



To: Members of the State Board of Health

From: Stephen Holloway, Branch Chief, Health Access Branch,  
Prevention Services Division

Through: Elizabeth Whitley, Prevention Services Division Director *EW*

Date: August 15, 2018

Subject: **Emergency Rulemaking Hearing**  
New rules at 6 CCR 1015-6 for State-Designated Health Professional Shortage  
Areas, emergency rulemaking hearing to occur on August 15, 2018

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The department's Primary Care Office (PCO) requests promulgation of new rules that establish methodologies for State-Designated Health Professional Shortage Areas (HPSA). Rulemaking is authorized by the passage of Senate Bill 18-024, "Expand Access to Behavioral Health Care Providers," Section 25-1.5-404 (1)(a) C.R.S.

Emergency rulemaking is requested because the burden of Substance Use Disorder (SUD) in Colorado is increasing. Opioid misuse has been declared a national public health emergency and mortality caused by acute drug intoxication (overdose) in Colorado has increased since 2000 by 170 percent and 300 percent for adults 25 to 34 and 55 to 64, respectively.

In order to respond to the public health crisis of SUD, greater access to secondary and tertiary treatment services is needed. Because access to treatment for SUD is substantially dependent on the capacity of community level behavioral health clinicians, the legislature has directed the PCO to expand the Colorado Health Service Corps (CHSC) (Section 25-1.5-501 *et seq*, C.R.S.) to include clinician practice incentives for SUD professionals to work in state-designated HPSAs.

These rules are a necessary prerequisite to the effective distribution of CHSC resources to areas of Colorado with the most acute SUD provider shortages. Alternative HPSA models are inadequate in describing specific provider shortages for SUD professionals. If state rules are not created, available state resources intended to improve access to SUD care may not be efficiently targeted or could be reverted to the state treasury.

**STATEMENT OF BASIS AND PURPOSE  
AND SPECIFIC STATUTORY AUTHORITY**

for new rule

6 CCR 1015-6, State-Designated Health Professional Shortage Area Methodology

**Basis and Purpose:**

Legislative Background

In 2017, the Opioid and Other Substance Use Disorders Interim Study Committee and Task Force met to study the following:

- a review of data and statistics on the scope of the substance use disorder problem in Colorado, including trends in rates of substance abuse, treatment admissions, and deaths from substance use;
- an overview of the current prevention, intervention, harm reduction, treatment, and recovery resources, including substance abuse prevention outreach and education, available to Coloradans, as well as public and private insurance coverage and other sources of support for treatment and recovery resources;
- a review of the availability of medication-assisted treatment and whether pharmacists can prescribe those medications through the development of collaborative pharmacy practice agreements with physicians;
- an examination of what other states and countries are doing to address substance use disorders, including evidence-based best practices and the use of evidence in determining strategies to treat substance use disorders, and best practices on the use of prescription drug monitoring programs;
- identification of the gaps in prevention, intervention, harm reduction, treatment, and recovery resources available to Coloradans and hurdles to accessing those resources; and
- identification of possible legislative options to address gaps and hurdles to accessing prevention, intervention, harm reduction, treatment, and recovery resources.<sup>1</sup>

SB 18-024 Implications for Rulemaking

During the 2018 legislative session, Senate Bill 18-024 was recommended by the Opioid and Other Substance Use Disorders (SUD) Interim Study Committee. SB 18-024 is one of five successful legislative proposals introduced during the 2018 legislative session to specifically address the opioid epidemic and SUD in Colorado. SB 18-024 expands the scope of the Colorado Health Service Corps (CHSC) loan repayment program to include clinicians and facilities that provide treatment for SUD and experience a shortage of health care professionals. SB 18-024 also expands loan repayment from licensed health professionals to

<sup>1</sup> Charge and Membership of the Opioid and Other Substance Use Disorders Interim Study Committee and Task Force, Colorado Legislative Council (June 28, 2017)

licensed health professionals and candidates for licensure in professions associated with the treatment of SUD. The CHSC improves access to health care by incentivizing clinical practice in areas of Colorado determined to have a shortage of health professionals.

In addition to these changes to the CHSC program, SB 18-024 created authority for state-designation of Health Professional Shortage Areas (HPSA) which will exist in parallel to federal HPSA designations. This authority is important because the Department has found that current federal methods do not adequately inform state decisions regarding emerging needs for improved health care services related to the treatment of SUD. Federal methods do not consider the unique systems and professions required to deliver comprehensive SUD care or consider the population level indicators of risk for SUD. For example, federal rules only measure physicians boarded in psychiatry when evaluating workforce capacity rather than the full range of behavioral health professionals and assume a constant rate of need for care within a population regardless of age, sex or other demographic factors that correlate with SUD risk.

The Department's Primary Care Office (PCO) requests promulgation of new rules that establish the first methodology for State-Designated HPSA for the behavioral health workforce engaged in SUD treatment. The shortage designation analysis and process, as described in the proposed rule will produce detailed quantitative information regarding local shortages of health professionals who provide treatment for SUD. Other rulemaking for primary care, oral health, and mental health as authorized by SB 18-024 will follow at a later date. HPSA for SUD is prioritized because it is the primary subject of SB 18-024 and rulemaking is necessary for its full implementation. Other parts of the existing CHSC program will continue to rely upon federal HPSA designation until state HPSA rules are promulgated.

Once the new rule for SUD HPSA is effective, \$2,257,412 (appropriated in FY 2018-2019) will be distributed in the form of educational loan repayment to clinicians who provide SUD treatment services in state-designated HPSA. The CHSC program reduces educational loan debt of qualified health professionals in exchange for a minimum three years of clinical service in an area of the state determined to have a shortage of providers. CHSC participants must agree to provide care to all individuals regardless of ability to pay.

The department anticipates participation in the program will increase over time. The priority for the new funds is to support the behavioral health work force (41 three-year loan repayment agreements in the average amount of \$55,000 anticipated); however, if there is insufficient applications, the department is authorized to use these funds for the existing CHSC loan repayment program.

The rule will also be used for individuals who will receive a scholarship to complete certifications in addictions counseling as established by SB 18-024 (Section 25-1.5-503.5, C.R.S.). Approximately \$75,000 will be made available for scholarship awards in FY 2018-2019 (21 scholarships in the average amount of \$3,500 anticipated).

The department intends to return to the Board in December 2018 for permanent rulemaking. This will allow the final rule to be effective in time for the March 2019 application cycle. The department anticipates that lessons learned from initial implementation of the methodology will inform improvements to the rule as this is the first time the department has established a state HPSA designation.

### Description of the Methodology

#### *Population*

The population considered for analysis was all persons who are resident<sup>2</sup> in Colorado but not part of a group quarter such as a military base or correctional facility. Group quartered populations were excluded from analysis because behavioral health services are presumed to be provided in closed health care delivery systems that are supported and maintained specifically for the quartered population. The cross interaction of behavioral health services supply and demand between quartered and unquartered populations within the same service area are assumed to be de minimis.

#### *Estimating Demand for SUD Treatment*

A table of civilian population estimates in Colorado was created from data downloaded from American FactFinder<sup>3</sup> (American Community Survey, 2012-2016 5-year estimates, Table B21001). The table consisted of civilian noninstitutionalized population totals for each Colorado census block group<sup>4</sup> broken down by age and sex.

<sup>2</sup> Where individuals live and sleep most of the time. The resident population excludes people whose usual residence is outside of the United States, such as the military and federal civilian personnel living overseas, as well as private U.S. citizens living overseas.

<sup>3</sup> American FactFinder is the United States Census Bureau's online self-service data tool, which supports public query of population, economic, geographic, and housing data.

<sup>4</sup> Census block groups are statistical divisions of census tracts that generally contain between 600 and 3,000 residents.

The number of individuals experiencing SUD at the block group level was estimated by multiplying the male and female civilian population by age according to the following table.

Age	Male	Female
18-25	25.7%	12.9%
26-34	17.6%	8.8%
35-49	10.4%	5.2%
50-64	6.1%	3.1%
65 or older	2.5%	1.3%

The SUD multiplier by age and sex was derived from national data from the report “Behavioral Health, United States, 2012” page 36 “Table 2. Past year mental illness and substance use disorders among adults, by selected characteristics: percentage, United States, 2010-2011 combined” and, page 44 “Table 5. Past year substance use disorders among adults, by sex: percentage, United States, 2010-2011 combined” (Substance Abuse Mental Health Services Administration, 2012).

From the estimate of individuals with SUD at the census block group level, an estimated treatment encounter demand for community-based services was derived by multiplying the total individuals with SUD by eight. The treatment encounter demand multiplier was obtained from the National Comorbidity Survey - Replication (NCS-R) report, which defines minimally adequate treatment<sup>5</sup> for SUD as eight or more visits with any health care or human services professional lasting an average of 30 minutes or more.

#### *Estimating Supply of SUD Treatment*

A table of behavioral health professionals who are licensed in Colorado and have evidence of recent practice within the state was downloaded from the Colorado Health Systems

<sup>5</sup> Minimal adequacy for SUD treatment encounters was determined by evaluating recommendations and guidelines from the American Psychiatric Association (APA) and the Agency for Healthcare Research and Quality (AHRQ).

Directory.<sup>6</sup> The table consisted of the name, license type, professional discipline, and practice location(s) of each behavioral health professional.

Each clinician type in the table was assigned to a benchmark for outpatient provider productivity obtained from the United States Department of Veterans Affairs (VA), Mental Health Benchmarks By Discipline (Open Minds, 2017). This benchmark rate assumes full-time practice in an outpatient public health care system.

Behavioral Health Discipline	Panel Size	Encounters/Year
Psychiatrist (MD, DO)	513	1827
Psychologist (Ph.D., Psy.D.)	266	1549
Social Worker (LCSW)	207	1575
Individual Therapist (LPC, LAC, LMFT, NP, PA)	275	1740
Group Therapist (CAC)	967	7736

Using the estimates of treatment encounter supply for each clinician type, an aggregate treatment encounter supply was created for each census block group. This was accomplished by summing the total estimated encounters by clinician for all behavioral health clinicians with a practice address in the block group. These encounter rates were applied for test purposes only and will be replaced with direct survey data collected from approximately 25,000 SUD clinicians during the months of July, August and September 2018.

#### *Estimating the Spatial Relationship of Supply and Demand for SUD Treatment*

The relationship of demand and supply for SUD treatment encounters was evaluated at the service area level. Service area is defined as a discrete geographic area where a preponderance of the civilian noninstitutionalized population within the service area could reasonably expect to access behavioral health services within the service area, when it is adequately resourced. All providers within the service area are presumed to be generally accessible and similarly proximate to the residents of the service area. SUD service locations

<sup>6</sup> The Colorado Health Systems Directory is a work product of the PCO, which provides a comprehensive database of all licensed clinicians and health care sites in Colorado. The database aggregates information from multiple data sources, matches records from those sources, standardizes information contained within those sources, and applies a probabilistic algorithm to determine current practice information for clinicians at the date of query.

that lie outside of the service area are assumed to be generally inaccessible by distance for the purposes of analysis.

To estimate the availability of treatment resources within each block group, considering the demand for and supply of SUD treatment encounters within the service area the Two-step Floating Catchment Area (2SFCA) method developed by Wei Luo and Fahui Wang was applied (Luo and Wang, 2003). The 2SFCA method was selected because spatial accessibility of treatment for SUD is not defined by the boundaries of a block group or any other census or political subdivision. This is because most civil boundaries of this type can be easily traversed by patients for the purposes of acquiring health services.

The application of the 2SFCA began with representing the population as a travel centroid<sup>7</sup> for each block group. The boundaries of each catchment area are then calculated by determining a 30-minute travel distance from the population centroid (derived from ESRI Street Map data, ArcGIS v. 10.4x). Thirty minutes by ordinary road travel was selected because it is the current standard for accessible primary care services according to distance as defined in federal primary care HPSA rules (Federal Register, Vol 73, No 41, 42 CFR Part 5 and 51c, 2008). Thirty minutes travel distance was also the measure used in the original development of the 2SFCA method.

Once the catchment area was defined by the 30-minute travel polygon,<sup>8</sup> the sum of predicted demand for SUD treatment encounters and the sum of predicted supply of SUD treatment encounters for each block group within the boundaries of the catchment area was calculated.

<sup>7</sup> A travel centroid is the geometric center of a group of points within a geographic shape (e.g., Census block group) where the center point generally falls within the shape.

<sup>8</sup> A closed, irregular geometric shape on a map surface that defines equivalent road travel distances from a central point within the shape.

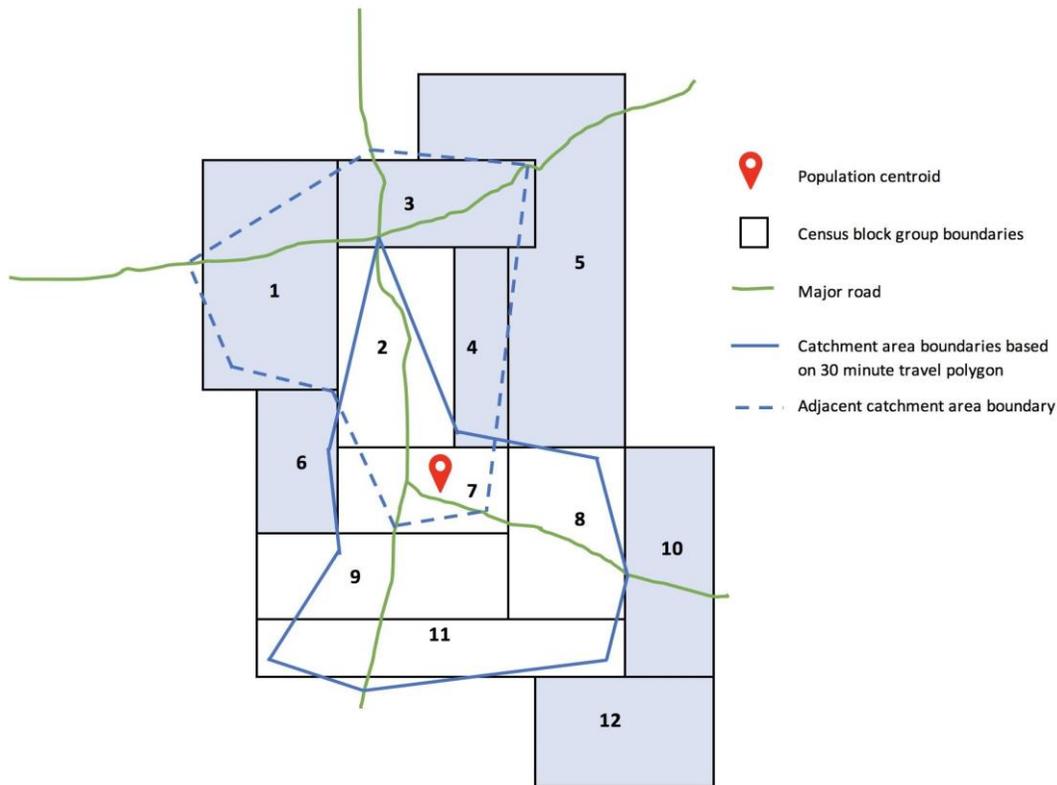
Figure 1: Hypothetical Catchment Area Map with 30-Minute Travel Polygon



In the example represented in Figure 1, estimated SUD treatment encounter demand from block group 1, 2, 3, 4, and 7 would be summed to estimate total encounter demand in the catchment area. Similarly, estimated treatment encounter supply from block group 1, 2, 3, 4, and 7 would be summed to estimate total encounter supply in the catchment area. A ratio of encounter supply to encounter demand for the catchment area is then derived for each census block group.

In the example represented in Figure 2, estimated SUD treatment encounter demand from block group 2, 7, 8, 9, and 11 would be summed to estimate total encounter demand in the catchment area and the encounter supply from the same block groups would be summed to estimate total encounter supply in the catchment area.

Figure 2: Hypothetical Catchment Area Map with 30-Minute Travel Polygon



The catchment area definition process and demand supply computation is repeated for each block group in the state. As expected under the 2SFCA model, adjacent block groups of relatively small geographies tended to create overlapping or “floating” catchment areas. In these two hypothetical examples block group 2 and block group 7 are included in both hypothetical catchment area constructions.

#### *Calculating the Ratio of Supply and Demand for SUD Treatment and Stratifying Shortage*

The ratio of demand to supply was calculated for all 3,532 census block group catchment areas in Colorado. The resultant ratio of encounter demand to supply was then binned into ten deciles. Those catchment areas where the ratio fell below 8.6 encounters per person with SUD is deemed to be a HPSA for SUD treatment.

#### *Limitations*

1. Census block group level population estimates have a higher error rate than larger census geographies such as census tracts or metropolitan statistical areas. Use of block groups improves discrete area analysis but may introduce more error. The overlapping nature of the floating catchment area analysis could reduce the overall effect of individual block group population error rates. Census tract level analysis will be investigated in advance of final rule implementation to evaluate the relative benefits

of each construction.

2. Individual provider encounter capacity was assigned in this model according to VA productivity standards. The clients served by the VA system are only a rough proxy for the general population and some providers included in our test analysis may not be actively caring for patients (examples include providers who are retired but maintain a license, educators, researchers, and administrators). Data collected during the survey process being conducted presently, will refine encounter capacity estimates before implementation of the model under rule.
3. The minimally adequate treatment benchmark for SUD was reported as eight visits of 30 minutes or longer. Though the NCS-R reported this rate as derivative of analysis of Agency for Health Research and Quality and the American Psychological Association sources, its determination was made prior to the enactment of the ACA and the Mental Health Parity and Addiction Equity Act (2008). These two changes in federal law increased standard minimum coverage for behavioral health care services. It may be that the standard of eight visits established a decade ago was somewhat suppressed by lack of insurance or inadequate insurance. Total coverage for behavioral health care in both private and public plans has improved since 2008, which may have led to changes in care acquisition or care referral, causing typical SUD treatment intensity per patient to rise.

There may be reason to maintain the standard minimum treatment rate of eight visits per episode of SUD in the model even if changes to this recommendation become known in the future. This is because the modest standard of eight treatment visits results in significant portions of Colorado being deficient in encounter capacity. If a higher standard for minimum treatment were applied to the predicted demand formula, fewer areas of the state would be determined to have adequate or surplus treatment supply. This would effectively reduce the resolution of analysis in determining areas of greatest need and thus reduce the value of the tool in identifying those areas with the most significant shortages.

