs assessment instruments. Educational attainment and occupation are key determinants of population health care access and health status, and contribute to a robust assessment of socioeconomic status, one of the chief drivers of population health disparities.

Measure	Definition	Weight	Rationale
Housing Stress	Fraction of households where one or more of the following conditions are met: (1) housing expense/income threshold—monthly housing costs, including utilities, exceed 30% of income, (2) crowding—more household members than rooms, (3) incomplete plumbing—home lacks necessary bathroom facilities, and (4) incomplete kitchen—home lacks essential kitchen facilities.	3.25%	This measure helps capture the affordability dimension of access. In addition to contributing to a robust assessment of socioeconomic status by adding information about household financial well-being, this measure accounts for the effect of the physical environment on population health, since poor housing conditions are a risk factor for chronic obstructive pulmonary disease and asthma—two top drivers of mortality and health care cost burden in the United States.
No High School Diploma	Fraction of individuals age 18 and older without a high school diploma or equivalent.	3.25%	This measure helps capture the approachability dimension of access. Educational attainment is a principal determinant of access to health care and population health status. Populations without a high school degree fare worse on population health indicators compared to those with higher levels of education. The use of this measure contributes to a robust assessment of socioeconomic status, along with the measures Unemployment and Associate Degree or Higher, which help approximate occupational status, stability, and mobility; and Housing Stress, Single-Parent Household, and Below 200% Federal Poverty Level, which help approximate household financial resources.
Single-Parent Household	Fraction of children under 18 who are living in single-parent households in a family or subfamily (excludes institutions, group homes, and other group living situations).	3.25%	This measure helps capture the affordability and availability dimensions of access. Single-parent households are restricted in financial and human resources, and they experience social and material deprivation. These factors impact the ability to seek and afford health care, as well as to participate in behaviors that promote health.

Measure	Definition	Weight	Rationale
Unemployment	Fraction of civilian labor force age 16 and older that is unemployed.	3.25%	This measure helps capture the affordability dimension of access. This measure contributes to a robust assessment of socioeconomic status, one of the main drivers of population health disparities. Unemployment impacts the ability to afford health care as well as to participate in behaviors that promote health. Unemployment contributes to stress levels and is a risk factor for negative health behaviors, such as substance misuse, that can lead to a cascade of negative life consequences, such as loss of income and further health deterioration.
Uninsured	Fraction of civilian non-institutionalized population without health insurance.	10.875%	This measure helps capture the affordability dimension of access. Health insurance absorbs some of the costs associated with seeking health care. This measure is highly actionable to the Health Center Program because it identifies the proportion of a population in a defined area that could benefit from the sliding scale care payment structure offered by health centers. Therefore, similar to Below 200% Federal Poverty Level, this measure has higher weight.
Linguistic Isolation	Fraction of the population age 5 and older who cannot speak English at least "very well."	3.25%	This measure helps capture the approachability and acceptability dimensions of access. Linguistic and cultural differences impact a population's ability to access health care as well as to participate in behaviors that promote health. In the absence of other publicly available and feasible measures of the cultural and linguistic determinants of health care access and health status, this measure best captures the populations requiring culturally and linguistically competent care, including migratory and seasonal agricultural worker populations that are of concern to the Health Center Program.
Vehicle Access	Fraction of households with no vehicles (passenger cars, vans, and pickup or panel trucks of one-ton capacity or less kept at home, including vehicles rented/leased for one month or more, company vehicles, and government vehicles used for non-business purposes) available for personal use.	3.25%	This measure helps capture the affordability and availability dimensions of access. Vehicle availability may increase the number of providers and other health-promoting resources that are accessible to a population and may provide additional insight into a family's financial situation beyond the yearly household income information captured by other measures.

Measure	Definition	Weight	Rationale
Direct Measures of Health Status (Total Weight = 15%)			
Direct Measures of Mortality (Total Weight = 4%)			
All-Cause Mortality Rate	Age-adjusted deaths from all causes per 100,000 population.	2.00%	This measure approximates the burden of excess and preventable mortality in a population and is highly correlated with individual rates of the top causes of mortality experienced in the United States (i.e., heart disease and cancer). Preventable mortality, especially at younger ages, is experienced at higher rates by populations served by the Health Center Program.
Unintentional Injury Mortality	Age-adjusted deaths due to unintentional injury per 100,000 population, including deaths from drug overdose, falls, agriculture and manufacturing accidents, motor vehicle accidents, and violence.	2.00%	This measure encompasses mortality due to drug overdose, motor vehicle accidents, work-related accidents, and other types of accidental injury. This measure captures several of the leading causes of mortality in the U.S. population. Populations served by the Health Center Program are at higher risk for mortality resulting from unintentional injury.
Direct Measures of Morbidity (Total Weight = 6%)			
Asthma	Percentage of adults who have been told they currently have asthma.	1.50%	Asthma is a top driver of morbidity and health care cost burden in the U.S. population, and is a risk factor for additional top causes of mortality (influenza and pneumonia). Populations served by the Health Center Program are at increased risk for asthma diagnosis and poor health outcomes resulting from asthma. This measure also captures other health determinants related to the physical environment, such as poor housing conditions and particulate matter and ozone pollution.
Diabetes	Fraction of adults age 20 and older who report having been diagnosed with diabetes.	1.50%	Diabetes is one of the top causes of mortality and a driver of health care cost burden in the U.S. population, and is a risk factor for other top causes of mortality (stroke, heart disease) and drivers of high health care cost (kidney disease). This measure is also indicative of other preventable and costly health determinants such as the presence of food insecurity, unhealthy diet, and obesity.
Poor Mental Health	Age-adjusted average number of mentally unhealthy days in past 30 days for adult respondents.	1.50%	Research demonstrates that this measure tracks with levels of poverty and unemployment in an area. This measure is one of the most widely used area-level measures of mental health, which is a significant driver of morbidity, mortality, and health care cost burden in the United States.

Measure	Definition	Weight	Rationale
Poor or Fair Health	Percentage of adults who report fair or poor health.	1.50%	Self-rated health is the mostly widely used and validated single-item indicator of health status that independently predicts morbidity, mortality, and health care utilization across languages, cultures, and population groups. In addition to serving as a valid indicator of physical health and functional limitations, this measure is a well-documented indicator of mental and emotional health, which is a significant driver of excess morbidity, mortality, and health care cost burden in the U.S. population.
Direct Measures of Health Behaviors (Total Weight = 5%)			
Chlamydia	Number of newly diagnosed chlamydia cases per 100,000 population.	1.67%	Chlamydia is the most prevalent and commonly reported sexually transmitted infection (STI) in the United States and is an important upstream determinant of reproductive health. The measure also has higher data quality compared to other publicly available STI measures and can be extrapolated to small geographic areas.
Physical Inactivity	Percentage of adults age 20 and over reporting no leisure-time physical activity.	1.67%	Physical inactivity is a risk factor for leading causes of mortality in the United States (heart disease, cancer, stroke, chronic lower respiratory diseases, and diabetes) and drivers of health care cost burden in the U.S. population.
Smoking	Percentage of adults who are current smokers.	1.67%	Smoking is the leading cause of preventable mortality in the United States and a risk factor for leading causes of mortality in the United States (heart disease, cancer, stroke, chronic lower respiratory diseases, and diabetes). Smoking is also a key driver of health care cost burden in the United States.

3 Data Sources Used to Calculate the UNS

The UNS is calculated using the latest available data. Brief descriptions of the data sources used for the UNS are given below. These data sources were accessed in August 2018. For the purposes of this document and the UNS, ZIP Code refers to a ZIP Code Tabulation Area (ZCTA)—a construction of the U.S. Census Bureau to represent U.S. Postal Service ZIP Code service areas.

