

Review and Evaluation of the Substance Abuse, Mental Health, and Homelessness Grant Formulas

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Preface

The 21st Century Cures Act requires the Secretary of Health and Human Services, through grant or contract or through an agreement with a third party, to conduct a study on the formulas for distributing funds to states under three block grant programs: (1) the Community Mental Health Services Block Grant, (2) the Substance Abuse Prevention and Treatment Block Grant, and (3) the Projects for Assistance in Transition from Homelessness program (21st Century Cures Act, 2016). The purpose of this project is to produce the studies required by Congress, which are intended to inform any recommended changes to the allotment formulas. This work was sponsored by the Office of the Assistant Secretary for Planning and Evaluation under contract No. HHSP-233201500038I, for which Judith Goldberg Dey serves as the contracting officer's representative. The research was conducted in RAND Health, a division of the RAND Corporation. A profile of RAND Health, abstracts of its publications, and ordering information can be found at www.rand.org/health.

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Summary

The 21st Century Cures Act requires the Secretary of Health and Human Services to conduct studies of the formulas for distributing funds to states under three block grants: (1) the Community Mental Health Services Block Grant (MHBG), (2) the Substance Abuse Prevention and Treatment Block Grant (SABG), and (3) the Projects for Assistance in Transition from Homelessness (PATH) program (21st Century Cures Act, 2016). These block grants are noncompetitive grants that provide state funding for services in each domain.

The statistical formulas for determining each state's share of funding under these grants have not been updated since 1992. There are questions in policy circles about whether the formulas are appropriate or need modification to reflect the changing landscape for mental health and substance abuse services and to make use of improved data.

This report presents the results of the congressionally mandated studies, which are intended to inform any recommended changes to the allotment formulas.

Background

The Alcohol, Drug Abuse and Mental Health Administration Reorganization Act of 1992 created the formulas that the federal government currently uses for distributing the MHBG and the SABG to states. In 2009, states received \$393 million through the MHBG, and this accounted for 1.1 percent of total state spending on mental health services, including the state share of Medicaid spending (Substance Abuse and Mental Health Services Administration [SAMHSA], 2013). States received \$1.3 billion through the SABG, and this accounted for 13.3 percent of total state spending on substance use services (SAMHSA, 2013). For fiscal year 2018, the total allotment for the states and territories for the MHBG increased to \$722 million, and the allotment for the SABG increased to \$1.7 billion. Each formula calculates state shares based on three components derived from state-level data: the size of the population needing services, the cost of services, and the state's fiscal capacity. The structure of these formulas reflects the concept of taxpayer equity—that is, the idea of equalizing the rates that taxpayers would have to pay to support a standard level of service across states (Burnam et al., 1997; U.S. General Accounting Office, 1992).

The PATH program, authorized by the Stewart B. McKinney Homeless Assistance Amendments Act of 1990, is a formula grant program that allocates an annual grant to states and territories to fund delivery of outreach and services to people with serious mental illnesses (including those with co-occurring substance use disorders) who experience or are at risk of homelessness. For fiscal year 2018, the total allotment to states and territories was \$64 million. The size of the urban population is used as an indicator of need for these types of services.

Study Approach

Our approach to the study was guided by the assumption that any change to the formulas should uphold the intent of the original legislation that created them. For the MHBG and SABG allotment formulas, this means that any revised formula should measure the three core components (population need, costs of services, and fiscal capacity) and relate these components to each other so as to preserve the taxpayer equity concept. For the PATH allotment formula, this means that any alternative formula should focus on measuring only population need.

There are other desirable characteristics that any alterations to the formulas should have. To be useful for determining annual allotments to states, the formulas require valid data that can be obtained annually, are recent, and are reliable for estimating inputs at the relevant level, such as state population or subpopulation. Stability of allocations from year to year is also desirable, to avoid large and unpredictable changes for states. The formulas should remain transparent to stakeholders. Finally, consistent with the underlying structure of the formulas, the inputs should be reasonably independent of other state policies or programs that address the formula subjects and are influenced by state choices.

Our evaluation had four main tasks: (1) conducting an environmental scan that examines literature on each of the formula's components and searches for nationally representative data sources not available during the formula's creation, (2) convening a technical advisory group panel of federal experts and additional stakeholders to consult with throughout the study, (3) developing an analytic plan to evaluate the current formulas and alternatives, informed by the results of tasks 1 and 2, and (4) evaluating the current formulas and proposed revisions of them.

The Current Formulas

The current MHBG and SABG formulas have three components: population need, cost of service delivery, and state fiscal capacity. The PATH formula has only a single component: population need. For each block grant, a score is computed for each state, and the state receives a share of the total funds available through the block grant based on its score.

The current MHBG and SABG formulas both use a cost index designed to reflect state variations in the inputs or resources required to deliver services. The cost index is based on a 1990 report (Pope, 1990) and includes three components: state-level costs of labor (currently measured as median hourly wages for occupations involved in providing mental health and substance abuse treatment services), rent ("fair market" apartment rental prices), and other supplies (assumed to be constant across states). The current MHBG and SABG allocation formulas also use the annual estimates of states' total taxable resources (TTR) from the U.S. Department of the Treasury as an indicator of state fiscal capacity.

The MHBG and SABG formulas combine an estimate of the quantity of services that need to be funded in the state, an estimate of the costs of providing those services in the state, and an estimate of the state's ability to fund services through other mechanisms to compute each state's

funding score. The programs' formulas differ only on how to compute population need (e.g., the quantity of services that need to be funded in the state). The current SABG formula uses weights in its calculation of population need to reflect what was believed to be higher need among young adults and those living in urban areas. The MHBG formula estimates population need based on weights given to the number of people in different age groups to reflect higher risk for mental disorders for certain ages. The weights used for the population need indicator in the SABG and MHBG are based on a 1986 Institute for Health and Aging (IHA) study (IHA, 1986). Both also rely on annual state population counts by age and, in the case of the SABG, urban status counts from U.S. Census Bureau data. These counts are weighted according to the formula to estimate the level of need. The formulas rely on this indirect estimate of the level of need instead of direct estimates provided by survey data.

The PATH formula is simpler. It is based only on an indicator of population need and does not take into account costs of services or state fiscal capacity. In total dollars, the PATH grant program is much smaller than the other two block grants, so a simpler allotment formula may be appropriate. The current formula for PATH defines need based on the state's proportion of the U.S. urban population, which, like the other block grant formulas, relies on the annual U.S. Census Bureau estimates of the size of a state's population that is living in urban areas. Exclusion of the rural population from this indicator of need likely reflects the view that homelessness is largely an issue faced in urban areas (Link et al., 1994).

All three formulas have a minimum allotment so that each state and territory is guaranteed a minimum amount of funding each year. The minimum allocation for the MHBG program is the amount received by the state in fiscal year 1998 (territories are subject to different minimum allotment rules). The minimum allotment rules for the SABG are more complex and based on each state's prior year allotment. The PATH program minimum allotments are \$300,000 for states, the District of Columbia, and Puerto Rico and \$50,000 for other territories.

Alternative Formulas

We explored two types of alternatives to the current formulas, drawing on input from the environmental scan and our technical advisory group. The first type of change is an update to the existing formulas that modifies individual components or data sources but retains the current structure and population focus. For example, we explored potential updates to the weights applied to current adult age categories for the MHBG need formula and explored using a different source of data to estimate how labor, rents, and other costs should be relatively weighted in the cost index. The second type of change explored revisions to the structure of the formula or to the population focus.

The current allotments served as the baseline allotments against which we compared potential changes. We then calculated the following indicators of change:

1. the total percentage of funds that are reallocated among states
2. the number of states whose allotments change and the total amount and direction of change for each state
3. the magnitude and direction of change per person in each state.

We calculated changes in allotments that resulted from changes in individual components of the formula, as well as changes in allotments once all alternatives to formula components were considered together. All of the changes were evaluated with this approach.

Changes to the Cost of Services Indicators

Both the MHBG and SABG programs currently rely on the Cost of Services Index (COSI). The COSI formula and weights are based on generic costs to deliver health care. Changes in the delivery system for mental health and substance use services raise the question of whether more-specific costs should be incorporated in the formulas and whether the existing weights across labor, rents, and other costs, such as supplies, accurately reflect current service delivery patterns.

Changes to Population Need Indicators

The current MHBG and SABG formulas focus on need among all adults in the state, while the current PATH formula focuses on need among all urban residents in the state. Currently, the level of need for the MHBG and SABG formulas is estimated by a formula that applies weights to counts of people in different groups, as determined from census data for adults in each state.

We refer to this method as an indirect method for estimating need because it estimates the level of need for a state indirectly through other variables that are associated with need, such as age or urban status. When the formulas were originally developed, there were no reliable sources of data that could provide direct estimates of state-level need. However, currently available survey data, such as the National Survey on Drug Use and Health (NSDUH), allow us to directly estimate the level of need among adults as currently defined in the MHBG and SABG formulas in each state because the surveys are designed to provide reliable state-level estimates. For the PATH formula, there are no sources of reliable state-level estimates of the number of persons who experience serious mental illness and are also homeless, so we used point-in-time estimates of the size of the homeless population in each state that are collected by the U.S. Department of Housing and Urban Development (HUD) as the best indicator of risk of homelessness for those with serious mental illness. We developed both indirect and direct alternatives for assessing state population need for the PATH formula.

Fiscal Capacity

We did not identify any alternative measures of fiscal capacity that we deemed to be better than TTR currently in use and therefore did not consider alternatives to the TTR in the MHBG and SABG allocation formulas.

Results: Effects of Changes to the Cost of Service Index

We evaluated one potential change to the cost element of the MHBG and SABG formulas, using an alternative data source to update the relative weighting of the components of the index. We used the Service Annual Survey (SAS) to estimate the relative contribution of wages, rent, and supplies to the cost of providing mental health and substance abuse treatment services. The SAS provides detailed information on expenses of different types for different industries (North American Industry Classification System code). We aggregated the detailed expense types into four categories that roughly match up to weights in the current formula: labor costs (wages), facility costs (rent), supplies, and other (Figure S.1).

First, we combined the supplies and other categories together and estimated the proportions for wages, rent, and the combined supply/other category. Second, we excluded the other category from the both the numerator and the denominator and calculated proportions for wages, rent, and supplies. We estimated the proportions annually from 2013 to 2016 to see how stable they were from year to year. Finally, we simulated the impact of using the weights derived from the SAS in place of the current weights in the COSI formula.

Figure S.1. Relative Contribution of Expenses by Category for Outpatient Care Centers

Current Formula:	Cost of Services =	75%	* Wages +	15%	* Rent +	10%	* Supplies/Other
Analysis from the 2013-2016 Service Annual Survey data:		Percentage of total expenses					
Outpatient Care Centers	Category	2013	2014	2015	2016		
Combine Supplies and Other	Wages	55%	55%	54%	53%		
	Rent	6%	6%	5%	5%		
	Supplies/Other	36%	37%	41%	41%		
Drop Other	Wages	72%	72%	69%	68%		
	Rent	7%	7%	7%	7%		
	Supplies	21%	21%	24%	25%		

Across both of the methods we used to estimate the weights from the SAS data, we saw reductions in the proportion of expenses attributed to wages and rent and substantial increases in the proportion of expenses attributed to supplies relative to the current formula (see Table S.1). When the supplies and other categories are combined, wages account for approximately 55 percent of expenses, rent accounts for 5 percent, and supplies/other account for 40 percent. From 2013 to 2016, the proportions are relatively stable, increasing or decreasing by only a few percentage points (Figure S.1).

Table S.1. Impacts of Changes to Cost of Service Index (without current minimum limits, compared with current scenario without minimum limits)

Change	% of Fund Reallocated	# States		\$ Decrease		% Decrease		\$ per Person Decrease	
		with Decrease	with >5% Decrease	Largest	Median	Largest	Median	Largest	Median
SABG									
1. Average weights: supplies/other category combined	1.16%	26	4	\$5.8M	\$0.3M	7.2%	1.7%	\$0.43	\$0.10
2. Average weights: drop other	0.65%	31	1	\$3.5M	\$0.0M	5.3%	0.0%	\$0.31	\$0.00
MHBG									
1. Average weights: supplies/other category combined	1.17%	26	3	\$1.8M	\$0.1M	7.3%	1.8%	\$0.13	\$0.03
2. Average weights: drop other	0.65%	32	1	\$1.0M	\$0.0M	5.3%	0.0%	\$0.09	\$0.00

Results: Effects of Changes to Population Need Indicators in MHBG Formula

We examined five scenarios involving potential changes to the population need indicators in the MHBG formula.

- In Scenario 1, each state is weighted simply by its total population, without consideration of any population characteristics. This scenario represents the simplest allotment rule and allows us to examine the impact of adopting a more basic allotment rule.
- In Scenario 2, we updated the current allocation formula with new weights based on recent data from the NSDUH. The terms of the formula were not changed. This scenario allowed us to assess the impact of using weights for age groups that are more robust methodologically and more current than the weights used in the existing formula.
- In Scenario 3, we added a new term to the formula to represent the population under age 18. This population was weighted based on information about the prevalence of serious emotional disturbance (SED) among children age 4 to 17. This scenario allowed us to examine the impact of considering need among children in the formula.
- In Scenario 4, we added additional predictors of mental health need to the allocation formula. The predictors we added, based on the environmental scan, were age and educational attainment. This scenario allowed to examine the impact of updating these demographic indicators and their weights to measure state population need. The new indicators and weights are based on statistical models predicting the probability of serious mental illness (SMI) among adults.

- In Scenario 5, we used direct estimates of the prevalence of SMI in each state, based on the NSDUH. Estimates of the prevalence of SMI for each state were available from the NSDUH using the online data analysis tool. This scenario allowed us to examine the impact of using direct rather than indirect estimates of population need for a state.

As shown in Table S.2, across the five scenarios, the first four would result in relatively small shifts in allotments when compared with the current formula. Of the first four scenarios, the fourth is arguably the most accurate because it takes into account the prevalence of SED among children, as well as updated demographic indicators and weights predicting the prevalence of SMI among adults. The fifth scenario uses national survey data designed to directly estimate the prevalence of SMI among adults for each state and therefore uses the best available data on state-level rates of SMI rather than using indirect demographic predictors. From a measurement perspective, this is the best alternative for measuring population need, but it also results in the greatest changes in allotments relative to the current formula.

Table S.2. Summary of Impacts of Changes to MHBG Population Need Index for Scenarios 1–5 (without current minimum limits, compared with current scenario without minimum limits)

Change	% of Fund Reallocated	# States		\$ Decrease		% Decrease		\$ per Person Decrease	
		with Decrease	with >5% Decrease	Largest	Median	Largest	Median	Largest	Median
Indirect methods for estimating need									
Scenario 1. Total state population	0.98%	21	1	\$1.3M	\$0.1M	21.4%	1.6%	\$0.39	\$0.02
Altering age weights									
Scenario 2. Update prevalence of SMI	0.57%	26	0	\$1.4M	\$0.0M	4.1%	1.0%	\$0.07	\$0.02
Scenario 3. Add weights for SED	1.12%	28	3	\$2.3M	\$0.1M	9.1%	2.0%	\$0.17	\$0.03
Altering prediction model									
Scenario 4. Add additional predictors	1.14%	17	3	\$1.8M	\$0.2M	19.3%	2.0%	\$0.35	\$0.03
Direct methods for estimating need									
Scenario 5. NSDUH state-level estimates	13.30%	21	18	\$22.5M	\$1.3M	50.0%	22.6%	\$0.81	\$0.30

Results: Combining Cost of Service and Population Need Changes to MHBG Formula

We explored two scenarios that combined changes to the need and cost components of the MHBG formula.

- Combined MHBG Scenario 1: New indirect estimate of combined adult and youth need (Need Scenario 4) and new estimate of COSI based on weights from outpatient care centers
- Combined MHBG Scenario 2: Direct estimate of adult need (Need Scenario 5) and new estimate of COSI based on weights from outpatient care centers.

We evaluated the impact of adopting each of these combined scenarios on state allotments in the same way that we evaluated the impact of the individual changes.

In Table S.3, we summarize the impact of the combined scenarios on state allotments. The first three rows repeat the individual changes, and the last two summarize the impact for the combined scenarios. The combined indirect scenario resulted in a reallocation of 1.8 percent of funds, compared with the 1.14 percent reallocation of the indirect need scenario by itself. Even though less than 2 percent of the total program funding would shift across states under the combined indirect scenario, nine states would experience decreases in their funding of 5 percent or more under this scenario. The largest decrease would be \$2.4 million, though the median decrease was low (about \$100,000).

For the combined direct scenario, updating both the COSI and the population need component resulted in a reallocation of 13.6 percent, compared with 13.3 percent for the direct population need component alone. Adding the COSI update did not produce a substantial change in allotments beyond the shifts that were due to using direct measures of population need. In both cases, there would be fairly large reallocations, with 18 states experiencing a 5 percent or greater decrease in their funding. The largest loss any state would experience would be 81 cents per person (median 30 cents).

Table S.3. Summary of Impacts to MHBG Combined Scenarios

Change	% of Fund Reallocated	# States		\$ Decrease		% Decrease		\$ per Person Decrease	
		with Decrease	with >5% Decrease	Largest	Median	Largest	Median	Largest	Median
Population need for MHBG									
Scenario 4. Indirect scenario	1.14%	17	3	\$1.8M	\$0.2M	19.3%	2.0%	\$0.35	\$0.03
Scenario 5. Direct scenario	13.30%	21	18	\$22.5M	\$1.3M	50.0%	22.6%	\$0.81	\$0.30
COSI for MHBG									
Scenario 1. Average weights: supplies/other category combined	1.17%	26	3	\$1.8M	\$0.1M	7.3%	1.8%	\$0.13	\$0.03
Combined scenarios for MHBG									
Combined Scenario 1. Indirect estimate of need + COSI with supplies and other	1.80%	25	9	\$2.4M	\$0.1M	14.8%	3.3%	\$0.27	\$0.06
Combined Scenario 2. Direct estimate of need + COSI with supplies and other	13.62%	21	18	\$22.6M	\$1.3M	50.3%	22.9%	\$0.81	\$0.30

Results: Effects of Changes to Population Need Indicators in SABG Formula

We examined five scenarios involving potential changes to the population need indicators in the SABG formula.

- In Scenario 1, each state was weighted simply by its total population, without consideration of any population characteristics. This scenario represents the simplest allotment rule and allows us to examine the impact of adopting a more basic allotment rule.
- In Scenario 2, we calculated adult treatment need differently, using data from the 2016 NSDUH. This scenario demonstrates the potential for including a broader range of indicators for adult treatment need in the SABG formula.
- In Scenario 3, we added revised youth treatment to the adult treatment need indicator developed in Scenario 2. This scenario demonstrates the impact of adding indicators for state variation in youth treatment need.
- In Scenario 4, we developed a direct estimate of adults with substance use disorders from the 2016 NSDUH. This scenario demonstrates the impact of shifting from an indirect to a direct approach to measure state-level treatment need.
- In Scenario 5, we added direct estimates of substance use disorders among youth to those among adults, again using state-level data from the 2016 NSDUH. This scenario allowed us to examine the impact of using direct rather than indirect estimates of population need for a state.

To analyze the impact of these alternative ways of measuring population need on the allocation of SABG funds, we did not apply the current statutory minimum allotment rules to the current formula or any of the alternatives. The SABG minimum allotment rules constrain the distribution of funding to the states, so the impacts of any other changes could not be observed if minimum allotment rules were applied. Results of this analysis appear in Table S.4.

Table S.4. Summary of Impacts of Changes to SABG Population Need Index for Scenarios 1–5 (without current minimum limits, compared with current scenario without minimum limits)

Change	% of Fund Reallocated	# States		\$ Decrease		% Decrease		\$ per Person Decrease	
		with Decrease	with >5% Decrease	Largest	Median	Largest	Median	Largest	Median
Scenario 0. Current allotment with no minimums	3.23%	24	13	\$12.4M	\$2.1M	65.2%	6.3%	\$6.22	\$0.32
Indirect methods for estimating need									
Scenario 1. Total state population	3.35%	15	9	\$23.9M	\$1.8M	33.6%	6.7%	\$2.41	\$0.33
Adult treatment need									
Scenario 2. Add additional predictors	4.73%	16	11	\$31.0M	\$2.6M	25.5%	6.8%	\$1.83	\$0.42
Add youth treatment need									
Scenario 3. Add youth treatment need	4.46%	17	12	\$29.3M	\$2.1M	31.8%	6.4%	\$2.28	\$0.38
Direct methods for estimating need									
Scenario 4. NSDUH state-level adult treatment need estimates	9.15%	19	17	\$51.4M	\$4.4M	59.3%	16.4%	\$3.65	\$0.77
Scenario 5. NSDUH state-level adult and youth treatment need estimates	8.65%	19	15	\$46.7M	\$3.6M	57.3%	17.0%	\$3.53	\$0.80

Updating the SABG population need indicator using the indirect method—which relies on weighting census-based demographic groups in each state by the national probability of having a substance use disorder within each group—results in smaller reallocation of funds than if direct state-level NSDUH estimates of prevalence of substance use disorder are used. For both indirect and direct measures, even though the percentage of total funding that shifts is not dramatic (less than 9 percent in the most extreme case, with a median decrease of 16.4 percent), some states would experience dramatic shifts in funding. This result can be partially explained by the high weight that the current formula places on the urban population. Even the first scenario, which is based on a simple population count, resulted in big shifts from the current formula, showing the large impact of the current formula’s heavy weighting of urban young adults.

Because recent NSDUH data do not show higher risk for substance use disorders in urban populations and, in fact, indicate slightly lower risk in urban populations, reallocations are large for some states. Updating the population need component of the SABG formula using either the indirect or direct method will require consideration of strategies to buffer states from dramatic losses in their funding.

Results: Combining Cost of Service and Population Need Changes to SABG Formula

We explored two scenarios that combine changes to the need and cost components of the SABG formula. For the cost component, we selected the same scenario that we selected for the MHBG combined scenarios, which includes the new weights based on the outpatient care centers. We again selected two different estimates of need. The first is the indirect estimate of need that combines the estimated adult need from the model with additional predictors of the youth need (Need Scenario 3). The second is the direct estimate of adult need (Need Scenario 5).

- Combined SABG Scenario 1: New indirect estimate of combined adult and youth need (Need Scenario 3) and new estimate of COSI based on weights from outpatient care centers
- Combined SABG Scenario 2: Direct estimate of adult need (Need Scenario 5) and new estimate of COSI based on weights from outpatient care centers.

We evaluated the impact of adopting each of these combined scenarios on state allotments in the same way that we evaluated the impact of the individual changes. We then calculated the costs and time associated with each scenario under the hold-harmless options described at the end of this Summary.

Table S.5 summarizes the impact of the combined scenarios on state allotments. The first three sets of results repeat the analysis of the individual scenarios, with and without minimums, and the last two sets summarize the impact of the combined scenarios. Updating the COSI in addition to the population need indicator does not result in large changes to the reallocation of funds when compared with updating only the population need index. The most accurate and complete alternative, which both updates the COSI and uses direct population need estimates, would reallocate 8.61 percent of total funds (assuming that the current minimum allotment rules are removed). Seventeen states would see a decrease of 5 percent or more in their allotment.

Table S.5. Summary of Impacts of Changes to SABG Combined Scenarios

Change	% of Fund Reallocated	# States		\$ Decrease		% Decrease		\$ per Person Decrease	
		with Decrease	with >5% Decrease	Largest	Median	Largest	Median	Largest	Median
Population need for SABG									
Scenario 3. Indirect scenario									
a. Does not include minimums	4.46%	17	12	\$29.3M	\$2.1M	31.8%	6.4%	\$2.28	\$0.38
b. Includes minimums	0.34%	3	2	\$3.3M	\$2.4M	7.7%	7.6%	\$0.48	\$0.43
Scenario 5. Direct scenario									
a. Does not include minimums	8.65%	19	15	\$46.7M	\$3.6M	57.3%	17.0%	\$3.53	\$0.80
b. Includes minimums	0.34%	3	2	\$3.3M	\$2.4M	7.7%	7.6%	\$0.48	\$0.43
COSI for SABG									
Scenario 1. Average weights: Supplies/other category combined									
a. Does not include minimums	1.16%	26	4	\$5.8M	\$0.3M	7.2%	1.7%	\$0.43	\$0.10
b. Includes minimums	0.08%	3	0	\$0.7M	\$0.5M	2.3%	2.2%	\$0.13	\$0.12
Combined scenarios for SABG									
Combined Scenario 1. Indirect estimate of need + COSI with supplies and other									
a. Does not include minimums	4.84%	17	12	\$27.4M	\$2.3M	35.5%	9.2%	\$2.55	\$0.53
b. Includes minimums	0.36%	4	2	\$3.3M	\$1.3M	7.7%	4.5%	\$0.48	\$0.25
Combined Scenario 2. Direct estimate of need + COSI with supplies and other									
a. Does not include minimums	8.61%	20	17	\$47.3M	\$3.8M	55.8%	13.1%	\$3.44	\$0.59
b. Includes minimums	0.34%	3	2	\$3.3M	\$2.4M	7.7%	7.6%	\$0.48	\$0.43

Existing minimum allotment rules for the SABG funds continue to exert a strong influence on the distribution of funds and greatly limit the extent to which any updated inputs or changes to the formula can impact distributions to states. This is different from the MHBG, where

simpler minimum allotment rules no longer influence distributions. While the direct method of estimating state population need would result in a somewhat larger reallocation of funds than the indirect method when the minimum allotment rules are relaxed, when combined with updates to the COSI, the total shifts in allotments are modest (8.61 percent for the direct method and 4.84 percent for the indirect).

As with the MHBG, the direct method is preferable because it more accurately measures state differences in population need. The ongoing NSDUH survey provides state-level estimates of youth in need of services, as well as adults. We initially defined and analyzed separate indicators for prevention and treatment need, but our analyses showed that a single indicator based on the prevalence of substance use disorders was sufficient to represent both prevention and treatment need, and so our results focus on the simpler definition of need.

PATH

We followed the same approach to make adjustments to the original need formula for PATH that includes the urbanized population. To develop potential alternative indicators of state need, we considered the indirect approach and examined potential census-based predictors of state-level population risk for homelessness. Specifically, we examined adding to the need component of the PATH formula (1) the vacancy rate and (2) the ratio of median rents to median household income. We also evaluated the impact of using the HUD point-in-time estimates as direct estimates of homelessness. We examined three scenarios:

- The first scenario weighted each state by its population size, representing a simple approach to allocation.
- The second scenario updated the weights to include additional need indicators.
- The third scenario used direct estimates of need based on HUD data.

Table S.6. Summary of Impacts of Changes to PATH Population Need Index (without current minimum limits)

Change	% of Fund Reallocated	# States		\$ Decrease		% Decrease		\$ per Person Decrease	
		with Decrease	with >5% Decrease	Largest	Median	Largest	Median	Largest	Median
Indirect methods for estimating need									
Scenario 1.									
Total state population	8.99%	17	14	\$1.8M	\$0.2M	31.0%	14.7%	\$0.08	\$0.03
Scenario 2.									
Add ratio of rents to income	12.65%	18	16	\$1.5M	\$0.2M	54.1%	19.5%	\$0.10	\$0.04
Direct methods for estimating need									
Scenario 3.									
HUD homeless counts	25.57%	33	31	\$2.6M	\$0.3M	57.8%	35.4%	\$0.16	\$0.06

Improving the PATH population need indicator, whether by using an indirect or a direct method for measuring state population risk for homelessness, would result in large shifts relative to the current formula: Approximately 13 percent of program funding (under Scenario 2) or 26 percent of program funding (under Scenario 3) would be redistributed across states. As with the MHBG and SABG population need indicators, the direct method is preferable because it uses the best-available, directly collected information on the risk of homelessness by state. Another advantage to the direct method is that point-in-time counts of homeless individuals are collected for states and for all but one of the territories, whereas one of the indirect indicators, a measure of housing affordability, is not available for territories.

Conclusions and Recommendations

We concluded that the formulas for all of the block grant programs we examined—MHBG, SABG, and PATH—can be revised to improve their accuracy. Specifically, the cost of services indicators would benefit from revised weighting based on current cost patterns, and population need indicators can draw on the best available data sources that directly measure need.

Cost of Service Index

Current weights used to apportion the components of the COSI are out of date and can be improved to reflect current patterns of costs for outpatient services. These cost patterns have been stable over the past several years, so we would not expect new weights to become outdated in the near future. Another way that weights could be improved in the future would be to analyze cost patterns specific to mental health and substance abuse outpatient services; these data are collected, but they were not available to us at that level of detail for the purposes of this study.

Recommendations for the MHBG and SABG Cost Formula

- Update weights for the cost components of the COSI, weighting labor at 0.55, rent at 0.05, and other costs at 0.40.
- Review best available data on costs of services every five years to allow weights to be updated to reflect recent cost patterns.

Community Mental Health Block Grant Allotment Formula

Current minimum allotment rules for the MHBG, established in 1998, no longer have any impact on distributions to states. If Congress updates the allotment formula, these rules could be dropped with no foreseeable consequence. Improvements could be made in the population need indicator for the MHBG formula to better align with the best available data on population need for mental health services. Making these changes, including changes in the COSI, as described above, would result in sizable shifts in allotments across states. Congress may wish to consider making new hold-harmless rules that take effect simultaneously with changes to the formula.

These could also apply to the SABG and PATH grant programs, so they are discussed in a later subsection.