4. Burden data applied to the model for substance use disorder does not include rates for adolescents between 12 and 18 and are not specific to Colorado. Additional specificity in the data may be possible through a data agreement with the Substance Use Mental Health Services Administration. The PCO is pursuing this avenue presently.

#### *Application to Colorado Health Service Corps Program*

Shortage designation determines which geographic areas of the state experience a shortage of health care professional capacity relative to the needs of the population. Independent of this rule, the CHSC also assesses individual clinical locations to determine eligibility of participation in the CHSC program. Criteria used to determine eligibility include that the practice accepts all patients regardless of ability to pay, has an established nondiscrimination

policy, accepts Medicaid, Medicare, and the Child Health Plan+, and offers treatment services for SUD.

Individual clinician participants in the CHSC must apply to the program to participate. Clinicians are selected for personal attributes that indicate a higher likelihood of long term retention in practice in the shortage area once the service obligation to the state is concluded. Attributes of “retainability” include training specific to rural or underserved practice, personal commitment to the needs of the underserved, personal experience of being underserved, graduation from a Colorado based education program, and ability to deliver clinical services in a language other than English.

**Emergency Rulemaking Justification:**

*SB 18-024, Concerning Modifications to the Colorado Health Service Corps Program Administered by the Department of Public Health and Environment to Expand the Availability of Behavioral Health Providers in Shortage Areas in the State, and, in connection therewith, making an appropriation, was signed into law on May 21, 2018.*

SB 18-024 directs the Board of Health to promulgate rules to assist communities with underserved health care or behavioral health care needs by establishing the state-specific methodologies for designating areas experiencing a shortage of health care professionals or behavioral health care providers. The state-designated health professional shortage area methodology is then used by the Department, with the assistance of the Health Service Corps Advisory Council, to provide loan repayment or scholarships in exchange for services by qualifying professionals in the state-designated shortage areas.

SB 18-024 is intended to address the opioid epidemic and increasing overdose rates, SB 18-024 Legislative Declaration (1)(b). SB 18-024 appropriated loan repayment and scholarship funds; these funds are to be issued beginning in SFY 018-19.

Emergency rule-making waives the initial Administrative Procedure Act noticing requirements. Emergency rulemaking is authorized pursuant to Section 24-4-103(6), C.R.S. This rule is necessary for the preservation of public health, safety, or welfare and compliance with the requirements of this section would be contrary to the public interest. In addition, the rule is imperatively necessary for the department to execute the loan repayment and scholarship requirements as directed in state law, Section 25-1.5-503, C.R.S. and Section 25-1.5-503.5, C.R.S.

This emergency rule shall become effective on adoption. It will be effective for no more than 120 days after its adoption unless made permanent through a rulemaking that satisfies the Administrative Procedure Act noticing requirements.

**Specific Statutory Authority.**

These rules are proposed pursuant to Section 25-1.5-404, C.R.S. and Section 25-1.5-501 *et seq*, C.R.S.

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SUPPLEMENTAL QUESTIONS

**Is this rulemaking due to a change in state statute?**

Yes, the bill number is SB 18-024 . Rules are  authorized  required.  
 No

**Is this rulemaking due to a federal statutory or regulatory change?**

Yes  
 No

**Does this rule incorporate materials by reference?**

Yes  
 No

**Does this rule create or modify fines or fees?**

Yes  
 No

**Does the proposed rule create (or increase) a state mandate on local government?**

No. This rule does not require a local government to perform or increase a specific activity for which the local government will not be reimbursed. Though the rule does not contain a state mandate, the rule may apply to a local government if the local government has opted to perform an activity, or local government may be engaged as a stakeholder because the rule is important to other local government activities. If it is not a mandate because local government will be reimbursed, identify the legislation, appropriation and/or funding stream in the Regulatory Analysis.

## REGULATORY ANALYSIS

for new rule

6 CCR 1015-6, State-Designated Health Professional Shortage Area Methodology

1. A description of the classes of persons affected by the proposed rule, including the classes that will bear the costs and the classes that will benefit from the proposed rule.

A. Identify each group of individuals/entities that rely on the rule to maintain their own businesses, agencies or operation, and the size of the group:

Implementation of this rule will be the charge of the Department's Primary Care Office (PCO).

Entities that employ clinicians who treat Substance Use Disorder (SUD) may benefit from this rule in that their provider recruitment and retention costs will be reduced when clinicians receive incentives to practice in State-Designated Health Professional Shortage Areas (HPSA) where their agencies are located. In excess of 300 health care sites could conceivably receive some direct or indirect benefit of the shortage designation process.

B. Identify each group of individuals/entities interested in the outcomes the rule and those identified in #1.A achieve, and if applicable, the size of the group:

Organizations that promote better access to health services for medically underserved populations may also benefit from the assessment of need and the promotion of improved access for underserved people. Perhaps 15 to 20 organizations and advocacy groups may benefit from this rule in this way. Other state and local governments, such as human services and criminal justice, would benefit if Colorado is better able to address SUD.

C. Identify each group of individuals/Entities that benefit from, may be harmed by or at-risk because of the rule, and if applicable, the size of the group:

The burden of SUD in Colorado is higher than the nation as a whole, where an estimated 358,000 Coloradans had a SUD (Substance Abuse Mental Health Services Administration, 2012). Approximately 796,000 Colorado residents disclose that they have used an illicit drug in the last month (National Survey on Drug Use and Health, 2017). State trends in illicit substance use have consistently paralleled national trends since at least 1999. Colorado's experience with the epidemic indicates that risk of fatal overdose for all illicit drugs is highest among those between the ages of 35 and 54. In the current decade, drug overdose mortality characterized by age has broadened to the younger age band of 25 to 34 and to the older age band of 55 to 64. Between 2000 and 2015, overdose mortality in these two age groups in Colorado has increased by 170 percent and 300 percent, respectively. Opioid use is higher in men in Colorado, as it is nationally, and men are far more likely than women to die from heroin overdose in Colorado. Overdose rates in women have annually increased faster than

with men at 125 percent versus 88 percent, respectively.

Those who are experiencing SUD in Colorado and receive improved access to secondary and tertiary treatment service as a result of this rule, will most benefit. Those individuals with SUD treatment needs who are uninsured, publicly insured, low income, or geographically isolated may benefit most because these classes of persons have the highest barriers to receiving adequate SUD treatment services.

No person or class of persons are likely to be harmed by this rule nor will any directly bear the costs of this rule. All costs are borne by a specific state appropriation derived from retail marijuana tax revenue.

**2. To the extent practicable, a description of the probable quantitative and qualitative impact of the proposed rule, economic or otherwise, upon affected classes of persons.**

**A. For those that rely on the rule to maintain their own businesses, agencies or operations:**

Entities that employ clinicians who treat SUD may experience reduced costs of provider recruitment and retention. The magnitude of this effect is not precisely known but could be substantial in aggregate. There are no anticipated negative impacts of this proposed rule upon these entities.

**Anticipated financial impact:**

Anticipated Costs:	Anticipated Benefits:
<p>Description of costs that must be incurred.</p> <ul style="list-style-type: none"><li>• None</li></ul> <p>Description of costs that may be incurred.</p> <ul style="list-style-type: none"><li>• None</li></ul>	<p>Description of financial benefit.</p> <p>Costs associated with recruiting health care professionals to underserved Colorado communities can be substantial (in excess of \$100,000 for certain physician specialties for example). Most Colorado Health Service Corps (CHSC) clinicians report that loan repayment had a meaningful effect on their decision on where to practice (program evaluation 2017). Current CHSC employers report that loan repayment is an important component of their recruitment and retention strategy.</p> <p>State financed practice incentives that will a result from this rule will lower employer retention costs. This is true even for those clinicians who do not ultimately receive a</p>

	CHSC award but were motivated to apply for qualified employment for the prospect of educational loan repayment.
<p>Cost or cost range.  \$ <u>none</u> or  <u>    </u> No data available.</p>	<p>Savings or range of savings.</p> <p>If employer recruitment costs are reduced by a conservative \$5,000 per CHSC applicant for clinician types eligible for CHSC, aggregate annual employer savings could exceed \$1,025,000. These savings are estimated according to the following:</p> <ul style="list-style-type: none"> <li>• Employers recruit health professionals in advance of clinicians' CHSC application.</li> <li>• Recruitment and retention cost savings accrue to employers when clinicians choose to work at eligible practice sites for the prospect of loan repayment benefits, regardless of whether individual clinicians receive a CHSC award.</li> <li>• The CHSC program typically receives five applications for each available award.</li> <li>• If 205 CHSC applications are received in year one (41 x 5) and employers experience a modest \$5,000 per applicant reduction in recruitment costs per applicant, then aggregate recruitment cost savings per year experienced by all employers will be approximately \$1,025,000 (205 x 5,000).</li> </ul>
<p>Dollar amounts that have not been captured and why:</p> <p>N/A</p>	<p>Dollar amounts that have not been captured and why:</p> <p>There are positive secondary economic benefits to health systems capacity development in underserved communities. For example, multiple non-clinical jobs are created when clinicians are added in a given service area. Communities also benefit when economic activity related to health care spending occurs within their community as opposed to adjacent communities where access to care may be better.</p>

Local Government Impact: No direct impact.

Statement from SB 18-024 Fiscal Note: N/A

B. For those that are affected by or interested in the outcomes the rule and those identified in #1.A achieve.

Favorable non-economic outcomes:

For individuals that are publicly insured, treatment participation may increase thus increasing the demand for public financing of care; however, it is anticipated that these costs will be offset and outweighed by the health care costs for individuals that do not address their SUD and experience other comorbidities as a result.

SB 18-024 directed that the department coordinate with the Department of Health Care Policy and Financing. This has occurred.

The CHSC and this rule may enhance resource allocation and policy attention of organizations that promote better access to health services for medically underserved populations, nongovernmental organizations that advocate for the needs of underserved populations, and support other state agencies and local governments.

Unfavorable non-economic outcomes:

None are anticipated.

Any anticipated financial costs monitored by these individuals/entities?

See above.

Any anticipated financial benefits monitored by these individuals/entities?

See above.

C. For those that benefit from, are harmed by or are at risk because of the rule, the services provided by individuals identified in #1.A, and if applicable, the stakeholders or partners identified in #1.B.

Describe the favorable or unfavorable outcomes (short-term and long-term), and if known, the likelihood of the outcomes:

There are many strategies to improve access to care. This rule and the work of the CHSC is one component of a complex social issue and service array. Appreciating that individuals may have individual barriers to seeking care and

health care costs influence our health care costs, this rule contributes to the effort by making sure persons experiencing SUD have those services available in their community.

As care capacity increases in areas with a health professional shortage, morbidity and mortality attributable to or associated with SUD is expected to decrease. Clinicians who receive practice incentives resulting from shortage analysis under this rule may collectively provide 67,000 treatment encounters for SUD in year one. By year three, total encounters for SUD by those who are contracted with the program may increase to 201,000 per year.

Financial costs to these individuals/entities:

There are no anticipated financial costs to individuals or entities directedly related to the enactment of this rule.

Financial benefits to or cost avoidance for these individuals/entities:

Those who receive better access to treatment for SUD experience lower costs for all health care needs and better health outcomes. Treatment for individuals experiencing SUD may reduce substance use, improve psychiatric symptoms and functioning, decrease acute hospitalizations, increase housing stability, reduce justice involvement, and improve quality of life and social function.

**3. The probable costs to the agency and to any other agency of the implementation and enforcement of the proposed rule and any anticipated effect on state revenues.**

Implementation of the rule is expected to generate department costs related to personnel and computational services only. Cost estimates are as follows. This rule will not require enforcement.

- A. Anticipated CDPHE personal services, operating costs or other expenditures specific to the SUD HPSA:

Type of Expenditure	Year 1	Year 2
Personnel Time	\$ 33,668	\$ 28,202
Data collection, analysis and systems database	\$ 16,000	\$ 5,000
<b>Total</b>	<b>\$ 49,668</b>	<b>\$ 33,202</b>

*Expenditures are less than that stated on the fiscal note because this table reports only those costs associated with rule implementation.*

Anticipated CDPHE Revenues: Not Applicable

- B. Anticipated personal services, operating costs or other expenditures by another state agency:

None at this time.

**4. A comparison of the probable costs and benefits of the proposed rule to the probable costs and benefits of inaction.**

Check mark all that apply:

- Inaction is not an option because the statute requires rules be promulgated.
- The proposed new rules are necessary to comply with federal or state statutory mandates, federal or state regulations, and department funding obligations.
- The proposed new rules appropriately maintain alignment with other states or national standards.
- The proposed new rules implement a Regulatory Efficiency Review (rule review) result, or improve public and environmental health practice.
- The proposed new rules implement stakeholder feedback.
- The proposed new rules advance the following CDPHE Strategic Plan priorities:

Goal 1, Implement public health and environmental priorities Goal 2, Increase Efficiency, Effectiveness and Elegance Goal 3, Improve Employee Engagement Goal 4, Promote health equity and environmental justice Goal 5, Prepare and respond to emerging issues, and comply with statutory mandates and funding obligations
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Strategies to support these goals:

- Substance Abuse (Goal 1)
- Mental Health (Goal 1, 2, 3 and 4)
- Obesity (Goal 1)
- Immunization (Goal 1)
- Air Quality (Goal 1)
- Water Quality (Goal 1)
- Data collection and dissemination (Goal 1, 2, 3, 4 and 5)
- Implements quality improvement or a quality improvement project (Goal 1, 2, 3 and 5)
- Employee Engagement (career growth, recognition, worksite

wellness) (Goal 1, 2 and 3)

✓ Incorporate health equity and environmental justice into decision-making (Goal 1, 3 and 4)

✓ Establish infrastructure to detect, prepare and respond to emerging issues (Goal 1, 2, 3, 4, and 5)

**5. A determination of whether there are less costly methods or less intrusive methods for achieving the purpose of the proposed rule.**

Rulemaking is the only statutorily allowable method for achieving the purpose of the statute. Implementation of this rule is not expected to be intrusive on any affected person or class of persons. Costs of implementation are borne by a specific state appropriation to the PCO for the purpose of administering state health professional shortage area designation. These proposed rules provide the most benefit for the least amount of cost and are the minimum necessary to achieve compliance with statute.

**6. Alternative Rules or Alternatives to Rulemaking Considered and Why Rejected.**

This rule is required by statute, therefore there are no alternatives to rulemaking.

**7. To the extent practicable, a quantification of the data used in the analysis; the analysis must take into account both short-term and long-term consequences.**

Proposed rules will apply a modified “two-step floating catchment area” method first proposed by Luo and Wang in 2003 (Measures of Spatial Accessibility to Health Care in a GIS Environment: Synthesis and a Case Study in the Chicago Region. *Environment and Planning B: Planning and Design*, 30, 865-884.)

Instruments that were applied in the test analysis included:

- ArcView GIS®, Version 10.4.1 © 2018 Esri
- Microsoft® Excel, Version 16.13.1 (180523). © 2018 Microsoft
- Qualtrics®, subscription data collection software, © 2018 Qualtrics
- Remark® Office OMR, © 2018 Gravic, Inc.

These instruments may be replaced with similar tools in implementation of the final rule and future shortage assessments.

Data sources that inform test determinations of state-designated Substance Use Disorder Health Professional Shortage Areas include:

- Colorado Health Systems Directory, Version 2.0. Colorado Department of Public Health and Environment

- Behavioral Health, United States, 2012; page 44 “Table 5. Past year substance use disorders among adults, by sex: percentage, United States, 2010-2011 combined”; row one “Any substance use disorder”
- National Comorbidity Survey - Replication; Minimally Adequate Treatment for Substance Use Disorder
- United States Census Bureau, American FactFinder; American Community Survey, 2012-2016 5-year estimates, Table B21001
- United States Department of Veterans Affairs, Mental Health Benchmarks By Discipline
- Survey findings of the PCO derived from approximately 25,000 solicited responses of licensed behavioral health clinicians in the state of Colorado

These sources may be replaced by better quality analogous data sets as they become available in implementation of the final rule and future shortage assessments.

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## Measures of spatial accessibility to health care in a GIS environment: synthesis and a case study in the Chicago region

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Received 12 December 2002; in revised form 14 March 2003

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**Abstract.** This article synthesizes two GIS-based accessibility measures into one framework, and applies the methods to examining spatial accessibility to primary health care in the Chicago ten-county region. The floating catchment area (FCA) method defines the service area of physicians by a threshold travel time while accounting for the availability of physicians by their surrounded demands. The gravity-based method considers a nearby physician more accessible than a remote one and discounts a physician's availability by a gravity-based potential. The former is a special case of the latter. Based on the 2000 Census and primary care physician data, this research assesses the variation of spatial accessibility to primary care in the Chicago region, and analyzes the sensitivity of results by experimenting with ranges of threshold travel times in the FCA method and travel friction coefficients in the gravity model. The methods may be used to help the US Department of Health and Human Services and state health departments improve designation of Health Professional Shortage Areas.

### Introduction

Accessibility refers to the relative ease by which the locations of activities, such as work, shopping, and health care, can be reached from a given location (BTS, 1997, page 173). Access to health care varies across space because access to health care is affected by where health professionals locate (supply) and where people reside (demand) and neither health professionals nor population is uniformly distributed. Physician shortage has been especially pronounced in rural areas and impoverished urban communities (COGME, 2000; Rosenblatt and Lishner, 1991). The US federal government spends about \$1 billion a year on programs designed to alleviate access problems, including awarding financial assistance to providers and assigning National Health Service Corps personnel to serve designated shortage areas (GAO, 1995). Any effective remedies begin with reliable measures of accessibility to health care.

Access to health care may be classified according to two dichotomous dimensions (potential versus revealed, and spatial versus aspatial) into four categories, such as: potential spatial access, potential aspatial access, revealed spatial access, and revealed aspatial access (Khan, 1992). *Revealed accessibility* focuses on actual use of health care services, whereas *potential accessibility* signifies the probable entry into the health care system, but does not ensure the automatic utilization of the offered services (Joseph and Phillips, 1984; Khan, 1992; Phillips, 1990; Thouez et al, 1988). *Spatial access* emphasizes the importance of the spatial/distance variable (as a barrier or a facilitator), whereas the *aspatial access* stresses nongeographic barriers or facilitators, such as social class, income, ethnicity, age, sex, etc (Joseph and Phillips, 1984; Khan, 1992; Meade and Earickson, 2000, page 383–392). This paper focuses primarily on measuring *potential spatial accessibility*. The measures of potential spatial accessibility include regional availability and regional accessibility (Joseph and Phillips, 1984). The *regional availability* approach is simpler and measures distribution of supply versus demand within a region, often expressed as a population-to-practitioner ratio (or its variation) within that region. The *regional accessibility* approach considers such

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potential for complex interaction between supply and demand located in different regions and thus is more complex and requires more data (Joseph and Phillips, 1984).