American Community Survey (ACS): The U.S. Census Bureau conducts this annual survey on a wide range of topics, and the data is available at ZIP Code level.

The measures used in the calculation of the UNS for which ACS provides data include:

1) Unemployment (from table: S2301 Employment Status)
2) Below 200% Federal Poverty Level (from table: S1701 Poverty Status in the Past 12 Months)
3) Associate Degree or Higher (from table: B15003 Educational Attainment for the Population 25 Years and Over)
4) Linguistic Isolation: Percent population speaking English less than "very well" (from table: S1601 Language Spoken at Home)
5) Vehicle Access (from table: B08201 Household Size by Vehicles Available)
6) No High School Diploma (from table: S1501 Educational Attainment)
7) Single-Parent Household (from table: B09005 Household Type for Children Under 18 Years in Households (Excluding Householders, Spouses, and Unmarried Partners))

In addition to the measures used in the calculation of the UNS, the ACS was the source for data on population sizes for each ZIP Code, which is used to compute the service area UNS described in Section 4.2. Demographic data from the ACS was also used in implementing the extrapolation procedures described in Section 4.1. For the extrapolations, the sources include:

1) Race/ethnicity (from table: B03002 Hispanic Or Latino Origin by Race)
2) Income (from table: S1701 Poverty Status in the Past 12 Months)

The ZIP Code population sizes used in calculating the service area UNS were taken from the "population for whom poverty status is determined" columns available in these same tables.

ACS data is available from American FactFinder using the Guided Search (interactive) or Advanced Search (for downloadable files) capabilities at the following website: https://factfinder.census.gov/faces/nav/jsf/pages/index.xhtml.

Behavioral Risk Factor and Surveillance Survey (BRFSS): The Centers for Disease Control and Prevention (CDC) conducts this annual survey, which has become the biggest source of health data for U.S. States, the District of Columbia, and three U.S. Territories. The UNS relies on BRFSS for data on Asthma, Pap Smear Screening, Poor or Fair Health, and Smoking. The data is available at the State level and was extrapolated to the ZIP Code level using information on income brackets for the ZIP Codes (see Section 4.1 for further explanation of the extrapolation strategy).

Summary-level BRFSS data is available from the interactive site https://www.cdc.gov/brfss/brfssprevalence/. The file can be downloaded from https://chronicdata.cdc.gov/Behavioral-Risk-Factors/Behavioral-Risk-Factor-Surveillance-System-BRFSS-P/dttw-5yxu.

County Health Rankings (CHR): The Robert Wood Johnson Foundation and the University of Wisconsin Population Health Institute collaboratively maintain this annual report of social, demographic, and health information by synthesizing information from multiple sources. The UNS relies on CHR for data on the following measures:

1) Violent Crime, which CHR derives from the Federal Bureau of Investigation's Uniform Crime Reporting program. For more information, see http://www.countyhealthrankings.org/explore-health-rankings/what-and-why-we-rank/health-factors/social-and-economic-factors/community-safety/violent-crime-rate.

2) Poor Mental Health, which the CDC extrapolates from the BRFSS data. For more information, see http://www.countyhealthrankings.org/explore-health-rankings/what-and-why-we-rank/health-outcomes/morbidity/health-related-quality-of-life/poor-mental-health-days.

County-level CHR data can be found at http://www.countyhealthrankings.org/. Information on methods and the downloadable file can be found at http://www.countyhealthrankings.org/explore-health-rankings/rankings-data-documentation.

Dartmouth Atlas of Health Care: This resource is maintained by an academic group primarily funded by the Robert Wood Johnson Foundation. The Dartmouth Atlas provides comprehensive data and analysis about national, regional, and local markets, as well as about individual hospitals and their affiliated physicians. The UNS calculation uses this data at the county level for the Preventable Hospital Stays measure. It originates from analysis of Medicare data, and is available from http://archive.dartmouthatlas.org/tools/downloads.aspx.

Diabetes Interactive Atlas: The CDC's National Diabetes Surveillance System maintains this interactive data set, which derives annual estimates of diabetes and diabetes risk factors. The UNS calculation uses this source for the Physical Inactivity measure, which is available at the county level using data from the BRFSS and the U.S. Census Bureau's Population Estimates Program. The data is available from https://www.cdc.gov/diabetes/data/countydata/countydataindicators.html.

U.S. Department of Housing and Urban Development (HUD): HUD provides annual data on housing and the extent of housing problems, known as the Comprehensive Housing Affordability Strategy (CHAS) data, using custom tabulation of ACS data. The UNS calculation uses census tract-level data on Housing Stress from CHAS, which is available from https://www.huduser.gov/portal/datasets/cp.html.

National Center for HIV/AIDS, Viral Hepatitis, STD, and TB Prevention (NCHHSTP): NCHHSTP is a CDC center that aggregates local and State data on STIs. NCHHSTP is the source for the data on Chlamydia incidence, which is provided at the county level. The data is available from https://gis.cdc.gov/grasp/nchhstpatlas/main.html?value=atlas.

National Vital Statistics System (NVSS): The CDC maintains the NVSS, which includes data on both natality and mortality. The natality data uses birth certificates to compile data on birth outcomes, including the Preterm Birth measure used in the UNS calculation, and can be found at https://wonder.cdc.gov/natality-current.html. The mortality data is used to calculate Unintentional Injury Mortality, and can be found at https://wonder.cdc.gov/ucd-icd10.html. For both of these measures, county-level data was extrapolated to the ZIP Code level using information on race and ethnicity for the ZIP Codes (see Section 4.1 for further explanation of the extrapolation strategy).

Uniform Data System (UDS) Mapper: The American Academy of Family Physicians supports the collection of data on the performance of health center awardees and look-alikes on behalf of HRSA. The UDS Mapper also provides estimates of several measures collected by other national surveys at the ZIP Code level.

General instructions for retrieving data from UDS Mapper are at https://www.udsmapper.org/. After registering on the website, click Go Straight to the UDS Mapper. Click the Explore Service Area icon and select By Geography. In the box that appears, enter service-area ZIP Codes or ZCTAs, and click Add. From the bar below the map, click on the Data Table icon.

UDS Mapper provides data for the following measures used in the calculation of the UNS. Instructions for obtaining data for the specific measures are provided for each measure:

1) Health Center Penetration: This data comes directly from the Health Center Program population as reported in the UDS. (After following the general instructions above, click on the Standard UDS Mapper Report tab. If the tab titled HCP: Penetration of Low- Income is checked, then the values for the ZIP Codes will appear in the UDS Mapper Data Table.)
2) All-Cause Mortality: These estimates are derived by combining data from CDC Vital Statistics with block population data from the Census Bureau. (After following the general instructions above, click on the additional population data tab, then click on Pop: Age-Adjusted Mortality Rate.)
3) Diabetes: These estimates are derived using data from the BRFSS and ACS. (After following the general instructions above, click on the additional population data tab, then click on Pop: Adults Ever Told Have Diabetes.)
4) No Dentist in Past Year: These estimates are derived using data from the BRFSS and ACS. (After following the general instructions above, click on the additional population data tab, then click on Pop: Adults with No Dental Visit in Past Year.)
5) Uninsured: These estimates are derived using data from the ACS. (After following the general instructions above, click on the additional population data tab, then click on Pop: Percent of Population that is Uninsured, Estimate.)

Information about the measures can also be found at the following link: https://www.udsmapper.org/knowledge-base.cfm?s=D. Further detail about how the estimates from national surveys are derived is available from https://www.udsmapper.org/data-estimation.cfm.