The population need indicator can be improved by using national survey data that assess the prevalence of adults with SMI and children with SED. When we used current survey data to establish new weights for age and education groups and then applied these weights to state populations using U.S. Census Bureau data, similar to the way that the current formula measures population need, the distribution of funds changed, but not dramatically. Using this approach, only 1.41 percent of total grant funds would be shifted. This “indirect” method has the advantage of producing state allotments that are similar to what states have come to expect. But this option has some disadvantages. First, these new weights could become outdated in the future if sociodemographic predictors of illness change, requiring new analyses to establish updated weights. Second, and more important, sociodemographic predictors of prevalence of mental illness will never be as accurate as the directly measured prevalence of illness in each state, as illustrated by relatively poor concordance between demographic model predictions of directly measured treatment need.

Both of these disadvantages can be overcome if the population need indicator directly employs state-by-state measures of prevalence of adults with SMI that are already generated by SAMHSA from the annual NSDUH survey data. When we used this “direct” method to measure adult population need and incorporated need among children using national prevalence estimates (because relevant data for children do not exist at the state level), the improved formula resulted in greater changes to state allotments, with 13.30 percent of total funds being shifted. Adding recommended changes to the COSI, along with the direct estimates of population need, results in a shift of 13.62 percent of total funds.

We recommend the direct method over the indirect method because it is a more accurate measure of population need for treatment and because it can be annually updated for each state. The NSDUH survey, which was not available when the formula was originally designed, is a valuable national surveillance system and is well designed to support national and state population need assessment.

Recommendations for the MHBG Formula

- Remove the current minimum allotment rule. Although it no longer affects the current allotments, it is outdated and should be eliminated or revised if changes are made to the formula.
- Update the population need indicator to use direct measures of prevalence of adults with SMI; these are available annually for each state and the District of Columbia from SAMHSA’s analyses of the NSDUH. For states and the District of Columbia, add a population need indicator for SED among children as 3.6 percent of children ages 5–17. Consider improving the precision and stability of state-level estimates of

adults with treatment need by using four years of NSDUH survey data instead of the two-year estimates currently reported by SAMHSA.

- For territories, where direct measures of adults with SMI are not available, use indirect estimates based on counts of people in various age and education categories: 3.6 percent of children ages 5–17, 5.3 percent of adults ages 18–49 with a high school education or less, 7.3 percent of adults ages 18–49 with some college education, 4.0 percent of adults ages 18–49 with a college degree or higher, 3.9 percent of adults ages 50–64 with a high school education or less; 5.4 percent of adults ages 50–64 with some college education; 3.0 percent of adults ages 50–64 with a college degree or higher; 1.1 percent of adults ages 65 and above with a high school education or less; 1.5 percent of adults ages 65 and above with some college education; and 0.8 percent of adults ages 65 and above with a college degree or higher.
- Every five years, review the best available data for measuring state-level adult and child treatment need to allow both direct and indirect components of the formula to be updated as surveillance data are improved.

Substance Abuse Prevention and Treatment Block Grant Allotment Formula

Like the MHBG, the current minimum allotment rule for the SABG was established in 1998, but unlike the MHBG rule, the rule for the SABG is more complex and is based on a comparison with the previous year's allotment. It has had the effect of preventing any substantial shifting in the allotments over time even as inputs to the formula change, and therefore it does not allow the current formula to operate as intended. When we simply removed the minimum allotment rule from the current SABG formula, 3.23 percent of the total 2018 allotment shifted. Because the rule continues to limit the way that funds are distributed, even though 20 years have elapsed since it was adopted, we recommend removing or replacing it. We explored alternative hold-harmless rules that could be adopted by Congress if changes are made to the formula.

As was the case with the MHBG, our analyses suggested that improvements can be made in the population need indicator for the SABG formula to better align with the best available data on population need for mental health services that are collected as part of the ongoing NSDUH survey. SAMHSA annually reports the national and state-level prevalences of adults and youth with substance use disorders (which also includes those in specialty treatment for substance use); these prevalence statistics are well-accepted indicators of treatment need. In our analyses, we also examined indicators of substance use prevention need using data from NSDUH, since the SABG is intended to fund both treatment and prevention services, and states are mandated to spend at least 20 percent of their block grant funds on prevention services. Our indicator of prevention need excluded those with substance use disorder but included adults who binge-drank alcohol or used illicit drugs and youth who used alcohol, drugs, or tobacco. Because the addition of a separate prevention need indicator was highly correlated with the indicator of treatment need ($r = 0.997$), we concluded that both prevention and treatment need are well represented with an

indicator based on the prevalence of substance use disorders, resulting in a simpler and more parsimonious definition of population need for the SABG.

The current formula gives a higher weight for population counts of young adults and those in urban areas. When we drew on NSDUH survey data to establish new weights for Census-based sociodemographic groups, young adults continued to be weighted more heavily, but those in rural areas proved to have somewhat higher rates of substance use disorders, and those who were unemployed also had higher rates, so these other groups also received large weights. Using this “indirect” method to update weights that are applied to sociodemographic characteristics of state populations resulted in a shift of 4.46 percent relative to the current formula (assuming that the current formula is not constrained by the minimum allotment rule). When we directly used state-level measures of prevalence of substance use disorders that are already generated annually by SAMHSA from the NSDUH data, 8.65 percent of the total 2018 allotment funds were shifted. Adding an updated COSI to the formula in addition to direct measures of population need results in a shift of 8.61 percent of the total funds.

As with the MHBG, we recognize arguments for using the indirect method for measuring population need; it is similar to the way the formula is currently structured, and updates would produce smaller changes relative to current formula allotments. Nonetheless, using state-level data directly from NSDUH is a more accurate indicator of state population need and takes advantage of the existence of the valuable NSDUH surveillance system that has been developed as a government resource. Although the NSDUH survey provides the best available information on state-level prevalence of substance use disorders, we note that these are measured with some sampling and measurement error. Improvements in the precision of the estimates could be gained by using the most recent four years of data instead of two years. The NSDUH survey is also limited because it is not fielded in Puerto Rico or other territories, which means that the indirect method continues to be the only option for territories, though updated indicators and weights can be used to make estimates for territories. As epidemiologic data are improved, improvements could be reflected in the formula.

Recommendations for the SABG Formula

- Remove the current minimum allotment rule because it continues to restrict the formula from operating as intended, artificially maintaining the allotments closely to 1998 funding levels.
- Update the population need indicator by using direct measures of prevalence of adults and youth with substance use disorders, which indicate both prevention and treatment need. These are available annually from SAMHSA’s analyses of the NSDUH for each state and the District of Columbia. Consider improving the precision and stability of these state-level estimates of need by using four years of NSDUH survey data instead of the two-year estimates currently reported by SAMHSA.

- For territories, where direct measures of adults and youth with substance use disorders are not available, use indirect estimates based on counts of people in various age and education categories: 4.1 percent of children ages 4–17, 14.8 percent of adults ages 18–25 who are employed or not in the workforce and reside in rural areas, 22.3 percent of adults ages 18–25 who are unemployed and reside in rural areas, 12.2 percent of adults ages 18–25 who are employed or not in the workforce and reside in urban areas, 18.7 percent of adults ages 18–25 who are unemployed and reside in urban areas, 6.8 percent of adults ages 26 and older who are employed or not in the workforce and reside in rural areas, 10.7 percent of adults ages 26 and older who are unemployed and reside in rural areas, 5.5 percent of adults ages 26 and older who are employed or not in the workforce and reside in urban areas, and 8.8 percent of adults ages 26 and older who are unemployed and reside in urban areas.
- Every five years, review the best available data for measuring state-level adult and youth prevention and treatment need to allow both the direct method (for states) and the indirect method (for territories) for calculating the need component to be updated as surveillance data are improved.

Projects for Assistance in Transition from Homelessness

The PATH grant formula currently allots funds based on the size of a state’s urban population. The minimum allotment for states, the District of Columbia, and Puerto Rico is \$300,000, and for other territories it is \$50,000. At the current time, the minimum allotment rule does not affect the distribution of funds because the formula results in no allocations to states or territories that fall lower than these minimums.

Using annually collected point-in-time counts of the size of homeless populations collected by HUD as the best available indicator of population need for services, we found that alternative weights for the urban population and a state-level indicator of housing affordability (ratio of rents to income) better predicted the size of a state’s homeless population. As with the MHBG and SABG, direct use of HUD counts should provide a more accurate estimate of population need, assuming that the broader risk of homelessness in a state is a good indicator of the risk of homelessness among those with severe mental illness. And, in this case, the direct use of homelessness counts results in a slightly smaller shift in funds than the use of indirect measures. One further advantage of the direct measures is that the HUD point-in-time information on the number of homeless individuals is currently collected for all territories except American Samoa, in addition to all the states and the District of Columbia. While HUD point-in-time counts are the best available state-level data on risk of homelessness, they also have limitations in that they tend to undercount those who are hard to find or episodically homeless, and they do not include counts of those who are precariously housed (e.g., doubled up with friends or family). As

methods for counting the size of the homeless population in states and territories are improved, these improvements could be reflected in the PATH formula.

Recommendations for the PATH Formula

- Remove the current minimum allotment rule. Although it does not affect current allotments, the minimum allotment levels are outdated and should be eliminated or revised if changes are made to the formula.
- Update the population need indicator by using direct measures of state point-in-time counts of homeless individuals (available annually from HUD for states and territories).
- Every five years, review the best available data for measuring state-level risk of homelessness, or, if available, state-level risk of homelessness among adults with SMI, to allow updates in the population need indicator as surveillance data on homelessness are improved.

Future Hold-Harmless Rules

If the recommendations of this report to update the formulas for the MHBG, the SABG, and the PATH grant are adopted, Congress would likely want to consider simultaneously making new hold-harmless rules that would buffer states from large and sudden losses in funding. To ensure that the formulas eventually redistribute funds equitably and as intended by the language of the regulations and the underlying structure of the formulas, we recommend the adoption of simple hold-harmless rules. The purpose of the rules would be to protect states from large declines in funding, yet over time redistribute growth in total funding in accordance with the formula.

Similar to the current MHBG minimum allotment rule, Congress could set the minimum allotment for a state to be no less than the amount it received prior to the year that the formulas are updated. When we examined the funding that would be required for each of the programs to fully redistribute funds in accordance with our recommended changes to the formulas, with no impact of this simple hold-harmless provision, we found that the MHBG allotment would need to be increased by 13.7 percent (\$72.2 million), the SABG allotment would need to be increased by 8.4 percent (\$145.9 million), and the PATH grant would need to be increased by 25.6 percent (\$15.7 million). These increases are relative to the current year's allotment as the base and, of course, would not have to occur in a single year. The analysis is meant to illustrate how increases in the budget over time would have the effect of redistributing the funds in accordance with an updated formula.

We simulated the effect of an alternative hold-harmless rule that would set a state's minimum allotment to no less than a 5-percent decrease from its current funding level, and we estimated how many years it would take before the hold-harmless rule had no impact on the distribution of allotments to states, assuming that each fiscal year the program receives a 1-percent increase in

total funding relative to the prior fiscal year. For the MHBG, it would take 12 years for the recommended formula changes to be fully implemented with no impact from this hold-harmless rule. For the SABG, it would take 14 years, and for the PATH grant, it would take 19 years. The attenuation of reallocations as intended by updated formulas for such long time periods is clearly not desirable. Shorter periods for full expression of reallocations under changed formulas could be achieved with faster growth in total grant funding or acceptance of larger decreases in state funding from year to year.

Because decreases in total program budgets are also possible, new hold-harmless rules would also need to establish how decreased funding would be shared among states. In that case, the impact of formula changes would likely be highly attenuated in order to preserve reasonable stability in funding for each of the states.

Recommendation

- If formulas are changed, establish new hold-harmless rules for all programs to protect states from large decreases in funding, yet allow formula changes to be implemented over time with increased program funding. Alternatively, increase program funding sufficiently to hold states harmless and ameliorate the need for new hold-harmless rules.

Final Observations

The formulas for distributing funds to states under the MHBG, the SABG, and the PATH grant were established in the early 1990s and have not been substantially modified since then. At that time, there were no ongoing public health surveillance systems that directly assessed either national or state populations' need for mental health or substance abuse prevention and treatment services. Nor were state homeless populations annually counted as part of a national census. Instead, population need indicators in all three formulas relied on the demographic characteristics of state populations (e.g., age, urban population) that were believed at the time to correlate with need for services.

Since then, national data systems have been developed that can provide direct assessments of population need for services rather than relying on demographic correlates. Although alternative data sources continue to have some limitations, use of direct measures in the population need components of the formulas, as recommended by this study, would represent a big improvement in the accuracy and appropriateness of the formulas for distributing funds to states.

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Abbreviations

ACA	Affordable Care Act
BIC	Bayesian information criterion
BLS	Bureau of Labor Statistics
BRFSS	Behavioral Risk Factor Surveillance System
CDC	Centers for Disease Control and Prevention
CFR	Consolidated Fiscal Reporting
CGAS	Children’s Global Assessment Scale
CMHC	Community Mental Health Center
CMS	Centers for Medicare & Medicaid Services
COR	Contracting Officer’s Representative
COSI	Cost of Services Index
DATCAP	Drug Abuse Treatment Cost Analysis Program
DSM-III-R	Diagnostic and Statistical Manual of Mental Disorders, Third Edition, Revised
DSM-IV	Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition
GCPI	Geographic Cost Practice Index
HCRIS	Healthcare Cost Report Information System
HER	Health Economics Research Inc.
HHS	Health and Human Services
HUD	U.S. Department of Housing and Urban Development
IHA	Institute for Health and Aging
MHBG	Mental Health Services Block Grant
MTF	Monitoring the Future
NAICS	North American Industry Classification System
NCHS	National Center for Health Statistics
NCS-A	National Comorbidity Survey Adolescent Supplement
NCS-R	National Comorbidity Survey Replication

NESARC	National Epidemiologic Survey on Alcohol and Related Conditions
NHIS	National Health Interview Survey
NIAAA	National Institute on Alcohol Abuse and Alcoholism
NSDUH	National Survey on Drug Use and Health
NVSS	National Vital Statistics System
OES	Occupational Employment Statistics
PATH	Projects for Assistance in Transition from Homelessness
PCPI	per capita personal income
PIT	point-in-time
RRS	representative revenue system
RTS	representative tax system
SABG	Substance Abuse Prevention and Treatment Block Grant
SAMHSA	Substance Abuse and Mental Health Services Administration
SAS	Service Annual Survey
SASCAP	Substance Abuse Services Cost Analysis Program
SDQ	Strengths and Difficulties Questionnaire
SED	serious emotional disturbance
SES	socioeconomic status
SMI	serious mental illness
SUD	substance use disorder
TAG	technical advisory group
TTR	total taxable resources
YRBSS	Youth Risk Behavior Surveillance System

1. Introduction and Background

The 21st Century Cures Act requires the Secretary of Health and Human Services (HHS), acting through the Assistant Secretary for Mental Health and Substance Abuse, through a grant or contract or an agreement with a third party, to conduct studies of the formulas for distributing funds to states under three block grants: (1) the Community Mental Health Services Block Grant (MHBG), (2) the Substance Abuse Prevention and Treatment Block Grant (SABG), and (3) the Projects for Assistance in Transition from Homelessness (PATH) program (21st Century Cures Act, 2016). These block grants are noncompetitive grants that provide state funding for services in each domain. The purpose of this project, which was conducted by RAND under contract with the HHS Assistant Secretary for Planning and Evaluation, is to produce the studies required by Congress, which are intended to inform any recommended changes to the allotment formulas.

The Alcohol, Drug Abuse and Mental Health Administration Reorganization Act of 1992 created the current formulas that the federal government uses for distributing the MHBG and the SABG to states. In 2009, states received \$393 million through the MHBG, and this accounted for 1.1 percent of total state spending on mental health services, including the state share of Medicaid spending (Substance Abuse and Mental Health Services Administration [SAMHSA], 2013). States received \$1.3 billion through the SABG, and this accounted for 13.3 percent of total state spending on substance use services (SAMHSA, 2013). For fiscal year 2018, the total allotment for the states and territories for the MHBG increased to \$530 million, and the SABG allotment increased to \$1.7 billion. Each formula calculates state shares based on three formula components that are measured using indicators derived from state-level data: the size of the population in need, the costs of providing services, and the state's fiscal capacity. The structure of these formulas implicitly reflects the concept of taxpayer equity—that is, the idea of equalizing the rates that taxpayers would have to pay to support a standard level of service across states (Burnam et al., 1997; U.S. General Accounting Office, 1992). A key feature of these formulas is that they are not designed to create incentives for state or local entities by rewarding or penalizing their behavior with respect to mental health care and substance use treatment and prevention. For example, the formulas do not take into account other public or private funding for mental health and substance use services raised by states or localities, the level of care provided, or the number of people receiving services in a state.

The 21st Century Cures Act requires that the study of the MHBG and SABG formulas include the following components:

1. an analysis of whether the distributions under the block grants accurately reflect the needs for services under the grants in the states
2. an examination of whether the indices used under the formulas for distribution of funds under such block grants are appropriate and, if not, alternatives recommended

by the study

3. a description of the variables and data sources that should be used to determine the indices, if it is determined that the indices used under the formulas for distribution of block grants are appropriate
4. an evaluation of the variables and data sources that are being used for each of the indices involved, and whether such variables and data sources accurately represent the need for services, the cost of providing services, and the ability of the states to pay for such services
5. the effect that the minimum allotment requirements for each such block grant has on each state's final allotment and the effect of such requirements, if any, on each state's formula-based allotment
6. recommendations for modifications to the minimum allotment provisions to ensure an appropriate distribution of funds
7. any other information that the Secretary determines appropriate.

The PATH program, authorized by the Stewart B. McKinney Homeless Assistance Amendments Act of 1990, is a formula grant program that allocates an annual grant amount to states and territories to fund delivery of outreach and services to people with serious mental illnesses (including those with co-occurring substance use disorders) who experience or are at risk of homelessness. For fiscal year 2018, the total allotment to states and territories was \$64 million. The size of the urban population is used as an indicator of need for these types of services. The 21st Century Cures Act requires that a study of the PATH program allotment formula include the following components:

- an evaluation of quality indicators of need for purposes of revising the formula for determining the amount of each allotment for the fiscal years following the submission of the study
- any other information that the Secretary determines appropriate.

The Need to Evaluate the Current Formulas

Since the inception of the block grant allotment formulas, questions have been raised in policy circles about whether the specific indices and data used to operationalize the formula components are appropriate. Among the three components of the formulas, indices for population need and costs of services have raised the most concern because they are based on population need data and cost-of-service concepts from 30 years ago. Improvements in data and changes in the treatment for mental health and substance use disorders since then may mean that these components of the formula should be updated. As far back as 1992, in light of such questions, Congress mandated a study of the MHBG and SABG formulas in the grants' authorizing legislation. The study (Burnam et al., 1997) found that the heavy weighting of the urban population to measure population need in the SABG formula was not consistent with the

latest epidemiologic data at the time. The research also concluded that the Cost-of-Services Index (COSI) could be improved by considering wages specific to occupations related to mental health and substance use, as well as by including an adjustment for the higher costs of delivering services in rural areas. Implementation of the recommendations from that study would have resulted in substantial shifts in the allotments across states, especially for the SABG, for which allotments could change by as much as 22 percent (Burnam et al., 1997).

For reasons unknown to us, Congress never acted to fundamentally change the formulas. SAMHSA began to use wages specific to occupations related to mental health and substance use as inputs to the wage component of the COSI, but other inputs to the formula were not modified. There is good reason to conduct an evaluation of the allotment formulas now. Since the early 1990s, when the formulas were established, there have been major improvements in the collection of national data to support an evaluation of current and alternative formula component indicators, as well as improvements in data that could be directly used as state-level inputs into the formulas. One goal of the current evaluation is to provide objective analysis and recommendations for updating the formulas to incorporate better data and measurement of the underlying components of population need, costs of services, and fiscal capacity.

Updating the formulas has the potential to result in large shifts in amounts that states receive, disrupting service availability in states that lose funds and, conversely, enabling the expansion of services in states that get more funds. Congress often uses minimum allotments to buffer the effects of such shifts, thereby preventing states from losing significant funding after formulas are changed by establishing a minimum amount that states will receive. The 1992 legislation establishing the current formulas included hold-harmless provisions that guaranteed states receive a level of funding based on their prior year's funding (Burnam et al., 1997). Congress also has the option to increase the total budget for these programs to diminish or avoid state losses in funding when relative allotments shift. Alternatively, Congress could also make gradual increases in total budget allotments to these programs over time, making the impact of hold-harmless provisions likewise gradually decrease and resulting in allotments that, over time, more closely correspond to the intent of the formula. In addition to evaluating changes to the block grant formulas, this evaluation examines the impact of the current mandatory minimum rules. We also explore the potential impacts of increasing total grant funding and creating new minimum allotment rules that would prevent any states from experiencing large decreases in funds if formulas are to be updated; we refer to these as hold-harmless approaches.

Tasks of the Current Study

This study is a response to the requirements set forth by Congress and attempts to address the need to evaluate the current SABG, MHBG, and PATH formulas. The study had four main tasks: (1) conducting an environmental scan that examines literature on each of the formula's components and searches for nationally representative data sources not available during the

formula's creation, (2) convening a technical advisory group (TAG) of federal experts and additional stakeholders to consult with throughout this study, (3) developing an analytic plan to evaluate the current formulas and alternatives, informed by the results of tasks 1 and 2, and (4) evaluating the current formulas and proposed revisions of them.

This report presents the study's results. It is organized as follows: We first describe our study framework and each of the three formulas. We then present our methodological approach to identifying potential revisions to the formulas, using available scientific literature and advice from the TAG. We describe our analytic plan for evaluating the likely effects of the revised formulas and the exploratory analyses conducted to support our decision process. Following this discussion, we present the potential revisions we identified for the grant program allotment formulas, with a chapter devoted to each of the programs. A final chapter presents conclusions and recommendations.

Study Framework

We conducted this study under the guiding assumption that any alteration of the formulas should uphold the intent of the original legislation that created them. For the MHBG and SABG allotment formulas, this means that any revised formula should measure the three core components (population need, costs of services, and fiscal capacity) and relate these components to each other so as to preserve the taxpayer equity concept. For the PATH allotment formula, this means that any alternative formula should focus only on measuring population need.

There are other desirable characteristics of any alterations to the formulas. To be useful for determining annual allotments to states, the formulas require valid data that can be obtained annually, that are recent, and that are reliable for estimating inputs at the relevant level, such as state population or subpopulation. Stability of allocations from year to year is also desirable, so as to avoid large and unpredictable changes for states. The formulas should remain transparent to stakeholders. Finally, consistent with the underlying structure of the formulas, the inputs to the formulas should be reasonably independent of other state policies or programs that address the formula subjects and are influenced by state choices.

2. The Current Formulas

Overview of the Formulas

As noted, the current MHBG and SABG formulas have three components: population need, cost of service delivery, and state fiscal capacity. The PATH formula has only a single component: population need. For each block grant, a score is computed for each state, and the state receives a share of the total funds available through the block grant based on its score.

More specifically, the MHBG and SABG formulas combine an estimate of the quantity of services that need to be funded in the state, an estimate of the costs of providing those services in the state, and an estimate of the state's ability to fund services through other mechanisms to compute each state's funding score. The programs' formulas differ only on how to compute population need (e.g., the quantity of services that need to be funded in the state). The current SABG formula uses weights in its calculation of population need to reflect what was believed to be higher need among young adults and those living in urban areas. The MHBG formula estimates population need based on weights given to the number of people in different age groups to reflect higher risk for mental disorders for certain ages. The weights used for the population need indicator in the SABG and MHBG are based on a 1986 Institute for Health and Aging (IHA) study (IHA, 1986). Both also rely on annual state population counts by age and, in the case of the SABG, urban status counts from U.S. Census Bureau data. These counts are weighted according to the formula to estimate the level of need. The formulas rely on this indirect estimate of the level of need instead of direct estimates provided by survey data.

In terms of costs, the current MHBG and SABG formulas both use a cost index (COSI) that is designed to reflect state variations in the inputs or resources required to deliver services. The COSI is based on a 1990 report (Pope, 1990) and includes three components: state-level costs of labor (currently measured as median hourly wages for occupations involved in providing mental health and substance abuse treatment services), rent ("fair market" apartment rental prices), and other supplies (assumed to be constant across states). The data used for these estimates are produced by the Bureau of Labor Statistics. The formula does not include any specification of settings where services are rendered (e.g., primary care, inpatient or outpatient care). The current MHBG and SABG allocation formulas also use the annual estimates of states' total taxable resources (TTR) from the U.S. Department of the Treasury as an indicator of state fiscal capacity.

The PATH formula is simpler than the MHBG and SABG formulas, in that it is based only on an indicator of population need and does not take into account costs of services or state fiscal capacity. In total dollars, the PATH grant program is much smaller than either of the other block grants, so a simpler allotment formula may be appropriate. The current formula for PATH defines need based on the state's proportion of the U.S. urban population, which, like the other

block grant formulas, relies on the annual counts of the U.S. Census Bureau for estimates of the size of a state's population that is living in urban areas. Exclusion of the rural population from this indicator of need likely reflects the view that homelessness is largely an issue faced in urban areas (Link et al., 1994).

All three formulas have a minimum allotment so that each state and territory is guaranteed a minimum amount of funding each year. The minimum allocation for the MHBG program is the amount received by the state in fiscal year 1998 (territories are subject to different minimum allotment rules). The minimum allotment rules for the SABG are more complex and based on each state's prior year allotment. The PATH program minimum allotments are \$300,000 for states, the District of Columbia, and Puerto Rico and \$50,000 for other territories.

Details of the Formulas

States receive a share of the total available block grant funds based on their relative score from the block grant formula. For the MHBG and SABG programs, the 50 states and the District of Columbia receive 98.5 percent of the total allotment, while territories receive the remainder. For the PATH program, the five included territories of Puerto Rico, American Samoa, Guam, Northern Mariana Islands, and the U.S. Virgin Islands are included with the states and D.C. when calculating shares. The shares allocated to individual states and/or territories are determined by the following formula:

$$G_i = A \left(\frac{X_i}{\sum X_i} \right)$$

where

G_i = grant amount for the i th state or territory

A = total funds appropriated for distribution among the states and/or territories

X_i = score for the i th state or territory

$\sum X_i$ = sum of scores for all 50 states and the District of Columbia (and territories for PATH grant).

The formulas we are evaluating differ in how they compute the state score, X_i . Note that the value of X_i indirectly determines the amount of funding a state receives. That means that changes in the population-need component of the formulas will have an impact on the final allotments only if improved accuracy changes the relative scores of the states. For example, state A may have a higher estimated level of need than state B under both formulas, even though the revised formula produces more-accurate estimates of need. In this case, both states will receive the same allotments under the new formula as under the original formula.

MHBG and SABG Formulas

The MHBG and SABG formulas have the same general structure for estimating the state score. There are three elements to be estimated: population in need (P), cost of service (C), and state fiscal capacity (F). The only difference between the two formulas is the equation for estimating the population in need because the focuses of the block grant programs are different (mental health and substance abuse, respectively). The score for each state, X_i above, is the product of P_i , C_i , and N_i . The score multiplies an estimate of the population in need of treatment (or prevention) services to be funded in a state (P_i) by the cost of providing those services (C_i) and then adjusts that estimated total expenditure by the ability of a state to cover it through other funds (F_i). States with higher estimated need and/or costs to provide services will have higher estimated total expenditures. States that have lower potential income through taxation will receive more federal funding through these block grants because of the fiscal capacity adjustment than states with the same estimated expenditures but higher potential income.

Community Mental Health Services Block Grant

The estimated state population in need (P_i) is a weighted sum of the number of individuals in each age group:

$$P_i = \sum_j w_j A_{ij}$$

The age categories are

A_{i1} = number of persons in state i ages 18 to 24

A_{i2} = number of persons in state i ages 25 to 44

A_{i3} = number of persons in state i ages 45 to 64

A_{i4} = number of persons in state i ages 65 and older.

The number of persons in each category is based on annual estimates of the population from the U.S. Census Bureau.

The weights are derived from the 1986 IHA study (IHA, 1986) and are intended to represent the relative risk of having a mental health disorder for each age group. Adults ages 25–44 had the highest observed prevalence, with about 16.6 percent of adults in this age range estimated to have at least one of the disorders reported in the 1986 study. Adults ages 18–24 had the second-highest prevalence (10.7 percent) followed by ages 45–64 (9.9 percent) and ages 65 and older (8.2 percent).

The cost element, intended to adjust for differences among states in the cost of providing mental health and substance abuse services, is derived from the 1990 report of Health Economics Research Inc. (HER). There are three parts to the cost formula: labor (L), rental (R), and “other supply” costs. The estimated cost for a state, C_i , is a weighted sum of L_i , R_i , and a constant. The formula for each state is

$$C_i = 0.75L_i + 0.15R_i + 0.10$$

The labor index for each state in the HER report was based on median hourly nonmanufacturing wages obtained from the 1990 Census, and the rental housing index was based on the U.S. Department of Housing and Urban Development (HUD) measure of “fair market” residential rents. The 1990 HER report estimated that 75 percent of the cost of providing mental health and substance abuse treatment was due to labor, 15 percent of the cost was due to rent, and 10 percent was due to everything else. Only wages and rent are allowed to vary by state. The cost of other services (drugs, office equipment, etc.) was assumed to be uniform across the nation and adds the constant 0.10 to the index value. The legislation specifies that the range of variation for C_i is limited between 0.9 and 1.1. The current formula continues to use the same weights across the cost components (75 percent for labor, 15 percent for rents, and 10 percent for other) but applies updated inputs to labor and rent. The COSI is calculated every third year. Labor is measured as median hourly wages for occupations related to mental health and substance abuse treatment providers. The U.S. Census Bureau performs a special tabulation of these wages for SAMHSA using one year of the most recent American Community Survey data at the time of calculation. Rents are updated using the most current fair market rates from HUD, with a weighted average for the state calculated using the most recent county-level census of population size.