The US Department of Health and Human Services (DHHS) uses two main systems for identifying shortage areas (GAO, 1995; Lee, 1991). One designates Health Professional Shortage Areas (HPSAs), the other Medically Underserved Areas or Populations (MUAs/MUPs). Both systems use the ratio of population to full-time-equivalent (FTE) primary care physicians within a 'rational service area' as a basic indicator (for example, 3500:1 in HPSA designations), and thus are primarily regional availability measures of potential spatial access with some aspatial elements. For example, the HPSAs can include population groups (for example, low-income or minority groups) and MUAs/MUPs consider aspatial factors, such as infant mortality rate, income level, and age. A rational service area may be (a) a whole county or groups of contiguous counties, (b) a portion of a county, or an area made up of portions of more than one county, (c) established neighborhoods and communities. For details, see guidelines at <http://bphc.hrsa.gov/dsd> (last accessed 3 December 2002). This paper will focus on spatial factors. Our ongoing research will address aspatial issues, and results will be reported in the near future.

The problems of the regional availability measures are that (1) they cannot reveal the detailed spatial variations within those large rational service areas (such as counties or group of counties) and (2) they carry the assumption that the boundaries are impermeable, that is, the actual interaction across boundaries is not adequately accounted for (Joseph and Phillips, 1984). In other words, access to health care depends, not only upon the supply of resources in a community, but also upon the supply of such resources in neighboring communities (GAO, 1995; Wing and Reynolds, 1988) and the distance and ease of travel among them (Kleinman and Makuc, 1983, page 543). The severity of the two problems also changes with the scale (that is, level of aggregation). The higher the aggregation level of rational service areas (that is, the larger the areal unit), the more serious the internal variation problem is, but the less serious the permeability problem is. The reverse is true for lower aggregation level. The two cannot be easily reconciled within the framework of regional availability measures.

Recent revisions of criteria for designating HPSAs and MUAs/MUPs intend to address the problems by (1) using geographic units smaller than counties as rational service areas (for example, minor civil divisions, census tracts), and (2) considering the impact of neighboring areas. For example, the third criterion in defining HPSAs specifies that medical resources in contiguous areas need to be "overutilized, excessively distant, or inaccessible". Implementing this criterion requires incorporating regional accessibility measures. In other words, it calls for an integration of regional availability (demand-to-supply ratio) and regional accessibility (interaction between demand and supply) measures.

The increasing abundance of digital data (for example, population data, street and road network, physician database) and advancement of GIS technology now make it possible to identify distributions of physicians and population at finer spatial resolutions (Cromley and McLafferty, 2002; Kohli et al, 1995; Love and Lindquist, 1995; Lovett et al, 2002; Mukuc et al, 1991; Parker and Campbell, 1998). In the meantime, the literature of accessibility measures has grown in a variety of fields (see related reviews in the following sections where methods are discussed). Several methods consider the effects of neighboring communities while accounting for availability of health care providers. Among others, the following two are most noticeable:

- (1) the *spatial decomposition method* by Radke and Mu (2000), and
- (2) the *gravity-based method* by Weibull (1976) and applied to health care access by Joseph and Bantock (1982).

This paper builds upon prior research, and makes contributions in the following ways:

- (a) It proves that the spatial decomposition method (referred to as the *two-step floating catchment area method* in this paper for reasons explained in a later section) is merely a special case of the gravity-based method, and thus synthesizes them into one framework. This reinforces the rationale of the two methods, which capture the same essence of accessibility measures.
- (b) Unlike most prior work using straightline distances, this research uses travel times to measure the spatial barrier between residents and physicians. In addition, the travel times are estimated systematically and consistently in a GIS environment, which have been either approximated by distances or estimated manually on a case-by-case basis (unpublished DHHS training manual).
- (c) The methods are applied to measuring health care accessibility using smaller geographic units (that is, physicians in ZIP-code areas and population in census tracts), and therefore more details of accessibility variations can be revealed.

Specifically, this paper examines spatial accessibility to primary health care in the Chicago ten-county region in 2000, with a focus on methodology issues. Results may be used to help the DHHS and state health departments design a better system for designation of areas of physician shortage.

#### The study area, data sources, and travel time estimation

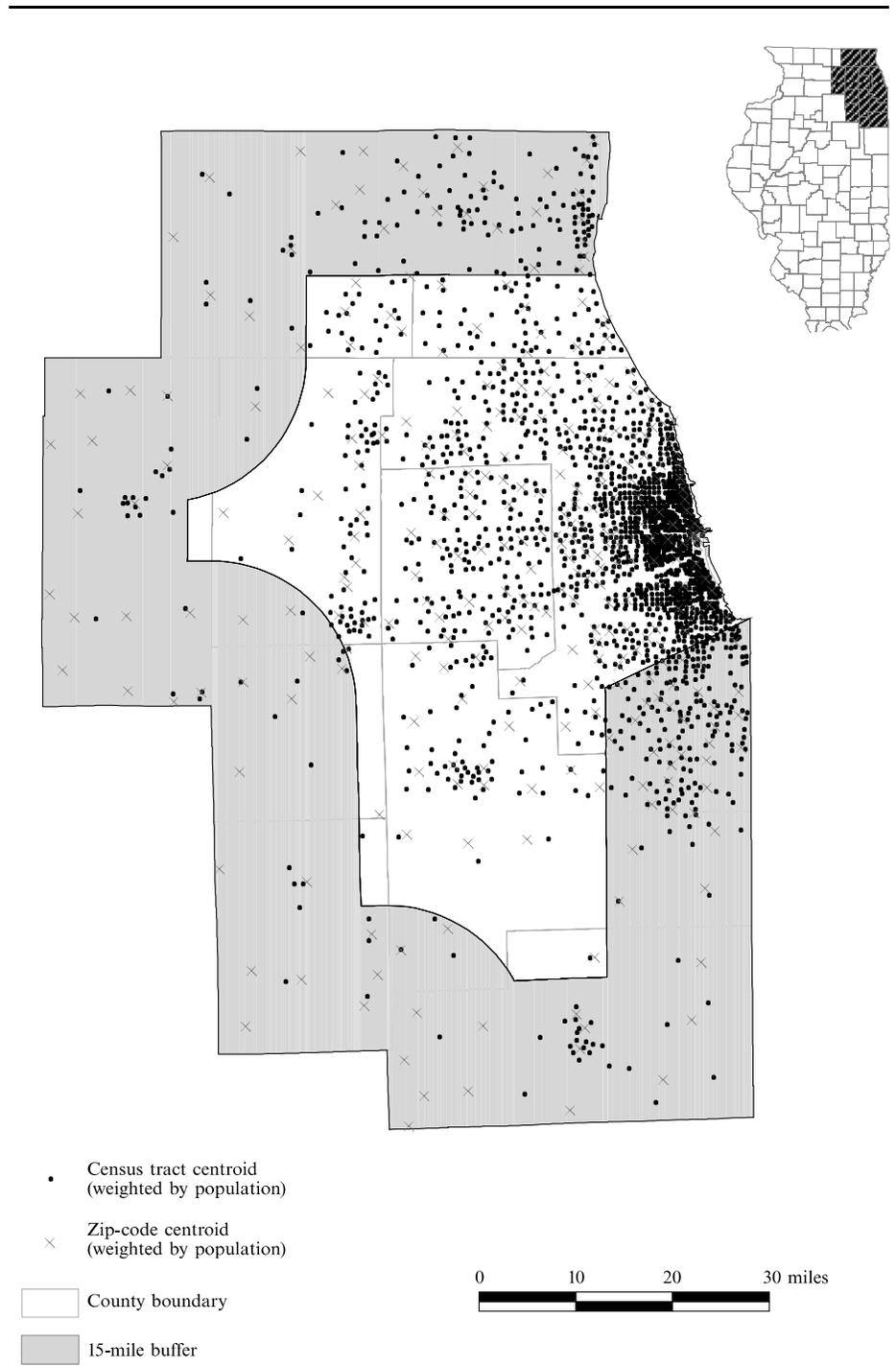
The ten Illinois counties in the Chicago CMSA (Consolidated Metropolitan Statistical Area) are chosen as the study area for this paper. See figure 1 (over). The area represents a small portion of the State of Illinois (to be studied in a larger project) so that local variations may be displayed in reasonable detail, yet this densely populated area accounted for two thirds of population in Illinois in 2000. Both urban and rural areas are represented in the region because some peripheral counties are mostly rural. In order to account for 'edge effects', a fifteen-mile buffer zone (approximately 30 minutes travel time) is identified near the borders of the study area (except for the shorelines of Lake Michigan on the east). Accessibility measures in this buffer zone need to be interpreted with caution because residents may seek health care outside the study area.

The population data were extracted from the 2000 Census Summary File 1 (US Bureau of Census, 2001a), and the corresponding spatial coverages of census tracts and blocks were generated from the 2000 Census TIGER/Line files (US Bureau of Census, 2001b). As the population is seldom distributed homogeneously within a census tract, the population-weighted centroid instead of the simple geographic centroid of a census tract represents the location of population more accurately (Hwang and Rollow, 2000). The population centroid of a tract may be distant from its geographic centroid, particularly in rural or peripheral suburban areas where tracts are large and population tends to concentrate in limited space. Weighted centroids are computed based on block-level population data, such as

$$x_c = \frac{\sum_{i=1}^{n_c} p_i x_i}{\sum_{i=1}^{n_c} p_i} , \quad (1)$$

$$y_c = \frac{\sum_{i=1}^{n_c} p_i y_i}{\sum_{i=1}^{n_c} p_i} , \quad (2)$$

where  $x_c$  and  $y_c$  are the  $x$  and  $y$  coordinates of the weighted centroid of a census tract;  $c$ ;  $x_i$  and  $y_i$  are the  $x$  and  $y$  coordinates of the  $i$ th block centroid within that census tract;  $p_i$  is the population at the  $i$ th census block within that census tract;



**Figure 1.** The Chicago 10-county region.

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and  $n_c$  is the total number of blocks within that census tract. The census tract is chosen as the analysis unit for population distribution, because it is the lowest areal unit used in the current practice of shortage-area designation, and the number of tracts is computationally manageable for travel-time estimation and accessibility modeling. In the study area, there were 1901 census tracts with a total population of 8376 604 in 2000 (see figure 1).

The primary care physician data of Illinois in 2000 were purchased from the Physician Master File of the American Medical Association (AMA) via Medical Marketing Service Inc. Primary care physicians include family physicians, general practitioners, general internists, general pediatricians, and some obstetrician–gynecologists (Cooper, 1994). This case study focuses on primary care physicians because these physicians are an integral component of a rational and efficient health delivery system and they are critical for the success of preventive care (Lee, 1995). Most of the HPSAs designated by the DHHS are also for primary medical cares (others are mental health and dental HPSAs). The methodology presented here can be easily adapted to identify shortage areas of other health care specialties, and at state and national levels.

Ideally, the physician locations should be geocoded by their street addresses with GIS software, a process of converting the address information to  $x$  and  $y$  coordinates of a point on the map by matching address name and interpolating the address range to those stored in a digital map (for example, TIGER/Line file). However, a significant number of records in the Physician Master File have only PO box addresses, which are not feasible for geocoding. This study simply used the centroid of zip code of a physician's office address to represent the physician's location. Only when the office addresses were not available, were the zip codes of preferred addresses used (such cases account for 18.5% of the records, which may or may not be office addresses). As physicians often choose to practice at populated places, population-weighted centroids instead of the simple geographic centroids of zip-code areas were used, and computed similarly to census tract centroids as in equations (1) and (2). The population of each block whose centroid falls within a zip-code area was used as the weight to calculate the population-weighted centroid for that zip code. We are aware of the problems associated with using zip-code data because zip codes may be totally unrelated to health care or demographic data. For example, some 'point zips' are for small rural post offices that have only a set of boxes for mail pickup. Many in urban areas are for office buildings or government subdivisions that are unrelated to either physician or potential patients (Wing and Reynolds, 1988). However, the zip code represents a finer resolution than the county and has been used extensively in health research (for example, Knapp and Harwick, 2000; Ng et al, 1993; Parker and Campbell, 1998). The AMA physician data do not identify how much percentage of time each physician serves at one location among multiple offices, and thus do not enable us to obtain the number of FTE physicians. Converting the FTE physicians requires extensive surveys and fieldwork (personal communication with Mary Ring and Jerry Partlow, Center for Rural Health, Illinois Department of Public Health, 22 August 2002), which are beyond the scope of this project. The focus of the paper is to demonstrate the methodology. Better physician information will certainly improve the result. There were 325 zip codes with 19202 primary physicians in the study area in 2000 (see figure 1). Table A1 in the appendix also provides total numbers of primary care physicians and population, and their ratios in all ten counties in the study area.

The methods of accessibility measures discussed in the next two sections utilize travel time between any pair of population and physician locations. Road networks for travel-time estimation were also extracted from the 2000 Census TIGER/Line files. Assuming people taking the fastest path, we used the Arc/Info network analysis

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module to derive the shortest travel time between any two locations. Travel speeds may also be dictated by traffic signals and preset speed limits [often reduced in business districts or high residential density areas (see IDOT, 1977)]. For planning purposes, people can be assumed to travel at the speed limit, which is used as the impedance value for each road segment in the network quickest path computation. After a careful examination of the speed-limit maps maintained by the Illinois Department of Transportation,<sup>(1)</sup> we developed several rules to approximate travel speeds based on the population density pattern (see table A2 and figure A1 in the appendix). See Wang (2003) for more details of estimating travel times.

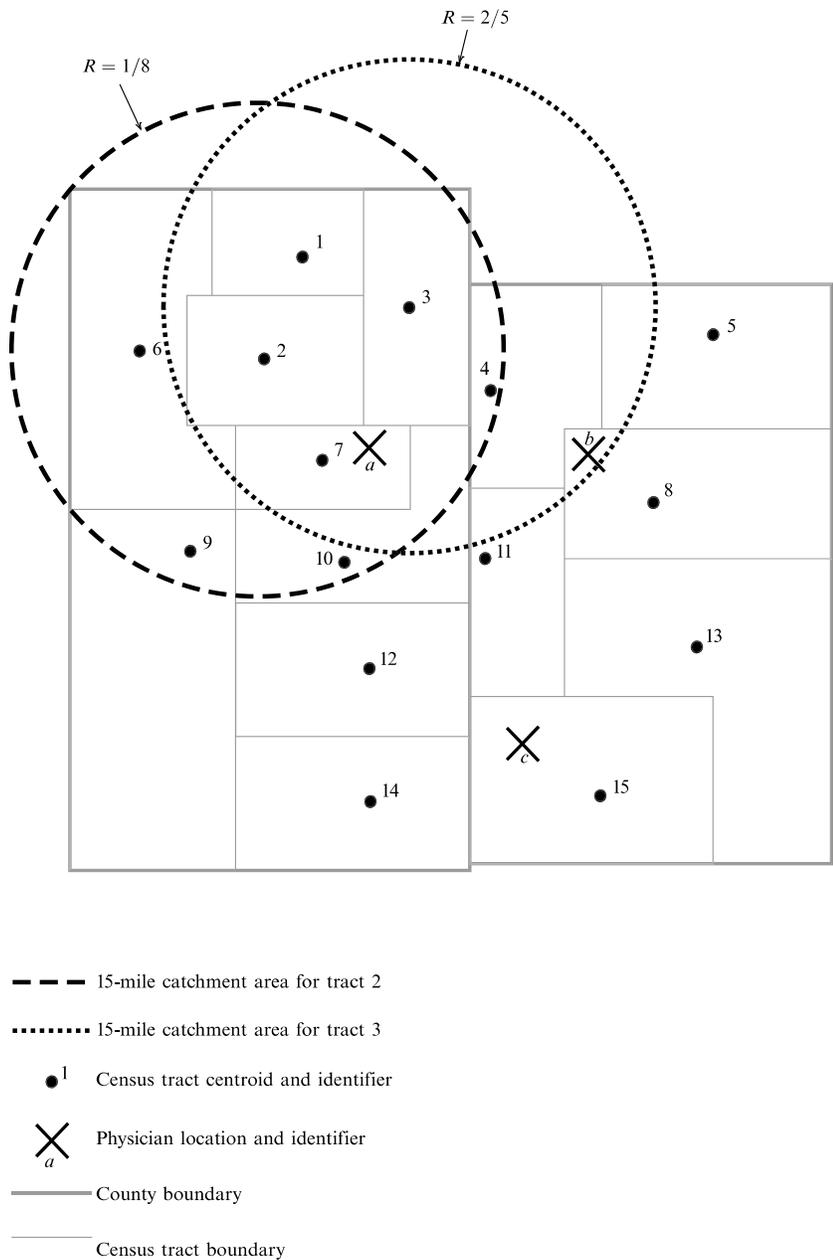
### The evolution of floating catchment area methods

Given the broad interests in accessibility measures, several approaches have been developed in various applications. Earlier versions of the floating catchment area (FCA) method were used in assessing job accessibility (for example, Peng, 1997; Wang, 2000). This method somewhat resembles kernel estimation (for example, Bailey and Gatrell, 1995), in which a 'window' (kernel) is moved across a study area, and the density of events within the window is used to represent the density at the center of the window. In estimating the density, one may use a gravity model to weigh events by the inverse of distances from the center. Figure 2 uses an example to illustrate the method. For simplicity, assume that each census tract has only one person residing at its centroid and each physician location has only one physician practising there. Also assume that a threshold travel distance for primary health care is 15 miles. A 15-mile circle around the centroid of residential location 2 defines its catchment area [Peng (1997) used a square to define a catchment area]. Accessibility in a census tract is defined as the physician-to-population ratio within its catchment area. For instance, there are one physician (that is,  $a$ ) and eight residents within the catchment area, and thus accessibility to physicians for tract 2 is their ratio  $1/8$ . The circle floats from one centroid to another while its radius remains the same. Similarly, there are two physicians ( $a$  and  $b$ ) and five residents within the 15-mile catchment area of tract 3, and thus the accessibility for tract 3 is their ratio,  $2/5$ . The underlying assumption is that services that fall within the catchment area will be fully available to residents within that catchment area. This assumption is obviously faulty. For example, the distance between a physician and a resident within the catchment area may exceed the threshold travel time (for example, distance between 1 and  $b$  is greater than the radius of the catchment of tract 3 in figure 2). Furthermore, the physician at  $b$  is within the catchment of tract 3, but may not be fully available to serve residents within the catchment because he or she will also serve nearby (but outside-the-catchment) residents at 5, 8, or 11. Wang and Minor (2002) used travel times instead of straight-line distances to define the catchment area, but the fallacy remains.