Table 2 summarizes the data source information for each of the measures used in the UNS calculation. The summary includes the data source, the geographic unit of the collected data, and the years of data used.

Table 2. Data Source Summary for Measures used in UNS Calculation

Measures	Data Source	Source Data Geographic Unit	Data Years
All-Cause Mortality	Uniform Data System (UDS) Mapper	ZIP Code	2013-2016
Associate Degree or Higher	American Community Survey (ACS)	ZIP Code	2012-2016
Asthma	Behavioral Risk Factor and Surveillance Survey (BRFSS)	State	2016
Below 200% Federal Poverty Level	ACS	ZIP Code	2012-2016
Chlamydia	National Center for HIV/AIDS, Viral Hepatitis, STD, and TB Prevention	County	2016
Diabetes	UDS Mapper	ZIP Code	2014
Health Center Penetration	UDS Mapper	ZIP Code	2017[2]
Housing Stress	U.S. Department of Housing and Urban Development	Census Tract	2011-2015
Linguistic Isolation	ACS	ZIP Code	2012-2016
No Dentist in Past Year	UDS Mapper	ZIP Code	2014
No High School Diploma	ACS	ZIP Code	2012-2016
Pap Smear Screening	BRFSS	State	2016[3]
Physical Inactivity	Diabetes Atlas	County	2013
Poor Mental Health	County Health Ranking (CHR)	County	2016
Poor or Fair Health	BRFSS	State	2016
Preterm Births	National Vital Statistics System (NVSS)	County	2012-2016
Preventable Hospital Stays	Dartmouth Atlas of Health Care	County	2015
Single-Parent Household	ACS	ZIP Code	2012-2016
Smoking	BRFSS	State	2016
Unemployment	ACS	ZIP Code	2012-2016
Uninsured	UDS Mapper	ZIP Code	2016
Unintentional Injury Mortality	NVSS	County	2012-2016
Vehicle Access	ACS	ZIP Code	2012-2016
Violent Crime	CHR	County	2012-2014

[2] The health center patient data is from 2017. The data for the population below 200% of the FPL is from 2012 to 2016.

[3] When the BRFSS data was accessed in August 2018, the Pap Smear Screening measure was not updated with 2016 measure values for the following states: AR, AZ, CT, MD, NH, RO, VT, and WA. In these instances, the 2014 BRFSS measure values are used instead.

4 Methodology for Calculating the UNS

The previously described measures are used to generate an UNS for each ZIP Code. The ZIP Code UNS is then used to calculate an UNS for a service area, which includes one or more ZIP Codes. The steps for generating the UNS for ZIP Codes and service areas are described below.

4.1 ZIP Code UNS

The UNS for a ZIP Code[4] is the sum of weighted measure values that have been standardized. The steps below describe the specific calculations to transform the measure values to an UNS. Table 3 provides an example tabulation of selected steps for a hypothetical ZIP Code.

1. **Extrapolate to ZIP Code level**: Where applicable, measure values that are not already reported at the ZIP Code level are extrapolated to the ZIP Code level. In some cases, a measure reported at the State or county level that is stratified (i.e., reported by demographic category such as income level or race), can be estimated or extrapolated for a ZIP Code within the State or county. To do this, the measure values for different demographic groups are weighted by the proportion of the population of the different demographic groups in the target ZIP Code. The measures that were extrapolated in this way are Preterm Births, Unintentional Injury Mortality, Asthma, Pap Smear Screening, Smoking, and Poor or Fair Health.

   Some of the measures used in the UNS are reported at the county level but are not stratified by demographic group. These measures include Poor Mental Health, Violent Crime, Physical Inactivity, Chlamydia, and Preventable Hospital Stays. For these measures, a ZIP Code that is completely contained in a county is assigned the county's value. ZIP Codes that are split across multiple counties are assigned a value using a population-based weighted average of the county values. A similar approach is used to obtain ZIP Code values for Housing Stress, which is reported for Census tracts: when a ZIP Code is split over multiple Census tracts, a value is assigned using a household-based weighted average of the Census tract values.

   At the end of this step, except in cases where there is missing data,[5] each ZIP Code has a measure value for each of the 24 measures.

2. **Standardize measure values based on percentile ranks**: After assigning values to each measure across all ZIP Codes, the values are standardized using percentile ranks. This step is necessary to ensure that all the disparate measures are on similar scale, with higher numbers indicating areas with greater need. After computing the percentile ranks, each of the 24 measures is transformed so that the values range from 0 to 100 where 0 would indicate the least need and 100 the greatest.

   In the first step of calculating percentile ranks for a measure, the measure values across all the ZIP Codes are ranked from lowest need to highest need. In Table 3, the hypothetical ZIP Code's Health Center Penetration ***value from the data source*** is 0.195, which places the ZIP Code's value at the ***measure rank*** of 12,518 among the 32,600

[4] Again, note that ZIP Code here is taken to mean ZCTA.
[5] See Section 4.3 for more information on how missing data is handled.

available values across all ZIP Codes. The ***percentile rank*** for a measure value is calculated by dividing the value's ***measure rank*** by the ***number of available values*** for all ZIP Codes and multiplying by 100 (i.e., [12,518/32,600]×100). In the example in Table 3, the ***percentile rank*** for Health Center Penetration is 38.4. The calculation illustrates that the percentile rank for a measure value is the percentage of all ZIP Codes that have values indicating equal or less need. Higher percentile ranks indicate greater need.

3. **Weight the percentile ranks**: The ***percentile ranks*** computed in step 2 are weighted based on the relevance of that measure to the Health Center Program. The ***percentile ranks*** are multiplied by the ***measure weights*** assigned to each of the 24 measures (see Figure 1 or Table 1). Health Center Penetration has a ***measure weight*** of 25%. In the example in Table 3, this weight is multiplied by the ***percentile rank*** (38.4) to yield a ***weighted measure*** of 9.6.

Table 3. Example Calculations for a Hypothetical ZIP Code UNS

Measure	Measure Value (from Data Source)	Measure Rank	Number of Available Values	Percentile Rank	Measure Weight (%)	Weighted Measure
Health Center Penetration	0.195	12,518	32,600	38.4	25.00	9.60
Below 200% Federal Poverty Level	0.298	12,723	32,600	39.0	10.875	4.24
Uninsured	0.059	6,899	32,600	21.2	10.875	2.30
Associate Degree or Higher	0.467	5,267	32,596	16.2	3.25	0.53
Housing Stress	0.285	16,710	32,347	51.7	3.25	1.68
Linguistic Isolation	0.025	21,115	32,600	64.8	3.25	2.11
No Dentist in Past Year	0.252	9,263	32,463	28.5	3.25	0.93
No High School Diploma	0.072	9,255	32,596	28.4	3.25	0.92
Pap Smear Screening	17.9	12,730	32,600	39.0	3.25	1.27
Preterm Births	0.084	6,119	32,469	18.8	3.25	0.61
Preventable Hospital Stays	43.2	8,907	32,027	27.8	3.25	0.90
Single-Parent Household	0.33	19,035	31,608	60.2	3.25	1.96
Unemployment	0.04	7,541	32,451	23.2	3.25	0.76
Vehicle Access	0.087	25,807	32,549	79.3	3.25	2.58
Violent Crime	234.1	15,633	31,073	50.3	2.50	1.26
All-Cause Mortality	0.7	12,850	32,463	39.6	2.00	0.79

Measure	Measure Value (from Data Source)	Measure Rank	Number of Available Values	Percentile Rank	Measure Weight (%)	Weighted Measure
Unintentional Injury Mortality	36.8	8,225	32,469	25.3	2.00	0.51
Chlamydia	466.2	23,484	32,577	72.1	1.67	1.20
Physical Inactivity	21.7	12,471	32,470	38.4	1.67	0.64
Smoking	20.1	22,150	32,600	67.9	1.67	1.13
Asthma	9.4	19,275	32,600	59.1	1.50	0.89
Diabetes	0.064	4,936	32,463	15.2	1.50	0.23
Poor Mental Health	2.9	1,411	32,439	4.3	1.50	0.07
Poor or Fair Health	14.3	10,324	32,600	31.7	1.50	0.48

4. **Sum the weighted measures**: The ZIP Code's 24 weighted measures are summed together to get a total for the ZIP Code. For the hypothetical ZIP Code in Table 3, the sum of the weighted measures presented in the last column is 37.6. Similar to the percentile, the sum of weighted measures for a ZIP Code is between 0 and 100 with higher values indicating greater need. The vast majority (99%) of the ZIP Code sums fall between 19.8 and 78.8, necessitating the next and final step to calculate the ZIP Code UNS.