The fiscal capacity element is intended to adjust for state capacity to pay for mental health and substance use services. The formula for each state is

$$F_i = 1 - 0.35 \left(\frac{R_i\%}{P_i\%} \right)$$

where $R_i\%$ represents the state’s share of national TTR and $P_i\%$ represents the state’s share of the total national population in need. F_i can be thought of as the share of the standard benefit per person in need that the federal government will pay. If a state’s share of TTR is the same as its share of the population in need, then F_i will equal 0.65. This means that the federal government will pay 65 percent, and the state will pay 35 percent. The minimum allowed value for F_i is 0.4. TTR is computed by the Treasury Department (U.S. Department of the Treasury, 2017).

Substance Abuse Prevention and Treatment Block Grant

The SABG formula differs from the MHBG formula only in its estimate of the population in need. The MHBG formula is a weighted sum of the adult population with weights that correspond to the observed prevalence of mental health conditions in the population. The SABG formula does not contain a prevalence-based weight, though it does count persons who fall into age ranges corresponding to higher observed substance abuse and dependence in the 1986 IHA study (IHA, 1986). It also gives more weight to young adults who live in urban areas.

$$P_i = 0.5 \left[\left(\frac{A_i}{\sum A_i} \right) + \left(\frac{B_i}{\sum B_i} \right) \right]$$

where

$$A_i = T_i + U_i$$

T_i = number of persons in state i ages 18 to 24

U_i = number of persons in state i ages 18 to 24 and living in urban areas

B_i = number of persons in state i ages 25 to 64.

The SABG population need formula does not have the same structure as the MHBG formula. The extra weight given to the number of adults ages 18–24 living in urban areas reflects the belief that this young, urban population has a higher prevalence of substance abuse and dependence (Burnam et al., 1997).

Projects for Assistance with Transition from Homelessness

Unlike the MHBG and SABG formulas, the PATH formula for each state’s score has only one element: population in need. It is based on the state’s relative urban population and is given by

$$P_i = \frac{U_i}{\sum U_i}$$

where

U_i = number of persons in state i living in urban areas

$\sum U_i$ =

number of persons in all 50 states, the District of Columbia, and U. S. territories living in urbanized areas.

In the next chapter, we describe our approach to the environmental scan and the TAG we used to guide and identify potential changes to the formulas.

3. Approach to Identifying Potential Changes to the Formulas

To identify potential modifications to the formulas, we conducted a detailed environmental scan focused on reviewing recent literature on indicators and weights used in existing formulas. Once we identified potential alternatives, we convened a TAG of recognized experts across a diverse range of topics and perspectives to advise us on how existing formulas could potentially be modified.

Environmental Scan Methodology

Our literature review was consistent with our framework for this study. Our aim was to preserve the underlying structure of the formulas. Thus, the environmental scan focused on literature relevant to the components of the current formulas and excluded other components (e.g., service delivery setting). Our results focused on sociodemographic predictors of substance use and disorder (serious mental illness [SMI] and serious emotional disturbance [SED]) and homelessness because they reveal factors that may lead to differences across states in the level of need for services. For instance, if an outcome, such as substance use, were strongly related to age, we would expect that states with different age structures would have different levels of need, even if they had the same total population.

We anchored the environmental scan in research from nationally representative data sources that could be used in future versions of the formulas. We first identified relevant data sources that were representative of the United States and territories that also provided state-level data on substance use disorders, mental disorders, or homelessness. Thereafter, we conducted our selective literature review citing research from these data sources to report on relevant population need indicators, costs of services, and state fiscal capacity. We describe these literature searches in more detail below. We conferred with our TAG to ensure the comprehensiveness of our list of data sources and literature review.

We searched peer-reviewed and gray literature. For the peer-reviewed literature, we utilized search engines and databases, such as Google, Google Scholar, the National Center for Biotechnology Information, and PubMed, using articles no older than 1997, which was when the last review on this topic was published (Burnam et al., 1997). We also conducted a “related articles” and “cited by” search on relevant sources to hone in on articles covering specific topics (e.g., geographical variations in binge drinking), including sources used in the 1997 report. Finally, we explored federal (e.g., Centers for Disease Control and Prevention [CDC], SAMHSA) and stakeholder websites (e.g., National Association of State Mental Health Program Directors, National Association of State Alcohol and Drug Abuse Directors) for reports and other useful documentation.

Population Need Indicators

The purpose of the selective literature search on population need indicators was to identify sociodemographic variables that could be used as indicators of state population need in each of the three formulas. After identifying relevant nationally representative data sources, we conducted a selective review of recent epidemiologic studies from these data sources that reported geographic and sociodemographic variations in substance use (alcohol and drug use), substance use disorders, mental disorders (SMI and SED; see Chapter 5 for formal definitions), and homelessness. Because census data on age and urban population are currently used to indirectly estimate state population need in the formulas, our review included recent studies reporting age and urbanicity variations in population prevalence of substance use, substance use and mental disorders, and homelessness. We also reviewed literature on additional sociodemographic and geographic indicators (e.g., gender, race/ethnicity, geographic region) that could potentially be used to indirectly estimate state-level variations in population need. Finally, because ongoing population surveillance data on substance use, mental disorders, and homelessness are now available, which was not the case when the formulas were originally established, we considered the strengths and limitations of available data sources for developing direct estimates of state population need.

Costs of Services and State Fiscal Capacity

The purpose of the selective literature review on service costs and state fiscal capacity was to identify potential data sources and evaluate measures of costs of mental health services and substance use prevention and treatments. We conducted a selective review of recent peer-reviewed and gray literature on measures of the costs associated with rents, wages, and equipment in the provision of mental health services and substance use prevention and treatment services. We extracted information to identify potential data sources for formula measures. This included the current sources used and new sources that were not available when the original formulas were established. We also conducted literature searches to update a prior report (Burnam et al., 1997) on measures for each state's fiscal capacity and described the strengths and weaknesses of the current formula data sources. Finally, we discussed potential alternatives for both cost measures and fiscal capacity based on the literature.

Technical Advisory Group

We recruited a TAG to advise and comment on the evaluation at key points during the study. We considered the TAG's feedback in discussions with our Contracting Officer's Representative (COR). For example, after each meeting, RAND's core team and the COR reviewed TAG feedback and then collectively made decisions on what feedback from the TAG to integrate. We nominated TAG members based on our familiarity with the content areas and our professional relationships with many nationally recognized experts and conferred with our COR for approval of each member. After this initial approval, we emailed a formal invitation to all nominees

asking them to participate in the TAG. A total of 23 invitations were sent; 15 agreed to participate. One nominee was nonresponsive after repeated attempts, and seven declined to participate because of lack of time and/or job change. In most instances, after declining, nominees provided alternate contacts for whom we subsequently sought approval before emailing them a formal invitation. Ultimately, the TAG consisted of 16 members with expertise in block grant formulas, state fiscal capacity, treatment delivery systems, the topic of interest (substance use disorders, mental health, and/or homelessness), and/or wage and cost indices. Of the 16 TAG members, five were government members from SAMHSA or the Bureau of Economic Analysis.

Each nominee agreed to participate in three meetings: a full-day, in-person meeting at the start of the study and two telephone-based half-day meetings in the middle and end of the study, respectively. The goal of the first kickoff meeting (week 5) was to receive feedback on our completed environmental scan and preliminary ideas for our analysis plan. For example, we generated discussion and suggestions from the TAG regarding information that might be missing in the environmental scan, how to operationally define each of the formula components, potential indicators of the definitions, and how best to empirically evaluate the quality and accuracy of current and alternative indicators. We have incorporated this feedback from the TAG throughout this report. The goal of the second meeting (week 39) was to receive feedback on our completed analyses so that we could generate interpretation and implications of the results before our final report was completed. The goal of the final meeting (week 44) was to receive feedback on a draft of the final report, including conclusions and recommendations. Two weeks in advance of each meeting, we provided each TAG member with materials to review. We paid each nongovernmental TAG member \$500 plus travel expenses after the last TAG meeting (one nongovernmental TAG member preferred not to be remunerated).

4. Approach to Evaluating Potential Changes to the Formulas

In this chapter, we describe our approach to evaluating the impact changes to the formulas (the specific alternatives that we identified are discussed in Chapters 6–9). We evaluate changes that update individual components of the existing formulas or improve data sources but retain the current structure and population focus. For example, we explored potential updates to the weights applied to current adult age categories for the MHBG need formula and explored using a different source of data to estimate how labor, rents, and other costs should be relatively weighted in the cost index. We also evaluated more substantial changes to the structure of the formula components or to the population focus. For example, we considered adding education and income to the MHBG and SABG need formulas.

Evaluating the Impact of Potential Changes to Formulas on State Allotments

The current allotments served as the baseline allotments against which we compared potential changes. An additional baseline we considered was a simple allotment based on population size alone. We computed the following indicators of change:

1. the total percentage of funds that are reallocated among states
2. the number of states whose allotments change and the total amount and direction of change for each state
3. the magnitude and direction of change per person in each state.

We calculated changes in allotments that resulted from changes in individual components of the formula, as well as changes in allotments once all alternatives to formula components were considered together. All of the changes were evaluated with this approach.

Developing Alternative Population Need Estimators

The current MHBG and SABG formulas focus on need among all adults in the state, while the current PATH formula focuses on need among all urban residents in the state. Currently, the level of need for the MHBG and SABG formulas is estimated by a formula that applies weights to counts of people in different groups, as determined from census data for adults in each state (see Chapter 2 for formulas that involve the number of people in different age categories and in urban areas).

We refer to the method currently employed by these formulas as an indirect method for estimating need because it estimates the level of need for a state indirectly through other variables that are associated with need, such as age or urban status. When the formulas were

originally developed, there were no reliable sources of data that could provide direct estimates of state-level need. The formulas used estimates from national survey data that described the association between need and age or need and the combination of age and urban status. The current formulas applied these associations to the state population to indirectly estimate the level of need in the state. However, currently available survey data, such as the National Survey on Drug Use and Health (NSDUH), allow us to directly estimate the level of need among adults as currently defined in the MHBG and SABG formulas in each state because the surveys are designed to provide reliable state-level estimates. For the PATH formula, there are no sources of reliable state-level estimates of the number of persons who experience serious mental illness and are also homeless, so we used point-in-time estimates of the size of the homeless population in each state that are collected by HUD as the best direct indicator of the risk of homelessness for those with serious mental illness. We developed both indirect and direct alternatives for assessing state population need for the PATH formula.

We reproduced the annual estimates of need using the current indirect formulas for the most recent available time period. We compared the estimates from each of the new indirect methods proposed below with the indirect estimates based on the original formula as well as with one another. We then evaluated the impact of changes following the approach outlined previously, which focuses on quantifying changes in allotments produced from different estimators of need. We evaluated the accuracy of changes by comparing the estimates of need and the allotments with those that would have been obtained from the survey data-based direct estimates.

Method for Constructing New Weights Using Indirect Estimation

To create alternative formulas utilizing the indirect method for estimating need, we used recent NSDUH survey data. In addition to exploring whether the current weights should be changed, we added other predictors based on our environmental scan and collective input from the TAG and our COR. We used the national survey data to estimate the associations between these additional predictors and the level of need and constructed weights that reflect these associations.

The first indirect estimation method involved using the current formula for need, but with weights obtained using more recent national data. For instance, the MHBG estimates need as a weighted sum of number of individuals in each age group. We estimated the proportion of individuals in each age group having serious mental illness from current data to get more accurate estimates for these weights. Data for the outcomes and for the predictors came from the NSDUH national public use data. We fit the following multiple logistic regression model:

$$P(Y_i = 1|X_i^T) = \frac{e^{X_i^T \beta}}{1 + e^{X_i^T \beta}}$$

where

Y_i = presence of need for survey respondent i

X_i^T = value of predictor variables for survey respondent i

The estimates of the coefficients $\hat{\beta}$ allowed us to estimate the probability that an individual of a certain demographic profile, as coded by covariates X , had need. These estimates served as our estimates of the weights associated with each predictor. For example, if the probability that an individual's (age 18–24) need was 0.15, then our estimate of the weight associated with the number of people ages 18–24 was 0.15.

There were additional predictors that we considered incorporating into the need formulas. We chose to include additional predictors from this set that met the following conditions: The variable could be measured annually at the state level from national surveys, varied across states, and was likely to be associated with prevention or treatment need. We then added the final set of new predictors to our logistic regression model and evaluated whether they should be added to the final formulas. The first step in evaluating any new predictor, such as education level, involves a test of its statistical significance and the improvement in model performance, as measured by the Bayesian information criterion (BIC) score. If there is no significant association between the new predictor and the outcome, then there is no need to pursue additional evaluation of that predictor.

To evaluate the accuracy of changes to the indirect method for estimating adult MHBG and SABG need, we calculated a concordance score that measures the percentage of time that the predicted probability of need for those that have need exceeds the predicted probability for those that do not have need. Models that perform well will have higher concordance scores than models that perform poorly. A model that predicts need perfectly will have a concordance score of 100 percent.

Method for Directly Estimating Need

An approach to directly estimate the level of need for adults in each state for the MHBG and SABG formulas uses survey data. For mental health services need, this approach only applies to adult level of need, as there are no reliable state-level estimates of need for children. For substance abuse prevention and treatment need, state-level estimates are available for both adults and youth. The major advantage of the direct method is that it provides the best available estimates of the true level of need in the states. In addition, it is sensitive to changes in that level of need over time, unlike indirect methods that can become outdated over time as demographic predictors of need change. Finally, it is simple and easy for stakeholders to understand.

One potential disadvantage of the direct method of estimating need is that it might be susceptible to state efforts to manipulate the level of need; however, members of our TAG considered it unlikely that states could impact these estimates. Another potential disadvantage is that it could penalize states that do an effective job of prevention or service delivery (and, hence, have lower need) while rewarding those who do not. While our TAG members recognized this possibility, they noted that block grant funding represents a small portion of the total public and

private spending on mental health and substance abuse services; variation in the ways that states use their funding would therefore be unlikely to impact population need indicators.

Focus on Population in Poverty

The current need components use the full state population as their basis for estimating need. Some members of our TAG argued that the indicator of population need should be limited to the population in poverty, given that SAMHSA block grant funds tend to be aimed at those who do not have insurance coverage for or cannot otherwise afford needed services. In addition, poverty is associated with an increased risk of a spectrum of adverse health outcomes, and a state's share of the national population living in poverty may therefore be associated with its share of need for services.

Other TAG members raised considerations that would argue against linking the population need indicator to those in poverty. The first is that SAMHSA policy does not restrict use of block grant program funds based on poverty level or any other means-tested requirements. Second, the fiscal capacity component of the MHBG and SABG formulas may be highly correlated with state poverty population and, therefore, may already be accounting for greater need for funds by states with relatively high levels of poverty.

Evaluating Current Minimum Allotments

Each of the formulas includes minimum allotment amounts. The minimum allotment for the MHBG is the amount received by the state in fiscal year 1998 (not adjusted for inflation; territories are subject to different minimum allotment rules). The SABG minimum allotment is based on a complex formula that guarantees a state a minimum allotment in years that the total appropriation increases. The minimum is the higher of either (1) an increase in allotment that is 30.65 percent of the proportionate increase in the total appropriation or (2) the smaller of 0.375 percent of the total appropriation or an increase in allotment that is 300 percent of the proportionate increase in the total appropriation. The PATH program minimum allotments are \$300,000 for states, the District of Columbia, and Puerto Rico and \$50,000 for other territories.

These minimum allotments place constraints on the distribution of funds. For example, the needs of states may have changed significantly since 1998. States that may have lower need now may be getting a larger allotment than they would without the minimum allotment, leaving less money to be allocated to states that may have experienced a larger increase in need. We compared the allotments with the minimums in place and the allotments without the minimums over time to evaluate the impact of the minimum allotments on the distribution of funds across states. We repeated this analysis for the potential changes to the formulas that we define above.

Two Potential Hold-Harmless Approaches

If formulas are changed in the future based on the analyses and recommendations from this report, such changes could be disruptive for states that receive large decreases in allotments. To minimize the negative impact of changes to the formulas, Congress could enact new hold-harmless scenarios. There are a number of approaches Congress could take. We evaluate two potential approaches in our report focused on two dimensions—money and time—that highlight the trade-offs in making changes to the formulas.

The first approach is to immediately increase overall grant funding to prevent any reductions in allotments for any state. We calculated the required additional dollar amount of total grant funding that would be required over the current level to prevent losses for any state due to changes in the formulas. This approach provides an upper-bound estimate of the money needed to change the formulas while preventing decreases for any state.

The second approach is a gradual shift in state allotments that allows for limited decreases. In this approach, state allotments are allowed to decrease, but decreases are limited to 5 percent of the allotment from the most recent prior year. This option is consistent with previous and current practices for other grants. Over the past five years, Congress has most often increased the total allocations for the MHBG and SABG by an average of 1 percent or more, though there have been years with higher increases and even years with decreases. We assume that funds will grow by 1 percent per year going forward. We then estimate the number of years that are required to achieve a total amount of funding at which all states are at their current allotments. This approach provides an estimate of the time required to implement changes to the formulas under reasonable assumptions.

5. Cost of Service and State Fiscal Capacity Indicators for Mental Health and Substance Abuse Prevention and Treatment Block Grants

Both the MHBG and the SABG formulas include an indicator (COSI) used to calculate the cost of the services funded under each program and the states' fiscal capacity to deliver these services. (The PATH program formula does not include a cost of service calculation.) The same COSI is used in both program formulas. This chapter examines the weights in the formula and the three components of the COSI (wages, rents, and miscellaneous resources). It then explains the current method for estimating each of the components and describes potential new data sources relevant to the method. Finally, it describes the changes we will evaluate.

Legislation in 1992 added a cost component to the formulas for both SABG and MHBG allocation. Even if states have the same level of need, they face differences in the costs to provide services. States with the highest costs could spend twice as much as states with the lowest costs to treat the same population in need (Pope, 1990). The addition of a cost component to the formulas addressed these differences and attempted to make allocations more equitable. The COSI is a weighted sum of three components: state wages (w), state rents (r), and miscellaneous resources (m) (Pope, 1990). The weights reflect the percentage of the cost index attributed to each component. Wages account for 75 percent of the total cost index, rent accounts for 15 percent, and miscellaneous charges account for 10 percent. We describe each component separately below.

Changes to the Mental Health and Substance Use Systems

The COSI formula and weights are based on generic costs to deliver health care. Changes in the delivery system for mental health and substance use services raise the question of whether more-specific costs should be incorporated in the formulas and whether the weights are appropriate. If incorporation of specific costs is worth pursuing, we need to think more carefully about the specific services that are delivered. This section reviews several changes to the overall system of mental health and substance use care since the block grant formulas were established.

The emergence of recovery-focused care as the standard of care has changed the mix of different types of services provided for both mental health and substance use in many states. This type of care includes more wraparound services (e.g., case workers) and support outside of the health care delivery system (e.g., peer-led support groups). This has an impact on the types of workers (wages) and commercial spaces (rents) that are used to provide care. These changes have not been uniform across states and, therefore, may impact the variation in costs across

states in ways that are not currently reflected in the allocation of block grant funds (Drake and Latimer, 2012).

Since the initial formulation of the block grants, there has also been a push for implementation of managed care to control health care costs. This shift changes the way that mental health and substance use providers and practices are reimbursed for patient treatment. Movement toward managed care has also not been uniform across states and, therefore, may have a disparate impact on the costs of providing care that are not currently reflected in the COSI (Fairfield et al., 1997).

The past few decades have seen a dramatic increase in the use of psychotropic medication as a first-line treatment for mental health and substance use disorders. Because prescription medication is not reflected in the current mental health and substance use formulas, this shift is likely not captured.

In addition, with an increase in medication-based care, there is a greater reliance on primary care for prescribing (King and Essick, 2013; Mark et al., 2011). Though this growth has slowed, it may still affect the relative proportions (or weights) used in the COSI for the different types of inputs, with the proportion of cost attributed to labor potentially falling and the proportion associated with miscellaneous inputs (where medication costs would be included) potentially growing.

Finally, it is also likely that the Affordable Care Act (ACA) had effects on the availability and use of different types of substance use services and thereby affected average costs of services. By extending insurance coverage for substance use services in both private and public plans, the ACA is expected to increase use of more medicalized forms of treatment (Buck, 2011). Because these treatments are provided by more highly trained clinicians, they are also likely to be costlier. Moreover, because the changes have occurred unevenly across states, they are likely to have affected state variations in costs. The formulas for the block grant allocations cannot take state actions, such as Medicaid expansion, into account, but state variation in costs may, to some extent, be indirectly affected by these changes. It is also important to note that, even with the expansion of availability of substance use treatment services, it continues to be true that the majority of people with substance use disorders do not receive treatment.

Weights

After a review of literature and discussion with our TAG and COR, we identified four potentially valuable sources of information on the relative contribution of different inputs to the total cost of providing services (see Table 5.1). Two are related to costs at community mental health centers, and two are more general.

- **Healthcare Cost Report Information System (HCRIS) Dataset—Community Mental Health Center (CMHC):** Maintained by the Centers for Medicare and Medicaid Services, the HCRIS data contain detailed data on operating costs for CMHCs. The main

limitation of the HCRIS CMHC cost report data is that they only cover CMHCs that bill Medicare.

- **New York State Consolidated Fiscal Reporting (CFR):** The CFR system in New York State (Office of Mental Health, undated) contains detailed cost data for both CMHCs and substance use treatment facilities operating in New York. All facilities licensed by the state Office of Mental Health or Office of Alcoholism and Substance Abuse Services are required to submit detailed financial reports on an annual basis. The content of the reports varies by the type of facility, but detailed information on major cost categories, including wages, rents, and equipment, is included. The reports require certification by a certified public accountant and thus are generally of high quality. Information from these reports, which to our knowledge is only available for New York State, could be useful for understanding variations across service sites in specific components of operating costs (Connor et al., 2017). The limitations of the CFR data are that they are only available for New York and that the estimates of the proportion of costs attributed to the different input components may not be representative of the nation.
- **Service Annual Survey (SAS) (North American Industry Classification System [NAICS] basis):** This is an annual, national survey of companies whose primary business or operation is to provide services to individuals, businesses, and governments. It includes information on expenses by type of expense (U.S. Census).
- **CMS geographic cost practice index (GCPI):** This includes relative prices for inputs for physician practices. It is updated every three years (CMS).

Table 5.1. Data Sources That Measure Relative Weights for COSI

Data Source	Strengths	Limitations
HCRIS Dataset—CMHC	<ul style="list-style-type: none"> • Detailed operating costs for CMHCs • Collected annually 	<ul style="list-style-type: none"> • Only includes CMHCs that bill Medicare and provide partial inpatient services
New York State CFR system	<ul style="list-style-type: none"> • Detailed operating costs for CMHCs and substance abuse centers • Certified by certified public accountant • Collected annually 	<ul style="list-style-type: none"> • Only available for New York State
SAS (NAICS basis)	<ul style="list-style-type: none"> • Detailed information on expenses by type of expense • Collected annually 	<ul style="list-style-type: none"> • Only includes employers, so will not include independent practices
CMS GCPI	<ul style="list-style-type: none"> • Relative prices for inputs to physician practices • Updated every three years 	<ul style="list-style-type: none"> • Only includes physician offices

Other possible sources of information on the costs of substance use treatment have been developed since the creation of the block grant formulas. Specifically, two new tools have been

developed to assist in estimating service costs. The drug abuse treatment cost analysis program (DATCAP), proposed by French et al. in the early 1990s, is a structured and scientifically based technical assistance tool for estimating cost of treatment services. The intent of DATCAP is to collect and organize detailed information on the resources used in treatment operations and the associated dollar costs. The guide also collects information on program revenues and client case flows (French et al., 1997). The second tool, called the Substance Abuse Services Cost Analysis Program (SASCAP), was developed by Zarkin and colleagues in the early 2000s. This method extends previous work and the DATCAP specifically by including both indirect labor and nonlabor resources in cost estimates. The authors of the tool found that service cost estimates were two to three times higher when they included indirect labor and nonlabor resources as opposed to those that only included direct labor costs. They concluded that studies that only included direct labor costs were seriously underestimating the true costs of providing treatment services (Zarkin, Dunlap, and Homs, 2004).

A number of studies have used these tools to estimate the costs of providing substance use treatment in specific settings. The results provide data that could be used to assess the relative contribution of different input components to the overall cost of providing services. However, the tools are typically used for the analysis of a specific program at a particular site, making it hard to generalize. The data have not been collected in any systematic or comprehensive way across states and types of service providers. Either of these tools may provide a helpful template for the collection and structuring of any data collection efforts undertaken in the future.

Based on our review of the available data sources, we chose to use the SAS for our analysis of potential changes in the weights in the COSI formula. It is nationally representative, is collected annually, and provides detailed information on expenses by type for various types of health care providers. The New York data have a similar level of granularity and are specific to mental health providers but are not nationally representative. The GCPI data only include physician offices and thus do not reflect a large proportion of mental health and substance abuse treatment services provided in outpatient clinics. The HCRIS data for CMHCs only include information on reimbursements from Medicare for partial hospitalization services and are known to have inaccuracies.

Wages

Labor costs are the principal component of the COSI and are a principal determinant of variation in costs between states. The current formula as described in regulation relies on state-level median wages for nonmanufacturing occupations in each state estimated by the Bureau of Labor Statistics (BLS). Since the last evaluation of this formula (Burnam et al., 1997), the BLS has increased its data collection to allow for more-granular analysis. These data now include state-specific information by occupation (U.S. Bureau of Labor Statistics, 2017) and support estimation of wages for those occupations that are specifically involved in the delivery of mental

health and substance abuse services. One concern with focusing on state-level wages for selected occupations is that the states may have influence on those wages. Teachers' wages, for example, are set by the states themselves rather than by the market, at least for public school teachers. If this is also true for some mental health or substance abuse treatment occupations, then we would need to consider how to address the potential for states to influence the wage component of the COSI. While states do set Medicaid reimbursement rates and may therefore have influence on wages for some mental health and substance abuse treatment professionals, states have little impact on overall wages for those occupations.

The BLS measure of wages is not the only one available in current databases. The Bureau of Economic Analysis also provides information on wages at the state level. This data source provides information at the industry level, which allows for evaluation of wages specific to the health care sector. However, it does not go so far as to report wages specific to mental health and substance abuse treatment. According to this data source, state growth rates in wages for all health care professions from 1998 to 2016 range from 3.9 percent for Rhode Island to 7.3 percent for Alaska. While both data sets are based on reliable sources, they have different strengths and limitations (see Table 5.2). Based on our review of the data sources, we determined that the BLS data, with their focus on occupation, are the appropriate source for use in the formula. However, there may be room to improve the wage estimates from this source being used in the COSI formula.

The written descriptions of the COSI indicate that it uses state-level median wages for nonmanufacturing occupations in each state based on the BLS data. The BLS data provide more-granular data by occupation that could be used to generate wage estimates that are more directly related to the services covered by the MHBG and SABG. The Bureau of Labor Statistics Employment and Wages from Occupational Employment Statistics (OES) survey data include wages for residential intellectual and developmental disability, mental health, and substance abuse facilities. These estimates exist at both the state level and the substate level (metropolitan and nonmetropolitan areas) (U.S. Bureau of Labor Statistics, 2017). After working to replicate the allocations using the data that feed into the allocation formulas, we found that SAMHSA has already made this improvement and is using the more-granular occupation data available from BLS.

Table 5.2. Data Sources That Measure Costs of Wages

Data Source	Strengths	Limitations
Bureau of Labor Statistics Employment and Wages from OES survey	<ul style="list-style-type: none"> • Includes data for all 50 states • Well-established methodology • Includes 800 occupations • Collected annually 	<ul style="list-style-type: none"> • Estimates do not include self-employed people or owners/partners in unincorporated firms
Bureau of Economic Analysis— National Income and Product Accounts	<ul style="list-style-type: none"> • Includes data for all 50 states • Well-established methodology • Provides estimates by industry classification • Collected annually 	<ul style="list-style-type: none"> • Provides aggregate estimate of wages paid in each industry and total employment, requiring calculation of average wage (total paid divided by total employed) • Does not provide estimates specific to mental health and substance abuse treatment providers

Rents

As evidenced in the COSI formula, rents are weighted significantly less than wages in the COSI formula, reflecting their lower contribution to the total cost of providing services. Previous research has found, however, that the rent index varies approximately as much as wages (Burnam et al., 1997). This research also found that the rent index alone accounted for comparatively little interstate variation in costs. Data limitations made it difficult to estimate relevant rents for the COSI when the formula was being developed. The index for rents in the COSI formula uses state-level fair market rents for residential structures as reported by HUD as a proxy for the commercial real estate rents that would be required for the delivery of mental health and substance use treatments (Burnam et al., 1997). At the time the formula was developed, there were no sources for state-level estimates of commercial rents.