In addressing the issues, Radke and Mu (2000) developed the spatial decomposition method to measure access to social services. The method computes the ratio of suppliers to residents within a service area centered at a supplier's location and sums up the ratios for residents living in areas where different providers' services overlap. Like the earlier versions of FCA approach, they used straight-line distances. In their study, analysis areas may be split by an overlaying circle, and service areas are a set of *decomposed* areas. In this research we use centroids to represent whole census tracts or zip-code areas for simplicity, and thus the process does not involve decomposition

<sup>(1)</sup> According to personal contacts with engineers in the Illinois Department of Transportation, data for speed-limit settings are cumbersome, and still maintained and updated manually on maps. Digitizing the official speed limits is beyond the scope of this project. We are currently exploring other approaches for improving travel-time estimates.

of polygons as described in Radke and Mu (2000). The method is referred to hereafter as the two-step FCA method to reflect its connection to the tradition of FCA methods. The method uses travel times, and is implemented in two steps. The following procedures are organized in a way for easy interpretation using notation consistent with the gravity-based method to be introduced in the next section.



**Figure 2.** An earlier version of the floating catchment area (FCA) method.

*Step 1.* For each physician location  $j$ , search all population locations ( $k$ ) that are within a threshold travel time ( $d_0$ ) from location  $j$  (that is, catchment area  $j$ ), and compute the physician-to-population ratio,  $R_j$ , within the catchment area:

$$R_j = \frac{S_j}{\sum_{k \in \{d_{kj} \leq d_0\}} P_k}, \quad (3)$$

where  $P_k$  is the population of tract  $k$  whose centroid falls within the catchment (that is,  $d_{kj} \leq d_0$ ),  $S_j$  is the number of physicians at location  $j$ , and  $d_{kj}$  is the travel time between  $k$  and  $j$ .

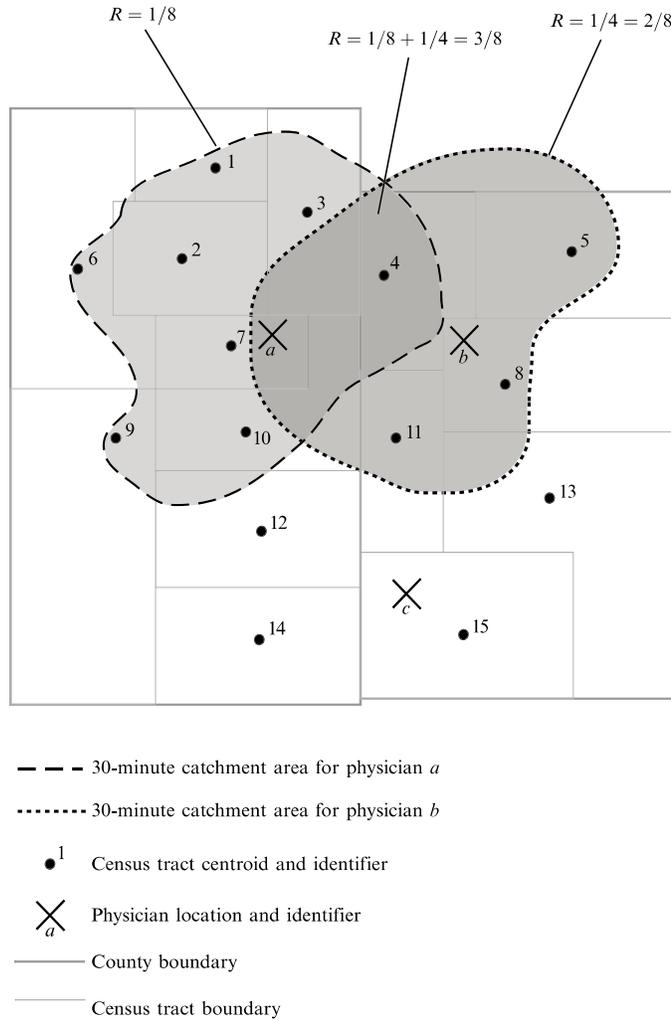
*Step 2.* For each population location  $i$ , search all physician locations ( $j$ ) that are within the threshold travel time ( $d_0$ ) from location  $i$  (that is, catchment area  $i$ ), and sum up the physician-to-population ratios,  $R_j$ , at these locations:

$$A_i^F = \sum_{j \in \{d_{ij} \leq d_0\}} R_j = \sum_{j \in \{d_{ij} \leq d_0\}} \frac{S_j}{\sum_{k \in \{d_{kj} \leq d_0\}} P_k}, \quad (4)$$

where  $A_i^F$  represents the accessibility at resident location  $i$  based on the two-step FCA method,  $R_j$  is the physician-to-population ratio at physician location  $j$  whose centroid falls within the catchment centered at  $i$  (that is,  $d_{ij} \leq d_0$ ), and  $d_{ij}$  is the travel time between  $i$  and  $j$ . A larger value of  $A_i^F$  indicates a better accessibility at a location. The first step corresponds to the assigning of an initial ratio to each service area centered at physician locations, and the second step corresponds to summing up the initial ratios in the overlapped service areas (where residents have access to multiple physician locations). This is similar, in effect, to decomposing the FCA in Radke and Mu (2000). In implementation, a matrix of travel times between any pair of physician location and population location ( $d_{ij}$  or  $d_{kj}$ ) is computed once and accessed twice.

Figure 3 shows an example to illustrate this two-step FCA method, assuming the same distributions of population and physicians as in figure 2 and a threshold travel time of 30 minutes. The different shades of the polygons represent different physician-to-population ratios. The catchment area for physician  $a$  has one physician and eight residents, and thus carries a physician-to-population ratio of 1/8. Similarly, the physician to population ratio for catchment  $b$  is 1/4. Residents at 1, 2, 3, 6, 7, 9, and 10 have access to physician  $a$  only and the ratio for them remains 1/8; and residents at 5, 8, and 11 have access to physician  $b$  only and thus a ratio of 1/4. However, the resident at 4 is located in an area overlapped by catchment areas  $a$  and  $b$ , and has access to both physicians  $a$  and  $b$ , and therefore enjoys a better accessibility (that is, a higher ratio  $1/8 + 1/4 = 3/8$ ). This overlapped area is identified in the second step, which finds that physicians  $a$  and  $b$  are both within a 30-minute catchment area of resident 4 (not shown in figure 3).

Note that the catchment drawn in the first step is centered at a physician location, and thus the travel time between the physician and any person within the catchment does not exceed the threshold travel time. The catchment drawn in the second step is centered at a resident location, and residents may visit physicians within the catchment and only these physicians contribute to the physician-to-population ratios for those residents. The method overcomes the fallacy in earlier FCA methods. Note that equation (4) is basically a ratio of supply to demand, with only selected physicians and residents entering the numerator and denominator. The two-step FCA method considers interaction between patients and physicians across administrative borders based on travel times, and computes an accessibility measure that varies from one



**Figure 3.** The two-step floating catchment area (FCA) method.

tract to another. However, it draws an artificial line (say, 30 minutes) between an accessible and an inaccessible physician. Physicians within that range are counted equally regardless of the actual travel time (for example, 5 minutes versus 25 minutes). Similarly, all physicians beyond that range are defined as inaccessible, regardless of any differences in travel time.

**The gravity-based method and a synthesis**

We start with a simple gravity model to illustrate the concept. Hansen (1959) proposed the following model for accessibility ( $A_i^H$ ) at location  $i$ :

$$A_i^H = \sum_{j=1}^n S_j d_{ij}^{-\beta} , \tag{5}$$

where  $S_j$  is the number of physicians at location  $j$ ,  $d_{ij}$  is the travel time between population location  $i$  and physician location  $j$ ,  $\beta$  is the travel-friction coefficient, and

$n$  is the total number of physician locations. In the model, a physician nearby is considered more accessible than a remote one, and thus weighted higher. A similar version is also discussed by Cromley and McLafferty (2002, pages 233–258).

One limitation of equation (5) is that it considers only the ‘supply side’ of health care (physicians), but not the ‘demand side’ (that is, competition for available physicians among residents). Weibull (1976) improved the measurement by accounting for competition for services among residents. Joseph and Bantock (1982) applied the method to assess health care accessibility. Similar approaches have been used for evaluating job accessibility (Shen, 1998; Wang and Minor, 2002). The gravity-based accessibility measure at location  $i$  can be written as

$$A_i^G = \sum_{j=1}^n \frac{S_j d_{ij}^{-\beta}}{V_j}, \quad (6)$$

where

$$V_j = \sum_{k=1}^m P_k d_{kj}^{-\beta},$$

$A_i^G$  is the gravity-based index of accessibility, where  $n$  and  $m$  are the total numbers of physician and population locations, respectively, and the other variables are the same as in equation (4). Compared with the primitive accessibility measure  $A_i^H$ ,  $A_i^G$  discounts the availability of a physician by the service-competition intensity at that location,  $V_j$ , measured by its population potential. A larger  $A_i^G$  implies better accessibility.

This accessibility index may be interpreted like the one defined by the two-step FCA method. It may be considered as the ratio of supply (physicians  $S$ ) to demand (population  $P$ ), both of which are weighted by negative power of travel times. Indeed, the weighted average of accessibility in all locations (using population as weight) is equal to the physician-to-population ratio in the whole study area (for a proof, see Shen, 1998). This property also applies to the two-step FCA accessibility defined by equation (4). A careful examination of the two methods further reveals that the two-step FCA method is merely a special case of the gravity-based accessibility method.

Note that the improved FCA method treats travel-time impedance as a dichotomous measure, that is, any travel time within a threshold is equally accessible and any travel time beyond the threshold is equally inaccessible. Using  $d_0$  as the threshold travel time, we may recode:

- (a)  $d_{ij}$  (or  $d_{kj}$ ) =  $\infty$ , if  $d_{ij}$  (or  $d_{kj}$ ) >  $d_0$ ; and
- (b)  $d_{ij}$  (or  $d_{kj}$ ) = 1, if  $d_{ij}$  (or  $d_{kj}$ )  $\leq$   $d_0$ .

For any  $\beta$  in equation (6), we have

- (a)  $d_{ij}^{-\beta}$  (or  $d_{kj}^{-\beta}$ ) = 0, when  $d_{ij}$  (or  $d_{kj}$ ) =  $\infty$ ; and
- (b)  $d_{ij}^{-\beta}$  (or  $d_{kj}^{-\beta}$ ) = 1, when  $d_{ij}$  (or  $d_{kj}$ ) = 1.

In case (a),  $S_j$  or  $P_k$  are excluded by being multiplied by zero; and in case (b),  $S_j$  or  $P_k$  are included by being multiplied by one. Therefore, equation (6) is regressed to equation (4), and thus the two-step FCA measure is just a special case of the gravity-based measure. Considering that the two methods have been developed in different fields for a variety of applications, this proof reinforces their rationale for capturing the essence of accessibility measures.

### The case study and sensitivity analysis

Applying the two GIS-based accessibility measures to the Chicago ten-county region requires definitions of two key parameters: the travel-time threshold  $d_0$  in the two-step FCA method and the travel-friction coefficient  $\beta$  in the gravity-based method.<sup>(2)</sup> Drawn from prior studies in the literature, reasonable ranges for the two parameters are defined, and sensitivity analysis is conducted by experimenting with various values within the ranges. Lee (1991) suggested using a threshold travel time of 30 minutes for primary road conditions. The same threshold is used for defining rational service area and determining whether contiguous resources are excessively distant in the guidelines for HPSA designation (<http://bphc.hrsa.gov/dsd>). In this study, seven thresholds ranging between 20 and 50 minutes (with an increment of 5 minutes) have been tested in the two-step FCA method. In a previous study of job-commuting patterns in the same area, the travel-friction coefficient  $\beta$  was derived as 1.85 (Wang, 2000). This study has tested seven values of  $\beta$  ranging from 1.0 to 2.2 (with an increment of 0.2).

Table 1 presents the standard deviations for the two accessibility measures with different choices of parameters. Note that the weighted mean of any accessibility measure is always equal to the physician-to-population ratio in the whole study area (that is, 0.002292), and therefore the mean values of accessibility are omitted from table 1. Several observations can be made from table 1:

(1) By the two-step FCA method, a larger threshold travel time leads to a smaller variance of accessibility scores. In other words, a larger threshold travel time generates stronger spatial smoothing, and reduces variability of accessibility across space (also see Fotheringham et al, 2000, page 46).

(2) Among the accessibility measures obtained by the gravity-based method, larger variances of accessibility scores are associated with higher values of travel-friction coefficient  $\beta$ . Indeed, a larger  $\beta$ -value implies that residents are more discouraged by long travel times in seeking primary care, and thus have a higher tendency to settle for service providers in nearby locations.

(3) The effect of a larger threshold travel time in the two-step FCA method is equivalent to that of a smaller travel-friction coefficient in the gravity-based method. People would travel farther to see a physician when travel friction is less significant. For instance, the variance in the case when  $d_0 = 50$  minutes (in the two-step FCA method) is similar to the variance in the case when  $\beta = 1.8$  (in the gravity-based method). Note that the former considers only physicians accessible within a threshold travel time

**Table 1.** Sensitivity analysis of accessibility measures.

Two-step floating catchment area method		Gravity-based method	
threshold travel time $d_0$	standard deviation of $A_i^F$	travel-friction coefficient $\beta$	standard deviation of $A_i^G$
20	0.002570	2.2	0.000999
25	0.001550	2.0	0.000934
30	0.001240	1.8	0.000863
35	0.001110	1.6	0.000787
40	0.001040	1.4	0.000705
45	0.000953	1.2	0.000619
50	0.000873	1.0	0.000527

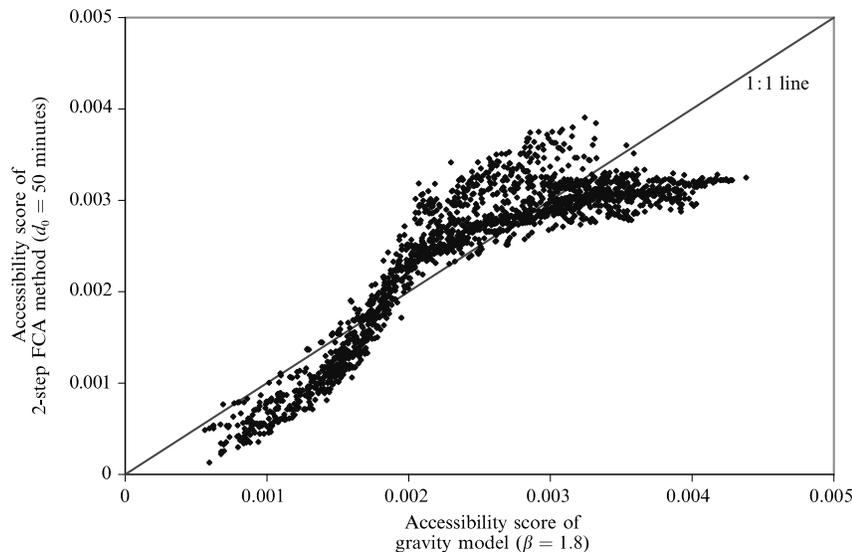
<sup>(2)</sup>One may suggest using actual data of primary care physician visits to determine the two parameters. This could be problematic. As pointed out by a reviewer, such estimates are likely to be confounded with the existing distribution of physicians in the region instead of representing the true travel frictions.

whereas the latter considers physicians at any locations accessible by residents, though to different degrees.

(4) Compared with the two-step FCA method, the gravity-based method tends to give higher accessibility scores to areas with low accessibility. See figure 4 for a comparison between the two methods, where their accessibility scores have similar variances and certainly equal weighted means. This indicates that the gravity-based method could conceal local pockets of poor accessibility.