5. **Rescale the weighted sum to create the ZIP Code UNS:** To facilitate meaningful distinctions, the sum of the weighted measures from step 4 is rescaled to ensure the maximum UNS is 100 and the minimum UNS is 0. The sums of the weighted measures are concentrated between 19.8 and 78.8 across all ZIP Codes, which has a range of 59 (i.e., 78.8–19.8=59). To rescale so that the range is 0 to 100, 19.8 is first subtracted from the sum of the weighted measures (37.6–19.8=17.8). Next, the result is divided by the range, and multiplied by 100 ([17.8/59]×100). For the hypothetical ZIP Code in Table 3 where the sum of the weighted measures is 37.6, the rescaling step creates a ZIP Code UNS of 30.2.

   This rescaling is applied to the sum of the weighted measures for every ZIP Code. One percent of the ZIP Code weighted sums are either greater than 78.8 or less than 19.8. The sums that are greater than 78.8, are rescaled to 100. The sums that are less than 19.8 are rescaled to 0.

4.2 Service Area UNS

Service areas composed of multiple ZIP Codes are scored by computing a population-based weighted average of the Unmet Need Scores for the ZIP Codes in the service area. Table 4 provides example calculations for a hypothetical service area UNS. The steps are as follows:

1. **Calculate population-based weighted scores for the ZIP Codes in the service area**: For each ZIP Code in the service area, a population-based weight is calculated to account for how much the ZIP Code contributes to the total population in the service area. The weight is the percentage of the total service area population for that ZIP Code. In the example in Table 4, ZIP Code 1 accounts for 10,000 of the 50,000 people in the service area, so its population-based weight is 20%. To get the ZIP Code population-

based weighted UNS, multiply the ZIP Code UNS by the value for the population-based weight (i.e., 75.1×20%=15).

Table 4. Example Calculations for a Hypothetical Service Area UNS

ZIP Code	ZIP Code UNS	Population Size	Population-based Weight (%)	Population-based Weighted UNS
ZIP Code 1	75.1	10,000	20	15.0
ZIP Code 2	44.2	20,000	40	17.7
ZIP Code 3	61.7	20,000	40	24.7

2. **Sum the weighted Unmet Need Scores**: To calculate the service area UNS, each ZIP Code's population-based weighted UNS is summed. For the hypothetical service area in Table 4, the UNS is the sum of the weighted scores presented in the last column which is 57.4. Similar to the ZIP Code UNS, a service area UNS ranges from 0 to 100, with higher values indicating greater need.

4.3 Additional Notes on the UNS Methodology

Health Center Penetration: Health Center Penetration required modification to some of the values reported by the data source. ZIP Codes with health center patient counts meeting or exceeding the population below 200% of the FPL are treated as having a ratio of one, indicating the lowest level of need. This includes ZIP Codes in which the entire population is reported to be above 200% of the FPL.

Missing Data: Some ZIP Codes have missing data for certain measures. For these ZIP Codes, the sum of weighted measures is normalized by the total weight of the available measures. For example, if one measure is missing (e.g., Poor or Fair Health, which has a weight of 1.5%), the sum would be normalized by the remaining weight (98.5% in the case where Poor or Fair Health is missing). In effect, the weights for the available measures are increased proportionally so that the total weight across the measures is 100%. Note that missing data occurs infrequently; only 3% of U.S. ZIP Codes have more than one missing measure.

Unscored ZIP Codes: Not all ZIP Codes are scored. There are some ZIP Codes with 0 population according to the ACS, and these are not scored. In addition, there are some ZIP Codes whose population consists only of those living in group quarters, such as prisons, military bases, and university dormitories. For these ZIP Codes, critical measures are missing, including the fraction of the population Below 200% Federal Poverty Level and Health Center Penetration, so they cannot be scored. In total, less than 2% of the ZIP Codes are not scored.

Appendix A Establishing Measures and Evaluation Criteria

The development of the Service Area Needs Assessment Methodology (SANAM) and resulting Unmet Need Score (UNS) was initially informed by an environmental scan that sought to understand the Health Center Program's history and goals, the challenges with the Need for Assistance (NFA) worksheet, which was used in New Access Point (NAP) applications to assess service area need, and the impacts of these challenges during health center application completion, application review, and award of NAP funding. The environmental scan also evaluated other assessments of population health-related need to ascertain the extent to which the current methodology used by the Health Center Program aligns with methodological guidance from the scientific community and reports by authoritative organizations, such as the Agency for Healthcare Research and Quality (AHRQ), Centers for Disease Control and Prevention (CDC), National Academy of Medicine (formerly the Institute of Medicine [IOM]), National Committee for Quality Assurance, and the National Quality Forum (NQF).

The environmental scan identified six measure domains and 79 measures frequently used by other authoritative needs assessments and cited in the peer-reviewed literature, as well as in government and institutional reports and documents, as relevant to population health-related service area need. To develop a framework and set of measures appropriate for the Health Center Program, four formal objectives were established. The objectives were informed by a thorough review of the Health Center Program statute and requirements, as well as the objectives of quantitative needs assessments by organizations with similar programmatic goals and scope. These objectives, enumerated below, were also shaped by discussions with HRSA staff and leadership about the Health Center Program scope, goals, and priorities, and how the UNS would be used to inform decision making:

1. The UNS resulting from the SANAM should support resource allocation decisions that increase access to primary and preventive health care services among medically underserved populations.
2. The SANAM should prioritize measures that capture indicators of need that are most relevant to underserved populations, and that are most actionable to the Health Center Program.
3. The SANAM should use rigorous methods that reflect advancements in science and availability of new and wide-ranging geographic and population data.
4. The development process and measures used to calculate the UNS should be open and transparent to stakeholders.

Guided by these formal objectives as well as the research literature, a definition of service area need in the context of the Health Center Program statute and mandate was established. For the SANAM and UNS, need is defined as the relative disparities in population health status exhibited across health center service areas, as well as the upstream and downstream determinants that lead to disparate health outcomes. This definition of need particularly emphasizes the determinants that shape lack of access to primary and preventive health care and the disparities in health status and determinants that are especially relevant to Health Center Program populations and other underserved communities. As noted extensively in the research literature as well as in technical reports by authoritative bodies such as AHRQ, IOM, and NQF,

separating the concept of access into “dimensions” makes it possible to map measures to the definition of access most highly promoted by the public health community. Access accounts for the geographic, financial, educational, cultural, and linguistic characteristics of patients and providers that converge to facilitate or impede patients’ receipt of needed and timely quality care. For the development of the SANAM and UNS, the definition of access posited by Levesque et al. 2013 was used. This definition integrates and builds upon the aggregate body of well-regarded research on access, and is defined by the following dimensions:

Availability/Accommodation: ability to reach health care
Affordability: ability to pay for health care
Approachability: ability to identify health care services that address needs
Acceptability: ability to seek health care services based on social and cultural factors
Appropriateness: ability to receive timely quality health care (also termed “access outcome” or “realized access”)

A.1 The Conceptual Framework

Using the definition of need and guided by the latest research from the scientific community and recommendations from authoritative bodies, the social-ecological perspective was adopted to create a conceptual framework that identifies measure groups that are most important to estimating service area need while considering the Health Center Program statute and mandate. This conceptual framework is presented in Figure A-1. This framework is expected to guide future SANAM and UNS updates. However, the specific composition of measures is expected to shift based on changes in the public health research evidence base and data availability over time, such as availability of newly collected measures.