In recent years, data specific to commercial real estate have become available (see Table 5.3). The data are primarily from private sources. For example, CoStar Commercial Real Estate collects data on private commercial real estate transactions within the United States (CoStar, 2017). This data source is proprietary, and accessing the data requires a paid membership. A number of other private data sources are also available, including Reis Commercial Data and Analytics. These proprietary data sources could be used to develop a rent index that is more specific to the types of spaces used in the delivery of mental health and substance use care. Using these data, we could evaluate the extent to which the pattern of geographic variation in commercial rents differs from the pattern of residential rents. If there was a difference, our analysis could assess how the use of more-specific data for the cost of renting commercial space would affect state allocations. However, the proprietary nature of the data presents a barrier to using these data on an ongoing basis for calculating a state-level rental index for the COSI.

While there are limitations associated with using fair market rents for the rental component of the formula, we did not identify any better sources that are publicly available and thus did not consider any potential changes to this component of the COSI.

Table 5.3. Data Sources That Measure Costs of Rents

Data Source	Strengths	Limitations
HUD fair market rents	<ul style="list-style-type: none"> • Representative of all 50 states • Well-established methodology • Collected annually 	<ul style="list-style-type: none"> • Measures residential rents, not commercial
CoStar Commercial Real Estate	<ul style="list-style-type: none"> • Includes all 50 states • Frequently cited in peer-reviewed literature 	<ul style="list-style-type: none"> • Privately collected and managed data source • Requires membership fee to access

Miscellaneous Resources

The COSI assumes that the prices of miscellaneous resources, such as supplies, drugs, and other resources, are constant across states. The justification for this assumption is that most drugs, medical supplies, and equipment items are sold in a national market and can be purchased at the same price nationwide. While this argument has merit, there may be some flaws in the assumption of consistent miscellaneous costs across states. For instance, states such as Alaska or Hawaii, as well as rural communities, may have significantly higher costs for equipment or supplies. The costs of supplies and equipment can be discounted based on high volume, which may unfairly penalize smaller practices (Burnam et al., 1997). However, we did not identify any readily available sources of information on local prices of relevant products. Therefore, we did not consider any potential changes to the miscellaneous resources component of the COSI.

Potential Change to the Cost of Services Index in the MHBG and SABG Formulas

We evaluated one potential change to the cost element of the MHBG and SABG formulas, using an alternative data source to update the relative weighting of the components of the index. We used the SAS to estimate the relative contribution of wages, rent, and supplies to the cost of providing mental health and substance abuse treatment services. The SAS provides detailed information on expenses of different types for different industries (NAICS code). We aggregated the detailed expense types into four categories that roughly match up to weights in the formula: labor costs (wages), facility costs (rent), supplies, and other (Figure 5.1).

Figure 5.1. Expenses from the Service Annual Survey Data Were Classified as Wages, Rent, Supplies, and Other

Category	SAS Expense Type	Category	SAS Expense Type
Wages	Defined benefit pension plans	Supplies	Data processing and other purchased computer services
	Defined contribution plans		Depreciation and amortization charges
	Gross annual payroll		Expensed equipment
	Health insurance		Expensed purchases of other materials, parts, and supplies
	Payroll taxes, employer paid insurance premiums (except health), and other employer benefits		Expensed purchases of software
Rent	Lease and rental payments for land, buildings, structures, store spaces, and offices		Lease and rental payments for machinery, equipment, and other tangible items
	Purchased electricity		Medical supplies
	Purchased fuels (except motor fuels)		Purchased repairs and maintenance to machinery and equipment
	Purchased repairs and maintenance to buildings, structures, and offices	Other	All other operating expenses
	Water, sewer, refuse removal, and other utility payments		Governmental taxes and license fees
			Professional liability insurance
			Purchased advertising and promotional services
			Purchased communication services
			Purchased professional and technical services

SAS provides the data by industry using NAICS codes at the four-digit level. We selected NAICS code 6214, Outpatient Care Centers, which includes community mental health and substance abuse centers, along with a number of other nonhospital outpatient providers. We selected this industry group because it most closely reflects the providers supported by the MHBG and the SABG. Within this industry, we estimated the proportion of total expenses that are attributable to each broad category in two ways that reflect a different treatment of the “other” category of expenses. We did this because it is not clear where the other expenses are included in the current weights. First, we combined the supplies and other categories together and estimated the proportions for wages, rent, and the combined supply/other category. Second, we excluded the other category from the both the numerator and the denominator and calculated proportions for wages, rent, and supplies. We estimated the proportions annually from 2013 to 2016 to see how stable they were from year to year. Finally, we simulated the impact of using the weights derived from the SAS in place of the current weights in the COSI formula.

Adjusting Weights for Cost of Services in MHBG and SABG Evaluation

The current formula weights wages at 75 percent, rent at 15 percent, and supplies at 10 percent. Across both of the scenarios we used to estimate the weights from the SAS data, we saw reductions in the proportion of expenses attributed to wages and rent and substantial increases in the proportion of expenses attributed to supplies (Figure 5.2) relative to the current formula. When supplies and other are combined, wages account for approximately 55 percent of

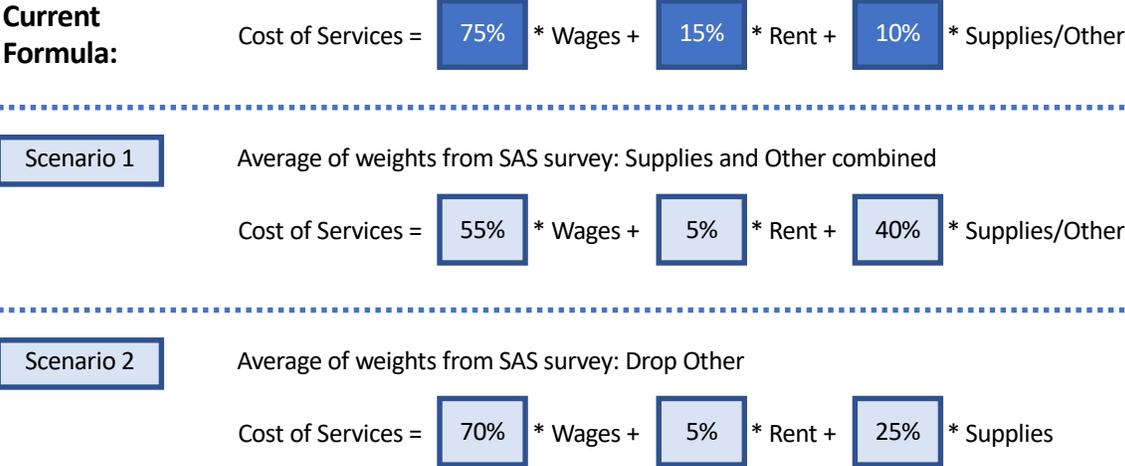
expenses, rent accounts for 5 percent, and supplies/other accounts for 40 percent. In the scenario that excludes the “other” category, we found that wages were approximately 70 percent of expenses, rent was 5 percent, and supplies were 25 percent. From 2013 to 2016, the proportions were relatively stable, increasing or decreasing by only a few percentage points.

Figure 5.2. Relative Contribution of Expenses by Category for Outpatient Care Centers

Analysis from the 2013-2016 Service Annual Survey data:		Percentage of total expenses			
Outpatient Care Centers	Category	2013	2014	2015	2016
Scenario 1: Combine Supplies and Other	Wages	55%	55%	54%	53%
	Rent	6%	6%	5%	5%
	Supplies/Other	36%	37%	41%	41%
Scenario 2: Drop Other	Wages	72%	72%	69%	68%
	Rent	7%	7%	7%	7%
	Supplies	21%	21%	24%	25%

We simulated the impact of using the weights derived from the 2016 SAS data on the MHBG and SABG allocations (Figure 5.3).

Figure 5.3. Two Different Reallocations of Weights



Impact of Alternative COSI Weights on State Allotments

We compared the simulated allotments using the new weights and the current allotments without current minimum limits. On the whole, a small percentage of the total block grant funding would shift between states, approximately 0.7 to 1.2 percent, if the new weights were adopted (Table 5.4). Some states, however, would experience somewhat bigger changes. For example, under Scenario 2 (other expenses excluded) for the MHBG, a total of 32 states would see a decrease, with the largest decrease being approximately \$1 million, which represents about

5 percent of that state’s allotment under the current formula (without current minimums). We note that the median decrease is close to 0, suggesting that most states would see very small decreases. The impact of including only supplies in costs is lower because the resulting weights are closer to the current weights.

Table 5.4. Summary of Impacts of Changes to Cost of Services Index (without current minimum limits, compared with current scenario without minimum limits)

Change	% of Fund Reallocated	# States		\$ Decrease		% Decrease		\$ per Person Decrease	
		with Decrease	with >5% Decrease	Largest	Median	Largest	Median ^a	Largest	Median
SABG									
Scenario 1. Average weights: supplies/other category combined	1.16%	26	4	\$5.8M	\$0.3M	7.2%	1.7%	\$0.43	\$0.10
Scenario 2. Average weights: drop other	0.65%	31	1	\$3.5M	\$0.0M	5.3%	0.0%	\$0.31	\$0.00
MHBG									
Scenario 1. Average weights: supplies/other category combined	1.17%	26	3	\$1.8M	\$0.1M	7.3%	1.8%	\$0.13	\$0.03
Scenario 2. Average weights: drop other	0.65%	32	1	\$1.0M	\$0.0M	5.3%	0.0%	\$0.09	\$0.00

^a This is the median percentage decrease among states that experience a decrease.

State Fiscal Capacity

In addition to including a cost component that captures differences among states in the cost to deliver care, the mental health and substance use block grant allocation formulas also include a fiscal capacity component to address differences in the ability of states to generate revenue to pay for services. The current measure used to estimate a state’s fiscal capacity in these formulas is drawn from the Treasury Department’s series on TTR (U.S. Department of the Treasury, 2017). This is based on data from the Bureau of Economic Analysis and the Internal Revenue Service’s Statistics of Income Division. Previous analysis found that the TTR was superior to the two most relevant alternatives (Burnam et al., 1997): per capita personal income (PCPI) and the representative tax system (RTS). PCPI was the measure initially included in the formula for fiscal capacity but was replaced by TTR because PCPI does not comprehensively capture all of the resources a state has for financing mental health and substance abuse services. The downside of RTS, which calculates the average tax rate over all states and then applies it to each state’s particular tax base, is that it may reflect economic choices by state government rather than the state’s actual capacity. This is especially concerning because it implies a lack of independence, and, therefore, states could make different choices to benefit more from the block grants.

In 1999, the Treasury Department began calculating TTR annually for use in the block grant allocation formula. The method used by the Treasury to calculate TTR has changed over time. Originally, the method was based on an average of the state's shares of aggregate income flows produced (gross state product) and personal income. An analysis by Compson and Navratil (1997) indicated that this did not reflect the intent of the TTR concept. In response, the Treasury updated the methodology to more directly subtract out income flows that states could not tax (e.g., federal indirect business taxes) and add in flows they could potentially tax (e.g., earnings of state residents who work outside of state borders). However, there is still some debate about the best measures of state fiscal capacity. Some have argued that some of the cross-border income flows currently being added in are not taxable and should not be included in the measure. Others have recommended alternative measures. For example, in a recent report, Gordon, Auxier, and Iselin (2016) measured fiscal capacity using the representative revenue system (RRS) approach. This method establishes a state-specific revenue base and then applies a national tax rate to estimate the revenue that could be generated. Using this method, they found large gaps in state revenue capacity versus expenditure need; however, the inputs to RRS are not standardized, so it is more difficult to implement as a transparent, easily repeatable input. We did not identify any alternative measures of fiscal capacity that we deemed to be better than the TTR and that are available on an ongoing basis for use in the formula. Thus, we did not consider alternatives to the TTR for the measurement of fiscal capacity in the MHBG and SABG allocation formulas.

Conclusion

The results of the environmental scan indicate that changes in the health care industry and environment more generally may not be reflected in the weights and data used in the current COSI. Based on our assessment and analysis of the available data sources, we found that the data currently used to calculate the COSI have some limitations but are the best available data for ongoing use in the formula. Therefore, we did not assess any changes to the underlying data sources. Our analysis of the weights for the components of the COSI (labor, rents, and supplies/other) indicated that the current weights do not reflect the relative proportion of these expense categories for outpatient care centers. If the weights were updated, a small percentage of the total block grant funding would shift between states. Some states, however, would experience changes as large as 7 percent.

As described above, we did not identify any alternative measures of fiscal capacity that we deemed to be better than the TTR and that are available on an ongoing basis for use in formula. Thus, we did not consider alternatives to the TTR in the MHBG and SABG allocation formulas.

6. Community Mental Health Services Block Grant

This chapter describes our analysis of the population need component of the MHBG formula. We then show how changes in the population need and cost of services components of the formula would impact the distribution of state allotments. Finally, we consider potential alternative hold-harmless strategies that could buffer states against large decreases in grant allotments if formula components are updated.

Population Mental Health Need

As noted above, the existing population need component is based solely on the age distribution of the population, with age groups weighted by the age-group–specific prevalence of mental disorders according to national data. Since the last revision of the formulas, there have been large advances in methods for studying population need and new sources of data with greater detail on predictors of population need. Based on the environmental scan and input from the TAG and our COR, we focused attention on three potential changes that might be made to improve the correspondence between the MHBG allocations and variations in the levels of population need for mental health treatment across U.S. states and territories:

- The prior formula only took into account need among adults in each state. Can a revised formula also take account need among children under 18 years of age?
- The prior formula used national data to construct a general model of population need, with state allocations being derived by inputting state characteristics into the model. Are data now available to arrive at direct estimates of population need, based on population surveys rather than on statistical modeling?
- What is the impact of including additional predictor variables or direct estimates of population need into the formula on the allocation of MHBG funds across states?

We further describe several things in this chapter. First, we considered the impacts of potential changes to the MHBG formula, including adding a child component. We also examined whether using direct estimates in place of model-based estimates was favored, and our TAG reached consensus in favor of direct estimates. Finally, data sources for direct estimates and estimates of their impact on MHBG allocations are discussed.

Population Mental Health Need Among Adults

Serious Mental Illness

By law, population need for MHBG funds is based on the prevalence of SMI. Federal agencies consider SMI to be indicated by a combination of a psychiatric disorder, defined by

clinical criteria, with significant functional impairment in carrying out everyday activities, such as maintaining employment, completing educational milestones, and establishing stable familial relationships. An official definition of SMI, published in the Federal Register in 1993, considers the category to include the following:

persons aged 18 or older who currently or at any time in the past year have had a diagnosable mental, behavioral, or emotional disorder (excluding developmental and substance use disorders) of sufficient duration to meet diagnostic criteria specified within DSM-IV [Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition] that has resulted in serious functional impairment, which substantially interferes with or limits one or more major life activities. (SAMHSA, 1993)

It is important to note that SMI is not meant to be a clinical diagnosis, but a combination of disorder and functional impairment to identify individuals who are likely to be in need of mental health services. At the time that the MHBG formula was developed, the data on SMI from large epidemiological surveys were limited. Weights were developed from a report by the Institute on Health and Aging that summarized available epidemiological data.

Data on Serious Mental Illness

Since the last revision of the MHBG formula, additional data sources have been developed with population-level information on the prevalence of SMI. There are now four surveys that provide epidemiological information on the prevalence of SMI in the United States and its variation across states and its demographic correlates (Table 6.1). Each of these surveys has its strengths and weaknesses.

- **National Survey of Drug Use and Health (NSDUH):** Sponsored by the Substance Abuse and Mental Health Services Administration (SAMHSA), the NSDUH is the nation's primary surveillance survey for substance use and substance use disorders. The survey is repeated annually in cross-sectional samples designed to be representative of each of the 50 states and the District of Columbia. The survey also includes a measure of SMI that combines information from the Kessler 6, a measure of serious psychological distress, and the World Health Organization Disability Assessment Scale, a measure of functional impairment (Hedden et al., 2012; Novak et al., 2010).
- **National Health Interview Survey (NHIS):** Sponsored by the National Center for Health Statistics (NCHS), the NHIS is another annual survey of the U.S. population. The NHIS has a broader health focus than the NSDUH, but it includes the K6 measure of serious psychological distress among its health measures. However, the NHIS lacks a direct measure of functional impairment that is due to mental illness, an important component of SMI.
- **National Comorbidity Survey Replication (NCS-R and NSC-A):** The NCS-R assesses a broad range of psychiatric disorders and functional impairment in a representative sample of

adults, but it was a one-time survey, conducted in 2001–2002. The NCS-R may be a valuable source of information on correlates of SMI but cannot provide state-level comparisons. The NCS-A samples adolescents age 13 to 18.

- **Behavioral Risk Factor Surveillance System (BRFSS):** The BRFSS collects data on a broad range of health-related behaviors and also has a large sample size. However, mental health assessments in the BRFSS have been inconsistent from year to year (Hedden et al., 2012; Kessler et al., 2003).

Table 6.1. Data Sources on Serious Mental Illness

Data Source	Strengths	Limitations
NSDUH	<ul style="list-style-type: none"> • Representative of each of the 50 states and D.C. • Estimates prevalence of serious mental illness in adults, ages 18 and over • Additional assessment of major depression 	<ul style="list-style-type: none"> • No respondents under 12 years of age. • No assessment of SED • Does not include institutional population or homeless population • State-level estimates have sampling error, especially for smaller states
NHIS	<ul style="list-style-type: none"> • Representative of all 50 states • Assessment of serious psychological distress 	<ul style="list-style-type: none"> • Data need to be collapsed for state-level estimates • No complete assessment of serious mental illness • Relies on parental report for adolescent respondents
NCS-R and NCS-A	<ul style="list-style-type: none"> • Nationally representative • Assesses specific psychiatric disorders and functional limitations • Samples of adolescents, ages 13 to 18, and adults, ages 18 and over 	<ul style="list-style-type: none"> • Not representative at the state level • No standardized assessment of serious mental illness • Data collected in 2001–2002 • No respondents under 13 years of age
BRFSS	<ul style="list-style-type: none"> • Representative at the state level • Mental health assessments in selected states, 2006–2010 • Assessment of alcohol use 	<ul style="list-style-type: none"> • No ongoing assessment of mental health status • Interviews conducted by telephone rather than in person • No respondents under age 18

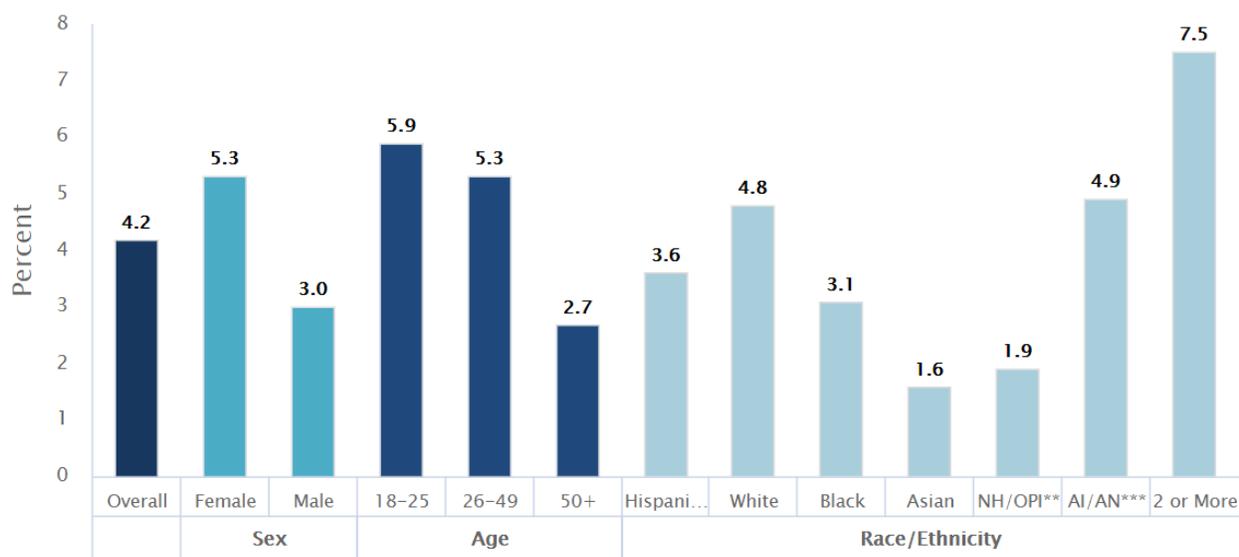
Of these four surveys, the NSDUH has several distinct advantages as a source of information on allocation of the MHBG funds to states. The NSDUH is a household survey based on face-to-face interviews, which yield higher-quality data than phone surveys; it is repeated annually, allowing for responsiveness to trends over time; and it has a measure of SMI that fits the official definition and has been validated by clinical follow-up studies.

Sociodemographic Predictors of SMI Need

Age and Gender

SMI varies among individuals 18 years of age and older. According to the most recent data from the NSDUH in 2016, the prevalence of SMI is highest in the 18- to 25-year-old age group (5.9 percent), followed by adults ages 26–49 (5.3 percent) and seniors over age 50 (2.7 percent). Across all three age groups, women had higher prevalence rates than men (Center for Behavioral Health Statistics and Quality, 2017). These patterns are consistent with previous years of the NSDUH and with results from other surveys, such as the NCS-R (Kessler et al., 2005). Figure 6.1 shows the rates of SMI by gender, age, and race/ethnicity from NSDUH 2016 data.

Figure 6.1. Prevalence of SMI Among U.S. Adults



*All other groups are non-Hispanic or Latino | **NH/OPI = Native Hawaiian / Other Pacific Islander
 ***AI/AN = American Indian / Alaskan Native

SOURCE: SAMHSA, 2017a.

Race/Ethnicity

Serious mental illness also varies considerably by race/ethnicity. According to NSDUH 2016 data, the prevalence of SMI was consistently lowest among Asian Americans (1.6 percent) and highest among American Indian/Alaska Natives (4.9 percent). The prevalence of SMI is lower among non-Hispanic Blacks (3.1 percent) and Hispanics (3.6 percent) than non-Hispanic whites (4.8 percent). These patterns are consistent with studies of racial/ethnic differences in the prevalence of psychiatric disorders (Breslau et al., 2006; Center for Behavioral Health Statistics and Quality, 2017).

Geographic Residence

SMI may not vary all that much by geographic region and urbanicity. While urban environments are associated with higher levels of stress, depression, anxiety, and other mental health complications, recent studies using the NSDUH and NCS-R observed no significant relationship between urbanicity and SMI (Breslau et al., 2014; McCall-Hosenfeld, Mukherjee, and Lehman, 2014). For example, Breslau et al. (2014) only found the prevalence of SMI to be higher in areas with intermediate population density (small metropolitan and semirural areas). According to NSDUH data, SMI is prevalent nearly equally (roughly 4 percent) among adults 18 and over across all four census regions (West, Northeast, Midwest, South) (Center for Behavioral Health Statistics and Quality, 2017). Thus, rates of SMI do not appear to vary significantly by geographic residence.

Employment

Limited research has examined how employment affects SMI. In nationally representative data sources, across all adult age groups, unemployed adults (6.5 percent) had a consistently higher prevalence of SMI than individuals working part time (5.4 percent) or full time (3.1 percent), with the exception of young adults, for whom individuals working part time had the highest prevalence of SMI (Center for Behavioral Health Statistics and Quality, 2017). Thus, unemployment seems to be associated with SMI among adults and is higher among part-time employed adolescents.

Education

We did not find literature using national data sources that detailed rates of SMI by education. However, examining SMI by education is important because of the known impact of SMI and educational attainment (Mojtabai et al., 2015). According to National Epidemiologic Survey on Alcohol and Related Conditions (NESARC) Wave 1 data, the odds of having a mental disorder tended to be more common among non-college-attending individuals when examining individuals ages 19 to 25 years of age, depending on the disorder (Blanco et al., 2008). For example, there were no significant differences between the two groups in the odds of having at least one mood or anxiety disorder. However, personality disorders (avoidant, dependent, paranoid, schizoid, and antisocial personality disorders) were significantly more common among non-college-attending individuals. Thus, college attendance appears to have some influence on mental disorder, but more research is needed specifically on the effects of varying levels of education on SMI.

Socioeconomic Status

There are some data on the rates of SMI for individuals with incomes below the federal poverty level, but there is limited research examining SMI and functional impairment more generally by socioeconomic status (SES) in national data sources. According to NSDUH data in

2016, there were slight variations in the prevalence of SMI among individuals with incomes below the federal poverty level (Center for Behavioral Health Statistics and Quality, 2017), with those having incomes less than 100 percent below the federal poverty level experiencing slightly higher rates of SMI (6.7 percent) than those having incomes 100–199 percent and 200 percent or more below the federal poverty level (5.6 percent and 3.3 percent, respectively). SES is associated with the prevalence of mental disorders (Mojtabai et al., 2015). According to NESARC data from both waves, individuals with a household income of less than \$20,000 per year had a higher risk of mood disorders than individuals with a household income of \$70,000 or more. The authors did not find evidence, however, that an increase in income would help reduce the risk of developing a mental disorder (Sareen et al., 2011). Thus, there are some data showing variations in SMI for those with incomes below the federal poverty level but no data that we are aware of from national data sources that have reported and published rates of SMI by other SES levels.

Population Need Among Children

Serious Emotional Disturbance

For children or persons up to age 18, SAMHSA uses SED as a parallel concept to SMI in adults; SED is defined by the occurrence of a psychiatric disorder with functional impairment among children and adolescents. SED is formally defined in the Federal Register:

Children (from birth to age 18) who currently or at any time during the past year have had a diagnosable mental, behavioral, or emotional disorder of sufficient duration to meet diagnostic criteria specified within DSM-III-R [Diagnostic and Statistical Manual of Mental Disorders, Third Edition, Revised] that resulted in functional impairment, which substantially interferes with or limits the child's role or functioning in family, school, or community activities. These disorders include any mental disorder (including those of biological etiology) listed in DSM-III-R or their ICD-9-CM equivalent (and subsequent revisions) with the exception of DSM-III-R 'V' codes, substance use, and developmental disorders, which are excluded, unless they co-occur with another diagnosable serious emotional disturbance. (SAMHSA, 1993)

However, in contrast with SMI, there are no widely accepted methods for defining SED in practice or assessing SED in surveillance surveys. Existing sources of epidemiological data on constructs related to SED are shown in Table 6.2. We described the NCS-A and NHIS above. An additional data source is the National Survey of Children's Health (NSCH), a telephone survey of 0- to 17-year-olds that was conducted three times between 2003 and 2012 and then in 2016 by the Census Bureau. It is designed to be representative of the U.S. population and provides individual state-level data. Although none of these studies directly estimate state variation in SED, they may provide useful information on state variations and predictors of mental health problems in children.

Table 6.2. Data Sources That Can Measure Serious Emotional Disturbance

Data Source	Strengths	Limitations
National Comorbidity Survey Replication Adolescent Supplement (NCS-A)	<ul style="list-style-type: none"> • Representative of all 50 states • Representative sample of middle schools, junior high, and high schools • Obtains respondents from adolescents themselves 	<ul style="list-style-type: none"> • No respondents under 13 years of age • Excludes nonstudent respondents
National Health Interview Survey (NHIS)	<ul style="list-style-type: none"> • Representative at the state level • Includes ages 4–17 	<ul style="list-style-type: none"> • Relies on parental report for adolescent respondents • Varying versions of the Strengths and Difficulties Questionnaire (SDQ)¹ • Excludes institutionalized population (e.g., children living in psychiatric hospitals, juvenile justice centers)
National Survey of Children's Health (NSCH)	<ul style="list-style-type: none"> • Representative of all 50 states • Includes ages 0–17 	<ul style="list-style-type: none"> • Relies on parental report for adolescent respondents • Excludes institutionalized population • Limited measurement of psychiatric disorders

Sociodemographic Predictors of SED Need

Given the uncertainty about the definition and assessment of SED in the population, less is known about its prevalence and predictors. In this section, we summarize results from three studies that take different approaches to defining SED (the NCS-R, NSDUH, and NHIS). NCS-R defined SED as a psychiatric disorder with concurrent disability defined by the Children's Global Assessment Scale (CGAS). Using this definition, the study found the prevalence of SED to be about 8 percent in the general population. SED prevalence did not differ by gender, but SED was more prevalent in 16-year-olds than other adolescent ages (the study included children ages 13 to 18) and less prevalent among non-Hispanic Blacks than non-Hispanic whites (Kessler et al., 2012).

The NSDUH does not have a direct assessment of SED, but it does assess major depressive disorder and associated impairment among 12- to 17-year-olds. Major depression is assessed in the NSDUH using a fully structured diagnostic interview module based on the Composite International Diagnostic Instrument, and impairment is assessed using the Sheehan Disability scale (Breslau et al., 2017; Mojtabai, Olfson, and Han, 2016). According to NSDUH data from 2016, 12.8 percent of 12- to 17-year-olds had major depression in the past year, and about 9 percent met criteria for depression with severe impairment in at least one of the four domains in which it was assessed: home, school, family relationships, and social life (Center for Behavioral

¹ NHIS data in 2001, 2003, and 2004 use an extended version of the SDQ, whereas the 2002, 2005, 2006, 2007, and 2010 editions use a brief version (Pastor, Reuben, and Duran, 2012).

Health Statistics and Quality, 2017). In the NSDUH adolescent sample, major depression with impairment is higher among females than males, among those age 16 and 17 than those between age 12 and 15, and among non-Hispanic whites than other racial/ethnic groups (Center for Behavioral Health Statistics and Quality, 2017).