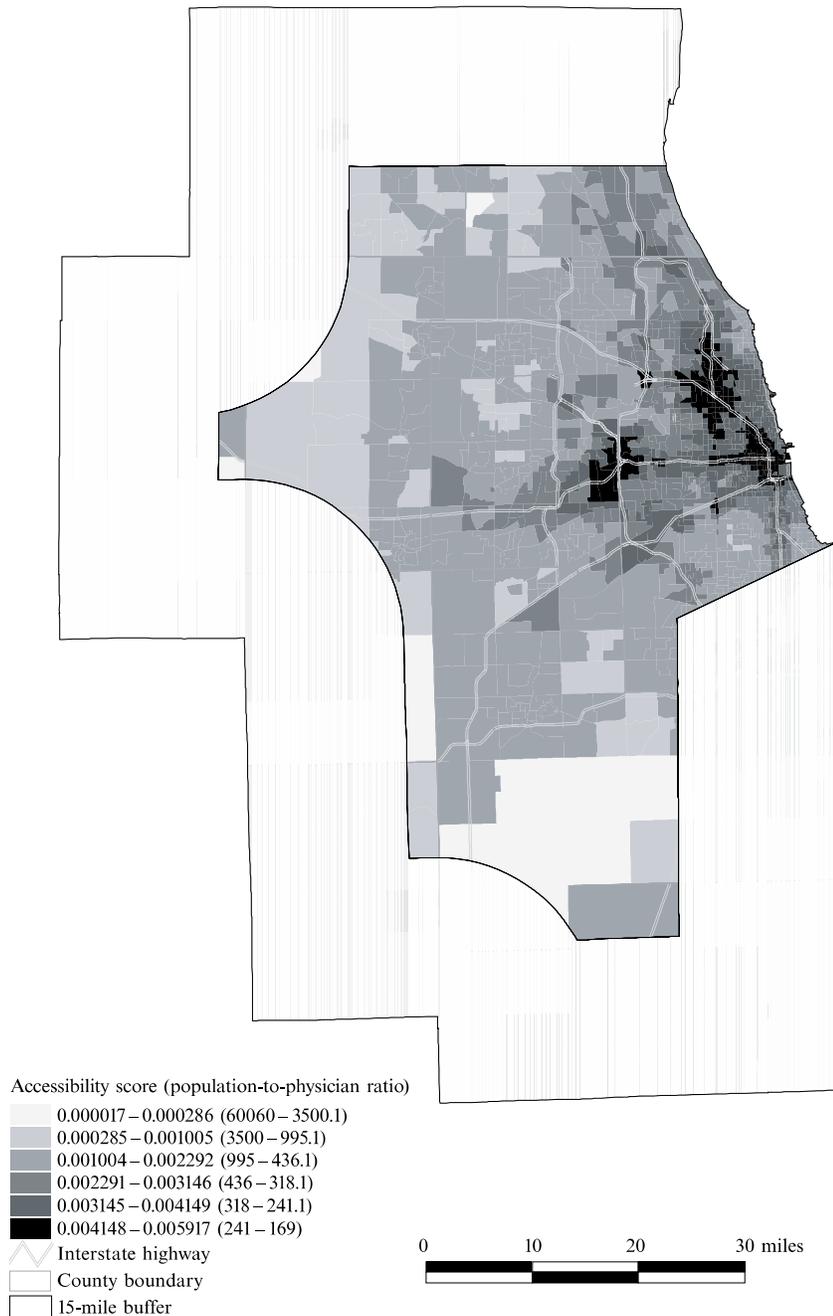
Using a threshold time of 30 minutes (as suggested by Lee, 1991), figure 5 shows the spatial variation of primary care accessibility in the Chicago ten-county region by the two-step FCA method. The grouping of accessibility classes was based on natural breaks in ArcGIS, which identifies breakpoints between classes using a statistical formula that minimizes the sum of the variance within each of the classes. For easy comparison, we added breaks at 3500 (DHHS standard) and 436 (average in the region). Because of edge effects, a 15-mile buffer zone (approximately 30 minutes travel time) near the borders of the study area is masked out. Three areas enjoy the best accessibility: one in downtown Chicago (commonly-known as the 'Loop') where some hospitals are located but with fewer residents, one in the north suburb or Lincolnwood–Skokie area where major research hospitals are located, and one in the west suburb or Elmhurst–Oak Brook area with several regional hospitals. All three areas are on major interstate highway intersections with easy transportation access. Also note some local pockets of relatively poor accessibility in the City of Chicago's south side and areas around the Midway Airport. In general, rural areas suffer from poor accessibility.

As the focus of the paper is on potential spatial accessibility, important aspatial factors are not considered here. Thus the results from this paper are not directly comparable with those areas of physician shortage designated by the DHHS. See figure A2 in the appendix for the latest existing primary care physician shortage designated in the study area as of 23 May 2001 (DHHS, 2002). Most of the shortage areas were defined because of aspatial factors, such as income, ethnicity, and age groups.



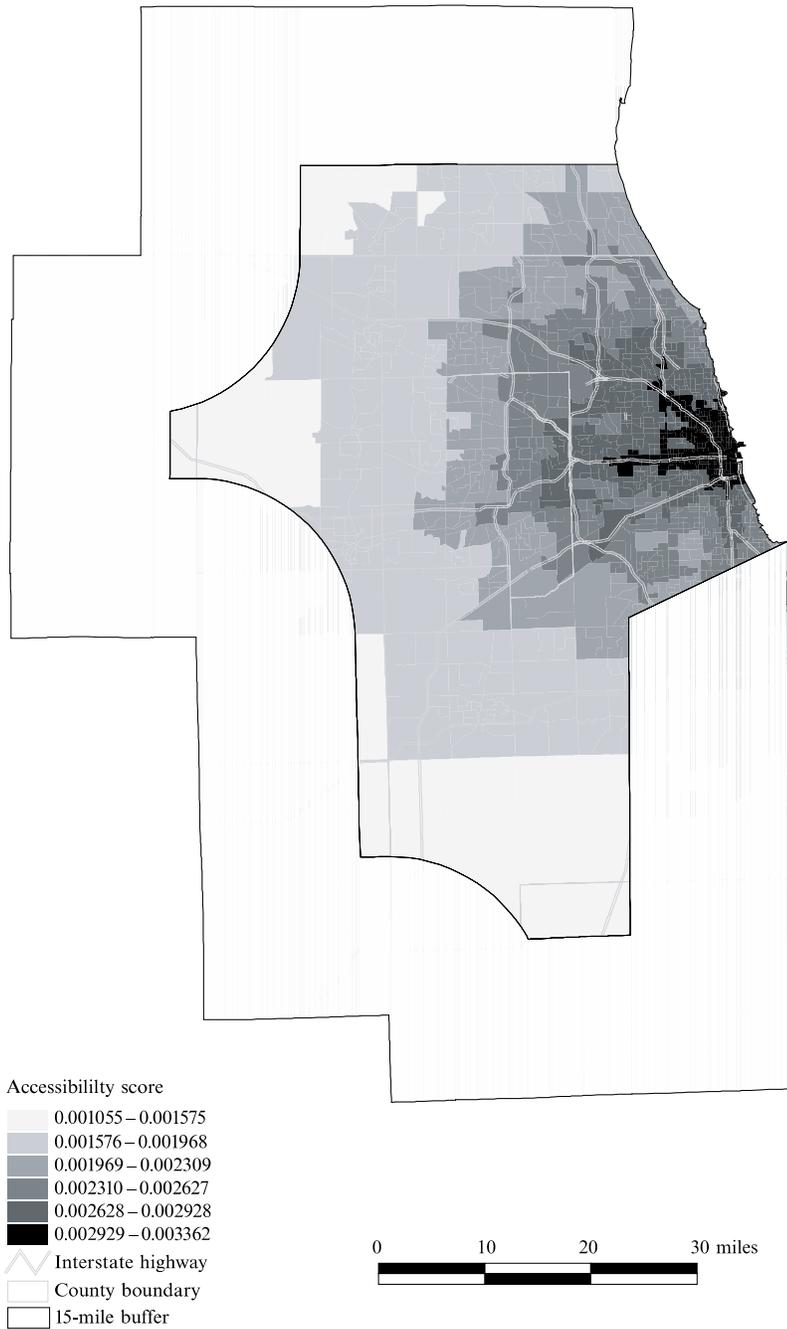
**Figure 4.** Accessibility measures by the two-step floating catchment area (FCA) and the gravity-based methods.

Our ongoing research will develop a comprehensive index of ‘medical needs’ based on factors including these demographic and socioeconomic variables (also see Field, 2000), and integrate it into the spatial accessibility measures discussed here.



**Figure 5.** Accessibility to primary care in Chicago region by the two-step floating catchment area (FCA) method ( $d_0 = 30$  minutes).

To highlight the spatial smoothing effect of gravity-based accessibility measures, figure 6 shows the result using  $\beta = 1.0$ . It shows a concentric pattern (better accessibility in areas closer to the city center) and much less spatial variability.



**Figure 6.** Accessibility to primary care in Chicago region by the gravity-based method ( $\beta = 1.0$ ).

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The gravity-based method defines 'accessible' as a continuous measure whereas the FCA method uses a dichotomous measure. Perhaps, for individuals, accessibility or inaccessibility to a physician location is a dichotomous decision. For an aggregated group of diverse individuals, the collective outcome reflects decisions based on different threshold travel times, and perhaps displays a continuous measure. However, one concern for the gravity-based method is that it allows for the tradeoff between the number of physicians and travel time. By the notion of the gravity model (assuming  $\beta = 1.0$  for simplicity), a patient is as accessible to two physicians 20 minutes away as to one physician 10 minutes away. This may be considered questionable, particularly to people outside the field of geography. Perhaps more importantly, as shown earlier, the gravity-based method tends to give high accessibility scores in poor-access areas, where the designation of physician shortage areas is intended to locate. The gravity-based method also involves more computation and programming and is less intuitive. In summary, we are leaning towards recommending the two-step FCA method for helping measure primary care accessibility and define physician shortage areas. The principles of the two-step FCA method can be easily incorporated into existing shortage-designation practice because the necessary data and technology are now available. In a systematic and consistent way, the method implements some of the DHHS guidelines that are stated only conceptually. In a GIS environment, the method can be highly automated as long as necessary data are in place.

#### **Summary and future work**

In summary, by using population and physician data at finer geographic resolutions, this research uses the two-step floating catchment area (FCA) method and the gravity-based method to examine spatial accessibility to primary care in the Chicago region. Both methods are implemented in a GIS environment. The methods consider the interaction between physicians and patients across administrative borders and use travel times to measure the spatial barrier between them. Results from the methods reveal details of varying spatial accessibility to health care with finer resolution data. Based on this preliminary case study, we recommend the two-step FCA method, simpler and easier to interpret, for use in improving the designation of health professional shortage areas.

Future work can improve the research in at least three aspects. First, this research does not differentiate population with and without personal vehicles. For those without automobiles and having to depend on public transit (particularly, low-income and minorities), their accessibility to physicians is diminished to a great degree. This issue will be addressed when the 2000 Census with vehicle-availability data becomes available, and a more comprehensive study of accessibility considering aspatial factors will be conducted. Second, we will evaluate how the variation of accessibility corresponds to the distribution of population with various socioeconomic statuses and ethnicities, and assess whether minorities and low-income residents are disproportionately located in poor-access areas. Finally, we will compare the health care accessibility between 1990 and 2000, and examine how the accessibility has changed over time and whether the accessibility has been improved for some areas.

**Acknowledgements.** This research is supported by the US Department of Health and Human Services, Agency for Healthcare Research and Quality, under Grant 1-R03-HS11764-01. Points of view or opinions in this paper are those of the authors, and do not necessarily represent the official position or policies of the US Department of Health and Human Services.

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**APPENDIX**
**Table A1.** Primary care physician and population by county in the study area, 2000.

County	Number of primary care physicians	Population	Population-to-physician ratio
Cook	15 795	5376 741	340.4: 1
DeKalb	94	88 969	946.5: 1
DuPage	2991	904 161	302.3: 1
Grundy	35	37 535	1072.4: 1
Kane	557	404 119	725.5: 1
Kankakee	150	103 833	692.2: 1
Kendall	27	54 544	2020.1: 1
Lake	1 550	644 356	415.7: 1
McHenry	257	260 077	1012.0: 1
Will	455	502 266	1103.9: 1

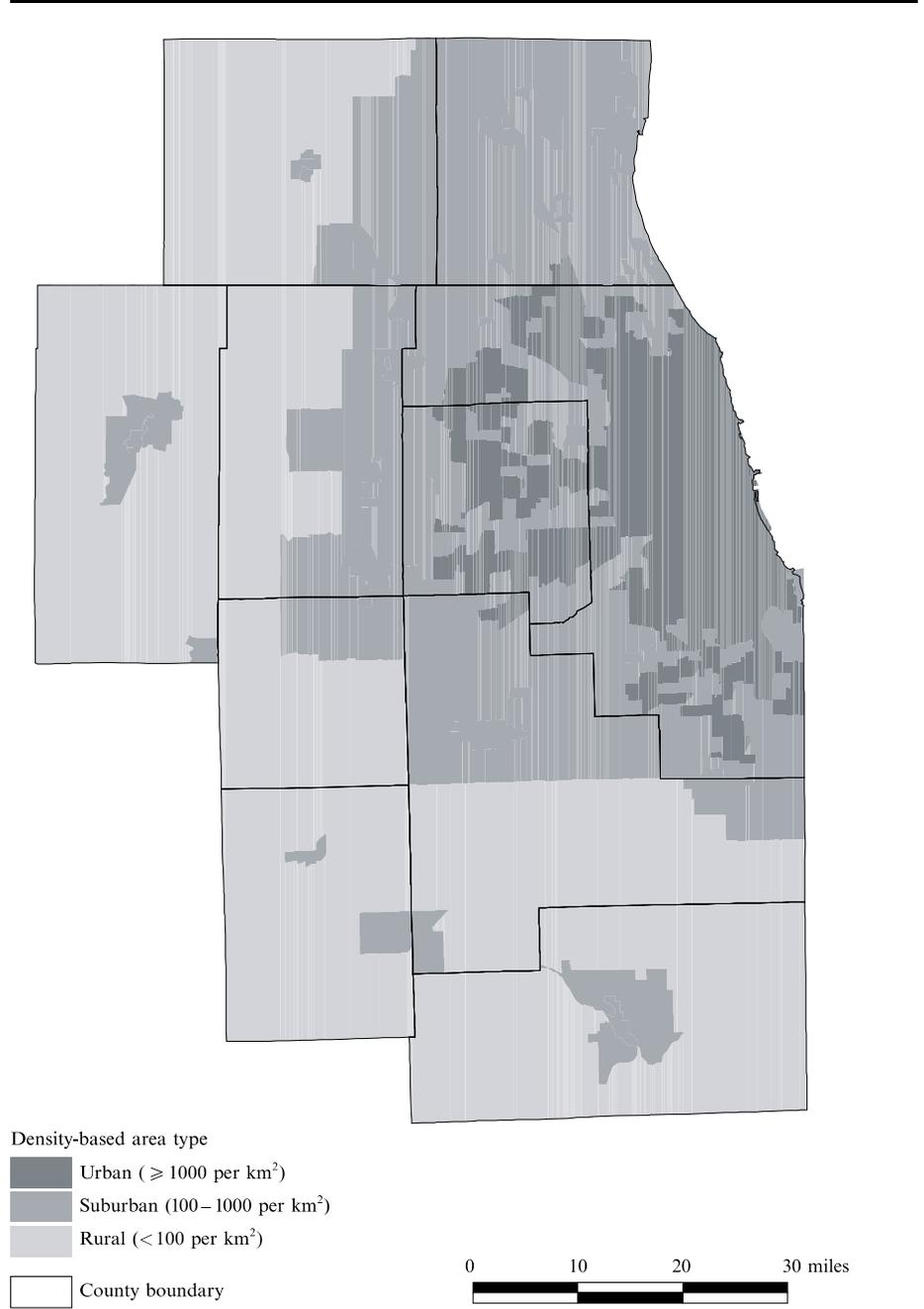
**Table A2.** Guidelines for travel speed settings.

Category (CFCC) <sup>a</sup>	Population density (per km <sup>2</sup> )	Area <sup>b</sup>	Speed limit (mph)
Interstate highways (A11–A18)	≥ 100	urban and suburban	55
	< 100	rural	65
US and state highways (A21–A38)	≥ 1 000	urban	35
	1 000 > density ≥ 100	suburban	45
	< 100	rural	55
Local roads (A41–A48)	≥ 1 000	urban	20
	1 000 > density ≥ 100	suburban	25
	< 100	rural	35

<sup>a</sup> The CFCC (census feature class codes) are used by the US Census Bureau in its TIGER/Line files.

<sup>b</sup> See figure A1 (over) for distribution.

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**Figure A1.** Population-density-based area types for travel-speed assignments.

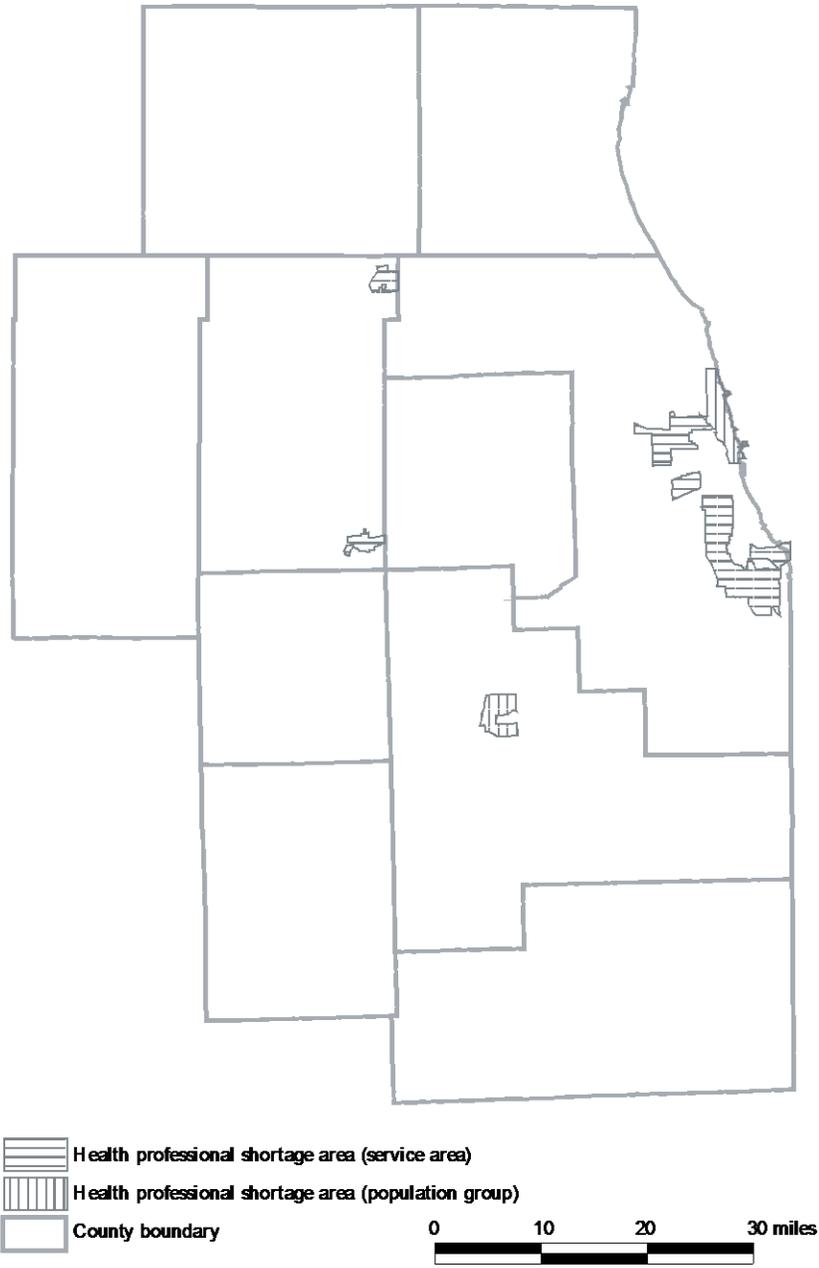


Figure A2. Designation areas of physician shortage (31 May 2001).