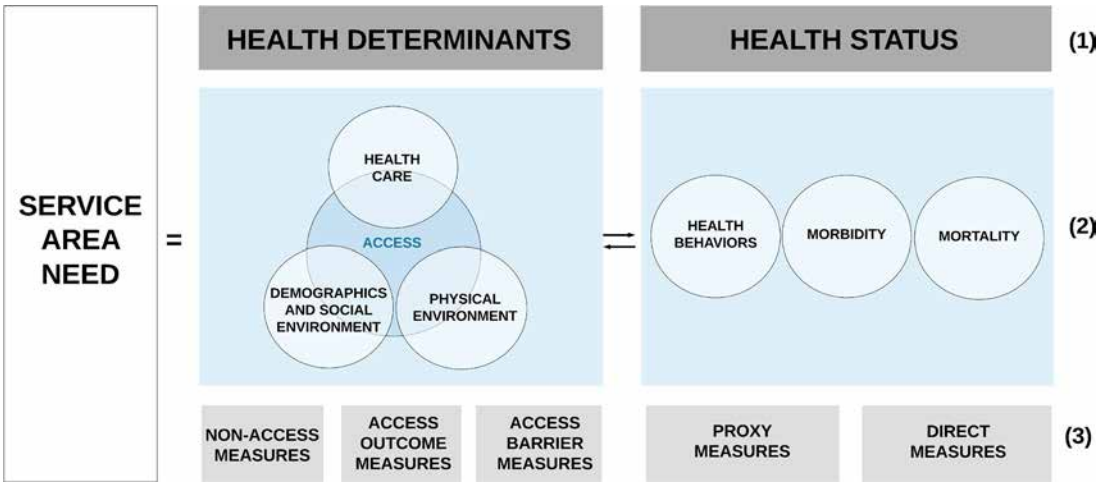

Figure A-1. Conceptual Framework for Definition of Need

The framework identifies the two primary measure categories (see (1) in Figure A-1) and measure domains (see (2) in Figure A-1) that are most commonly employed by needs assessments promoted by authoritative bodies and the research literature. Importantly, it also identifies the measure groups (see (3) in Figure A-1) that reflect the specific objectives and priorities of the Health Center Program.

The **health determinants measure category** captures upstream drivers of health status, including the social determinants of health and aspects of the physical environment. Of central importance to the Health Center Program, these measures indicate which service areas encounter more difficulty in accessing primary and preventive health care compared to other areas by accounting for factors that directly or indirectly impede access to care. Under the health determinants measure category, the **non-access measure group** captures information about factors that impact health outside the pathway of access to health care. The **access outcome measure group** captures retrospective information about health care utilization and the timeliness and quality of care received. The **access barrier measure group** captures information about characteristics of health care providers and health-seeking populations that have been demonstrated to impede timely access to care.

The **health status measure category** includes measures that indicate which service areas have worse health status relative to other areas by representing service areas' current morbidity and mortality rates, as well as the health behaviors that influence the future burden of morbidity and mortality. Here, the top causes of mortality and health care cost burden as well as their top risk factors are considered. Likewise, the key morbidity-shaping indicators of health status as well as their top risk factors are considered.

For health status, the framework considers both **direct** and **proxy measures**. Informed by the social-ecological model of health, the framework considers measures of socioeconomic status as indicating possible barriers to population access to care, while also serving as proxy measures of population health status.

Appendix B Selecting Specific Measures for the UNS

To arrive at the specific measures that are used to calculate the UNS, measure evaluation and selection criteria was established based on criteria for selecting health quality measures first published by NQF in 2016 (updated on a yearly basis), as well as guidance published in 2013 by the IOM. Using this guidance, the 79 candidate measures identified through the environmental scan were distilled to 26 key measures, after evaluating the extent to which the measures met the following five criteria:

> **Importance**: Measure is important to making gains in overall population health (e.g., represents top causes of mortality or reflects a high preventable burden based on financial cost, disability, or lifespan impacts), and is evidence-based.
>
> **Relevance and Usability**: Measure produces information that is meaningful, understandable, and useful for decision making, and there is robust evidence that actions on the measure influence disparities in population health or access to health care for underserved populations of concern to the Health Center Program. Measure must also be available for defined geographical areas with a strong preference for those available at or able to be extrapolated to the ZIP Code level.
>
> **Scientific Soundness**: Measure meets NQF endorsement or meets the criteria for acceptance as an indicator of health or access by frameworks in standard use (e.g., County Health Rankings), public health and provider organizations, and/or public health and quality reporting programs.
>
> **Feasibility**: Measure is captured without undue burden (e.g., via UDS Mapper), collected frequently enough to track changes over time, and updated at least every five years.
>
> **Harmonization and Parsimony**: When compared to other measures, measure makes a unique contribution to measuring (a) population access to health care and/or (b) current or future level of health, as determined by the research literature and correlation analyses.

Using various combinations of the 26 measures that best met the measure criteria, a number of preliminary SANAM prototypes were developed. The prototypes included between 4 and 24 measures. See Appendix C for more on the development, testing, and selection of the preliminary prototypes.

B.1 Assigning Weights to Measure Groups

The weights assigned to the individual measures used in the UNS calculation sum to 100. The total weight is divided among the measure groups based on the measures' importance to assessing need in the context of the Health Center Program statute and potential patient populations. Figure B-1 presents the weights allocated to the measure groups. Most of the weight is therefore allocated to measures that contribute to an assessment of access—the main measurement and improvement priority of the Health Center Program. Between the two groups of measures that evaluate access, the access barrier measure group is allocated more weight than the access outcome measure group due to the dual role some of the access barrier measures play in the framework. Six of the nine access barrier measures when combined form a robust indicator

of socioeconomic status, and these measures contribute to both an assessment of access and an indirect, or "proxy" assessment of health status (see Figure 1).

Figure B-1. Assignment of Weights to Measure Groups

Three measures used in the UNS calculation are particularly relevant to the Health Center Program: Health Center Penetration, Below 200% Federal Poverty Level (FPL), and Uninsured. Health Center Penetration is conceptualized as an access outcome measure, while the other two measures belong to the access barrier measure and proxy measure groups. These measures each performed better when compared to other measures within the same measure group on the degree to which each measure is (a) actionable to the Health Center Program, (b) relevant to the Health Center Program populations, and (c) substantiated in the literature or reinforced by authoritative assessments as a significant indicator of underserved populations' level of access to primary and preventive health care. Consequently, these measures have the most weight individually and as a group comprise 46.75% of the total weight.

Appendix C Prototype Testing and Selection

The SANAM that generates an UNS was designed to objectively capture aspects of need particularly relevant to the Health Center Program by synthesizing information from authoritative frameworks for assessing population health-related need. Prior to selecting the SANAM, several preliminary SANAM prototypes were developed and evaluated.