According to NHIS data combined from 2001 to 2007, an estimated 7.4 percent of children between the ages of 4 and 17 experience serious emotional and behavioral problems as measured by a high score on a brief version of the SDQ or an endorsement of a single item of serious overall emotional and behavioral difficulties. Rates of SED are higher among those ages 15 to 17 compared with those ages 4 to 7 (Pastor, Reuben, and Duran, 2012). Males tend to have higher rates of SED than females; whites and Blacks tend to have higher rates of SED than Hispanics, though the difference between whites and Blacks varies depending on the measure of severe functional impairment (Pastor, Reuben, and Duran, 2012).

Taken together, the field has measured SED in a variety of ways. Our TAG confirmed that the definitions the NHIS uses appear to be the most comprehensive.

Assessing Five Potential Changes to the MHBG Population Need Formula

Based on the environmental scan and input from the TAG and our COR, we examined a range of alternative scenarios for revising the MHBG formula. Five of these scenarios, which represent the most important decision points, are shown in Figure 6.2. Each scenario involves either a revision of the weights used in the current formula, a revision of the components of the formula itself, or an alternative data source. We then created simulations of the MHBG allocation using each scenario and compared these allocations with the current allocation. The impacts of each scenario were estimated without accounting for the minimum allocations.

Figure 6.2. Five Scenarios Tested for Impact of Changes to Formula on Allocation of MHBG Funds

Scenario 1	Weight to current year's population from Census
Scenario 2	Updated Weights: Current prevalence of SMI
Scenario 3	Updated Weights: Add prevalence of SED
Scenario 4	Updated Weights: Replace with more detailed demographic categories
Scenario 5	Direct Estimates based on NSDUH estimates

- In Scenario 1, each state is weighted simply by its total population, without consideration of any population characteristics. This scenario represents the simplest allotment rule and allows us to examine the impact of adopting a more basic allotment rule.
- In Scenario 2, we updated the current allocation formula with new weights based on recent data from the NSDUH. The terms of the formula are not changed. This scenario allows us to assess the impact of using weights for age groups that are more robust methodologically and more current than the weights used in the existing formula.
- In Scenario 3, we added a new term to the formula to represent the population under age 18. This population is weighted based on information about the prevalence of SED among children ages 4 to 17. This scenario allowed us to examine the impact of considering need among children in the formula.
- In Scenario 4, we considered including additional predictors of mental health need to the allocation formula. The predictors we consider, based on the environmental scan, are age and educational attainment. This scenario allows us to examine the impact of updating these demographic indicators and their weights to measure state population need. The new indicators and weights are based on statistical models predicting the probability of SMI among adults.
- In Scenario 5, we used direct estimates of the prevalence of SMI in each state, based on the NSDUH. Estimates of the prevalence of SMI for each state were available from the NSDUH using the online data analysis tool. This scenario allowed us to examine the impact of using direct rather than indirect estimates of population need for a state.

To create Scenario 2, which updates the age-group prevalence estimates that are used as weights in the current formula, we replaced the current weights with new age weights based on recent data from the NSDUH. As noted in the environmental scan, these data are both more current and more valid as estimates of the population prevalence of SMI because of improvements in sampling and measurement. The new prevalence estimates under Scenario 2 were compared with the current ones in Figure 6.3. In contrast with the current formula, Scenario 2 places less weight on the young adult to early middle age group compared with the younger and older groups. In addition, Scenario 2 places less weight on older populations, those 65 and older, than the current formula. The age categories available in the public NSDUH data are slightly different than the age categories used in the current formula. When we compared the impact of using different age categories, we found nearly identical impact for both age category definitions. The correlation between allotments under each definition was 0.999.

Figure 6.3. Updated Estimates of the Prevalence of SMI (Scenario 2) and Addition of the Prevalence of SED (Scenario 3)

<u>Current Formula</u>	<u>Scenario 2</u>	<u>Scenario 3</u>
Age 18-24 10.7%	Age 18-25 6.2%	Age 18-25 6.2%
Age 25-44 16.6%	Age 26-49 5.5%	Age 26-49 5.5%
Age 45-64 9.9%	Age 50-64 4.0%	Age 50-64 4.0%
Age 65+ 8.2%	Age 65+ 1.1%	Age 65+ 1.1%
Age 5-17 0.0%	Age 5-17 0.0%	Age 5-17 3.6%

Note that neither the current formula nor Scenario 2 places any weight on the under-18 population. To create Scenario 3, we estimated the prevalence of SED among children ages 5–17 using data from the 2016 NHIS. The NHIS assesses SED in children and adolescents ages 5–17 with the SDQ. According to that survey, the prevalence of SED is 3.6 percent, as reflected in the weight for the ages 5–17 group in the third column of Figure 6.3.

Scenario 4 was developed by selecting the optimal logistic regression model for predicting the probability of SMI among adults using the covariates considered for inclusion in the formula, age and educational attainment. We compared models that included only main effects of age and education, as well as models adding interactions between age and education. The optimal model was identified by estimating a series of models with a range of possible specifications and comparing them using the BIC, a statistic that evaluates the fit of a model relative to its complexity. The model that best balances fit and complexity, according to the BIC, is one that includes age and educational attainment without their statistical interaction. Regression statistics for the best model are shown on the left-hand side of Figure 6.4. In the final model, we collapsed the two younger age groups because the prevalence of SMI did not significantly differ across these two groups. The final, optimal regression model was then used to estimate the prevalence of SMI for each population group defined by values of age and education. This analysis shows the highest prevalence of SMI among adults younger than 50 relative to those 50–64 years of age and the lowest prevalence among those 65 or older. For education, the highest prevalence of SMI was found among those with some college education relative to those with a high school education or less, with the lowest prevalence among those with a college degree. Even though

the model in Figure 6.4 was the best-performing model among those we tested, the concordance score is 46 percent. This means that the model correctly predicts in less than half of cases whether or not an individual in the NSDUH survey was assessed as having SMI.

Figure 6.4. Development of Prevalence Estimates for Scenario 4

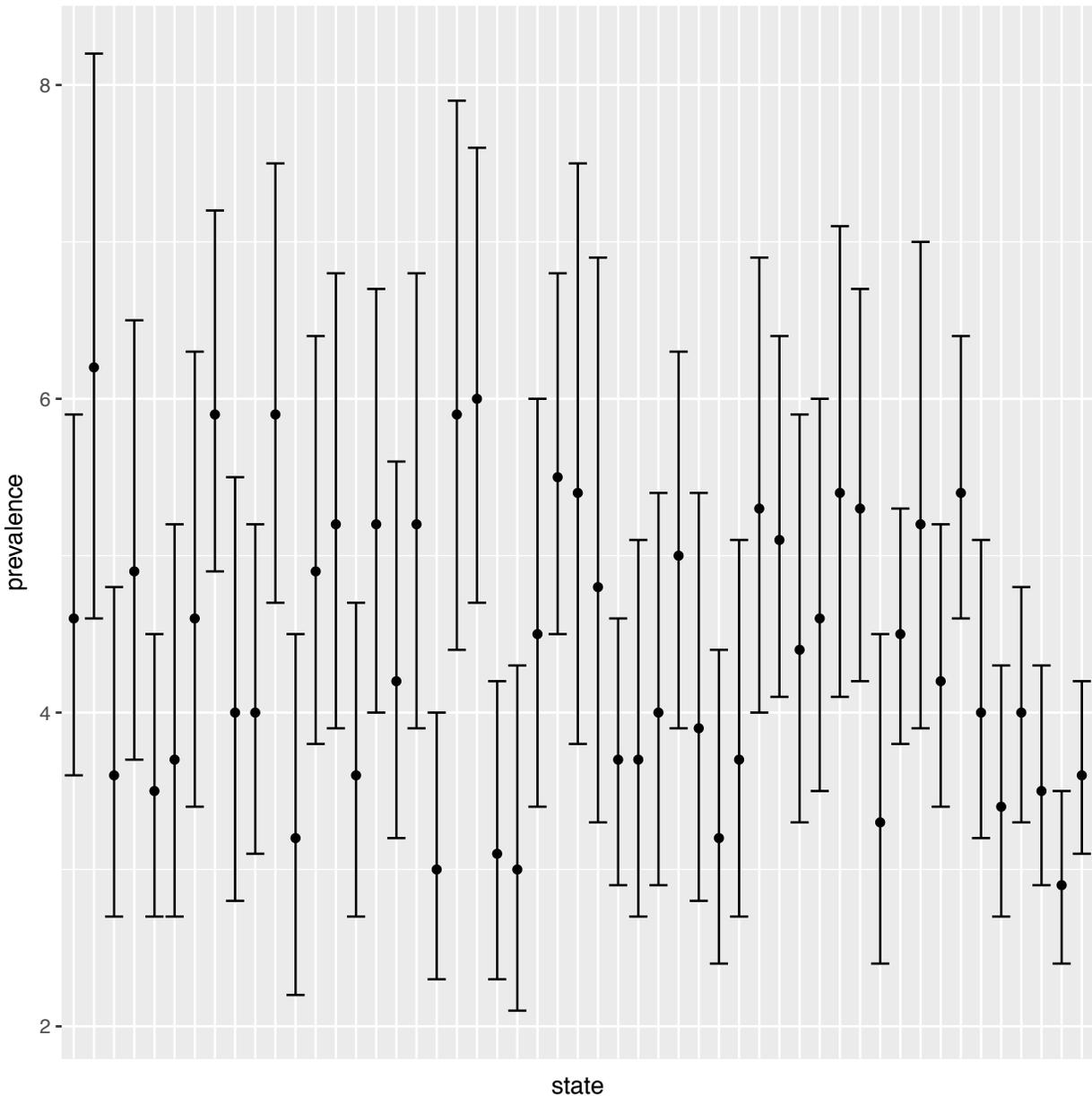
The final adult SMI model including Age and Education categories  The estimated prevalence of SMI in each group based on the final model

Variable	Coeff Est	Std Err	T-Stat	p-value
Intercept	-2.89	0.05	-58.89	<0.001
Age: 50-64	-0.31	0.10	-3.29	0.002
Age: 65+	-1.61	0.21	-7.52	<0.001
Some College/ Associates	0.35	0.07	5.15	<0.001
College	-0.27	0.07	-4.16	<0.001

Age	Education	Prevalence
18-49	Through HS	5.3%
	Some College	7.3%
	College	4.0%
50-64	Through HS	3.9%
	Some College	5.4%
	College	3.0%
65+	Through HS	1.1%
	Some College	1.5%
	College	0.8%

The need estimates used in Scenario 5 were derived from direct estimates of the prevalence of SMI in each state in the NSDUH. As noted, the NSDUH is appropriate for this purpose because the sample was designed to be representative of the population of each of the 50 states and the District of Columbia. These estimates were taken from the online analysis system of the Substance Abuse and Mental Health Data Archive, which is maintained by SAMHSA. Figure 6.5 shows the state-level prevalence estimates with 95-percent confidence intervals sorted from smallest state to largest state. The uncertainty of these sample estimates means that while the point estimates differ across states, the true prevalence rates between two states may be similar or even reversed in some cases. In general, smaller states have larger intervals, and larger states have smaller intervals.

Figure 6.5. State-Level Prevalence of SMI with 95-Percent Confidence Intervals



Impact of Alternative Population Need Estimates on State Allotments

Using the alternative population need prevalence estimates described previously, we conducted a series of simulations in which we examined the impact that adopting each scenario would have on the allocation of MHBG funds across states. In Table 6.3, we summarize the results of these simulations in terms of the extent to which the allocation under each scenario would differ from the current allocation. These differences are characterized by the total percentage of MHBG funds that would be reallocated under each scenario and the number and

characteristics of the states that would see a decrease in their MHBG funding, assuming that the total amount of funding remained the same and that no minimum funding levels were enforced.

Table 6.3. Summary of Impacts of Changes to MHBG Population Need Index for Scenarios 1–5 (without current minimum limits, compared with current scenario without minimum limits)

Change	% of Fund Reallocated	# States		\$ Decrease		% Decrease		\$ per Person Decrease	
		with Decrease	with >5% Decrease	Largest	Median	Largest	Median ^a	Largest	Median
Indirect methods for estimating need									
Scenario 1. Total state population	0.98%	21	1	\$1.3M	\$0.1M	21.4%	1.6%	\$0.39	\$0.02
Altering age weights									
Scenario 2. Update prevalence of SMI	0.57%	26	0	\$1.4M	\$0.0M	4.1%	1.0%	\$0.07	\$0.02
Scenario 3. Add weights for SED	1.12%	28	3	\$2.3M	\$0.1M	9.1%	2.0%	\$0.17	\$0.03
Altering prediction model									
Scenario 4. Add additional predictors	1.14%	17	3	\$1.8M	\$0.2M	19.3%	2.0%	\$0.35	\$0.03
Direct methods for estimating need									
Scenario 5. NSDUH state-level estimates	13.30%	21	18	\$22.5M	\$1.3M	50.0%	22.6%	\$0.81	\$0.30

^a This column shows the median percentage decrease among states that experience a decrease.

Scenario 1, which removes all information about the distribution of SMI in the population and simply weights each state by its total population, results in a reallocation of 0.98 percent of the total MHBG funds compared with the current allocation. In this scenario, the funding would decrease in 21 states, with only one state experiencing a decrease of 5 percent or more in its allotment. The largest decrease would be \$1.3 million for this one state. The median decrease across all states would be \$0.1 million. The largest percentage decrease in funding would be 21.4 percent (median-only 1.6 percent), and the largest per person decrease would be \$0.39 (median-only \$0.02).

If the age-group distribution of SMI were simply updated to reflect the most recent data, with no changes made to the formula (Scenario 2), only 0.57 percent of the total allocation would shift. Twenty-six states would see a decrease in funds, though no states would experience a decrease of 5 percent or more. The largest decrease would be \$1.4 million, with the median at \$0.

The change is slightly larger when the prevalence of SED includes youth ages 5 through 17 (Scenario 3). In this scenario, a total of 1.14 percent of the MHBG allocation is shifted between states, with 17 states seeing a decrease and 3 states seeing a decrease of 5 percent or more. The

maximum decrease is also larger, over \$2 million. The median continues to be low, equaling about \$100,000.

In Scenario 4, where the model was modified to include both age and education, the amount of the MHBG that is reallocated is similar to that in scenario 3. However, in Scenario 4, the maximum decrease is smaller compared with scenario 3, at \$1.8 million, with a median of about \$200,000. In this scenario, 17 states saw decreases in funding, with 3 states experiencing a decrease of 5 percent or more.

In comparison with Scenarios 1–4, where the total amount of reallocated MHBG funds would be less than 2.00 percent, Scenario 5 produces a much larger change from prior allocations, with 13.30 percent of the funds reallocated. The changes are large across all measures. In this scenario, the state seeing the greatest absolute decrease in funding would lose \$22.5 million relative to the current formula, and the median is \$1.3 million. The largest relative decrease and increase would be 50.0 percent and 90.9 percent, respectively (median 22.6 percent). Eighteen states would see a decrease in allotments of 5 percent or more.

In summary, across the five scenarios that use alternative approaches to measure state population need, the first four would result in relatively small shifts in allotments when compared with the current formula. The first four scenarios are similar to the current formula in that they rely on state population data from the census and they use weights to count people in some demographic groups more heavily than others (except for Scenario 1, where each person has equal weight). Of the first four scenarios, the fourth is arguably the most accurate, in that it takes into account the prevalence of SED among children, as well as updated demographic indicators and weights predicting prevalence of SMI among adults. The fifth scenario uses national survey data designed to directly estimate the prevalence of SMI among adults for each state, and, therefore, it uses the best available data on state-level rates of SMI rather than using indirect demographic predictors. From a measurement perspective, this is the best alternative for measuring population need, but it also results in the greatest changes in allotments relative to the current formula.

Assessing Impacts of Current Minimum Allotment Rule

The minimum allotment rule for the MHBG is the 1998 allotments for each state. No state relies on this minimum under current allotments. The minimum allotment rule does not impact any of the scenarios we analyzed.

Assessing Impacts of Changes to Both Population Need and Cost of Service Indicators

We chose two scenarios that combine changes to the need and cost components of the MHBG formula. For the cost component, we selected the scenario that includes the new weights based on the outpatient care centers. We then selected two different estimates of need. The first

is the indirect estimate of need that combines the estimated adult need from the model with additional predictors with the youth need (Need Scenario 4). This scenario is the indirect method based on the most detailed method examined. The second is the direct estimate of adult need (Need Scenario 5). The direct estimate is important to examine because it uses the best available data and because it produces large changes in the allocation.

- Combined MHBG Scenario 1: New indirect estimate of combined adults and youth need (Need Scenario 4) and new estimate of COSI based on weights from outpatient care centers
- Combined MHBG Scenario 2: Direct estimate of adult need (Need Scenario 5) and new estimate of COSI based on weights from outpatient care centers.

We evaluated the impact of adopting each these combined scenarios on state allotments in the same way that we evaluated the impact of the individual changes. We then calculated the costs and time associated with each scenario under the hold-harmless options described previously.

Results: How Do the MHBG Allocations Change Under Each Scenario?

In Table 6.4, we summarize the impact of the combined scenarios on state allotments. The first three rows repeat the individual changes, and the last two summarize the impact for the combined scenarios. The impact of the combined scenarios was very similar to the impact of the corresponding population need scenarios. Combined MHBG Scenario 1 resulted in a reallocation of 1.80 percent of funds, compared with the 1.14 percent reallocation of Need Scenario 4. Even though less than 2 percent of the total program funding would shift across states under the combined indirect scenario, nine states would experience decreases in their funding of 5 percent or more under this scenario. The largest decrease would be \$2.4 million, though the median decrease is low (about \$100,000).

For Combined MHBG Scenario 2, updating both the COSI and population need component resulted in a reallocation of 13.62 percent, compared with 13.30 percent for Need Scenario 5. Adding the COSI update did not produce substantial change in allotments beyond the shifts that were due to using direct measures of population need. In both cases, there would be fairly large reallocations, with 18 states experiencing a 5 percent or greater decrease in their funding. The largest loss any state would experience is 81 cents per person (median 30 cents). While this scenario resulted in the biggest changes in allotments relative to the current formula, it has the advantage of making full use of the best available data measuring state population need, and it also updates weights used in the COSI. However, because these direct estimates are based on annual state-level survey data instead of average prevalence estimates pooled across states, states may experience greater variation in their allotments due to sampling variation. Using the

standard error estimates provided with the mean state-level estimates, we explored the level of uncertainty in the direct estimate scenario.

We generated 100 random need estimates for each state using the mean and standard error estimates provided by SAMHSA and calculated the allotment for each under the scenario that combines need and cost. We then estimated the 95-percent confidence intervals for some of the impact estimates from Table 6.4. The 95-percent confidence interval for the largest decrease in allotted funds is \$15.9 million to \$28.8 million. The 95-percent confidence interval for the number of states that would experience a decrease of 5 percent or more of their allotment is 17 to 23.

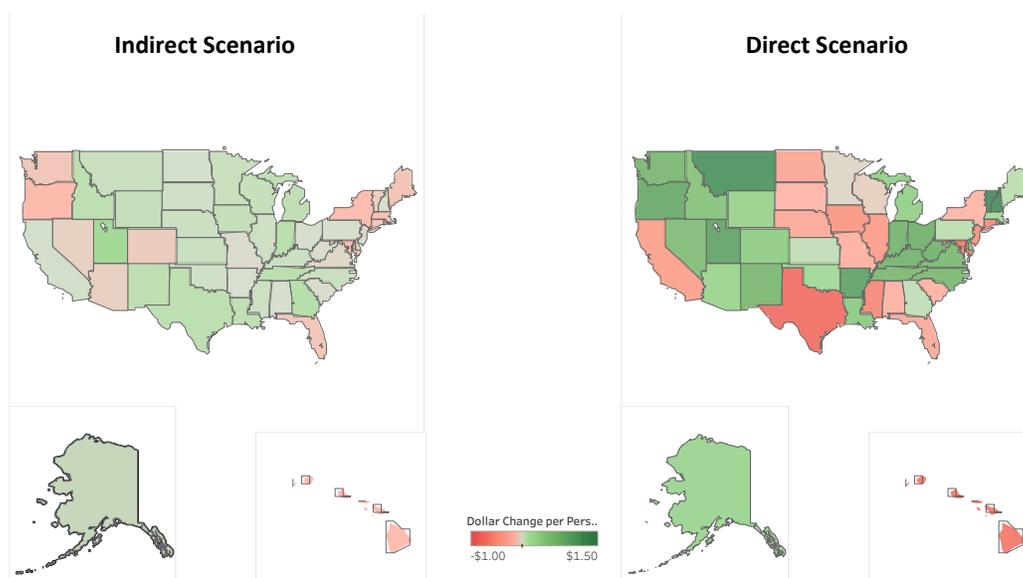
Table 6.4. Summary of Impacts to MHBG Combined Scenarios

Change	% of Fund Reallocated	# States		\$ Decrease		% Decrease		\$ per Person Decrease	
		with Decrease	with >5% Decrease	Largest	Median	Largest	Median ^a	Largest	Median
Population need for MHBG									
Scenario 4. Indirect scenario	1.14%	17	3	\$1.8M	\$0.2M	19.3%	2.0%	\$0.35	\$0.03
Scenario 5. Direct scenario	13.30%	21	18	\$22.5M	\$1.3M	50.0%	22.6%	\$0.81	\$0.30
COSI for MHBG									
Scenario 1. Average weights: Supplies/other category combined	1.17%	26	3	\$1.8M	\$0.1M	7.3%	1.8%	\$0.13	\$0.03
Combined scenarios for MHBG									
Combined scenario 1. Indirect estimate of need + COSI with supplies and other	1.80%	25	9	\$2.4M	\$0.1M	14.8%	3.3%	\$0.27	\$0.06
Combined scenario 2. Direct estimate of need + COSI with supplies and other	13.62%	21	18	\$22.6M	\$1.3M	50.3%	22.9%	\$0.81	\$0.30

^a This column shows the median percentage decrease among states that experience a decrease.

The left-hand side of Figure 6.6 shows how states would lose or gain shares of the allotment in the combined indirect scenario, which in this figure is shown as dollar changes per person. The right-hand side shows how dollars per person would shift across states under the combined direct scenario. As can be seen in the figure, the indirect method results in a different pattern of state allotments relative to the direct method. For example, the direct method results in decreased shares of the allotment relative to the current formula for Texas and California and increased shares for Oregon, Washington, and Colorado. The indirect method, on the other hand, shows gains for Texas and California and losses for Oregon, Washington, and Colorado.

Figure 6.6. Maps Summarizing Dollar Change per Person for MHBG Scenarios Combining Changes to Need and Cost Components



Consequences of Alternative Hold-Harmless Approaches

In light of changes in the formula that would result in big shifts in allotments across states, it is important to consider hold-harmless approaches that could buffer states from large decreases in funding. We explored two potential approaches to implementing a hold-harmless strategy to minimize the negative impact of making the changes described previously. A hold-harmless approach is any approach that buffers a state from large decreases in its funding from one year to the next. This can be achieved by adopting a new minimum allotment rule when the formula is changed and/or by increasing total block grant dollars. Table 6.5 summarizes the implications of two hold harmless-alternatives for the formula change scenarios that combine changes to the population need and cost components of the MHBG formula.

Table 6.5. Summary of Hold-Harmless Approaches for MHBG Combined Scenarios

Change	Hold Harmless Alternative 1 No state loses money Increase in Total Allocation (% Increase)	Hold Harmless Alternative 2 Maximum decrease 5% Years to Reach Current Allotments
Combined scenario 1. Indirect estimate of need + COSI with supplies and other	\$9.8M (1.9%)	3 years
Combined scenario 2. Direct estimate of need + COSI with supplies and other	\$72.2M (13.7%)	12 years

Implementing the indirect combined scenario and ensuring that no state loses funds would require an increase of \$9.8 million in total allocation over 2018 (a 1.9-percent budget increase). Under this scenario, it would take three years for the formula to distribute allotments as intended if the total budget increases annually by 1 percent and no state is allowed to lose more than 5 percent of its allotment from the prior year.

Under the direct combined scenario, the total allotment would need to increase by \$72.2 million (a 13.7-percent budget increase) to avoid any state losses. It would take 12 years for the formula to distribute allotments as intended, assuming total budget increases of 1 percent per year and assuming that no state is allowed to receive less than a 5-percent decrease from its prior year’s funding amount. 80 percent of states would be at their intended allotments after five years.

Conclusions

Results of the analysis of alternative population need indicators suggest the following conclusions. First, adjustments that maintain the current indirect method of allocating MHBG funds with changes to the formula for arriving at weights for each state result in reallocation of about 1 percent of the total MHBG funding. Even when the variables in the model are changed and weights for the child population are included, the distribution of allotments remains about the same as the current formula, and only a few states would see large swings in the amount of their allocations. A major drawback of the indirect method is that the demographic variables in the model predict whether an adult has SMI in less than half of cases, suggesting that it cannot accurately measure population need.

Second, the direct method of assessing population need that includes state-level estimates of adults with SMI and a national estimate of children with SED results in bigger shifts in allotments than the indirect method. Furthermore, as shown in the map of state-level changes (Figure 6.5), specific states are affected differently when direct or indirect methods are used. For instance, the direct method shows that the allocations for California and Texas would be decreased, while the indirect method would result in increased allocations.

Third, when the cost components are added to the population need components in combined scenarios, the same general pattern of results remains. The impact of including cost estimates on the allocation of funds is small in comparison to the impact of switching to direct estimates of population need.

There are clear reasons to prefer the direct over the indirect method of measuring population need even though it would result in bigger changes in the distribution of allotments relative to the current formula. The indirect estimates do not sufficiently explain variation in the prevalence of SMI. The direct method is based on the best available information regarding true levels of state population need, and these measures would be sensitive to changing trends over time. One limitation of the direct method is that it is subject to survey sampling error; thus, state-level prevalences of adults with SMI are estimated with confidence intervals that illustrate greater measurement error in prevalence estimates for smaller states. The precision of the state-level estimates, as well as their stability over time, could be improved if four years of the most recent NSDUH data were used, rather than two. This would reduce the size of the confidence intervals for state-level estimates by about 30 percent. Alternatively, the NSDUH sample size could be increased in the future to improve the precision of the two-year estimates. A limitation of both the direct and indirect methods is that the available national surveillance survey data from NSDUH do not represent those in jail or prison or those in long-term care facilities, such as hospitals or nursing homes.

To reduce the potential adverse impact of dramatic losses in funding at the state level that would occur with changes to the formula, a hold-harmless approach that includes increased funding and a new minimum allotment rule could be adopted. Both to buffer states from large decreases in funding and to allow an improved formula to redistribute allotments in the way that is intended over a reasonable period of time, overall budget increases in the block grant will be required. Our results when considering two alternative hold-harmless approaches illustrated the trade-off between budget increases and the number of years it would take for a minimum allotment rule to no longer constrain state allotments.

7. Substance Abuse Prevention and Treatment Block Grant

The SABG program provides funds for states to plan, implement, and evaluate activities for the prevention and treatment of substance use disorders. The funds are primarily meant to support treatment, but states must spend a minimum of 20 percent of their allotment on prevention efforts. The TAG initially recommended investigation of separate formula components for prevention and treatment needs, and we explored this accordingly in our environmental scan and analyses. In our environmental scan, we first identified indicators of need that were specific to prevention and treatment needs and available in large population-based studies that would allow assessments of variation across states. Ultimately, in discussions with our COR and after analyzing the marginal impact of including a prevention measure, we chose to include a single treatment need measure to represent both treatment and prevention need. Below we provide details related to our environmental scan for treatment. We then briefly summarize our environmental scan for prevention because this literature informed the analyses we conducted.

For treatment, we focused on measures of substance use disorders, which are the target of treatment efforts. For prevention, we focused on measures of problematic use of alcohol or drugs because these behaviors are the direct targets of prevention efforts. The prevention measures we examined include past-month binge drinking (five or more alcoholic drinks for males or four or more alcoholic drinks for females on the same occasion) and any illicit drug use among adolescents and adults. Among adolescents, we also considered correlates of past-month tobacco use. We then surveyed data sources that could identify predictors of the identified indicators of need, based on prior knowledge, literature review, and input from the TAG and our COR. We focused on reports based on population surveillance data sources that were nationally representative of the United States and territories. Available data and published research were then reviewed for information on population predictors of treatment and prevention needs.

We discussed several additional issues with the TAG following discussions with our COR. First, the TAG suggested separate alcohol and drug use indicators. In discussions with our COR, we decided to explore these separate indicators in our environmental scan and analyses. Second, in recognition of the current opioid overdose crisis (National Institute on Drug Abuse, 2018), we included data on drug overdose deaths derived from national mortality files, which provide state-level data on opioid and other drug overdose deaths. However, the TAG recommended that the SABG formula should not weigh substance use disorders differentially based on type of drug because any type of drug disorder indicates a need for treatment. Third, the TAG also recommended that we consider marijuana in both the prevention and treatment indicators, despite the fact that marijuana laws vary dramatically by state. Below, we describe key data

sources first, and then we summarize the literature relevant to treatment and prevention need indicators, respectively.

Data Sources on Population Need for Substance Use Treatment and Prevention

We searched for data sources representative of the United States and territories that could be used to estimate state-level substance use and disorder. We have already described the BRFSS, NSDUH, and NHIS in Table 6.1, and we summarize the Youth Risk Behavior Surveillance System (YRBSS) and the National Vital Statistics System (NVSS) in Table 7.1.