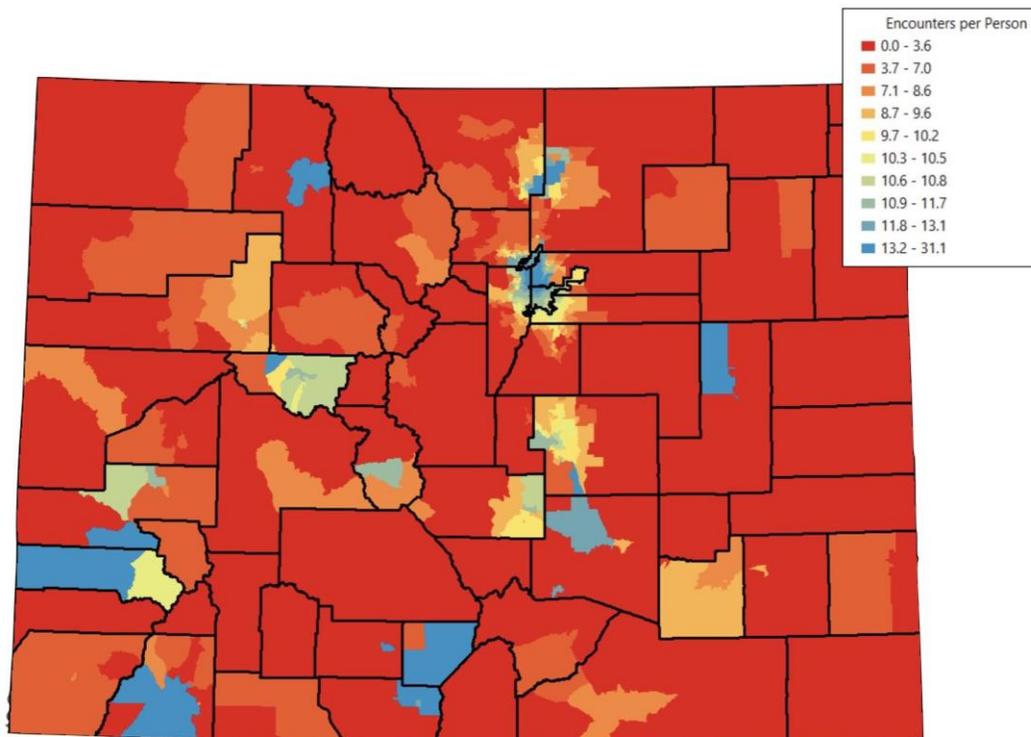
**Sample Model Results**  
**State-Designated Substance Use Disorder Health Professional Shortage Areas (SUD-HPSA)**  
**by Decile in Colorado**

(Center for Health and Environmental Data (CHED), 2018)

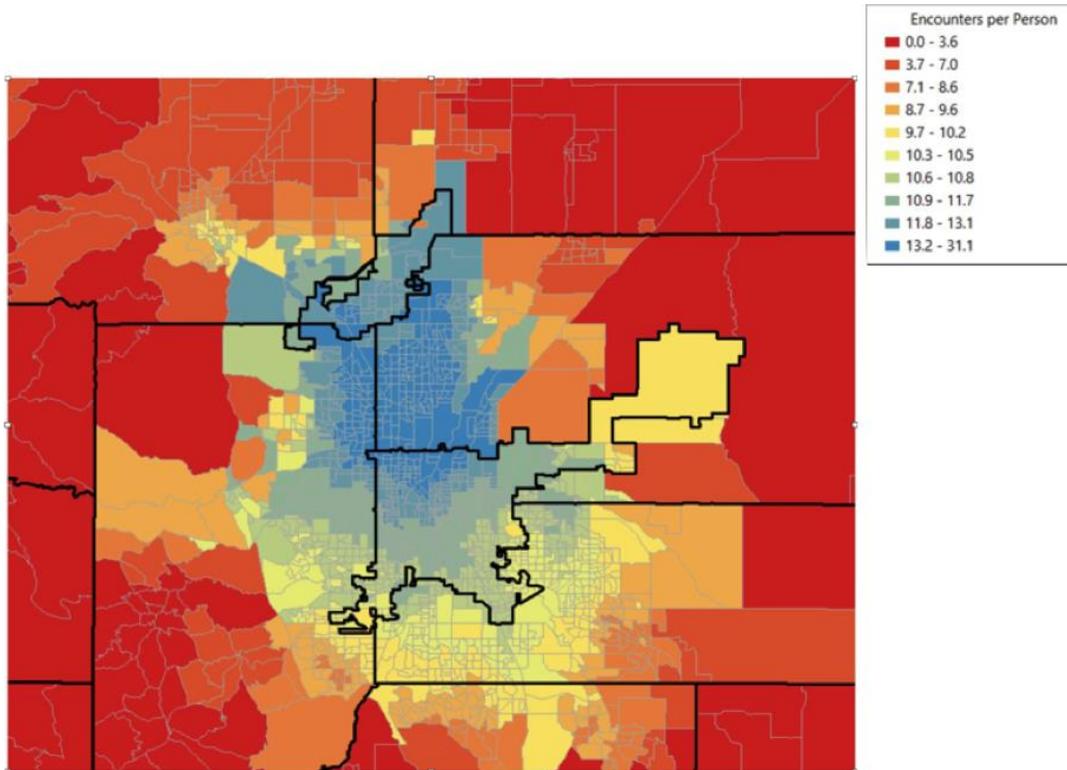
These maps are test results of the methodology with available data at the time of analysis. The final methodology and data may modify these results in implementation of the rule, though differences are not predicted to be substantial. The following are GIS maps that represent the number of SUD treatment services encounters available to resident civilian males and females ages 18 and above who are experiencing an episode of SUD using the methodology communicated in the rule and described in the Statement of Basis and Purpose.

The map reflects the number of SUD treatment services encounters available to residents ages 18 and above within each Census Block Group based on the two-step floating catchment area methodology, binned by decile. Each decile bin contains 353 census block groups (3,532/10). Census block groups that are shaded deep red, red, and orange fall below an estimated provider capacity of eight visits per person affected by SUD. These areas of the state may receive formal designation as a SUD-HPSA under these proposed rules.

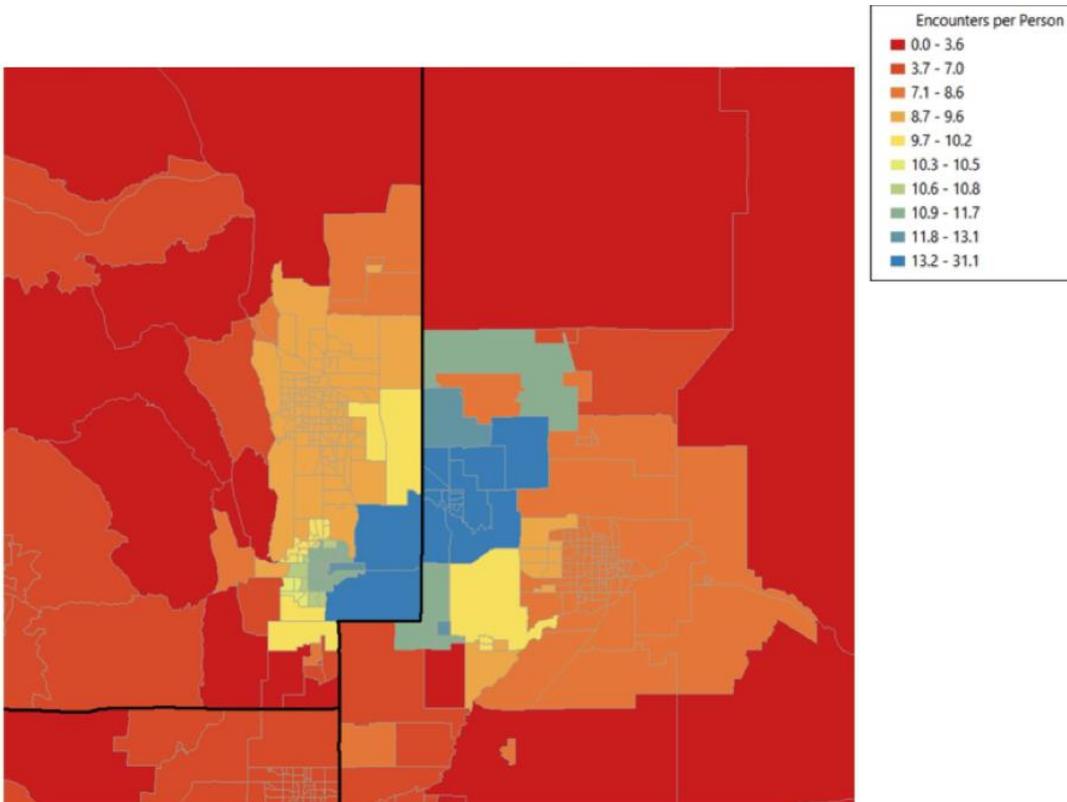
Test model results: Colorado SUD HPSA (*CHED, 2018*)



Test model results: Denver metro SUD HPSA detail (CHED, 2018)



Test model results: Fort Collins, Greeley, Loveland SUD HPSA detail (CHED, 2018)



## STAKEHOLDER ENGAGEMENT

for new rule

6 CCR 1015-6, State-Designated Health Professional Shortage Area Methodology

State law requires agencies to establish a representative group of participants when considering to adopt or modify new and existing rules. This is commonly referred to as a stakeholder group.

### Early Stakeholder Engagement:

The following individuals and/or entities were invited to provide input and included in the development of these proposed rules:

#### State Government

Organization	Representative
Department of Health Care Policy and Financing <ul style="list-style-type: none"><li>Compliance &amp; Stakeholder Relations</li> <li>Executive Leadership Team</li></ul>	Kimberly Smith, Compliance & Stakeholder Relations Unit Manager; Michelle Miller, Chief Nursing Officer, Client & Clinical Care Office; Melissa Eddleman, Behavioral Health Unit Manager
Department of Human Services: Office of Behavioral Health	Camille Harding, Division Director of Community and Behavioral Health- Office of Behavioral Health; Claudia Zundel, Director of Child Adolescent and Family Services; Janet Steinkamp, OBH-SIM Project Manager; Mary McMahon, Manager CAC Clinical Training Program; Linda Martin, State Targeted Response Treatment Manager
Department of Public Health and Environment <ul style="list-style-type: none"><li>Center for Health and Environmental Data: GIS Unit</li></ul>	Devon Wilford, Health and Geographic Information System

<ul style="list-style-type: none"> <li>● Community Health Division <ul style="list-style-type: none"> <li>○ Office of Emergency Preparedness and Response</li> <li>○ Office of Planning and Partnerships</li> </ul> </li> <li>● Executive Director's Office</li> <li>● Health Facilities Division</li> <li>● Prevention Services Division <ul style="list-style-type: none"> <li>○ Children Youth and Families Branch (Maternal and Child Health)</li> <li>○ Healthy Connections Branch (School Based Health Programs)</li> <li>○ Violence and Injury Prevention Mental Health Promotion Branch (Opioid Overdose Prevention Program)</li> </ul> </li> </ul>	<p>Integration; Ben White, GIS Health Analyst</p> <p>Curt Drennen, Psy.D., Branch Supervisor Health and Safety Unit; Anne-Marie Braga, Director of Local Public Health Partnerships</p> <p>Tista Ghosh, MD, Director, Public Health Programs and Deputy Chief Medical Officer</p> <p>Randy Kuykendall, Health Facilities Division Director Kara Johnson-Hufford, Branch Chief Health Facility Quality Branch</p> <p>Elizabeth Whitley, Ph.D., Prevention Services Division Director Rachel Hutson, Branch Chief Children, Youth and Families Branch</p> <p>Kristina Green, SBIRT School-Based Health Center Project Coordinator</p> <p>Lindsey Myers, Branch Chief Violence and Injury Prevention-Mental Health Promotion Branch; Maria Butler, Prescription Drug Epidemiologist; Allison Rosenthal, Prescription Drug Overdose Project Evaluator Christina Mickle Toxicology Reviewer</p>
<p>Department of Public Safety</p>	<p>Peggy Heil, Office of Research</p>

	and Statistics Division of Criminal Justice
Department of Regulatory Agencies <ul style="list-style-type: none"> <li>• Division of Insurance</li> <li>• Division of License and Registration</li> </ul>	Adam Boggess, Interim Director Rates and Forms/ Life, Accident and Health; Shirley Taylor, Rates and Forms/ Life, Accident and Health; Jo Donlin, Director of Regulatory Outreach and Education
Office of the Governor: State Innovation Model Office	Barbara Martin, Director, SIM; Shilynn Coleman, SIM Workforce and Population Health Program Manager

### Federal Government

Organization	Representative
Health Resources and Services Administration (Region 8)	Kim Patton, Psy.D., Public Health Analyst/ Behavioral Health Liaison
Substance Abuse Mental Health Services Administration (Region 8)	Charles Smith, Ph.D., Regional Administrator Region VIII

### Non-governmental Partners

Organization	Representative
Center for Improving Value in Health Care	Jonathan Mathieu, Ph.D., Vice President of Research & Compliance and Chief Economist; Maria de Jesus Diaz, Quality Measures Program Manager
Colorado Association of Addiction Professionals	Mita Johnson, Ed.D., Member of the Board

Colorado Association of Local Public Health Officials	Tracy Anselmo, Executive Director
Colorado Behavioral Health Care Council	Moses Gur, Director of Policy and Member Engagement; Emily Haller, SIM Program Coordinator
Colorado Community Health Network	Suzanne Smith, Health Center Operations Director; Victoria Anderson Senior Quality Initiatives Manager
Colorado Consortium on Prescription Drug Abuse Prevention	Whit Olyer, Strategic Planning Coordinator
Colorado Criminal Justice Reform Coalition	Terri Hurst, Policy Coordinator
Colorado Medical Society	Chet Seward, Senior Director, Division of Health Care Policy
Colorado Providers Association	Jennifer Miles, Public Affairs Consultant, Frontline
Colorado Psychological Association	Jeannie Vanderburg, Public Affairs Consultant, Capstone
Colorado Rural Health Center	Michelle Mills, Chief Executive Officer
Mental Health Colorado	Moe Keller, Vice President of Public Policy and Strategic Initiatives
National Council for Behavioral Health	Mindy Klowden, Director Training and Technical Assistance
The Steadman Group	J.K. Costello, MD, Senior Consultant
University of Denver, Graduate School of Social Work	Michael Talamantes, MSW, Clinical Associate Professor
Wellbeing Trust	Benjamin Miller, PsyD., Chief Strategy Officer

Stakeholder meetings have been ad hoc and one-on-one though the development of this request for rulemaking packet. Additional opportunities for stakeholder input will occur between the emergency rulemaking and returning to the board for permanent rulemaking.

#### Stakeholder Group Notification

The stakeholder group was provided notice of the rulemaking hearing and provided a copy of the proposed rules or the internet location where the rules may be viewed. Notice was provided prior to the date the notice of rulemaking was published in the Colorado Register (typically, the 10th of the month following the Request for Rulemaking).

- Not applicable. This is a Request for Rulemaking Packet. Notification will occur if the Board of Health sets this matter for rulemaking.
- Yes.

Summarize Major Factual and Policy Issues Encountered and the Stakeholder Feedback Received. If there is a lack of consensus regarding the proposed rule, please also identify the Department's efforts to address stakeholder feedback or why the Department was unable to accommodate the request.

No major factual or policy issues were encountered during the preparation of this Emergency Rulemaking Packet. No local government mandate or impact is anticipated.

Overall, after considering the benefits, risks and costs, the proposed rule:

Select all that apply.

✓	Improves behavioral health and mental health; or, reduces substance abuse or suicide risk.	✓	Reduces or eliminates health care costs, improves access to health care or the system of care; stabilizes individual participation; or, improves the quality of care for unserved or underserved populations.
✓	Improves housing, land use, neighborhoods, local infrastructure, community services, built environment, safe physical spaces or transportation.	✓	Reduces occupational hazards; improves an individual's ability to secure or maintain employment; or, increases stability in an employer's workforce.
	Improves access to food and healthy food options.		Reduces exposure to toxins, pollutants, contaminants or hazardous substances; or ensures the safe application of radioactive material or chemicals.
✓	Improves access to public and environmental health information; improves the readability of the rule; or, increases the shared understanding of roles and responsibilities, or what occurs under a rule.	✓	Supports community partnerships; community planning efforts; community needs for data to inform decisions; community needs to evaluate the effectiveness of its efforts and outcomes.
	Increases a child's ability to participate in early education and educational opportunities through prevention efforts that increase protective factors and decrease risk factors, or stabilizes individual participation in the opportunity.		Considers the value of different lived experiences and the increased opportunity to be effective when services are culturally responsive.
✓	Monitors, diagnoses and investigates health problems, and health or environmental hazards in the community.	✓	Ensures a competent public and environmental health workforce or health care workforce.
	Other: _____ _____		Other: _____ _____

# An Act

SENATE BILL 18-024

BY SENATOR(S) Jahn and Tate, Aguilar, Lambert, Priola, Court, Crowder, Fields, Garcia, Guzman, Jones, Kefalas, Kerr, Martinez Humenik, Merrifield, Moreno, Todd, Williams A., Zenzinger;  
also REPRESENTATIVE(S) Singer and Pettersen, Kennedy, Arndt, Bridges, Esgar, Exum, Ginal, Gray, Herod, Hooton, Jackson, Kraft-Tharp, Lee, Lontine, Melton, Michaelson Jenet, Salazar, Weissman, Winter, Young, Duran.

CONCERNING MODIFICATIONS TO THE COLORADO HEALTH SERVICE CORPS PROGRAM ADMINISTERED BY THE DEPARTMENT OF PUBLIC HEALTH AND ENVIRONMENT TO EXPAND THE AVAILABILITY OF BEHAVIORAL HEALTH CARE PROVIDERS IN SHORTAGE AREAS IN THE STATE, AND, IN CONNECTION THEREWITH, MAKING AN APPROPRIATION.