In the evaluation, the preliminary prototypes were compared to other reputable, independently crafted needs assessment instruments with similar goals, including the County Health Rankings, Health Professional Shortage Areas (HPSA), the Social Deprivation Index, and HRSA's Need for Assistance (NFA) worksheet that had been recently used to assess need for service areas proposed by applicants for NAP funding. The results of these evaluations indicate that the UNS values generated by the prototypes are significantly correlated with area-level scores from the County Health Rankings, Social Deprivation Index, and NFA ($p<0.05$). Furthermore, a ZIP Code within a HPSA designation tends to have a higher UNS than one outside for each of the prototypes. These results together validate that the prototypes' UNS values are measuring some of the same information measured by reputable, independently created assessments of area-level need. Evaluations also indicated that rural populations and recent applicants serving special populations are not disadvantaged by the UNS values generated by the prototypes under final consideration.

HRSA hosted three webinars to present the prototypes to health center stakeholders and solicited feedback on the prototypes during the comment periods. After considering feedback from webinar participants and HRSA staff and leadership, HRSA selected the holistic prototype that had 24 measures. HRSA also eliminated the provider availability measure and added a mental health measure to the prototype, resulting in the UNS described in this document.

Appendix D U.S. Territories and the Freely Associated States

The SANAM and UNS discussed above applies to the 50 States and the District of Columbia. This UNS is referred to as the "UNS for the States" in this appendix. The same conceptual framework and measure evaluation and selection criteria discussed above was used to design methodologies to generate scores for the U.S. Territories and the Freely Associated States. The effort led to the development of three UNS calculations for ZIP Codes in Puerto Rico, U.S. Territories excluding Puerto Rico, and the Freely Associated States. The UNS calculation for Puerto Rico uses 15 measures, while the UNS calculations for U.S. Territories excluding Puerto Rico and for the Freely Associated States use nine and eight measures, respectively.

D.1 Measures and Weight Assignment for Puerto Rico

Puerto Rico participates in several of the surveys that serve as data sources for the UNS for the States. These data sources were used in calculating the UNS for Puerto Rico. Other sources used by the UNS for the States did not provide information on Puerto Rico, therefore the corresponding measures were excluded. Figure D-1 displays the measures and weights for the Puerto Rico UNS calculation. These measures have the same definition and data sources described in Section 2 and 3.

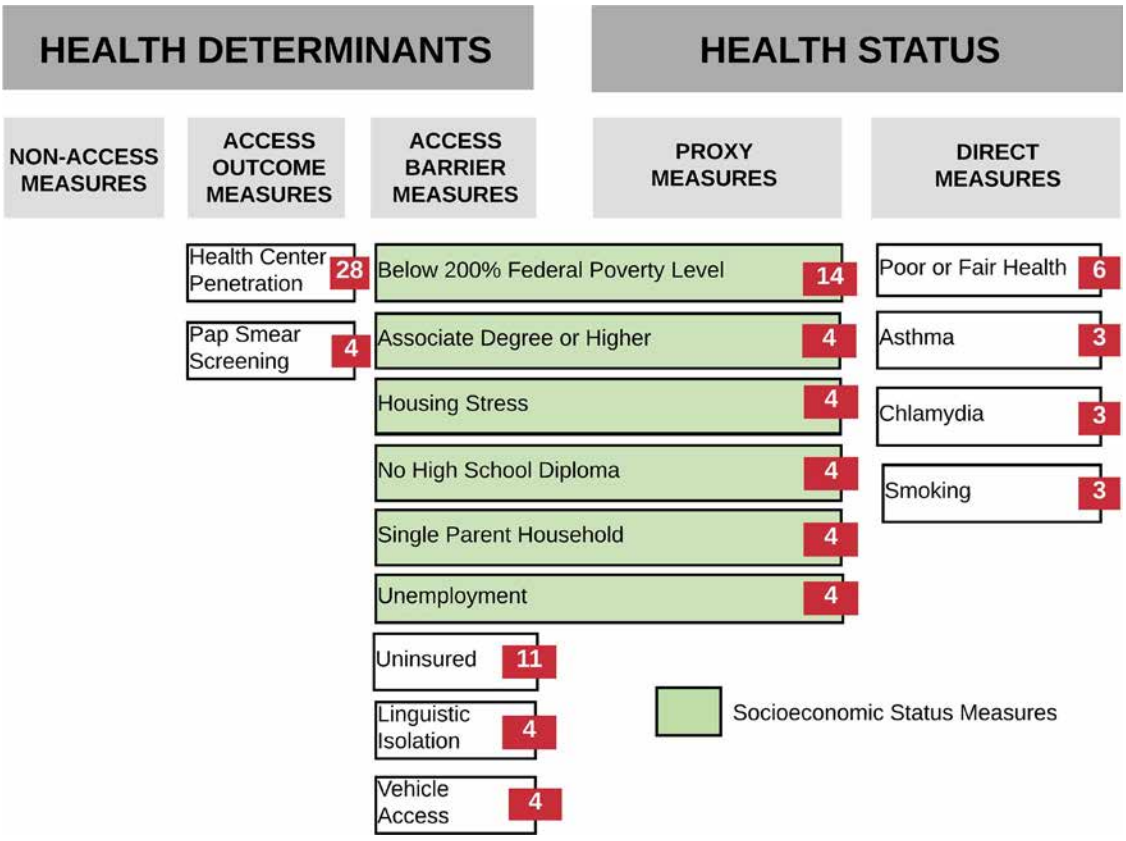

Figure D-1. The Measures and Measure Weights used in the UNS Calculation for Puerto Rico

D.2 Measures and Weight Assignment for U.S. Territories Excluding Puerto Rico and the Freely Associated States

The UNS calculation for U.S. Territories excluding Puerto Rico uses nine measures, while the calculation for the Freely Associated States uses eight measures. The difference is because of the inclusion of data from the U.S. Census on the fraction of the population without health insurance for the U.S. Territories excluding Puerto Rico. This data source is not available for the Freely Associated States. Figure D-2 and Figure D-3 display the measures and weights for the UNS calculations developed for the U.S. Territories excluding Puerto Rico and the Freely Associated States, respectively. Following the figures are definitions of the measures.

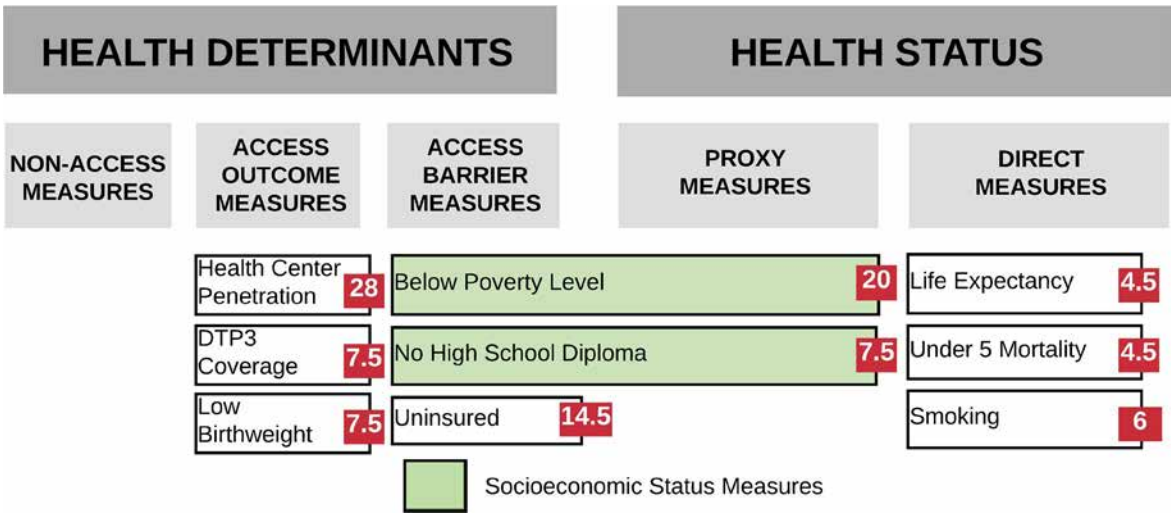

Figure D-2. The Measures and Measure Weights used in the UNS Calculation for U.S. Territories Excluding Puerto Rico