- Youth Risk Behavior Surveillance System (YRBSS) (CDC, 2017c):** YRBSS is a biennial school-based survey of students in 9th through 12th grades that is conducted by the CDC with cooperation from state and local governments and school districts. The survey includes a nationally representative sample of about 15,000 students from 37 states and 19 large urban school districts. Data are collected through self-administered questionnaires, which cover substance use in addition to a broad range of health-related behaviors.
- National Vital Statistics System, Mortality file (NVSS, CDC) (CDC, 2016):** NVSS combines vital data from multiple public registration systems—births, deaths, divorces, fetal deaths, and marriages. The “mortality” section of NVSS provides cause-of-death information, including drug overdoses. Data are collected annually by the National Center for Health Statistics and from vital registration systems that are operated in all 50 U.S. states and five territories (Puerto Rico, the U.S. Virgin Islands, Guam, American Samoa, and the Commonwealth of the Northern Mariana Islands).

Table 7.1. Data Sources on Substance Use and Disorders

Data Source	Strengths	Limitations
Youth Risk Behavior Surveillance System (YRBSS)	<ul style="list-style-type: none"> • Representative sample of high school students • Provides data on states and territories • Collects data on use of alcohol and other substances 	<ul style="list-style-type: none"> • Not conducted in all 50 states • Limited to school-enrolled children of high school age • No ongoing assessment of substance use disorder
National Vital Statistics System (NVSS)	<ul style="list-style-type: none"> • Incorporates data for all states and territories 	<ul style="list-style-type: none"> • Access to data is lagged by at least two years • Methodology for determining cause of death is not standardized across states/localities

Other large data sources, such as Monitoring the Future (MTF) (Miech et al., 2017) and NESARC (National Institute on Alcohol Abuse and Alcoholism [NIAAA], undated), do not provide publicly available state-level estimates, to our knowledge, but, given their reputation, we included major reports from these data sources in our prevention and treatment sections below.

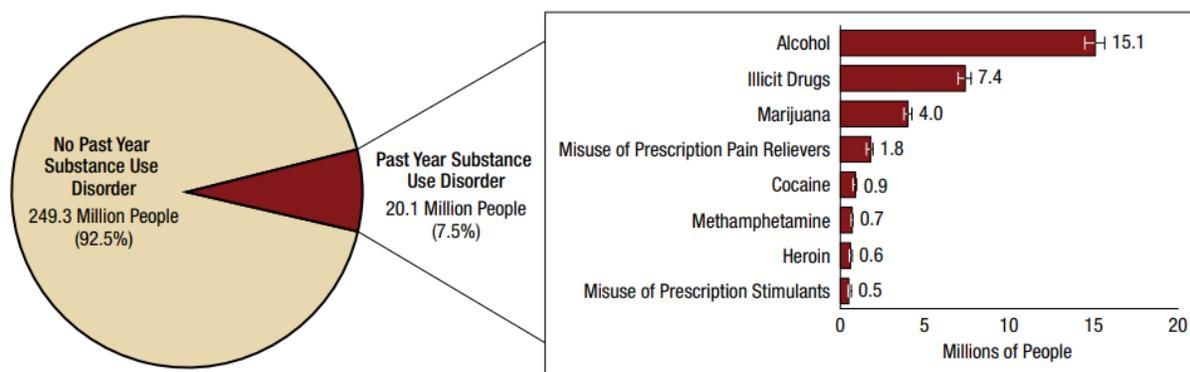
The MTF study collects information on alcohol and drug use annually from a nationally representative sample of 8th, 10th, and 12th graders in public and private middle and high schools across the United States (not including territories) (Miech et al., 2017). The NESARC study has collected three waves of data (last wave was in 2013) specifically on alcohol and drug use and select physical and mental health conditions among a nationally representative sample of individuals 18 years and older across the United States (not including territories).

Sociodemographic Predictors of Treatment Need

Treatment is often recommended for individuals with more-severe substance use disorder, who often experience significant impairment as a result of their substance use (American Psychiatric Association, 2006). While treatment can be delivered in a variety of modes (e.g., individual, group, medication) and settings (e.g., primary care, inpatient, outpatient), our selective literature review focused on sociodemographic predictors of substance use disorder (treatment need) and excluded variation in service delivery to remain consistent within the parameters of the current formula. Thus, we first examined rates of substance use disorder and then examined the relevant literature on sociodemographic correlates that predict disorder.

Overall, with respect to rates of disorder by substance, NSDUH data indicate that alcohol use disorders are more prevalent than other drug disorders (Figure 7.1; Center for Behavioral Health Statistics and Quality, 2017). Between 2002 and 2016, the rate of alcohol use disorder has decreased, but rates of disorder caused by marijuana and heroin use have remained similar in previous years since 2011 (Center for Behavioral Health Statistics and Quality, 2017). Of particular concern, recent data from the NVSS show that rates of opioid overdose deaths were five times higher in 2016 than in 1999 (Hedegaard, Warner, and Miniño, 2017), highlighting the nation’s current opioid crisis (National Institute on Drug Abuse, 2018).

Figure 7.1. Numbers of People with a Past-Year Substance Use Disorder



SOURCE: SAMHSA, 2017a.

Age

Alcohol and drug use disorders vary considerably by age. According to NSDUH data, individuals between the ages of 18 and 25 have the highest rate of alcohol use disorder (10.7 percent) compared with those who are between 12 and 17 years of age (2 percent) and those who are 26 and older (5.2 percent) (SAMHSA, 2017a). More-precise prevalence estimates could be derived within these broad age categories using the NSDUH data directly. Rates of drug use disorder are also highest for those 18 to 25 years old (7.0 percent) compared with those who are 12 to 17 (3.2 percent) and those who are 26 or older (2.0 percent) (Center for Behavioral Health Statistics and Quality, 2017; Compton et al., 2007). Overall rates of marijuana use disorder and cocaine use disorder were similar in recent years but lower than earlier years since 2002 across age groups. However, rates of heroin use in 2016 (0.2 percent) were significantly higher than rates in 2002 to 2010 (0.1 percent) and similar to years 2011 to 2015 (SAMHSA, 2017a). Rates of heroin use in the past year were highest among 18- to 25-year-olds (0.4 percent) compared with those who were 25 or older (0.2 percent). Rates of pain reliever use disorder in the past year followed similar patterns, with persons ages 18 to 25 having the highest rates (0.8 percent) compared with other age groups. However, there has been an increase in the number of persons of all races/ethnicities ages 35-54 with an opioid use disorder, the number of non-Hispanic whites between 20 to 34 years of age with an opioid use disorder (The Conversation, 2017), and the number of heroin overdose deaths among whites ages 18 to 44 (CDC, 2014). According to 2016 data, heroin deaths are also particularly concerning among African Americans in urban areas; heroin deaths have increased 41 percent from 2000 to 2016 (Katz and Goodnough, 2017). This is consistent with studies that have noted pronounced increases in overdose deaths among non-Hispanic Black males 50 and older and Black females 45 and older (Shiels et al., 2017).

Socioeconomic Status

Substance use disorders may vary significantly by income level. Some research suggests that alcohol dependence is significantly higher among those with an annual family income of less than \$25,000 than for individuals with an annual family income of greater than or equal to \$25,000 (Esser et al., 2014). According to NSDUH data in 2016, substance use disorders vary slightly for adolescents and adults with incomes below the federal poverty level, with those having incomes that were less than 100 percent below the federal poverty level experiencing higher rates of disorder (10.4 percent) than individuals with incomes at 100–199 percent and at 200 percent or more below the federal poverty level (7.9 percent and 7.5 percent, respectively). For adolescents, individuals with incomes less than 100 percent below the federal poverty level also experience higher rates of substance use disorder (SUD) (9.6 percent) than individuals with incomes 100–199 percent or 200 percent or more below the federal poverty level (7.3 percent; 7.0 percent). While limited research exists examining substance use disorders by SES in nationally representative data sources, there does seem to be some variation by income level.

Education

Limited research also exists on substance use disorders by education, and the available research is mixed. According to NESARC data collected in Wave 1, the progression from alcohol use to dependence is significantly more common among individuals without a college degree compared with those with a college degree; having a college degree, in other words, appeared to be protective against progressing into alcohol dependence (Gilman et al., 2008). However, other studies examining college-aged individuals (ages 19 to 25) from the same data set found that after adjusting for other sociodemographic factors, there was no significant difference in having a past-year alcohol use disorder between college-attending and non-college-attending young adults and that college students were significantly less likely than non-college students to have a past-year substance use disorder (Blanco et al., 2008). Further research examining variations in lower levels of educational attainment is needed.

Employment

Unemployment may also increase one's risk of developing an alcohol use disorder. According to NESARC data from both Waves 1 and 2, an increase in state-level unemployment was associated with significant increases in rates of alcohol use disorder (Dávalos et al., 2012). In addition, according to NESARC data, individuals who consumed alcohol and had ever been employed were less likely to transition into dependence (Lopez-Quintero et al., 2011). Among those who are working full time and between 18 and 64 years of age, NSDUH data suggest that about 9.5 percent experience substance use disorder. Those with occupations in the food service industry experience disorder at the highest rates, and those in the educational services industry experience disorder at the lowest rates (Bush and Lipari, 2015). Thus, employment status and job type appear to influence rates of substance use disorder.

Marital Status

In general, married individuals appear to have lower rates of substance use and, for those who use alcohol, a lower risk of transitioning to dependence. According to NESARC data from both waves, those who were never married were more likely to transition from alcohol use to dependence (Lopez-Quintero et al., 2011). Thus, there is some evidence that substance use disorders vary by marital status, though the literature from nationally representative data sources is limited.

Geographic Residence

Mortality from substance use disorders, including alcohol use disorder, has varied widely throughout the United States since 1980 (Mokdad et al., 2017). Rates of past-year alcohol use disorder are generally greater in urban areas and lowest in rural areas and the Southern region (SAMHSA, 2016), although alcohol use disorder remains a serious problem for adolescents in rural areas (Dixon and Chartier, 2016). There are significant state and regional variations in the

rates of drug-related overdose deaths, which are largely attributed to prescription and illicit opioid use (CDC, 2017a). According to a CDC report of 2016 data from the National Vital Statistics System, 22 states and the District of Columbia had statistically significant increases in drug overdose deaths compared with the national average; the highest-ranking states were in the Northeast: West Virginia, Ohio, New Hampshire, and Pennsylvania (Hedegaard et al., 2017). In addition, reports from the 2016 data reveal that urban areas have the highest rates of drug overdose deaths when compared with rural areas, and rates among urban Blacks underwent a steep increase in 2016 (Katz and Goodnough, 2017).

Sociodemographic Predictors of Prevention Need

Prevention aims to reduce substance use before the onset of a substance use disorder, and assessments of the prevalence of use or misuse are valuable indicators of need for prevention services (Substance Abuse and Mental Health Services Administration, undated, 2018). We examined prevalence rates of binge drinking and illicit drug use from nationally representative data sources because these are both considered good measures of prevention need (Substance Abuse and Mental Health Services Administration, undated). We focused on predictors of binge drinking because of its association with health, social, and economic consequences (CDC, 2017b; Lipari et al., 2017). For drug use, we focused on any use within the past month. Our inclusion of adolescents is consistent with the nationwide effort to provide preventive interventions (e.g., screening and brief intervention) to youth in college (NIAAA, 2017) and medical settings (McCance-Katz and Satterfield, 2012) and SAMHSA's focus on both adults and adolescents in suicide prevention (SAMHSA, 2017b).

Research examining the sociodemographic predictors associated with binge drinking and illicit drug use generally shows that age, gender, race/ethnicity, and geographic region are associated with increased prevalence rates. Adolescents from 18 to 25 years old have the highest prevalence rates of past-month binge drinking and illicit drug use, according to NSDUH data (Center for Behavioral Health Statistics and Quality, 2017), and there are some studies suggesting that rates of binge drinking are escalating among adults 65 and older (Grant et al., 2017). By gender, NSDUH data show that males tend to have the highest prevalence rates of binge drinking and illicit drug use. By race/ethnicity, whites continue to have higher rates of binge drinking, illicit drug use, and opioid misuse; however, individuals who are multiracial tend to have higher rates as well, though they represent a small sample in the overall NSDUH data (Center for Behavioral Health Statistics and Quality, 2017). The relationship between geographic region and substance use varies and interacts with several factors, including how urban/rural classification is defined and interactions with other sociodemographic factors, such as race/ethnicity (Dixon and Chartier, 2016). Metropolitan areas tend to have higher overall rates of binge drinking than rural areas, but there is growing evidence that certain rural areas are experiencing an increase in binge drinking and that there is also considerable variation within

rural areas (Borders and Booth, 2007). Illicit drug use and opioid misuse vary considerably by region and may be heightened in the West and in some metropolitan areas, but rates are growing in some rural areas, particularly among older adolescents.

Binge drinking and drug use also vary by employment status and SES. NSDUH data show that those employed full time have the highest rates of binge drinking (Center for Behavioral Health Statistics and Quality, 2017), but other studies show that state-level unemployment is associated with significant increases in binge drinking (Dávalos et al., 2012). In general, adults with higher SES tend to drink equal or greater amounts of alcohol than residents with lower SES, but the latter group disproportionately endures the consequences of heavy drinking and alcohol use disorders, especially marginalized communities (e.g., minorities, homeless persons) (Collins, 2016; Delker et al., 2016). Some studies show that rates of drug use are higher among those with lower SES (Compton et al., 2007).

Assessing Five Potential Changes to the SABG Population Need Formula

Alternative scenarios for revision to the SABG formula were investigated using data from the 2016 NSDUH. For the prevention component, we examined predictors of binge alcohol use² and/or illicit drug use (marijuana, cocaine, heroin, hallucinogens, inhalants, methamphetamine, misuse of psychotherapeutics) in the past month. Subsumed under illicit drug use is opioid misuse, defined as heroin use or prescription pain reliever misuse³ in the past month (Center for Behavioral Health Statistics and Quality, 2017). For the treatment component, we examined predictors of having SUD in the past year or using specialty treatment for SUD in the past year (SAMHSA, 2016). SUD was defined as meeting diagnostic criteria for illicit drug or alcohol dependence or abuse in the past year, based on the Diagnostic and Statistical Manual of Mental Disorders (DSM-IV) (Center for Behavioral Health Statistics and Quality, 2017).

After performing initial analyses to estimate separate population prevention and treatment need indicators, we found that there was very little additional information gained by adding prevention need to treatment need. The correlation between the state-level estimates of treatment need alone and the combined estimates of treatment and prevention need was 0.997. In other public health contexts, rates of illness are often used as indicators of need for prevention services targeted to various populations or regions. We concluded that, conceptually as well as empirically, state rates of substance use disorder are an appropriate indicator of both substance abuse treatment services and prevention services. We therefore do not present separate analyses of prevention need in this report.

² NSDUH defines binge alcohol use as drinking five or more drinks (for males) or four or more drinks (for females) on the same occasion (i.e., at the same time or within a couple of hours of each other) on at least one day in the past 30 days.

³ NSDUH defines prescription pain reliever misuse as use in any way not directed by a doctor, including use without a prescription of one's own; use in greater amounts, more often, or longer than told; or use in any other way not directed by a doctor. Over-the-counter drugs are not prescription pain relievers.

As noted in Chapter 2, the current SABG formula has two equally weighted components defined by age and urbanicity. The formula double-counts the urban population ages 18–24, reflecting the expectation at the time that needs were higher in urban areas than in nonurban areas. As shown in Figure 7.2, we evaluated five scenarios for change to the current formula: four using indirect estimation of population need and one using direct estimates. The scenarios were chosen to highlight how key decisions about the formula would impact the allocation of funds across states. To illustrate the impact of these decisions, we simulated the allocation of SABG funds under each scenario and compared them with the current allocation.

Figure 7.2. Multiple Scenarios for the SABG Population-in-Need Index

Scenario 1	Population Only: Uses state population size only
Scenario 2	Revised Adult Treatment: Uses new predictive model for adult treatment need
Scenario 3	Youth and Adult Treatment: Add youth treatment need
Scenario 4	Direct Estimate of Adult Treatment: 2016 NSDUH
Scenario 5	Direct Estimate of Youth and Adult Treatment: 2016 NSDUH

- In Scenario 1, each state is weighted by its total population. This scenario provides each state an allocation based solely on the state’s population. It is not meant as a potential alternative but as a comparison of the current formula with a simpler allotment.
- In Scenario 2, we use a new linear model for treatment need in adults, which was developed using data from the 2016 NSDUH. The variables identified in the environmental scan as potential sociodemographic predictors of treatment need were entered into a series of regression models, with the probability of having a substance use disorder as the outcome. In addition to examining age and urban status as predictors, we also considered income, education, and employment status. The preferred model was selected based on the BIC, a statistical measure of the model fit and complexity. This scenario demonstrates the potential for including a broader range of indicators for adult treatment need in the SABG formula.
- In Scenario 3, we add weights for youth treatment need to the adult treatment need indicator developed in Scenario 3. The weights for youth were developed using the 2016 NSDUH and the same model-building strategy as employed in Scenario 3, with the probability of substance use disorder as the outcome. This scenario demonstrates the impact of adding indicators for state variation in youth treatment need.
- In Scenario 4, we directly use estimates of the prevalence of adults with substance use disorders from the 2016 NSDUH that are reported for each state by SAMHSA. This scenario demonstrates the impact of shifting from an indirect to a direct approach to measure state-level treatment need.
- In Scenario 5, we add direct estimates of substance use disorders among youth to those

among adults, again using state-level data from the 2016 NSDUH reported by SAMHSA. This scenario allows us to examine the impact of using direct rather than indirect estimates of population need for a state that includes both adult and youth populations.

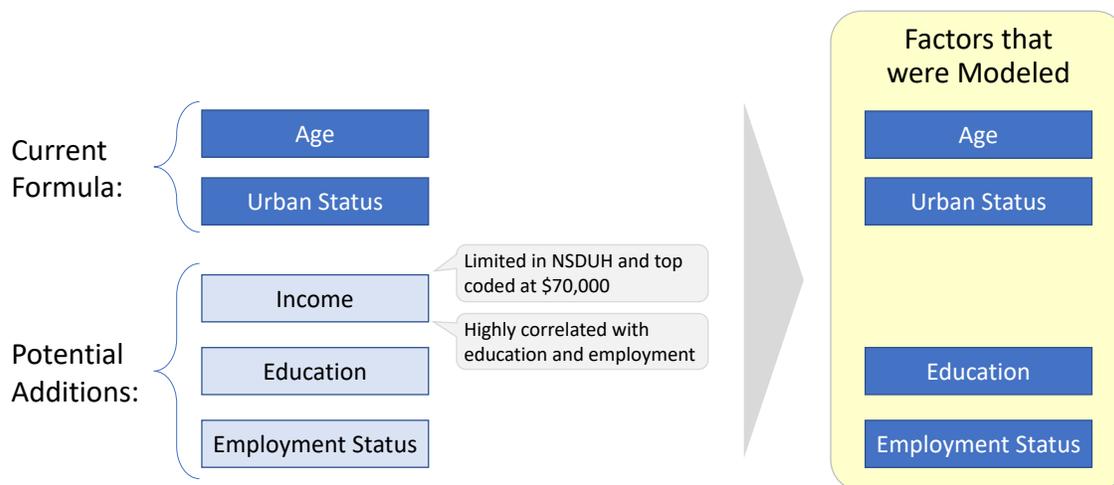
To analyze the impact of these alternative ways of measuring population need on the allocation of SABG funds, we did not apply the current statutory minimum allotment rules to the current formula or any of the alternatives. The reason for this is that, as we will show later, the SABG minimum allotment rules continue to highly constrain the distribution of funding to the states, so the impacts of any other changes could not be observed if minimum allotment rules were applied.

Results: How Do the SABG Allotments Change Under Each Scenario?

Developing Alternative Population Need Indicators

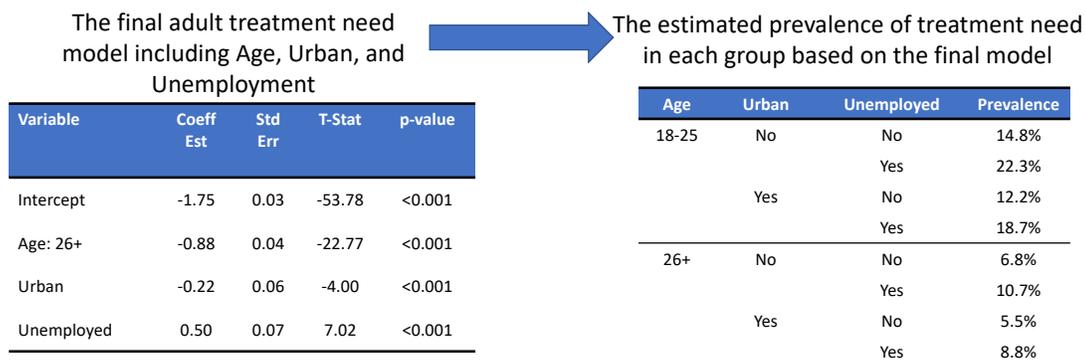
Scenario 2 required the development of a new statistical model that used sociodemographic indicators to indirectly predict the probability of substance use disorder. As shown in Figure 7.3, the predictors selected for potential inclusion in the new model on the basis of the environmental scan included age, urban status (living in a metropolitan area), household income, educational attainment, and employment status. Household income was dropped as a potential predictor because it is top-coded at \$70,000 in the NSDUH public data set and is highly correlated with educational attainment and employment status.

Figure 7.3. Additional Factors Associated with Treatment Need



Based on the BIC, the preferred model of adult treatment need included age, rural versus urban residence, and unemployed versus employed as predictors, with no statistical interactions between these variables. We used the final regression model to predict the prevalence of substance use disorder for each demographic group, as shown in the right-hand side of Figure 7.4. These predictions are then used as weights to estimate state population need (for example, 14.8 percent of a state’s adults ages 18–25 living in nonurban areas and unemployed would be counted as having treatment need). As can be seen in this figure, the prevalence of substance use disorder was predicted to be highest among employed young adults living in nonurban areas (22.3 percent) and lowest among unemployed adults 26 and over living in urban areas (5.5 percent). In contrast with the current formula’s population need indicator, which weights urban population more heavily than nonurban, our analysis indicates that those living in metropolitan areas are actually slightly less likely to have a substance use disorder. The concordance score for the preferred model of adult treatment need is 37 percent. The mean predicted probability for those defined as having treatment need is 0.269, and it is 0.262 for those without treatment need. This suggests that the model may be the best among those we tested, but it still does not perform well in terms of distinguishing between those assessed with and without need in the NSDUH survey.

Figure 7.4. Development of Adult Prevalence of Treatment Need Estimates for Scenario 2



Scenario 3 adds an indirect indicator to measure treatment need for youth under age 18, in addition to the adult measure of treatment need (Figure 7.5). We used a similar approach with NSDUH data on substance use disorder among youth ages 4–17. For this logistic regression modeling exercise, we examined only urban status as a predictor because these are mostly students for whom educational attainment and employment status are not yet relevant. Because urban status was not a significant predictor of substance use disorder among youth, we used a

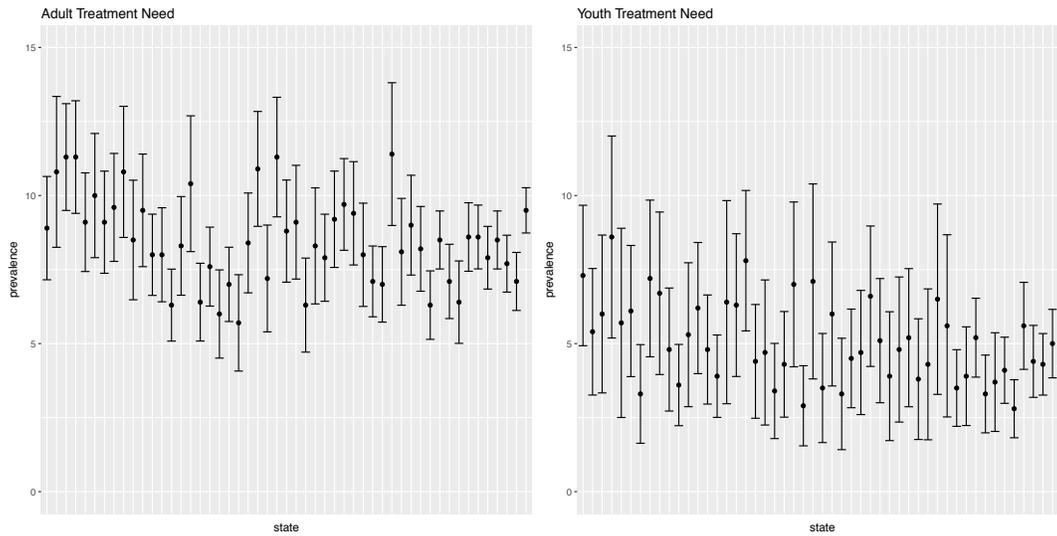
single weight for youth, which is the estimated national prevalence of substance use disorder among those ages 4–17 (4.1 percent). The concordance score for the preferred model of youth treatment need is very low, only 16 percent. The mean predicted probability for both those with and without treatment need is 0.0412. Thus, the model is unable to distinguish between those assessed with and without need in the NSDUH data.

Figure 7.5. Development of Youth Prevalence of Treatment Need Estimates for Scenario 3



Scenarios 4 and 5 are based on direct estimates of states’ treatment needs, using state-level NSDUH survey estimates obtained from SAMHSA, since these data are not available through the online analysis tool. Scenario 4 includes state-level estimates of the prevalence of substance use disorder among adults, and Scenario 5 adds state-level estimates of the prevalence of substance use disorder among youth. Figure 7.6 shows the prevalence rates of both adult and youth treatment need. Each panel shows the prevalence rates and 95-percent confidence intervals sorted by state population. As with the SMI estimates in Figure 6.5, uncertainty due to sampling error means that individual state prevalence rates cannot be precisely estimated. Smaller states generally have larger intervals than larger states.

Figure 7.6. State-Level Prevalence of Adult and Youth Treatment Need with 95-Percent Confidence Intervals



Impact of Alternative Population Need Estimates on State Allotments

We summarize the results from the five scenarios in Table 7.2. Scenario 0 looks at how the current SABG formula would redistribute funds to states if the only change to the formula is that the minimum allotment rules are removed. Over 3 percent of funds would be redistributed, and 13 states would experience decreases in funding that exceed 5 percent of their current budget. Some states with decreased budgets would experience big decreases (median, 6.3 percent; largest, 65.2 percent). This illustrates that the current minimum allotment rule is continuing to have a large impact on state distributions, limiting the extent to which funds are distributed in accordance with the formula.

Because of the constraining effects of the minimum allotment rules, we did not apply them when we compared formula allocations under Scenarios 1–5. The current formula with no application of minimum allotment rules is the comparison for alternative ways of measuring population need in Scenarios 1–5. Scenario 1, based only on state population, would result in reallocation of 3.35 percent of the total SABG funds relative to the current formula. However, some states would see substantial increases or decreases of a third or more of their total allocation. The median decrease would be 6.7 percent. The largest decrease per person would be \$2.41 (median \$0.33).

Table 7.2. Summary of Impacts of Changes to SABG Population Need Index for Scenarios 1–5 (without current minimum limits, compared with current scenario without minimum limits)

Change	% of Fund Reallocated	# States		\$ Decrease		% Decrease		\$ per Person Decrease	
		with Decrease	with >5% Decrease	Largest	Median	Largest	Median ^a	Largest	Median
Scenario 0. Current allotment with no minimums	3.23%	24	13	\$12.4M	\$2.1M	65.2%	6.3%	\$6.22	\$0.32
Indirect methods for estimating need									
Scenario 1. Total state population	3.35%	15	9	\$23.9M	\$1.8M	33.6%	6.7%	\$2.41	\$0.33
Adult treatment need									
Scenario 2. Add additional predictors	4.73%	16	11	\$31.0M	\$2.6M	25.5%	6.8%	\$1.83	\$0.42
Add youth treatment need									
Scenario 3. Add youth treatment need	4.46%	17	12	\$29.3M	\$2.1M	31.8%	6.4%	\$2.28	\$0.38
Direct methods for estimating need									
Scenario 4. NSDUH state-level adult treatment need estimates	9.15%	19	17	\$51.4M	\$4.4M	59.3%	16.4%	\$3.65	\$0.77
Scenario 5. NSDUH state-level adult and youth treatment need estimates	8.65%	19	15	\$46.7M	\$3.6M	57.3%	17.0%	\$3.53	\$0.80

^a This column shows the median percentage decrease among states that experience a decrease.

Scenarios 2 and 3 update the population need indicator using the indirect method of weighting census-based sociodemographic groups. The more-complete indirect measure, Scenario 3, which includes an indicator for youth as well as the adult population need, leads to a similar reallocation of funds as Scenario 2, which counts only adult treatment need. For these scenarios, between 4 and 5 percent of total funds are redistributed, with a median state decrease of between \$2 and \$3 million, and 11–12 states experience a decrease in funding of 5 percent or more. Some of these reallocations would be quite large; the state with the largest decrease would see its allotment go down by over 30 percent under Scenario 3 (the median for states experiencing a decrease would be 6.4 percent).

Both of the scenarios that use direct estimates of state treatment needs result in greater reallocations of SABG funds than either of the indirect estimate scenarios. For instance, Scenario 5, which includes both adults and youth, would result in a reallocation of 8.65 percent of the SABG funds, the largest decrease would be \$46.7 million, and 15 states would experience a budget decrease of 5 percent or more. The median decrease is \$3.6 million.