*Be it enacted by the General Assembly of the State of Colorado:*

**SECTION 1. Legislative declaration.** (1) The general assembly finds and determines that:

(a) Colorado faces a health care workforce shortage in many health care areas, including a shortage in behavioral health care providers who work with patients with mental health and substance use disorders;

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*Capital letters or bold & italic numbers indicate new material added to existing statutes; dashes through words indicate deletions from existing statutes and such material not part of act.*

(b) With an opioid epidemic and increasing overdose rates affecting all corners of the state, the need for health professionals who can treat patients with substance use disorders is particularly acute;

(c) Additionally, providers who seek to hire mental health and substance use disorder professionals report difficulty in filling positions, leading to reduced services despite having the physical space for beds or outpatient treatment rooms;

(d) The state currently operates a loan repayment program, known as the Colorado health service corps, that targets the need for primary care services in health professional shortage areas throughout the state by providing loan repayment to a health care professional who commits to practicing and providing primary care in a shortage area for a minimum period;

(e) The Colorado health service corps program, in its current form, is limited to specific providers providing primary or psychiatric care in areas of the state designated as health professional shortage areas under federal guidelines;

(f) Further, the existing loan repayment program is available only to providers who have already obtained a license, which can require at least one to two years of supervised practice, depending on the license type, after completion of a master's or doctorate degree, yet the need for assistance with repaying student loans is often greatest during this supervised practice period since salary earnings are lower;

(g) While the current program requirements are well suited for providing greater access to primary and psychiatric care, they do not address the increasing demand for behavioral health care services to treat other mental health or substance use disorders and the financial burdens faced by candidates for licensure who are progressing to licensure but are not eligible for loan repayment and are often working at an entry-level salary;

(h) Moreover, the federal guidelines for determining a health professional shortage area do not adequately measure the shortage of other mental health or substance use disorder professionals in areas of the state experiencing an increased need for behavioral health care services;

(i) In order to expand access to behavioral health care providers and behavioral health care services in areas of the state where the need for behavioral health care is great and the access to care is limited, it is important to:

(I) Allow behavioral health care providers and candidates for licensure as a behavioral health care provider to participate in the loan repayment program through the Colorado health service corps to provide incentives to those providers and candidates to deliver behavioral health care services in health professional shortage areas in the state and to ease the financial burdens they face when practicing in health professional shortage areas;

(II) Establish a scholarship program to provide financial assistance to addiction counselors seeking initial or a higher level of certification to defray education and training costs in exchange for a commitment to provide behavioral health care services in health professional shortage areas;

(III) Allow the primary care office, under guidelines adopted by the state board of health, to designate health professional shortage areas in the state using state-specific guidelines rather than federal guidelines;

(IV) Add representatives of substance use disorder service providers to the advisory council that reviews and makes recommendations on loan repayment applications; and

(V) Dedicate an amount of money from the marijuana tax cash fund to provide loan repayment to behavioral health care providers and candidates for licensure and scholarships to addiction counselors in order to expand access to behavioral health care services to individuals suffering from a mental health or substance use disorder.

(2) The general assembly further finds that expanding access to the health care professional loan repayment program to behavioral health care providers will expand access to behavioral health care services and treatment for people with mental health or substance use disorders, and therefore, the use of retail marijuana tax revenues to fund loan repayments for behavioral health care providers under the Colorado health service corps program is authorized under section 39-28.8-501 (2)(b)(IV)(C), C.R.S.

**SECTION 2.** In Colorado Revised Statutes, 25-1.5-402, **add** (11) as follows:

**25-1.5-402. Definitions.** As used in this part 4, unless the context otherwise requires:

(11) "STATE-DESIGNATED HEALTH PROFESSIONAL SHORTAGE AREA" MEANS AN AREA OF THE STATE DESIGNATED BY THE PRIMARY CARE OFFICE, IN ACCORDANCE WITH STATE-SPECIFIC METHODOLOGIES ESTABLISHED BY THE STATE BOARD BY RULE PURSUANT TO SECTION 25-1.5-404 (1)(a), AS EXPERIENCING A SHORTAGE OF HEALTH CARE PROFESSIONALS OR BEHAVIORAL HEALTH CARE PROVIDERS.

**SECTION 3.** In Colorado Revised Statutes, 25-1.5-404, **amend** (1)(a) as follows:

**25-1.5-404. Primary care office - powers and duties - rules.** (1) The primary care office has, at a minimum, the following powers and duties:

(a) To assess the health care AND BEHAVIORAL HEALTH CARE professional needs of areas throughout the state AND CREATE AND ADMINISTER STATE-DESIGNATED HEALTH PROFESSIONAL SHORTAGE AREAS IN ACCORDANCE WITH STATE BOARD RULES ADOPTED UNDER THIS SUBSECTION (1)(a) ESTABLISHING STATE-SPECIFIC METHODOLOGIES FOR DESIGNATING AREAS EXPERIENCING A SHORTAGE OF HEALTH CARE PROFESSIONALS OR BEHAVIORAL HEALTH CARE PROVIDERS. THE PRIMARY CARE OFFICE SHALL COORDINATE WITH THE DEPARTMENT OF HEALTH CARE POLICY AND FINANCING IN DEVELOPING THE HEALTH PROFESSIONAL SHORTAGE AREA DESIGNATION METHODOLOGIES AND IN DRAFTING RULES UNDER THIS SUBSECTION (1)(a).

**SECTION 4.** In Colorado Revised Statutes, **amend** 25-1.5-501 as follows:

**25-1.5-501. Legislative declaration.** (1) The general assembly hereby finds that there are areas of Colorado that suffer from a lack of health care professionals OR BEHAVIORAL HEALTH CARE PROVIDERS to serve, and a lack of nursing or other health care professional faculty to train health care professionals to meet, the medical AND BEHAVIORAL HEALTH CARE

needs of communities. The general assembly further finds that the state needs to implement incentives to encourage health care professionals AND BEHAVIORAL HEALTH CARE PROVIDERS to practice in these underserved areas and to encourage nursing faculty and other health care professional faculty to teach ~~these~~ health care professionals.

(2) It is therefore the intent of the general assembly in enacting this part 5 to create a state health service corps program that uses state ~~moneys~~ MONEY, federal ~~moneys~~ MONEY, when permissible, and contributions from communities and private sources to help repay the outstanding education loans that many health care professionals, BEHAVIORAL HEALTH CARE PROVIDERS, CANDIDATES FOR LICENSURE, nursing faculty, and health care professional faculty hold. In exchange for repayment of loans incurred for the purpose of obtaining education in their chosen health care AND BEHAVIORAL HEALTH CARE professions, the health care professionals, BEHAVIORAL HEALTH CARE PROVIDERS, AND CANDIDATES FOR LICENSURE will commit to provide health care OR BEHAVIORAL HEALTH CARE services, AS APPLICABLE, in communities with underserved health care OR BEHAVIORAL HEALTH CARE needs throughout the state, and the nursing and health care professional faculty will commit to providing a specified period of service in a qualified faculty position.

(3) IN ADDITION, FOR PURPOSES OF INCREASING THE AVAILABILITY OF CERTIFIED ADDICTION COUNSELORS, IT IS THE INTENT OF THE GENERAL ASSEMBLY TO CREATE A SCHOLARSHIP PROGRAM TO PROVIDE SCHOLARSHIPS TO ADDICTION COUNSELORS WHO, IN EXCHANGE FOR RECEIVING SCHOLARSHIPS TO ASSIST THEM IN OBTAINING THE REQUIRED EDUCATION AND TRAINING TO BE CERTIFIED AS AN ADDICTION COUNSELOR, COMMIT TO PRACTICE IN A HEALTH PROFESSIONAL SHORTAGE AREA FOR A SPECIFIED PERIOD.

**SECTION 5.** In Colorado Revised Statutes, 25-1.5-502, **add** (1.3), (1.5), (1.7), (6.5), (12), (13), and (14) as follows:

**25-1.5-502. Definitions.** As used in this part 5, unless the context otherwise requires:

(1.3) "BEHAVIORAL HEALTH CARE PROVIDER" MEANS THE FOLLOWING PROVIDERS WHO PROVIDE BEHAVIORAL HEALTH CARE SERVICES WITHIN THEIR SCOPE OF PRACTICE:

- (a) A LICENSED ADDICTION COUNSELOR;
- (b) A CERTIFIED ADDICTION COUNSELOR;
- (c) A LICENSED PROFESSIONAL COUNSELOR;
- (d) A LICENSED CLINICAL SOCIAL WORKER;
- (e) A LICENSED MARRIAGE AND FAMILY THERAPIST;
- (f) A LICENSED PSYCHOLOGIST;
- (g) A LICENSED PHYSICIAN ASSISTANT WITH SPECIFIC TRAINING IN SUBSTANCE USE DISORDERS;
- (h) AN ADVANCED PRACTICE NURSE WITH SPECIFIC TRAINING IN SUBSTANCE USE DISORDERS, PAIN MANAGEMENT, OR PSYCHIATRIC NURSING; OR
- (i) A PHYSICIAN WITH SPECIFIC BOARD CERTIFICATION OR TRAINING IN ADDICTION MEDICINE, PAIN MANAGEMENT, OR PSYCHIATRY.

(1.5) "BEHAVIORAL HEALTH CARE SERVICES" MEANS SERVICES FOR THE PREVENTION, DIAGNOSIS, AND TREATMENT OF, AND THE RECOVERY FROM, MENTAL HEALTH AND SUBSTANCE USE DISORDERS.

(1.7) "CANDIDATE FOR LICENSURE" MEANS A PERSON WHO:

- (a) IS A CANDIDATE FOR A LICENSE AS A LICENSED PSYCHOLOGIST, CLINICAL SOCIAL WORKER, MARRIAGE AND FAMILY THERAPIST, LICENSED PROFESSIONAL COUNSELOR, OR ADDICTION COUNSELOR;
- (b) HAS COMPLETED A MASTER'S DEGREE OR, FOR A PSYCHOLOGIST LICENSURE CANDIDATE, HAS COMPLETED A DOCTORAL DEGREE;
- (c) HAS NOT YET COMPLETED THE SUPERVISED EXPERIENCE HOURS REQUIRED FOR LICENSURE PURSUANT TO SECTION 12-43-304 (1)(d), 12-43-404 (2)(c), 12-43-504 (1)(d), 12-43-603 (1)(d), OR 12-43-804 (1)(g), AS APPLICABLE; AND

(d) IS OR WILL BE PROVIDING BEHAVIORAL HEALTH CARE SERVICES.

(6.5) "HEALTH PROFESSIONAL SHORTAGE AREA" MEANS A FEDERALLY DESIGNATED HEALTH PROFESSIONAL SHORTAGE AREA OR A STATE-DESIGNATED HEALTH PROFESSIONAL SHORTAGE AREA.

(12) "SCHOLARSHIP PROGRAM" MEANS THE SCHOLARSHIP PROGRAM FOR ADDICTION COUNSELORS CREATED IN SECTION 25-1.5-503.5.

(13) "STATE-DESIGNATED HEALTH PROFESSIONAL SHORTAGE AREA" MEANS AN AREA OF THE STATE DESIGNATED BY THE PRIMARY CARE OFFICE, IN ACCORDANCE WITH STATE-SPECIFIC METHODOLOGIES ESTABLISHED BY THE STATE BOARD BY RULE PURSUANT TO SECTION 25-1.5-404 (1)(a), AS EXPERIENCING A SHORTAGE OF HEALTH CARE PROFESSIONALS OR BEHAVIORAL HEALTH CARE PROVIDERS.

(14) "UNDERSERVED POPULATION" MEANS ANY OF THE FOLLOWING:

(a) INDIVIDUALS ELIGIBLE FOR MEDICAL ASSISTANCE UNDER ARTICLES 4 TO 6 OF TITLE 25.5;

(b) INDIVIDUALS WHO ARE PROVIDED SERVICES BY A BEHAVIORAL HEALTH CARE PROVIDER AND ARE EITHER CHARGED FEES ON A SLIDING SCALE BASED UPON INCOME OR ARE SERVED WITHOUT CHARGE.

**SECTION 6.** In Colorado Revised Statutes, 25-1.5-503, **amend** (1), (2), (5), and (6) as follows:

**25-1.5-503. Colorado health service corps - program - creation - conditions - rules.** (1) (a) (I) ~~Beginning July 1, 2009,~~ The primary care office shall maintain and administer, subject to available appropriations, the Colorado health service corps. Subject to available appropriations, the Colorado health service corps shall provide loan repayment for certain eligible:

(A) Health care professionals who provide primary health services; ~~Beginning July 1, 2011, the Colorado health service corps shall also provide loan repayment for certain eligible~~

(B) Nursing faculty or health care professional faculty members in

qualified faculty positions; AND

(C) BEHAVIORAL HEALTH CARE PROVIDERS AND CANDIDATES FOR LICENSURE WHO PROVIDE BEHAVIORAL HEALTH CARE SERVICES.

(II) Under the Colorado health service corps, subject to the limitations specified in subsection (2) of this section, upon entering into a loan contract the state may either:

(A) Make payments on the education loans of the health care professional, BEHAVIORAL HEALTH CARE PROVIDER, CANDIDATE FOR LICENSURE, nursing faculty member, or health care professional faculty member; or

(B) Agree to make an advance payment in a lump sum of all or part of the principal, interest, and related expenses of the education loans of health care professionals, BEHAVIORAL HEALTH CARE PROVIDERS, CANDIDATES FOR LICENSURE, nursing faculty members, or health care professional faculty members, subject to the limitations specified in subsection (2) of this section.

(III) (A) In consideration for receiving repayment of all or part of his or her education loan, the health care professional shall agree to provide primary health services in ~~federally designated~~ health professional shortage areas in Colorado.

(B) IN CONSIDERATION FOR RECEIVING REPAYMENT OF ALL OR PART OF HIS OR HER EDUCATION LOAN, THE BEHAVIORAL HEALTH CARE PROVIDER OR CANDIDATE FOR LICENSURE SHALL AGREE TO PROVIDE BEHAVIORAL HEALTH CARE SERVICES IN HEALTH PROFESSIONAL SHORTAGE AREAS IN COLORADO.

(IV) In consideration for receiving repayment of all or part of his or her education loan, the nursing or other health care professional faculty member must agree to serve two or more consecutive academic years in a qualified faculty position.

(b) Repayment of loans under the Colorado health service corps may be made using ~~moneys~~ MONEY in the Colorado health service corps fund. The primary care office is authorized to receive and expend gifts, grants,

and donations or ~~moneys~~ MONEY appropriated by the general assembly for the purpose of implementing the Colorado health service corps. In administering the Colorado health service corps, the primary care office shall collaborate with appropriate partners as needed to maximize the federal ~~moneys~~ MONEY available to the state for state loan repayment programs through the federal department of health and human services. The selection of health care professionals, BEHAVIORAL HEALTH CARE PROVIDERS, CANDIDATES FOR LICENSURE, nursing faculty members, and health care professional faculty members for participation in the Colorado health service corps is exempt from the competitive bidding requirements of the "Procurement Code", articles 101 to 112 of title 24. ~~C.R.S.~~

(c) THE FOLLOWING PROVIDERS ARE NOT ELIGIBLE FOR LOAN REPAYMENT THROUGH THE COLORADO HEALTH SERVICE CORPS:

~~(c)~~ (I) Health care professionals WHO ARE NOT practicing in ~~nonprimary~~ PRIMARY care specialties or providing ~~nonprimary~~ PRIMARY health services; ~~are not eligible for loan repayments through the Colorado health service corps~~ AND

(II) BEHAVIORAL HEALTH CARE PROVIDERS AND CANDIDATES FOR LICENSURE WHO ARE NOT PROVIDING BEHAVIORAL HEALTH CARE SERVICES.

(d) (I) As a condition of receiving a loan repayment through the Colorado health service corps, a health care professional OR BEHAVIORAL HEALTH CARE PROVIDER must enter into a contract pursuant to which the health care professional OR BEHAVIORAL HEALTH CARE PROVIDER agrees to practice for at least two years in a community that is located in a ~~federally designated~~ health professional shortage area. The health care professional OR BEHAVIORAL HEALTH CARE PROVIDER, AS APPLICABLE, the primary care office, and the community employer with which the health care professional OR BEHAVIORAL HEALTH CARE PROVIDER is practicing must be parties to the contract.

(II) As a condition of receiving a loan repayment through the Colorado health service corps, a nursing faculty or health care professional faculty member must enter into a contract pursuant to which he or she agrees to serve at least two consecutive academic years or their equivalent in a qualified faculty position. The nursing faculty or health care professional faculty member, the primary care office, and the educational

institution where the qualified faculty position is located must be parties to the contract.

(III) AS A CONDITION OF RECEIVING A LOAN REPAYMENT THROUGH THE COLORADO HEALTH SERVICE CORPS, A CANDIDATE FOR LICENSURE MUST ENTER INTO A CONTRACT PURSUANT TO WHICH THE CANDIDATE FOR LICENSURE AGREES TO PRACTICE FOR AT LEAST TWO YEARS AFTER OBTAINING THE LICENSE, PLUS AN ADDITIONAL AMOUNT OF TIME EQUIVALENT TO THE TIME SPENT OBTAINING THE SUPERVISED EXPERIENCE HOURS REQUIRED FOR LICENSURE WHILE PARTICIPATING IN THE PROGRAM, IN A COMMUNITY THAT IS LOCATED IN A HEALTH PROFESSIONAL SHORTAGE AREA. THE CANDIDATE FOR LICENSURE, THE PRIMARY CARE OFFICE, AND THE COMMUNITY EMPLOYER WITH WHICH THE CANDIDATE FOR LICENSURE IS PRACTICING MUST BE PARTIES TO THE CONTRACT.

(2) Subject to available appropriations, the primary care office shall annually select health care professionals, BEHAVIORAL HEALTH CARE PROVIDERS, CANDIDATES FOR LICENSURE, nursing faculty members, and health care professional members from the list provided by the advisory council pursuant to ~~section 25-1.5-504 (6)~~ SECTION 25-1.5-504 (5)(a) to participate in the Colorado health service corps.

(5) (a) A health care professional participating in the Colorado health service corps shall not practice with a for-profit private group or solo practice or at a proprietary hospital or clinic.