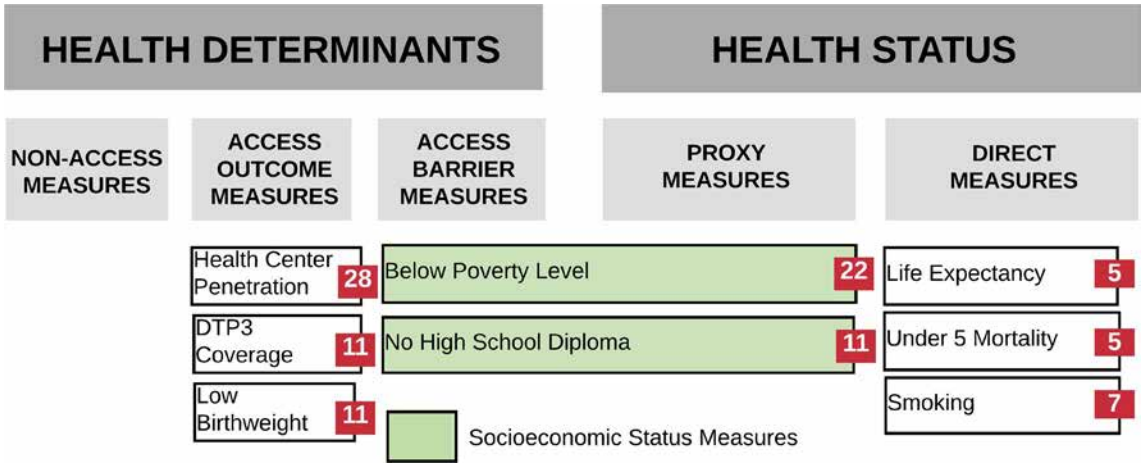

Figure D-3. The Measures and Measure Weights used in the UNS Calculation for the Freely Associated States

D.2.1 Access Outcome Measures

Health Center Penetration

The calculation of this measure follows the formula used in Section 2, which is the ratio of the population served by a health center to the population with household income below 200% of the FPL. The U.S. Census does not provide information on the percentage below 200% of the FPL for the Freely Associated States; therefore, the entire population of these nations rather than their low-income population is used as the denominator in calculating Health Center Penetration. Similar to the calculation for the UNS for the States, this measure carries the most weight, reflecting its importance in assessing need for health center services.

DTP3 Coverage (Diphtheria, Tetanus, and Pertussis Coverage)

This measure captures the percentage of children in an area who have received the third dose of the combined immunization for Diphtheria, Tetanus, and Pertussis (DTP3) by the age of 12 months. The World Health Organization (WHO) uses DTP3 coverage as an evaluation of how well nations are doing in providing routine immunization services. Also, the WHO views DTP3 as an indication of how well families are set up for other complementary immunization as the child grows. While this measure was not used in the UNS for the States calculation, it is an important upstream determinant of child health in global contexts.

Low Birthweight

This measure captures the fraction of babies born with birthweight below 2,500 grams or 5.5 pounds. Low birthweight usually results from preterm birth (which is the measure used for calculating the UNS for the States, but it is not available for these regions). Low birthweight can also result from poor fetal growth while in the uterus. Therefore, this measure provides an evaluation of the physical environment and access to health services for mothers and infants in a region. According to the WHO, low birthweight is associated with an increased likelihood of early death and inhibitions in physical and cognitive development, and it is an indicator of future health of the infant.

D.2.2 Access Barrier Measures and Proxy Measures of Health Status

Below Poverty Level

This measure captures the fraction of individuals living in households with income below the poverty level for each area. This measure is different from the one used to calculate the UNS for the States, which captured the fraction of the population below 200% of the FPL. For the U.S. Territories, information from the U.S. Census was used to calculate the measure. Each of the Freely Associated States has an individual designation of poverty level, which is primarily derived from country-specific Household Income and Expenditure Surveys. Similar to the UNS for the States calculation, this measure is allocated a higher weight.

No High School Diploma

This measure captures the fraction of the population without a high school education or equivalent by age 25. Educational attainment is a principal determinant of access to health care and population health status. It also contributes to a robust assessment of socioeconomic status. The data source used for the UNS for the States provided information on attainment of high school education or equivalent by age 18, but 25 was the lowest age for which data was available for all the U.S. Territories excluding Puerto Rico and the Freely Associated States.

Uninsured

This measure captures the fraction of the civilian non-institutionalized population without health insurance. Health insurance helps absorb some costs associated with seeking health care. Similar to the UNS for the States calculation, this measure is allocated higher weight. This measure is not included in the calculation of the UNS for the Freely Associated States.

D.2.3 Direct Measures of Health Status

Life Expectancy

The WHO defines this measure as the number of years people in a region are expected to live at birth. It reflects the mortality pattern across all age groups in a given year for the region. All regions use the same calculation in the definition of life expectancy at birth.

Under 5 Mortality

The WHO defines this measure as the probability of death before age 5 for a child born in a specified year, calculated as the rate per 1,000 live births and using the age-specific mortality rate for the specified year. This indicator captures the socioeconomic and environmental conditions for children in an area. About 90% of mortality before age 18 occurs before age 5.

Smoking

This measure captures the proportion of the adult population who report smoking tobacco on a daily or non-daily basis. Smoking is a major driver of morbidity and mortality, and it is implicated as one of the top five drivers of morbidity in the U.S. Territories excluding Puerto Rico and the Freely Associated States. For American Samoa and the Freely Associated States, data could only be obtained for adults between ages 25 and 64.

D.3 Data Sources for the UNS for the U.S. Territories Excluding Puerto Rico and the Freely Associated States

Obtaining data for the U.S. Territories excluding Puerto Rico and the Freely Associated States required additional data sources. Table D-1 displays these data sources, which were accessed in August 2018. The abbreviations used in this resource guide for the data sources are listed first, followed by a description of the source and web link to the source.