In summary, updating the SABG population need indicator using the indirect method—which relies on weighting census-based demographic groups in each state by the national probability of having a substance use disorder within each group—results in a smaller

reallocation of funds than if state-level NSDUH estimates of prevalence of substance use disorder are directly used. For both indirect and direct measures, even though the percentage of total funding that shifts is not dramatic (less than 9 percent in the most extreme case; median decrease of 16.4 percent), we found that some states would experience dramatic shifts in funding. This result can be partially explained by the high weight that the current formula places on the urban population. Even the first scenario, which is based on a simple population count, resulted in big shifts from the current formula, illustrating the large impact of the current formula's heavy weighting of urban young adults.

Because recent NSDUH data do not show higher risk for substance use disorders in urban populations and, in fact, indicate slightly lower risk in urban populations, reallocations are large for some states. Updating the population need component of the SABG formula using either the indirect or direct method will require consideration of strategies to buffer states from dramatic losses in their funding if the current minimum rules are changed.

As a measure of state-level population need, the direct state-level estimates of adult and youth rates of substance use disorders provided by the ongoing NSDUH (Scenario 5), are the most accurate and complete alternative for measuring a state's population need for substance abuse treatment and prevention.

Assessing Impacts of Current Minimum Allotment Rule

The minimum allotment rule for the SABG is more complex than the rule for the MHBG, and it results in more states having their allotments defined by the minimum. The minimum rules for SABG significantly decrease the impact of any of the changes we have described previously. Table 7.3 summarizes the impact of each of the five scenarios when the current minimum allotment rule is applied. The impact of all scenarios is a change in total allocation of less than one half of one percent, and very few states experience any change. Only three states experience a decrease in allotments under any scenario, and the largest decrease is less than 10 percent for all scenarios. These results illustrate that, unless the current minimum allotment rules are removed, updating the SABG will have little effect on distributions to states.

Table 7.3. Updates to SABG Population Need Index for Scenarios 1–5 with Current Minimums Result in Few Changes

Change	% of Fund Reallocated	# States		\$ Decrease		% Decrease		\$ per Person Decrease	
		with Decrease	with >5% Decrease	Largest	Median	Largest	Median ^a	Largest	Median
Indirect methods for estimating need									
Scenario 1.									
Total state population	0.20%	3	1	\$2.1M	\$1.0M	6.9%	2.4%	\$0.39	\$0.15
Adult treatment need									
Scenario 2.									
Add additional predictors	0.34%	3	2	\$3.3M	\$2.4M	7.7%	7.6%	\$0.48	\$0.43
Add youth treatment need									
Scenario 3.									
Add youth treatment need	0.34%	3	2	\$3.3M	\$2.4M	7.7%	7.6%	\$0.48	\$0.43
Direct methods for estimating need									
Scenario 4.									
NSDUH state-level adult treatment need estimates	0.34%	3	2	\$3.3M	\$2.4M	7.7%	7.6%	\$0.48	\$0.43
Scenario 5.									
NSDUH state-level adult and youth treatment need estimates	0.34%	3	2	\$3.3M	\$2.4M	7.7%	7.6%	\$0.48	\$0.43

^a This column shows the median percentage decrease among states that experience a decrease.

Assessing Impacts of Changes to Both Population Need and Cost of Service Indicators

We chose two scenarios that combine changes to the need and cost components of the SABG formula. For the cost component, we selected the same scenario we selected for the MHBG combined scenarios that includes the new weights based on the outpatient care centers. We again selected two different estimates of need. The first is the indirect estimate of need that combines the estimated adult need from the model with additional predictors of the youth need (Need Scenario 3). The second is the direct estimate of adult and youth need (Need Scenario 5).

- Combined SABG Scenario 1: New indirect estimate of combined adult and youth need (Need Scenario 3) and new estimate of COSI based on weights from outpatient care centers
- Combined SABG Scenario 2: Direct estimate of adult need (Need Scenario 5) and new estimate of COSI based on weights from outpatient care centers.

We evaluated the impact of adopting each of these combined scenarios on state allotments in the same way that we evaluated the impact of the individual changes. We then calculated the costs and time associated with each scenario under the hold-harmless options described

previously. The impacts both with and without the current minimum allotments are described in Table 7.4.

Results: How Do the SABG Allocations Change Under Each Scenario?

Table 7.4 summarizes the impact of the combined scenarios on state allotments. The first three sets of results repeat the analysis of the individual scenarios, with and without minimums, and the last two sets summarize the impact for the combined scenarios. As with the MHBG combined scenarios, the impact of each of the combined SABG scenarios is similar to the impact of the corresponding need scenario. Updating the COSI in addition to the population need indicator does not result in large changes to the reallocation of funds compared with updating only the population need index. The most accurate and complete alternative, which both updates the COSI and uses direct population need estimates, would reallocate 8.61 percent of total funds (assuming that the current minimum allotment rules are removed), and the number of states that would see a decrease of 5 percent or more in their allotment is 17. The median decrease would be 13.1 percent. Based on our simulations, the 95-percent confidence interval for the number of states experiencing a decrease of 5 percent or more is 15 to 21.

Table 7.4. Summary of Impacts of Changes to SABG Combined Scenarios

Change	% of Fund Reallocated	# States		\$ Decrease		% Decrease		\$ per Person Decrease	
		with Decrease	with >5% Decrease	Largest	Median	Largest	Median ^a	Largest	Median
Population need for SABG									
Scenario 3. Indirect scenario									
a. Does not include minimums	4.46%	17	12	\$29.3M	\$2.1M	31.8%	6.4%	\$2.28	\$0.38
b. Includes minimums	0.34%	3	2	\$3.3M	\$2.4M	7.7%	7.6%	\$0.48	\$0.43
Scenario 5. Direct scenario									
a. Does not include minimums	8.65%	19	15	\$46.7M	\$3.6M	57.3%	17.0%	\$3.53	\$0.80
b. Includes minimums	0.34%	3	2	\$3.3M	\$2.4M	7.7%	7.6%	\$0.48	\$0.43
COSI for SABG									
Scenario 1. Average weights: supplies/other category combined									
a. Does not include minimums	1.16%	26	4	\$5.8M	\$0.3M	7.2%	1.7%	\$0.43	\$0.10
b. Includes minimums	0.08%	3	0	\$0.7M	\$0.5M	2.3%	2.2%	\$0.13	\$0.12
Combined scenarios for SABG									
Combined scenario 1. Indirect estimate of need + COSI with supplies and other									
a. Does not include minimums	4.84%	17	12	\$27.4M	\$2.3M	35.5%	9.2%	\$2.55	\$0.53
b. Includes minimums	0.36%	4	2	\$3.3M	\$1.3M	7.7%	4.5%	\$0.48	\$0.25
Combined scenario 2. Direct estimate of need + COSI with supplies and other									
a. Does not include minimums	8.61%	20	17	\$47.3M	\$3.8M	55.8%	13.1%	\$3.44	\$0.59
b. Includes minimums	0.34%	3	2	\$3.3M	\$2.4M	7.7%	7.6%	\$0.48	\$0.43

^a This column shows the median percentage decrease among states that experience a decrease.

Figures 7.7 and 7.8 include maps summarizing the changes by state for each of the two combined scenarios in terms of dollars per person in the state. Figure 7.7 shows the changes by state without the current minimum allotment rule, and Figure 7.8 shows the changes with the current minimum allotment rule.

Figure 7.7 illustrates a somewhat different pattern of state increases (receiving higher allotment shares if the formula is updated) and losses (receiving lower allotments if the formula is updated), depending on whether the indirect or direct estimates of population need are used,

assuming that the minimum allotment rules are not applied to either the current or alternative formulas. Similar to results shown earlier, Figure 7.8 illustrates that current minimum allotment rules highly limit the reallocation of funds as intended by the formulas.

Figure 7.7. Maps Summarizing Dollar Change per Person for SABG Scenarios Combining Changes to Need and Cost Components Without Minimum Allotment Rule

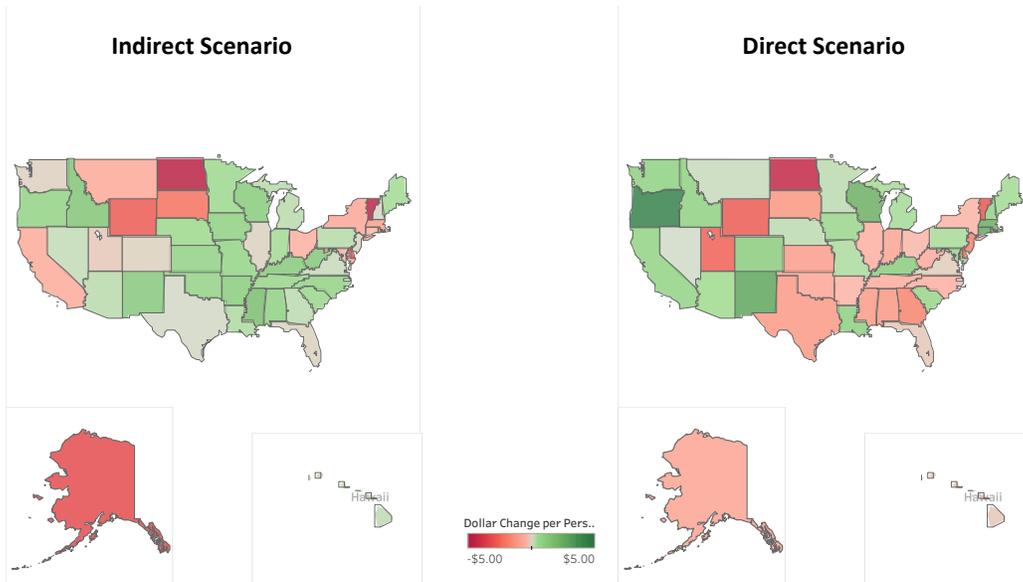
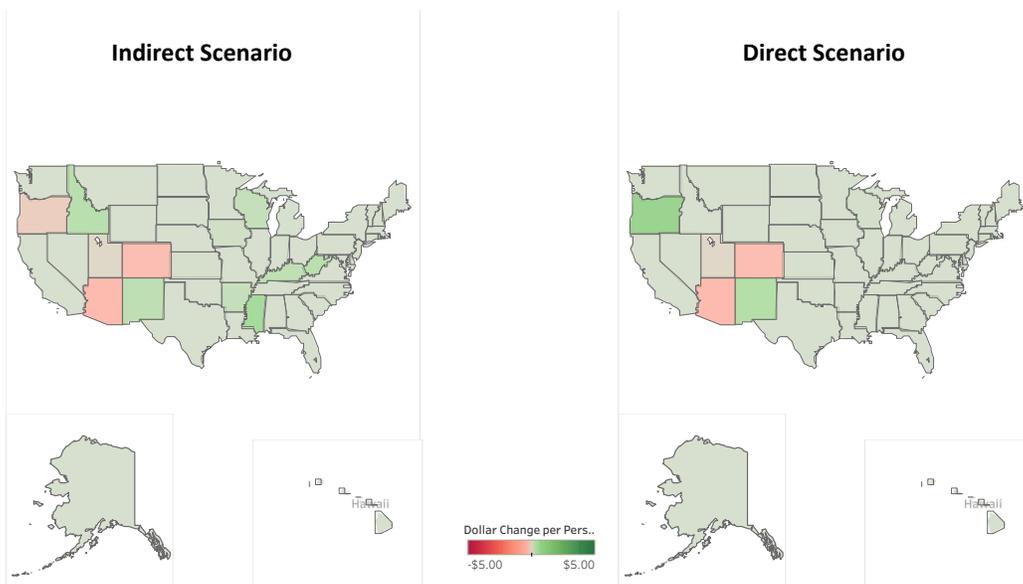


Figure 7.8. Maps Summarizing Dollar Change per Person for SABG Scenarios Combining Changes to Need and Cost Components with Minimum Allotment Rule



Consequences of Alternative Hold-Harmless Approaches

We explored two potential approaches to implementing a hold-harmless strategy to minimize the negative impact of making the changes described if the current minimum allotment rules are relaxed. Table 7.5 summarizes the implications of each approach for the two scenarios that combine changes to the population need and cost components of the SABG formula.

Table 7.5. Summary of Hold-Harmless Alternatives for SABG Combined Scenarios

Change	Hold Harmless Alternative 1 No state loses money Increase in Total Allocation (% Increase)	Hold Harmless Alternative 2 Maximum decrease 5% Years to Reach Current Allotments
Combined scenario 1. Indirect estimate of need + COSI with supplies and other	\$84.3M (4.9%)	12 years
Combined scenario 2. Direct estimate of need + COSI with supplies and other	\$145.9M (8.4%)	14 years

To implement the first indirect combined scenario (indirect measure of population need and updated COSI) and ensure that no state loses funds, an increase of \$84.3 million in total allocation over 2018 (a 4.9-percent increase) would be required. Under the indirect combined scenario, it would take 12 years for all states to reach their current allotments if the total budget for the program increased 1 percent each year and no state was allowed to lose more than 5 percent of its allotment from the prior year. Under the direct combined scenario (direct measure of population need and updated COSI), the total allotment would need to increase by \$145.9 million (an 8.4-percent increase) to avoid losses to any state, or it would take 14 years if the total program allotment increased by 1 percent annually and no state received a decrease of more than 5 percent of funding from its prior year’s allotment. Eighty percent of states would be at their intended allotments after five years.

Conclusions

Established 20 years ago, existing minimum allotment rules for the SABG funds continue to exert a strong influence on the distribution of funds and greatly limit the extent to which any updated inputs or changes to the formula can impact distributions to states. This is different from the MHBG, where simpler minimum allotment rules no longer influence distributions. Therefore, for the SABG, we examined the way the current formula would distribute funds to states with and without applying existing minimum allotment rules and how changes to the formula would shift these distributions. While the direct method of estimating state population need would result

in a somewhat larger reallocation of funds than the indirect method when the minimum allotment rules are relaxed, when combined with updates to the COSI, the total shifts in allotments are not large (8.61 percent for the direct method and 4.84 percent for the indirect).

As with the MHBG, the direct method is preferable because it more accurately measures state differences in population need. The ongoing NSDUH survey provides state-level estimates of those in need of services for youth as well as adults. We initially defined and analyzed separate indicators for prevention and treatment need, but our analyses showed that a single indicator based on the prevalence of substance use disorders was sufficient to represent both prevention and treatment need, and so our results focus on the simpler definition of need.

A large advantage of the direct over indirect approach was seen when we examined how well the demographic models predicted treatment need. The best demographic models were poor at predicting whether an individual was assessed in the NSDUH as having need (37 percent concordance for adults and 16 percent for youth). Not surprisingly, then, the pattern of results for state allotments when using the indirect method differed substantially from those when using the direct method (as seen in Figure 7.7).

As we noted with the MHBG, one limitation of the state-level estimates of need generated from the NSDUH survey is that they are subject to sampling and measurement error; therefore, confidence intervals for state estimates of need are larger for states with smaller survey sample sizes. Confidence intervals could be reduced and the stability of estimates over time increased by using four years of data rather than two to calculate state-level estimates of need. A limitation of the NSDUH data for both direct and indirect estimates is that they do not represent those who are incarcerated or living in long-term care facilities.

To protect states from large decreases in funding if the formula is changed, Congress could consider hold-harmless approaches. These assume that total budget allotments generally increase over time, such that any new minimum allotment rules suppressing the effects of formula changes ultimately allow funds to be distributed as intended.

8. Projects for Assistance in Transition from Homelessness

PATH is a formula grant program that allocates an annual grant amount to states and territories to provide outreach and services to people with SMI (including those with co-occurring substance use disorders) who experience or are at risk of homelessness. The grant allocation formula distributes funding to states and territories based on an indicator of population need; the current indicator is the size of the urban population. Funding is also subject to a minimum allotment.

Population Need

To evaluate the extent to which urban population size is an adequate indicator of state need for PATH funding and how this indicator might be improved, it would be ideal to have national epidemiologic data on the prevalence of persons with SMI who are homeless or at risk of homelessness, as well as geographic or other sociodemographic factors associated with this prevalence. We were unable to find such data, and our TAG confirmed that they do not exist. Numerous local community studies that have surveyed samples of homeless people have reported relatively high prevalence of substance use and mental disorders among homeless samples compared with rates in the general population, but these studies are methodologically as well as geographically diverse, and the reported rates of severe mental disorders, such as psychosis, personality disorders, and major depression, among homeless samples range widely across studies (Fazel et al., 2008).

Since the authorization of the PATH program in 1990, however, sources of state and national data on the prevalence of homelessness have improved. If state variations in the number of people who are homeless correspond closely to state variations in the number of people with SMI who are homeless, then data on prevalence of homelessness can inform the evaluation of the PATH population need indicator. A number of studies reporting similar reasons for and pathways to homelessness among adults with and without SMI (Mojtabai et al., 2015; Odell and Commander, 2000; Sullivan, Burnam, and Koegel, 2000) are consistent with the idea that there is a correspondence.

Prevalence of Homelessness

There are two broad approaches to estimating the prevalence of homelessness. The first uses a census-like approach, attempting to provide a count of the number of people who are homeless at a given point in time. As part of the 1990 U.S. Census, census workers were directed to enumerate homeless individuals staying in emergency shelters and on the streets in cities with populations of 50,000 or more. This “S-night” enumeration (which counted 228,000–240,000

people) is believed to have substantially undercounted the homeless population. Given that these concerns were mainly focused on problems with counting unsheltered homeless people, the censuses of 2000 and 2010 produced a more-limited report of people enumerated on one night in emergency shelters (including shelters for adolescents, abused women and children, and transitional shelters). The total number of sheltered persons counted on one night in 2000 was 170,706, and in 2010 it was 209,325; the comparable number of those counted in shelters for 1990 was 178,638 (A. C. Smith and Smith, 2001; A. S. Smith, Holmberg, and Jones-Puthoff, 2012). While these census enumerations of sheltered individuals provide state-by-state counts as well as demographic characteristics of the population, a census of emergency shelters reflects the public policy response to homeless individuals and does not directly indicate broader need for services.

The only annual national count of homeless individuals is provided by HUD. Since 1994, HUD has required counties that receive federal funding for homelessness-related services to develop estimates of the number of sheltered and unsheltered homeless persons in their jurisdiction on a single night in late January. Currently, this requirement is met by local authorities responsible for regional continuums of care that conduct an annual count of homeless persons who are sheltered in emergency shelter, transitional housing, and safe havens. Continuums of care also must conduct a count of unsheltered homeless persons every other year (odd-numbered years). HUD provides methodological guidelines for developing these “point-in-time” estimates and has encouraged communities to improve their methods and the accuracy of their estimates over time. Because a variety of approaches can be used, these estimates are generally considered noisy (that is, heterogenous due to methodologic variability) and are potentially biased toward overcounting to justify need for services (Quigley, Raphael, and Smolensky, 2001). In 2016, the point-in-time count of people experiencing homelessness in the United States was nearly 550,000. States with the highest number of homeless people in 2016 were California, New York, Florida, Texas, and Washington. Since 2007, the point-in-time estimates have shown a general decline over time in the total number of homeless people and the proportion of those who are unsheltered (HUD, 2016). Our TAG favored using these annual homelessness counts as a source for direct estimates of need for homelessness services to compare with the current, indirect estimates based on the count of the urbanized population from census data.

The second approach involves estimating the prevalence of homelessness based on community surveys that ask respondents about their experiences with homelessness. A telephone survey of adults residing in households conducted in 1990 asked about experiences of “literal” homelessness (sleeping unsheltered or in a shelter for homeless people) as well as “doubling up” (sleeping in a friend’s or relative’s home because one was homeless [Link et al., 1994]). The study reported rates of literal homelessness ever experienced to be 7.4 percent, with 3.1 percent reporting literal homelessness in the past five years. When doubling up was included, total lifetime prevalence of homelessness was 14 percent, and for the past five years it was 4.6

percent. These rates suggest much higher levels of homelessness than the point-in-time census methods. Based on these rates, an estimated 5.7 million adults experienced literal homelessness in the past five years, which increases to 8.5 million if doubling up is included. This result underscores the consistent finding that many people experience short-term homelessness or times when they need to rely on friends or family for shelter. Using a similar telephone survey methodology, Tompsett and colleagues (2006) reported similar rates of homelessness in a survey administered in 1993–1994 and lower rates when the survey was repeated in 2001 (e.g., past five-year rates of literal homelessness dropped from 3.9 percent in 1993 to 1.9 percent in 2001). Morton and colleagues (2018) recently reported the prevalence of adolescent and young adult experiences with homelessness using a nationally representative telephone survey of households. Households reported that 3 percent of adolescents ages 13–17 had experienced homelessness in the past 12 months (including running away and being asked to leave). Among adults ages 18–25 who self-reported, 5.2 percent experienced literal homelessness in the past 12 months (Morton et al., 2018).

Compared with census approaches, community survey approaches have the advantage of capturing the experience of those who have been episodically homeless and precariously housed, but a limitation of this sampling is that those who tend to be more persistently homeless are missed. In addition, surveys that include questions about homelessness are not regularly fielded, and existing surveys are not large enough to provide state-level estimates. We compared the state-level estimates from the indirect method with the HUD point-in-time estimates as a measure of how well the indirect method performs.

Relationship of Urban Population to Homelessness

The size of the urban population of a state has been considered an indicator of need for homelessness services because homeless individuals have tended to migrate to more “urban” areas where emergency shelters and other homeless services are concentrated. However, two limitations of this approach should be considered. First, it is not clear how “urban” should be defined because there may also be concentrations of homeless individuals in suburban areas or smaller cities, particularly in states without large metropolitan areas. Second, rural areas may have substantial numbers of people at risk for homelessness. Factors shown to be antecedents to homelessness, such as poverty, severe mental illness, substance use, and adverse childhood experiences, can contribute to risk for homelessness in rural as well as more urban areas. Here, we consider recent evidence on the relationship of homelessness to urbanicity.

HUD reported 2016 point-in-time counts of homeless people by three geographic categories: major cities (the 50 largest cities in the United States), smaller cities/counties, and rural counties (or, in some cases, entire rural states) (see Table 8.1). While major cities accounted for more than half of the homeless population count (59 percent), smaller cities/counties and even rural areas contributed substantially to the totals (27 percent and 14 percent, respectively). All three

geographic areas show downward trends in the number of homeless persons since 2007, especially for the unsheltered homeless population (U.S. Department of Housing and Urban Development, 2016). The geographic categories reported by HUD do not correspond to standard census-based definitions because the geographic unit reporting homeless counts to HUD is a programmatically defined continuum-of-care service area. Lee and Farrell (2005) examined 1990 and 2000 census data on homeless counts and found that “critical mass neighborhoods”—that is, metropolitan neighborhoods with emergency and transitional services that house high numbers of homeless people—declined in number between 1990 and 2000 and were more dispersed. The results suggest movement away from more traditional “skid row” areas of cities, with more cities and suburbs affected by homeless populations and providing services. Somewhat surprisingly, in their telephone survey of residential adults, Link and colleagues found no significant relationship between the prevalence of reported homelessness and current community size (Link, 1994), a finding suggesting that the broader experience of short-term homelessness and risk for homelessness is more evenly distributed across urban, suburban, and rural areas.

Table 8.1. Data Source That Measures Prevalence of Homelessness

Data Source	Strengths	Limitations
U.S. Department of Housing and Urban Development Point in Time Estimates of Homeless Persons	<ul style="list-style-type: none"> • Collected for all 50 states • Annual estimates • Sheltered are counted every year, and unsheltered are counted every other year 	<ul style="list-style-type: none"> • Continuum-of-care areas employ a range of methodologies to provide estimates

Other Predictors of Homelessness

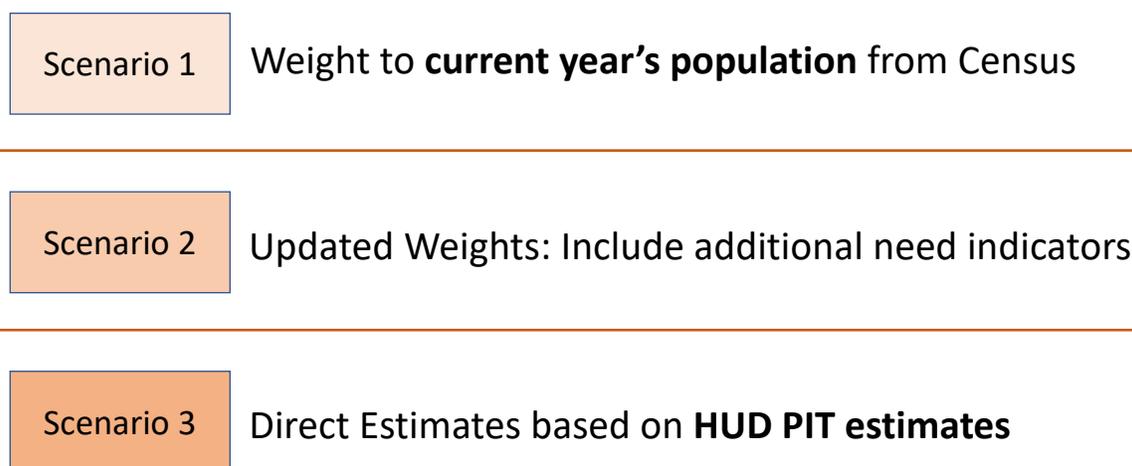
Conceptually, antecedents of homelessness can be viewed as individual/micro factors that reduce opportunities and increase vulnerabilities to experiencing homelessness and economic/macro factors that promote homelessness (Koegel, Burnam, and Baumohl, 1996). Demographically, homeless individuals are more likely to be single men, though the population is heterogenous, including women, families, adolescents, and the elderly (Burt, 2001; Crane et al., 2005; A. S. Smith et al., 2012). Studies of the health and quality of life of homeless individuals have described low material and social support, high food insecurity, poor health and mental health, high rates of substance use, high rates of childhood adversity, and high rates of being victimized (see review by Lee et al., 2010). These characteristics may, in part, be consequences of the experience of homelessness, rather than antecedents.

Studies that have examined macro-level predictors of homelessness provide some insight into what may be accounting for regional differences in the prevalence of homelessness. While macro-level studies are often limited by the nature of available data with sufficient geographic and temporal variation, studies are consistent in finding a relationship between affordability of housing and homelessness (Quigley et al., 2001; Wright, Donley, and Gotham, 2008).

Three Potential Changes to the PATH Formula

We followed the same approach as we did in the MHBG and SABG need formulas to make adjustments to the original PATH formula that includes the urbanized population. To develop potential alternative indicators of state need, we considered the indirect approach and examined potential census-based predictors of state-level population risk for homelessness. Specifically, we examined adding to the need component of the PATH formula (1) the vacancy rate for home ownership and rental combined and (2) the ratio of median rents to median household income. We also evaluated the impact of using the HUD point-in-time (PIT) estimates as direct estimates of homelessness. Figure 8.1 summarizes the three scenarios we evaluated. We then created simulations of the PATH allocation using each scenario and compared these allocations with the current allocation. The impacts of each scenario were estimated without accounting for the minimum allocations

Figure 8.1. Three Scenarios Tested for Impact of Changes to Formula on Allocation of PATH Funds



- In Scenario 1, each state is weighted simply by its total population, without consideration of any population characteristics. This scenario is meant to provide a heuristic baseline against which other scenarios can be compared.
- In Scenario 2, we consider including additional predictors of homelessness to the allocation formula. The additional predictors we consider, based on the environmental scan, are vacancy rate and the ratio of rents to income.
- In Scenario 3, we use direct estimates of the number of homeless in each state, based on the HUD PIT estimates.

For Scenario 2, we fitted a multiple linear regression model:

$$Y_i = X_i^T \beta$$

where

Y_i = natural log of the count of homeless individuals in state i from HUD PIT

X_i^T = value of predictor variables for state i .

California and New York have much larger homeless counts than the other states. In 2016, the count of homeless individuals in California was 5 standard deviations above the average count, and New York was more than 3 standard deviations above the average count. It is challenging to find a model that performs well when there are outliers like these two states. To address this challenge, we log transformed the count of homeless individuals in each state, which reduced the relative size of the homeless counts in California and New York. The predictor variables included the natural log of the total state population in urbanized areas, the state vacancy rate, and the ratio of rent to income. The estimates of the coefficients $\hat{\beta}$ allowed us to estimate the change in the natural log of a state's population of homeless individuals that was due to changes in the covariate X . These estimates served as our estimates of the multipliers associated with each predictor. After applying the multipliers to the predictor variables to get \hat{Y}_i , the predicted count of homeless individuals in state i is $e^{\hat{Y}_i}$.

Results: How Do the PATH Allotments Change Under Each Scenario?