Table D-1. List of Data Sources for the U.S. Territories Excluding Puerto Rico and the Freely Associated States

Abbreviation	Description of Source	Link to Source
ADB	Asian Development Bank Basic 2018 Statistics	https://www.adb.org/publications/basic-statistics-2018
AS WHO	American Samoa World Health Organization Country Profile	http://hiip.wpro.who.int/portal/countryprofiles/AmericanSamoa.aspx
CDC ChildVax	Childhood Diphtheria toxoid, Tetanus toxoid, acellular Pertussis (DTaP) Vaccination Coverage Report	https://www.cdc.gov/vaccines/imz-managers/coverage/childvaxview/data-reports/dtap/reports/2016.html (Choose Download Report Data and see column corresponding to >=3 doses at age 13 months)
CDC Health	Health, United States, 2016	https://www.cdc.gov/nchs/data/hus/hus16.pdf (See Table 6)

Abbreviation	Description of Source	Link to Source
FM Census	Summary Analysis of Key Indicators from the 2010 FSM Census of Population and Housing	http://prism.spc.int/images/census_reports/FSM_2010_Census_Indicators_Final.pdf
FM Poverty	Poverty Profile of the Federated States of Micronesia (World Bank)	http://documents.worldbank.org/curated/en/629961528185586614/pdf/FSM-HIES-2013-Poverty-Assessment.pdf
FM WHO	Federated States of Micronesia WHO Country Profile	http://hiip.wpro.who.int/portal/countryprofiles/MicronesiaFederatedStatesof.aspx
GU WHO	Guam WHO Country Profile	http://hiip.wpro.who.int/portal/countryprofiles/Guam.aspx
HRSA UDS	HRSA UDS Data	No weblink
HUMDATA	Humanitarian Data Exchange	https://data.humdata.org/
MP WHO	Northern Marianas Islands WHO Country Profile	http://hiip.wpro.who.int/portal/countryprofiles/NorthernMarianaIslands.aspx
PW HIES	Palau Analysis of the 2006 Household Income and Expenditure Survey	https://www.palaugov.pw/wp-content/uploads/2015/01/Palau-Poverty-Analysis.pdf
PW WHO	Palau WHO Country Profile	http://hiip.wpro.who.int/portal/countryprofiles/Palau.aspx
PW ST	2017 Statistical Yearbook, Republic of Palau	http://palaugov.pw/wp-content/uploads/2018/07/2017-Statistical-Yearbook-Final.pdf
MH Census	The RMI 2011 Census of Population and Housing, Summary and Highlights Only	https://www.doi.gov/sites/doi.gov/files/migrated/oia/reports/upload/RMI-2011-Census-Summary-Report-on-Population-and-Housing.pdf
MH HIES	RMI Household Income & Expenditure Survey 2002 Basic Tables	http://catalog.ihsn.org/index.php/catalog/2191
MH WHO	Marshall Islands WHO Country Profile	http://hiip.wpro.who.int/portal/countryprofiles/Marshallislands.aspx
UDS Mapper	Uniform Data System (UDS) Mapper	https://www.udsmapper.org/ (See instructions in Section 3 of this guide)
US Census	2010 U.S. Census	https://factfinder.census.gov/faces/nav/jsf/pages/index.xhtml (use the Advanced Search option)
WHO NCD	World Health Organization NCD Risk Factor STEPS Report: Federated States of Micronesia	http://www.who.int/ncds/surveillance/steps/2006_STEPS_Report_Micronesia.pdf

Table D-2 lists the measures and corresponding data sources used in calculating the UNS for U.S. Territories excluding Puerto Rico and the Freely Associated States.

Table D-2. Data Sources by Measure for Each U.S. Territory and the Freely Associated States

Measure	American Samoa	Guam	Northern Mariana Islands	U.S. Virgin Islands	Marshall Islands	Federated States of Micronesia	Palau
Below Poverty Level	US Census	US Census	US Census	US Census	MH HIES	FM Poverty	PW HIES
DTP3 Coverage	AS WHO	CDC ChildVax	MP WHO	CDC ChildVax	MH WHO	FM WHO	PW WHO
Health Center Penetration	UDS Mapper	UDS Mapper	UDS Mapper	UDS Mapper	HRSA UDS, MH Census	HRSA UDS, FM Census	HRSA UDS, PW ST
Life Expectancy	AS WHO	GU WHO	MP WHO	HUMDATA	MH WHO	FM WHO	PW WHO
Low Birthweight	CDC Health	CDC Health	CDC Health	CDC Health	MH WHO	FM WHO	PW WHO
No High School Diploma	US Census	US Census	US Census	US Census	MH Census	FM Census	PW ST
Smoking	AS WHO	CDC BRFSS	MP WHO	CDC BRFSS	MH WHO	WHO NCD	PW WHO
Under 5 Mortality	AS WHO	GU WHO	MP WHO	HUMDATA	ADB	ADB	ADB
Uninsured	US Census	US Census	US Census	US Census	N/A	N/A	N/A

D.3.1 Information and Source of Data for U.S. Comparators

The calculation of the UNS for each area involves standardizing measure values using percentile ranks, and then weighting and summing the standardized measure values. The percentile ranks for the U.S. Territories excluding Puerto Rico and the Freely Associated States were computed relative to measure values for the United States. The sources of the U.S. measure values used in the percentile calculation are provided in Table D-3.

Table D-3. Data Sources for U.S. Comparators

Measure	Source	Link to source
Health Center Penetration	UDS Mapper	https://www.udsmapper.org
Below Poverty Level	American Community Survey	https://factfinder.census.gov/faces/nav/jsf/pages/index.xhtml
No High School Diploma (ages 25+)	American Community Survey	https://factfinder.census.gov/faces/nav/jsf/pages/index.xhtml
Uninsured	American Community Survey	https://factfinder.census.gov/faces/nav/jsf/ pages/index.xhtml
Low Birthweight	National Vital Statistics System	https://wonder.cdc.gov/natality-current.html

Measure	Source	Link to source
Life Expectancy	Institute for Health Metrics and Evaluation	http://ghdx.healthdata.org/record/united-states-life-expectancy-and-age-specific-mortality-risk-county-1980-2014
Under 5 Mortality	Institute for Health Metrics and Evaluation	http://ghdx.healthdata.org/record/united-states-life-expectancy-and-age-specific-mortality-risk-county-1980-2014
Smoking	Behavioral Risk Factor and Surveillance Survey	https://www.cdc.gov/brfss/brfssprevalence/
DTP3 Coverage	2016 Childhood Diphtheria toxoid, Tetanus toxoid, acellular Pertussis (DTaP) Vaccination Coverage Report	https://www.cdc.gov/vaccines/imz-managers/coverage/childvaxview/data-reports/dtap/reports/2016.html

Appendix E Bibliography

An evidence-based approach was used in developing the SANAM and UNS. At each step, the SANAM development relied on systematic reviews of the white, grey, and peer-reviewed literature. This bibliography lists the sources that most significantly informed the measure composition and weighting scheme used to calculate the UNS. Sources in the bibliography also informed the objectives and conceptual framework as well as the methodology used for measure evaluation and selection. The references in the bibliography are organized into three categories based on how they were utilized during the development process:

1) *Needs Assessment Methodology*: sources that informed the evidence-based methodology used in UNS calculations, including the structure of the conceptual framework and the procedure used to evaluate and select specific measures

2) *Health Determinants and Health Status Measurement*: sources that informed the health determinants and health status measures included in the UNS calculations and their corresponding weights

3) *Socioeconomic Measurement*: sources that informed the measurement of "socioeconomic" status and incorporation of the concept of social determinants of health given variability in practice and challenges of data feasibility when measuring these concepts in population health research

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Appendix F Acronyms

ACS	American Community Survey
AHRQ	Agency for Healthcare Research and Quality
BRFSS	Behavioral Risk Factor and Surveillance Survey
CDC	Centers for Disease Control and Prevention
CHAS	Comprehensive Housing Affordability Strategy
CHR	County Health Rankings
DTP3	Diphtheria, Tetanus, and Pertussis
FPL	Federal Poverty Level
HPSA	Health Professional Shortage Areas
HRSA	Health Resources and Services Administration
HUD	U.S. Department of Housing and Urban Development
IOM	Institute of Medicine
NAP	New Access Point
NCHHSTP	National Center for HIV/AIDS, Viral Hepatitis, STD, and TB Prevention
NFA	Need for Assistance
NQF	National Quality Forum
NVSS	National Vital Statistics System
SANAM	Service Area Needs Assessment Methodology
STI	Sexually Transmitted Infection
UDS	Uniform Data System
UNS	Unmet Need Score
WHO	World Health Organization
ZCTA	ZIP Code Tabulation Area