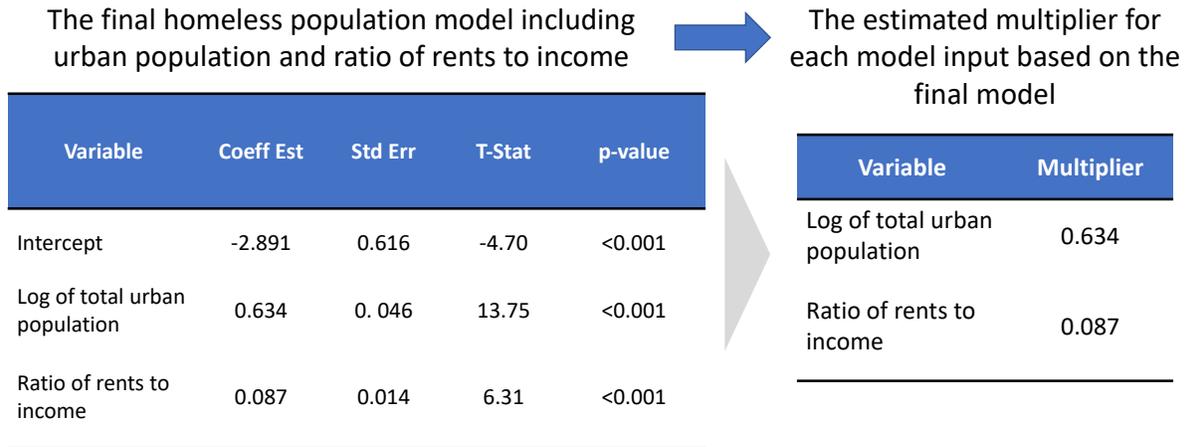
Developing Alternative Population Need Indicators

Our analysis of Scenario 2 revealed that there is no statistical association between a state's population of homeless individuals and the vacancy rate. Therefore, our final model for Scenario 2 included only the urbanized population and the ratio of rents to income (Figure 8.2). The indirect estimate of the log of homeless individuals in each state is:

$$\hat{Y}_i = -2.891 + 0.634 \times \ln(\text{urban population}_i) + 0.087 \times \text{ratio rents to income}_i$$

Even though this is the best model, it still yields predicted values for California and New York that are significantly lower than their actual HUD counts. However, using a model that yields better estimates for these two states would then perform badly at estimating the number of homeless individuals in the other states. Thus, indirect methods for estimating homeless individuals are limited in their ability to accurately estimate the number of homeless individuals in each state.

Figure 8.2. Model for Scenario 2



Impact of Alternative Population Need Estimates on State Allotments

Using the alternative population need weights described, we conducted a series of simulations in which we examined the impact that adopting each scenario would have on the allocation of PATH funds across states. In Table 8.2, we summarize the results of these simulations in terms of the extent to which the allocation under each scenario would differ from the current allocation. These differences are characterized by the total percentage of PATH funds that would be reallocated under each scenario and the number and characteristics of the states that would see an increase or a decrease in their PATH funding, assuming that the total amount of funding remained the same and that no minimum funding levels were enforced.

Table 8.2. Summary of Impacts of Changes to PATH Population Need Index (without current minimum limits)

Change	% of Fund Reallocated	# States		\$ Decrease		% Decrease		\$ per Person Decrease	
		with Decrease	with >5% Decrease	Largest	Median	Largest	Median ^a	Largest	Median
Indirect methods for estimating need									
1. Total state population	8.99%	17	14	\$1.8M	\$0.2M	31.0%	14.7%	\$0.08	\$0.03
2. Add ratio of rents to income	12.65%	18	16	\$1.5M	\$0.2M	54.1%	19.5%	\$0.10	\$0.04
Direct methods for estimating need									
3. HUD homeless counts	25.57%	33	31	\$2.6M	\$0.3M	57.8%	35.4%	\$0.16	\$0.06

^a This column shows the median percentage decrease among states that experience a decrease.

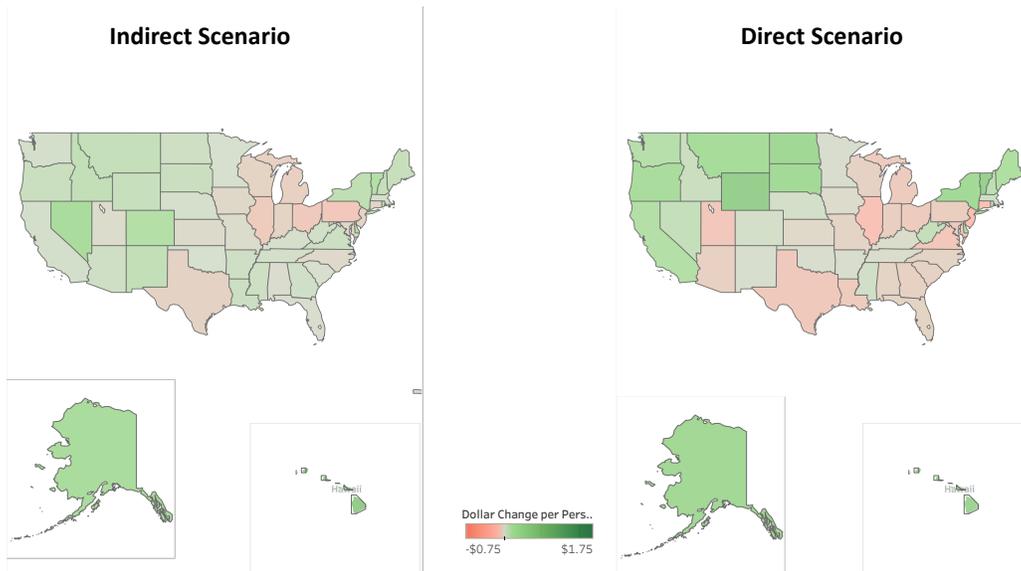
Scenario 1, which removes all information about the homeless population and simply weights each state by its total population, results in a reallocation of 8.99 percent of the total PATH funds when compared with the current allocation. In this scenario, the funding would decrease in 17 states, and 14 would have their funding decrease by 5 percent or more. The largest decrease per person (i.e., the total increase divided by the state's total population) would be \$0.08, and the median decrease per person would be \$0.03.

If the formula were expanded to include the ratio of rents to income (Scenario 2), 12.65 percent of the total allocation would shift. In this scenario, 18 states would experience a decrease, and 16 states would experience a decrease of 5 percent or more. The largest percentage decrease would be 54.1 percent (median 19.5 percent).

Using direct estimates of need for the PATH formula has the largest impact among the alternatives we considered, as it did for both the MHBG and the SABG. The total change in allocation would be 25.57 percent. Many more states (33) would experience a decrease in funds, and almost all of these would experience a decrease of 5 percent or more. The median decrease would be 35.4 percent. The direct estimates of homelessness do not have the same uncertainty as the estimates of need for the MHBG or SABG formulas because they are a census rather than a sample estimate. Stability over time is still a potential concern, however. Changes in the homeless population within a state may vary over time and create challenges for state planning. Pooling years would address this by smoothing year-to-year changes while preserving trends over time. States that are experiencing increases or decreases in the count of homeless individuals over time would see their allotments increase or decrease, but states that have random changes from year to year would receive consistent funding over time. We estimated the average counts of homeless individuals using two years and three years and compared the variability between these averages and the single-year counts. The correlation across years in the annual count of homeless individuals is very high (0.999), so states remain consistent over time. However, averaging over two or three years of data does decrease the variation from year to year. The standard deviation of the percentage change in the three-year average count of homeless individuals is about one half of the standard deviation for the annual count.

Figure 8.3 provides maps summarizing the changes by state for an indirect scenario (Scenario 2) and a direct scenario (Scenario 3) in terms of dollars per person in the state. Once again, the maps illustrate different patterns of change under the two scenarios. For example, under the indirect method, southeastern states remain stable or gain funds when compared with their current allotments, while under the direct method, more of these states lose funds relative to their current allotments.

Figure 8.3. Maps Summarizing Dollar Change per Person for Two PATH Scenarios



Consequences of Alternative Hold-Harmless Approaches

We focused on two types of changes to the PATH formula. There is no cost component for the PATH formula, but like the MHBG and SABG analyses, we have identified both a new indirect method for estimating need (Scenario 2) and a direct method for estimating need (Scenario 3). We explored two potential approaches to implementing a hold-harmless strategy to minimize the negative impact of making these two changes. Table 8.3 summarizes the implications of each approach.

Table 8.3. Summary of Hold-Harmless Alternatives for PATH Scenario

Change	Hold Harmless Alternative 1 No state loses money Increase in Total Allocation (% Increase)	Hold Harmless Alternative 2 Maximum decrease 5% Years to Reach Current Allotments
1. Indirect scenario	\$7.8M (12.6%)	23 years
2. Direct scenario	\$15.7M (25.6%)	19 years

To implement the new indirect estimation scenario (indirect estimate of risk of homelessness) and ensure that no state loses funds, an increase of \$7.8 million in total allocation over 2018 (a 12.6-percent increase) would be required. If the indirect scenario is adopted, and if we assume that total program allocation increases by 1 percent each year and no state is allowed to lose more than 5 percent of its allotment from the prior year, it would take 23 years for the formula to distribute funds as intended. Under the direct estimation scenario (direct use of HUD homeless counts for each state), the total allotment would need to increase by \$15.7 million (a 25.6-percent increase) to avoid losses to any state, and it would take 19 years to distribute funds as intended, assuming a 1-percent program allocation increase each year with no state getting less than a 5-percent decrease from its prior year’s allotment. Eighty percent of states would be at their intended allotments after 13 years.

Conclusions

Improving the PATH population need indicator, whether by using an indirect or direct method for measuring the state population risk for homelessness, would result in large shifts relative to the current formula: Approximately 13 percent or 25 percent of program funding would be redistributed across states, respectively. As with the MHBG and SABG population need indicators, we conclude that the direct method is preferable because it uses the best available directly collected information on risk of homelessness by state. Another advantage to the direct method is that point-in-time counts of homeless individuals are collected for all but one of the territories as well as for states, whereas one of the indirect indicators, a measure of housing affordability, is not available for territories.

9. Conclusions and Recommendations

The main purpose of this study was to determine whether the formulas used to distribute funds for the MHBG and SABG and the PATH grant accurately reflect states' need for services. In particular, we were tasked to determine whether the data and variables used to measure the components of the formulas were appropriate and whether minimum allotment rules were appropriate. Finally, if we determined that the formulas and rules were not appropriate, we were asked to recommend modifications.

We conducted this study under the guiding assumption that any alteration of the formulas should uphold the intent of the original legislation that created them. For the MHBG and SABG formulas, this means that any revised formula should measure the three core components (population need, costs of services, and fiscal capacity) and relate these components to each other so as to preserve the taxpayer equity concept—which is designed to equalize states in the rate that taxpayers would have to pay to support a standard level of service for their population in need. For the PATH formula, this means that any alternatives should focus on measuring only population need.

We considered desirable characteristics of data and variables used to measure formula components, including validity, annual availability, recency, reliability for state-level measurement, and stability over time. In addition, it was desirable that the formulas and the data used to calculate them remain transparent to stakeholders. Finally, consistent with the underlying structure of the formulas, it was desirable that the inputs to the formulas should be reasonably independent of other state policies or programs that address the formula subjects and are influenced by state choices.

This chapter presents the main conclusions of our analysis and our recommendations for modifications. These are organized as follows: (1) COSI and state fiscal capacity indicator, which are components of the SABG and MHBG formulas and are measured the same in each of these formulas; (2) MHBG formula, including the minimum allotment rules, the mental health population need measure, and the MHBG formula when combining changes to both the population need measure and COSI; (3) SABG formula, including the minimum allotment rules, the substance abuse prevention and treatment population need measure, and the SABG formula when combining changes to both the population need measure and COSI; (4) the PATH grant formula, including the minimum allotment rules and the population need measure; and (5) hold-harmless approaches that could be used to buffer states from big losses in funding when formulas are modified.

Costs of Service Index and State Fiscal Capacity Indicator for the MHBG and SABG Allotment Formulas

Both the MHBG and the SABG formulas rely on the same measures of costs of services and state fiscal capacity. Our analysis showed that the current weights used to apportion the components of the COSI (i.e., the most recent state-level information on labor and rents and a constant for other costs) are out of date and can be improved to reflect current patterns of costs for outpatient services. These cost patterns have been stable over the past several years, so we would not expect new weights to become outdated in the near future. However, it would be relatively easy to check and update weights on a regular basis, such as every five years. Another way that weights could be improved in the future would be to analyze cost patterns specific to mental health and substance abuse outpatient services; these data are collected, but they were not available to us at that level of detail for the purposes of this study.

Inputs to state-level indicators of labor and rents of the current COSI were considered appropriate, given ongoing available data sources for measuring them. Updating only the COSI with new weights would shift 1.16 percent of the total 2018 MHBG allotment and 1.17 percent of the total SABG allotment.

The current indicator of state fiscal capacity, total taxable resources, continues to be the optimal choice given available data sources.

Information is available to calculate the COSI and state fiscal capacity indicator for states and the District of Columbia, but not for territories. Current practice for calculating allotments is to allocate 1.5 percent of the total block grant funds to territories and to distribute this amount among territories based on their population need measure. This seems a reasonable approach, and we have no basis for recommending an alternative method.

It is important to note that we did not consider alternative cost and fiscal capacity indicators that would take into account known state differences in the financing and structure of public mental health and substance abuse services. For example, some states elected to expand Medicaid coverage under the ACA, many states have shifted to managed care arrangements for some or all of their publicly funded mental health and substance abuse services, and states vary in the extent to which their state and local tax revenues fund mental health and substance abuse services. We made this decision because the underlying structure of the MHBG and SABG formulas is currently based on the concept of taxpayer equity, which does not take into account how states may be benefiting from other federal programs or otherwise managing their publicly funded services. We inferred from the language of the regulations that mandated this study that Congress intends to continue the taxpayer equity approach, but other approaches are possible and could be considered in the future.

Recommendations for the MHBG and SABG Formulas

- Update weights for the cost components of the COSI, weighting labor at 0.55, rent at 0.05, and other costs at 0.40.

- Review best available data on the costs of services every five years to allow weights to be updated to reflect recent cost patterns.

Community Mental Health Block Grant Allotment Formula

Current minimum allotment rules for the MHBG, established in 1998, no longer have any impact on distributions to states. If Congress updates the allotment formula, these rules could be dropped with no foreseeable consequence.

Our analyses suggested that improvements could be made in the population need indicator for the MHBG formula to better align with the best available data on population need for mental health services. Making these changes, including changes in the COSI as described, would result in sizeable shifts in allotments across states. Congress may wish to consider making new hold-harmless rules that take effect simultaneously with changes to the formula. Because these could apply to the SABG and PATH grant programs as well as to the MHBG program, we discuss them in the last section of this chapter.

The population need indicator can be improved by utilizing national survey data that assess the prevalence of adults with SMI and children with SED. When we utilized current survey data to establish new weights for age and education groups and then applied these weights to state populations using U.S. Census data, similar to the way that the current formula measures population need, the distribution of funds changed, but not dramatically. Using this approach, only 1.41 percent of total grant funds would be shifted. This indirect method has the advantage of producing state allotments that are similar to what states have come to expect. But this option has some disadvantages. First, these new weights could become outdated in the future if sociodemographic predictors of illness change, requiring new analyses to establish updated weights. Second, and more important, sociodemographic predictors of prevalence of mental illness will never be as accurate as directly measured prevalence of illness in each state, as illustrated by relatively poor concordance between demographic model predictions of directly measured treatment need.

Both of these disadvantages can be overcome if the population need indicator directly employs state-by-state measures of the prevalence of adults with SMI that are already generated by SAMHSA from the annual NSDUH survey data. When we used this direct method to measure adult population need and incorporated need among children using national prevalence estimates (because relevant data for children do not exist at the state level), the improved formula resulted in greater changes to state allotments, with 13.30 percent of total funds being shifted. Adding recommended changes to the COSI along with the direct estimates of population need results in a shift of 13.62 percent of total funds. One potential disadvantage of the direct method is that state-level estimates are subject to measurement error, particularly for smaller states. SAMHSA currently uses two years of the most recent data to provide state-level estimates to mitigate this problem, but four years of the most recent data would improve the precision of the estimates by about 30 percent and also increase the stability of the estimates over time. We recommend the

direct method over the indirect method because it is a more accurate measure of population need for treatment and because it can be annually updated for each state. The NSDUH survey, which was not available when the formula was originally designed, is a valuable national surveillance system and is well designed to support national and state population need assessments. The NSDUH survey also has some limitations that should be noted. First, state-level prevalence of SMI is measured with some error, both because it is based on a sample of individuals, and also because it is based on self-reported symptoms of emotional distress and functioning rather than on clinical diagnoses. It is currently the best available data on state variations in the prevalence of SMI, but improvements in epidemiologic data could very well be made in the future that would improve on this information. For example, members of our TAG suggested that NSDUH sample sizes could be increased to improve the precision of state-level estimates, and other efforts could be made to estimate treatment need among institutionalized populations. Secondly, the NSDUH survey is currently not fielded in Puerto Rico or other territories, and therefore estimates of prevalence of SMI for territories will have to rely on the indirect method of estimating prevalence of adults with SMI, but these could be made using updated weights for age and education groups from this study.

Recommendations for the MHBG Formula

- Remove the current minimum allotment rule. Although it no longer affects the current allotments, it is outdated and should be eliminated or revised if changes are made to the formula.
- Update the population need indicator to use direct measures of prevalence of adults with SMI; these are available annually for each state and the District of Columbia from SAMHSA's analyses of the NSDUH. For states and the District of Columbia, add a population need indicator for SED among children of 3.6 percent of children ages 5–17. Consider improving the precision and stability of state-level estimates of adults with treatment need by using four years of NSDUH survey data instead of the two-year estimates currently reported by SAMHSA.
- For territories, where direct measures of adults with SMI are not available, use indirect estimates based on counts of people in various age and education categories: 3.6 percent of children ages 5–17, 5.3 percent of adults ages 18–49 with a high school education or less, 7.3 percent of adults ages 18–49 with some college education, 4.0 percent of adults ages 18–49 with a college degree or higher, 3.9 percent of adults ages 50–64 with a high school education or less, 5.4 percent of adults ages 50–64 with some college education, 3.0 percent of adults ages 50–64 with a college degree or higher, 1.1 percent of adults ages 65 or above with a high school education or less, 1.5 percent of adults ages 65 or above with some college education, and 0.8 percent of adults ages 65 or above with a college degree or higher.

- Every five years, review the best available data for measuring state-level adult and child treatment need to allow both direct and indirect components of the formula to be updated as surveillance data are improved.

Substance Abuse Prevention and Treatment Block Grant Allotment Formula

Like the MHBG, the current minimum allotment rule for the SABG was established in 1998, but unlike the MHBG rule, the rule for the SABG is more complex and is based on a comparison with the previous year's allotment. It has had the effect of preventing any substantial shifting in the allotments over time even as inputs to the formula change, and therefore it does not allow the current formula to operate as intended. When we simply removed the minimum allotment rule from the current SABG formula, 3.23 percent of the total 2018 allotment shifted. Because the rule continues to limit the way that funds are distributed, even though 20 years have elapsed since it was adopted, we recommend removing or replacing it. As an alternative to the current rule, we explored alternative hold-harmless rules that could be adopted by Congress if changes are made to the formula. These would buffer negative effects for states that would experience decreased allotments, while over time they would move toward a distribution of allotments as intended by the formula. We discuss these in greater detail at the end of this chapter.

As was the case with the MHBG, our analyses suggested that improvements can be made in the population need indicator for the SABG formula to better align with the best available data on population need for mental health services that are collected as part of the ongoing NSDUH survey. SAMHSA annually reports the national and state-level prevalence of adults and youth with substance use disorders (which also includes those in specialty treatment for substance use); these prevalence statistics are well-accepted indicators of treatment need. In our analyses, we also examined indicators of substance use prevention need using data from NSDUH because the SABG is intended to fund both treatment and prevention services, and states are mandated to spend at least 20 percent of their block grant funds on prevention services. Our indicator of prevention need excluded those with substance use disorder but included adults who binge-drank alcohol or used illicit drugs and youth who used alcohol, drugs, or tobacco. Because the addition of a separate prevention need indicator was highly correlated with the indicator of treatment need ($r = 0.997$), we concluded that both prevention and treatment need are well represented with an indicator based on the prevalence of substance use disorders, resulting in a simpler and more parsimonious definition of population need for the SABG.

The current formula gives a higher weight for population counts of young adults and those in urban areas. When we drew on NSDUH survey data to establish new weights for census-based sociodemographic groups, young adults continue to be weighted more heavily, but those in rural areas proved to have somewhat higher rates of substance use disorders, and those who are unemployed also have higher rates, so these other groups also receive large weights. Using this

indirect method to update weights that are applied to sociodemographic characteristics of state populations resulted in a shift of 4.46 percent relative to the current formula (assuming that the current formula is not constrained by the minimum allotment rule). When we directly used state-level measures of the prevalence of substance use disorders that are already generated annually by SAMHSA from the NSDUH data, 8.65 percent of the total 2018 allotment funds were shifted. Adding an updated COSI to the formula in addition to direct measures of population need resulted in a shift of 8.61 percent of the total funds.

As with the MHBG, we recognize arguments for using the indirect method for measuring population need; it is similar to the way the formula is currently structured, and updates would produce smaller changes relative to current formula allotments. Nonetheless, using state-level data directly from NSDUH is a more accurate indicator of state population need and takes advantage of the existence of the valuable NSDUH surveillance system that has been developed as a government resource. Although the NSDUH survey provides the best available information on the state-level prevalence of substance use disorders, we note that these are measured with some sampling and measurement error. Improvements in the precision of the estimates could be gained by using the most recent four years of data instead of two years. The NSDUH survey is also limited because it is not fielded in Puerto Rico or other territories, which means that the indirect method continues to be the only option for territories, though updated indicators and weights can be used to make estimates for territories. As epidemiologic data are improved, improvements could be reflected in the formula.

Recommendations for the SABG Formula

- Remove the current minimum allotment rule because it continues to restrict the formula from operating as intended, artificially maintaining the allotments closely to 1998 funding levels.
- Update the population need indicator by using direct measures of the prevalence of adults and youth with substance use disorders, which indicate both prevention and treatment need. These are available annually from SAMHSA's analyses of the NSDUH for each state and the District of Columbia. Consider improving the precision and stability of these state-level estimates of need by using four years of NSDUH survey data instead of the two-year estimates currently reported by SAMHSA.
- For territories, where direct measures of adults and youth with substance use disorders are not available, use indirect estimates based on counts of people in various age and education categories: 4.1 percent of children ages 4–17, 14.8 percent of adults ages 18–25 who are employed or not in the workforce and reside in rural areas, 22.3 percent of adults ages 18–25 who are unemployed and reside in rural areas, 12.2 percent of adults ages 18–25 who are employed or not in the workforce and reside in urban areas, 18.7 percent of adults ages 18–25 who are

unemployed and reside in urban areas, 6.8 percent of adults ages 26 and older who are employed or not in the workforce and reside in rural areas, 10.7 percent of adults ages 26 and older who are unemployed and reside in rural areas, 5.5 percent of adults ages 26 and older who are employed or not in the workforce and reside in urban areas, and 8.8 percent of adults ages 26 or older who are unemployed and reside in urban areas.

- Every five years, review the best available data for measuring state-level adult and youth prevention and treatment need to allow both the direct method (states) and the indirect method (territories) for calculating the need component to be updated as surveillance data are improved.

Projects for Assistance in Transition from Homelessness

The PATH grant formula currently allots funds based on the size of a state's urban population. The minimum allotment for states, the District of Columbia, and Puerto Rico is \$300,000, and for other territories it is \$50,000. At the current time, the minimum allotment rule does not affect the distribution of funds because the formula results in no allocations to states or territories that fall lower than these minimums.

Using annually collected point-in-time counts of the size of homeless populations collected by HUD as the best available indicator of population need for services, we found that alternative weights for urban population and a state-level indicator of housing affordability (the ratio of rents to income) better predicted the size of a state's homeless population. When we used these alternative weights in the formula, approximately 13 percent of funds were redistributed. When we directly used HUD data on size of the homeless population for each state, a quarter of the grant funding was redistributed (25.57 percent). As with the MHBG and SABG, direct use of HUD counts should provide a more accurate estimate of population need, assuming that the broader risk of homelessness in a state is a good indicator of the risk for homelessness among those with SMI. One further advantage of the direct measures is that the HUD point-in-time information on the number of homeless individuals is currently collected for all territories except American Samoa, in addition to all the states and the District of Columbia. While HUD point-in-time counts are the best available state-level data on risk of homelessness, they also have limitations in that they tend to undercount those who are hard to find or episodically homeless, and they do not include counts of those who are precariously housed (e.g., doubled up with friends or family). As methods for counting the size of the homeless population in states and territories are improved, these improvements could be reflected in the PATH formula.

Recommendations for the PATH Formula

- Remove the current minimum allotment rule. Although it does not affect current allotments, the minimum allotment levels are outdated and should be eliminated or revised if changes are made to the formula.
- Update the population need indicator by using direct measures of state point-in-time counts of homeless individuals (sheltered count available annually and unsheltered count available every other year from HUD for states and territories).
- Every five years, review the best available data for measuring the state-level risk of homelessness, or, if available, the state-level risk of homelessness among adults with SMI, to allow updates in the population need indicator as surveillance data on homelessness are improved.

Future Hold-Harmless Rules

If the recommendations of this report to update the formulas for the MHBG and SABG and the PATH grant are adopted, Congress would likely want to consider simultaneously making new hold-harmless rules that would buffer states from large and sudden losses in funding. To ensure that the formulas eventually redistribute funds equitably and as intended by the language of the regulations and the underlying structure of the formulas, we recommend the adoption of simple hold-harmless rules. The purpose of the rules would be to protect states from large declines in funding yet over time redistribute growth in total funding in accordance with the formula.

Similar to the current MHBG minimum allotment rule, Congress could set the minimum allotment for a state to be no less than the amount it received prior to the year that the formulas are updated. Under this rule, to the extent that grant funding increases, the distribution of allotments to the states becomes increasingly aligned with the formula until the funding exceeds a certain amount, at which time the minimum allotment rule no longer affects the distributions. When we examined the funding that would be required for each of the programs to fully redistribute funds in accordance with our recommended changes to the formulas, with no impact of this simple hold-harmless provision, we found that the MHBG allotment would need to be increased by 13.7 percent (\$72.2 million), the SABG allotment would need to be increased by 8.4 percent (\$145.9 million), and the PATH grant would need to be increased by 25.6 percent (\$15.7 million). These increases are relative to the current year's allotment as the base, and of course they would not have to occur in a single year. The analysis is meant to illustrate how increases in the budget over time would have the effect of redistributing the funds in accordance with an updated formula.

We simulated the effect of an alternative hold-harmless rule that would set a state's minimum allotment to no less than a 5-percent decrease from its current funding level, and we estimated how many years it would take before the hold-harmless rule had no impact on the distribution of

allotments to states, assuming that each fiscal year the program receives a 1-percent increase in total funding relative to the prior fiscal year. For the MHBG, it would take 12 years for the recommended formula changes to be fully implemented with no impact from this hold-harmless rule. For the SABG, it would take 14 years, and for the PATH grant, it would take 19 years. The attenuation of reallocations as intended by updated formulas for such long time periods is clearly not desirable. Shorter periods for the full expression of reallocations under changed formulas could be achieved with faster growth in total grant funding or acceptance of larger decreases in state funding from year to year.

Because decreases in total program budgets are also a possibility, new hold-harmless rules would also need to establish how decreased funding would be shared among states. In that case, the impact of formula changes would likely be highly attenuated to preserve reasonable stability in funding for each of the states.

Recommendation

- If formulas are changed, establish new hold-harmless rules for all programs to protect states from large decreases in funding yet allow formula changes to be implemented over time with increased program funding. Alternatively, increase program funding sufficiently to hold states harmless and ameliorate the need for new hold-harmless rules.

Final Observations

The formulas for distributing funds to states under the MHBG and SABG and the PATH grant were established in the early 1990s and have not been substantially modified since then. When established, there were no ongoing public health surveillance systems that directly assessed either national or state population need for mental health or substance abuse prevention and treatment services. Nor were state homeless populations annually counted as part of a national census. Instead, population need indicators in all three formulas relied on the demographic characteristics of state populations (e.g., age, urban population) that were believed at the time to correlate with need for services.

Since that time, national data systems have been developed that can provide direct assessments of population need for services rather than relying on demographic correlates. Although alternative data sources continue to have some limitations, the use of direct measures in the population need components of the formulas, as recommended by this study, would represent a big improvement in the accuracy and appropriateness of the formulas for distributing funds to states.

For the cost of services and fiscal capacity components of the MHBG and SABG formulas, we concluded that the data sources currently used as inputs to these components continue to be

appropriate. For the COSI, however, the weighting across the three cost components (labor, rents, and other costs) should be updated to reflect recent cost patterns.

Existing MHBG and SABG minimum allotment rules were designed to buffer states from possible losses in funding in the late 1990s. While the mental health minimum allotment rules were written in such a way that they had waning impact as funding grew, the substance abuse minimum allotment rules were written such that they maintained distributions close to their 1998 levels, thereby preventing the formula from distributing funding as intended. We recommend removing all of the existing minimum allotment rules because they are now outdated in their reference to 1998 funding levels.

If the formula improvements recommended by this study are adopted, they will result in large shifts in allotments, so it is appropriate to consider new hold-harmless approaches to buffer states from sudden large losses in funding. Hold-harmless approaches rely on overall growth in total grant funding over time; as funding increases, allotments are allowed to shift through differing rates of increase in state funding rather than through decreases in funding. Quicker growth in total grant funding allows the formulas to more quickly redistribute allotments as intended. If funding grows too slowly or not at all, then hold-harmless approaches, such as minimum allotment rules, prevent the formulas from distributing funds as intended. These trade-offs are important to consider if new minimum allotment rules are established when formulas are changed.

Finally, we have recommended future routine reviews of available data sources that might lead to improvements in the formulas. We expect that relevant data for measuring formula components will continue to improve over time, and we believe that the best data should be used to improve the accuracy of the formulas as they become available. The time period for review that we have recommended—five years—is arbitrary but is a long enough period in which to expect data improvements or historical trends that could affect static components of the formulas (such as weights for cost components).

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