(b) FOR A BEHAVIORAL HEALTH CARE PROVIDER OR CANDIDATE FOR LICENSURE APPLYING TO PARTICIPATE IN THE COLORADO HEALTH SERVICE CORPS, THE ADVISORY COUNCIL SHALL PRIORITIZE BEHAVIORAL HEALTH CARE PROVIDERS AND CANDIDATES FOR LICENSURE WHO ARE PRACTICING WITH A NONPROFIT OR PUBLIC EMPLOYER. THE ADVISORY COUNCIL MAY ALSO CONSIDER FOR PARTICIPATION IN THE COLORADO HEALTH SERVICE CORPS BEHAVIORAL HEALTH CARE PROVIDERS AND CANDIDATES FOR LICENSURE WHO ARE PRACTICING WITH A FOR-PROFIT EMPLOYER, SUCH AS A PRIVATE PRACTICE OR OTHER SITE, THAT PROVIDES SERVICES TO AN UNDERSERVED POPULATION.

(6) A contract for loan repayment entered into pursuant to this part 5 must not include terms that are more favorable to health care professionals, BEHAVIORAL HEALTH CARE PROVIDERS, OR CANDIDATES FOR

LICENSURE than the most favorable terms that the secretary of the federal department of health and human services is authorized to grant under the national health services corps program. In addition, each contract must include penalties for breach of contract that are at least as stringent as those available to the secretary of the federal department of health and human services. In the event of a breach of contract for a loan repayment entered into pursuant to this part 5, the primary care office shall enforce the contract and collect any damages or other penalties owed.

**SECTION 7.** In Colorado Revised Statutes, add 25-1.5-503.5 as follows:

**25-1.5-503.5. Scholarship program for addiction counselors - creation - eligibility - conditions - rules.** (1) BEGINNING IN THE 2018-19 STATE FISCAL YEAR, THE PRIMARY CARE OFFICE SHALL MAINTAIN AND ADMINISTER A SCHOLARSHIP PROGRAM TO ASSIST IN INCREASING THE POPULATION OF CERTIFIED ADDICTION COUNSELORS PROVIDING BEHAVIORAL HEALTH CARE SERVICES IN HEALTH PROFESSIONAL SHORTAGE AREAS. SUBJECT TO AVAILABLE APPROPRIATIONS, THE PRIMARY CARE OFFICE SHALL AWARD SCHOLARSHIPS TO HELP DEFRAY THE EDUCATION AND TRAINING COSTS ASSOCIATED WITH OBTAINING CERTIFICATION AS AN ADDICTION COUNSELOR OR WITH PROGRESSING TO A HIGHER LEVEL OF CERTIFICATION FOR APPLICANTS WHO AGREE TO PRACTICE IN A HEALTH PROFESSIONAL SHORTAGE AREA FOR A SPECIFIED PERIOD.

(2) UNDER THE SCHOLARSHIP PROGRAM, SUBJECT TO THE LIMITATIONS SPECIFIED IN THIS SECTION, UPON ENTERING INTO A SCHOLARSHIP CONTRACT, THE STATE MAY PAY UP TO THE FULL COST OF EDUCATIONAL MATERIALS AND DIRECT EXPENSES ASSOCIATED WITH EDUCATION AND TRAINING REQUIRED FOR CERTIFICATION AS AN ADDICTION COUNSELOR OR FOR PROGRESSING TO A HIGHER LEVEL OF ADDICTION COUNSELOR CERTIFICATION, WHICH AMOUNT SHALL BE PAID TO THE ACADEMIC INSTITUTION OR STATE-APPROVED TRAINER WHERE THE ADDICTION COUNSELOR STUDENT IS ENROLLED OR PARTICIPATING.

(3) AS A CONDITION OF RECEIVING A SCHOLARSHIP AWARD TO ASSIST WITH OBTAINING CERTIFICATION OR A HIGHER LEVEL OF CERTIFICATION, AN APPLICANT MUST ENTER INTO A CONTRACT WITH THE PRIMARY CARE OFFICE PURSUANT TO WHICH HE OR SHE AGREES TO SERVE AT LEAST SIX CONSECUTIVE MONTHS IN A COMMUNITY THAT IS LOCATED IN A HEALTH

PROFESSIONAL SHORTAGE AREA.

(4) SUBJECT TO AVAILABLE APPROPRIATIONS, THE PRIMARY CARE OFFICE SHALL ANNUALLY SELECT APPLICANTS FROM THE LIST PROVIDED BY THE ADVISORY COUNCIL PURSUANT TO SECTION 25-1.5-504 (5)(b) FOR SCHOLARSHIP AWARDS UNDER THIS SECTION.

(5) FOR PURPOSES OF RECOMMENDING SCHOLARSHIP AWARDS, THE ADVISORY COUNCIL SHALL PRIORITIZE ADDICTION COUNSELORS WHO ARE PRACTICING WITH A NONPROFIT OR PUBLIC EMPLOYER. THE ADVISORY COUNCIL MAY ALSO CONSIDER FOR PARTICIPATION IN THE SCHOLARSHIP PROGRAM ADDICTION COUNSELORS WHO ARE PRACTICING WITH A FOR-PROFIT EMPLOYER, SUCH AS A PRIVATE PRACTICE OR OTHER SITE, THAT PROVIDES SERVICES TO AN UNDERSERVED POPULATION.

(6) IN THE EVENT OF A BREACH OF CONTRACT FOR A SCHOLARSHIP ENTERED INTO UNDER THIS SECTION, THE PRIMARY CARE OFFICE SHALL ENFORCE THE CONTRACT AND COLLECT ANY DAMAGES OR OTHER PENALTIES OWED.

**SECTION 8.** In Colorado Revised Statutes, 25-1.5-504, **amend** (1), (2) introductory portion, (2)(1), and (5); and **add** (2)(n) and (2)(o) as follows:

**25-1.5-504. Colorado health service corps advisory council - creation - membership - duties.** (1) There is hereby created in the primary care office the Colorado health service corps advisory council to review applications for participation in the Colorado health service corps AND FOR SCHOLARSHIPS UNDER SECTION 25-1.5-503.5 and TO make recommendations to the primary care office pursuant to section 25-1.5-503 (2) AND 25-1.5-503.5 (4).

(2) The advisory council consists of ~~thirteen~~ FIFTEEN members appointed by the governor as provided in this subsection (2). In appointing members of the advisory council, the governor shall ensure that the advisory council includes at least one representative from each of the following organizations:

(1) A physician who is a faculty member of a medical school in Colorado; and

(n) A MEMBERSHIP ORGANIZATION REPRESENTING SUBSTANCE USE DISORDER SERVICE PROVIDERS; AND

(o) A LICENSED OR CERTIFIED ADDICTION COUNSELOR WHO HAS EXPERIENCE IN RURAL HEALTH, SAFETY NET CLINICS, OR HEALTH EQUITY.

(5) (a) The advisory council shall review applications received from health care professionals, BEHAVIORAL HEALTH CARE PROVIDERS, CANDIDATES FOR LICENSURE, nursing faculty members, and health care professional faculty members to participate in the Colorado health service corps. Subject to available appropriations and federal requirements concerning eligibility for federal loan repayment matching funds, the advisory council shall annually select health care professionals, BEHAVIORAL HEALTH CARE PROVIDERS, CANDIDATES FOR LICENSURE, nursing faculty members, and health care professional faculty members to participate in the Colorado health service corps and shall forward its list of selected participants to the primary care office.

(b) THE ADVISORY COUNCIL SHALL REVIEW APPLICATIONS RECEIVED FOR PARTICIPATION IN THE SCHOLARSHIP PROGRAM. SUBJECT TO AVAILABLE APPROPRIATIONS, THE ADVISORY COUNCIL SHALL ANNUALLY SELECT ADDICTION COUNSELORS TO PARTICIPATE IN THE SCHOLARSHIP PROGRAM AND SHALL FORWARD ITS LIST OF SELECTED PARTICIPANTS TO THE PRIMARY CARE OFFICE.

**SECTION 9.** In Colorado Revised Statutes, amend 25-1.5-505 as follows:

**25-1.5-505. Advisory council - report.** (1) On or before December 1, 2011, and on or before December 1 every two years thereafter, THE PRIMARY CARE OFFICE, WITH ASSISTANCE FROM the advisory council, shall submit to the governor, the health and human services committee of the senate, ~~and~~ the COMMITTEES ON health, INSURANCE, and environment ~~committee~~ AND ON PUBLIC HEALTH CARE AND HUMAN SERVICES of the house of representatives, or any successor committees, a report that includes, at a minimum, the following information:

(a) ~~Identification and a summary of successful loan forgiveness programs for health care professionals and best practices in health care professional loan forgiveness programs across the country~~ A DESCRIPTION

OF THE HEALTH CARE PROFESSIONALS, BEHAVIORAL HEALTH CARE PROVIDERS, CANDIDATES FOR LICENSURE, NURSING FACULTY MEMBERS, AND HEALTH CARE PROFESSIONAL FACULTY MEMBERS PARTICIPATING IN THE COLORADO HEALTH SERVICE CORPS PROGRAM AND THE SCHOLARSHIP PROGRAM;

(b) A description of the programmatic goals of the Colorado health service corps AND THE SCHOLARSHIP PROGRAM, including the present status of and any barriers to meeting those goals;

(c) Existing efforts and potential future projects to overcome any barriers to meeting the programmatic goals of the Colorado health service corps AND THE SCHOLARSHIP PROGRAM;

(d) An analysis of the ~~impact~~ EFFECTS of the Colorado health service corps program AND THE SCHOLARSHIP PROGRAM ON ADDRESSING THE HEALTH CARE AND BEHAVIORAL HEALTH CARE NEEDS OF COMMUNITIES IN COLORADO;

~~(e) If applicable, results of any surveys conducted of state health professional incentive programs in primary care and any recommendations to individually enhance, improve coordination among, and potentially consolidate existing or potential programs to better address Colorado's primary care workforce issues~~ A SUMMARY OF ANY ASSESSMENT OR EVALUATION OF PROGRAM PERFORMANCE CONDUCTED DURING THE YEAR; and

~~(f) The number of~~ A DESCRIPTION OF THE nursing faculty or other health care professional faculty members ~~who receive moneys from~~ PARTICIPATING IN the Colorado health service corps and the ~~number of~~ educational institutions where the ~~recipients~~ PARTICIPANTS teach.

(2) THE DEPARTMENT OF PUBLIC HEALTH AND ENVIRONMENT SHALL INCLUDE THE REPORT REQUIRED BY THIS SECTION AS PART OF ITS "STATE MEASUREMENT FOR ACCOUNTABLE, RESPONSIVE, AND TRANSPARENT (SMART) GOVERNMENT ACT" HEARING REQUIRED BY SECTION 2-7-203.

(3) THE REPORTING REQUIREMENT IN THIS SECTION IS NOT SUBJECT TO SECTION 24-1-136 (11)(a)(I).

**SECTION 10.** In Colorado Revised Statutes, amend 25-1.5-506 as follows:

**25-1.5-506. Colorado health service corps fund - created - acceptance of grants and donations - annual appropriation from marijuana tax cash fund.** (1) The Colorado health service corps fund is hereby created in the state treasury, which fund consists of:

(a) All general fund ~~moneys~~ MONEY appropriated by the general assembly for the Colorado health service corps, the first five hundred thousand dollars of which shall be used solely for loan repayments for nursing faculty;

(b) Damages and penalties collected from breach of contract actions for loan repayment contracts; and

(c) For the 2016-17 fiscal year and each fiscal year thereafter, tobacco litigation settlement ~~moneys~~ MONEY transferred to the fund by the state treasurer pursuant to section 24-75-1104.5 (1.7)(n). ~~C.R.S.~~

(2) (a) The ~~moneys~~ MONEY in the fund, other than the ~~moneys~~ MONEY described in ~~paragraph (c) of subsection (1)~~ SUBSECTION (1)(c) of this section, ~~are~~ IS hereby continuously appropriated to the primary care office for the Colorado health service corps. Any ~~moneys~~ MONEY in the fund not expended for the purpose of this part 5 may be invested by the state treasurer as provided by law. All interest and income derived from the investment and deposit of ~~moneys~~ MONEY in the fund shall be credited to the fund. Any unexpended and unencumbered ~~moneys~~ MONEY remaining in the fund at the end of a fiscal year ~~remain~~ REMAINS in the fund and shall not be credited or transferred to the general fund or another fund.

(b) The ~~moneys~~ MONEY described in ~~paragraph (c) of subsection (1)~~ SUBSECTION (1)(c) of this section ~~are~~ IS subject to annual appropriation by the general assembly to the primary care office for the Colorado health service corps.

(3) The primary care office is authorized to receive contributions, grants, and services from public and private sources, AND TO EXPEND PUBLIC OR PRIVATE CONTRIBUTIONS AND GRANTS, to carry out the purposes of this part 5.

(4) (a) FOR THE 2018-19 FISCAL YEAR AND EACH FISCAL YEAR THEREAFTER, THE GENERAL ASSEMBLY SHALL APPROPRIATE TWO MILLION FIVE HUNDRED THOUSAND DOLLARS FROM THE MARIJUANA TAX CASH FUND CREATED IN SECTION 39-28.8-501 TO THE PRIMARY CARE OFFICE TO:

(I) PROVIDE LOAN REPAYMENT FOR BEHAVIORAL HEALTH CARE PROVIDERS AND CANDIDATES FOR LICENSURE PARTICIPATING IN THE COLORADO HEALTH SERVICE CORPS; AND

(II) AWARD SCHOLARSHIPS TO ADDICTION COUNSELORS PARTICIPATING IN THE SCHOLARSHIP PROGRAM.

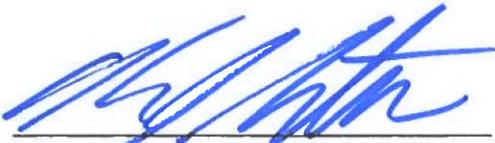
(b) SINCE BEHAVIORAL HEALTH CARE PROVIDERS, CANDIDATES FOR LICENSURE, AND ADDICTION COUNSELORS PROVIDE BEHAVIORAL HEALTH CARE SERVICES AND TREATMENT TO PEOPLE WITH SUBSTANCE USE OR MENTAL HEALTH DISORDERS, USE OF MONEY IN THE MARIJUANA TAX CASH FUND IS PERMITTED UNDER SECTION 39-28.8-501 (2)(b)(IV)(C).

**SECTION 11. Appropriation.** For the 2018-19 state fiscal year, \$2,500,000 is appropriated to the department of public health and environment for use by the prevention services division. This appropriation is from the marijuana tax cash fund created in section 39-28.8-501 (1), C.R.S., and is based on an assumption that the division will require an additional 2.0 FTE. To implement this act, the division may use this appropriation for the Colorado health service corps in the primary care office.

**SECTION 12. Effective date.** This act takes effect July 1, 2018.

**SECTION 13. Safety clause.** The general assembly hereby finds,

determines, and declares that this act is necessary for the immediate preservation of the public peace, health, and safety.



Kevin J. Grantham  
PRESIDENT OF  
THE SENATE



Crisanta Duran  
SPEAKER OF THE HOUSE  
OF REPRESENTATIVES



Effie Ameen  
SECRETARY OF  
THE SENATE

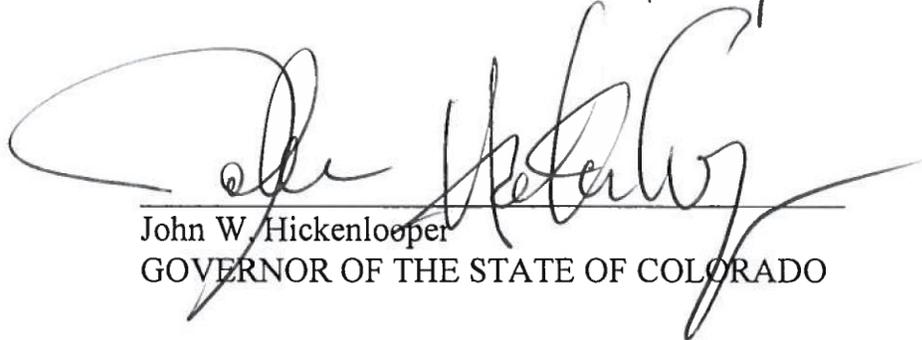


Marilyn Eddins  
CHIEF CLERK OF THE HOUSE  
OF REPRESENTATIVES

APPROVED

2:19 PM

5/21/18



John W. Hickenlooper  
GOVERNOR OF THE STATE OF COLORADO

1 DEPARTMENT OF PUBLIC HEALTH AND ENVIRONMENT  
2 Prevention Services Division  
3 STATE-DESIGNATED HEALTH PROFESSIONAL SHORTAGE AREA METHODOLOGY  
4 6 CCR 1015-6  
5 Emergency Rulemaking adopted August 15, 2018; effective August 15, 2018

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6  
7 **1.1 Purpose**

8 This rule establishes quantitative methods for determining which areas of Colorado have a  
9 shortage of health care providers and thus, should receive a state designation as a health  
10 professional shortage area. The methodology for substance use disorder designation is based  
11 upon:

- 12 1) The estimated demand for substance use disorder service encounters within a  
13 population defined by a discrete geographic area;
- 14  
15 2) The estimated supply of substance use disorder service encounters for the  
16 population within a discrete geographic area;
- 17  
18 3) The determination of whether supply meets demand within a discrete  
19 geographic area; and
- 20  
21 4) The designation of geographic areas as substance use disorder health  
22 professional shortage areas where the resultant supply falls short of estimated  
23 demand for minimally adequate substance use disorder treatment.

24  
25 **1.2 Authority**

26 This regulation is adopted pursuant to the authority in Section 25-1.5-404(1)(a), Colorado  
27 Revised Statutes.

28  
29 **1.3 Definitions**

- 30  
31 1) “Behavioral Health Care Provider,” pursuant to Section 25-1.5-502(1.3), C.R.S.,  
32 means the following providers who provide behavioral health care services  
33 within their scope of practice:
  - 34  
35 a) a licensed addiction counselor (LAC),
  - 36 b) a certified addiction counselor (CAC),
  - 37 c) a licensed professional counselor (LPC),
  - 38 d) a licensed clinical social worker (LCSW),
  - 39 e) a licensed marriage and family therapist (LMFT),
  - 40 f) a licensed psychologist (Ph.D. or Psy.D.),
  - 41 g) a licensed physician assistant (PA) with specific training in substance  
42 use disorder,
  - 43 h) an advanced practice nurse (APN) with specific training in substance use  
44 disorder, pain management, or psychiatric nursing, or

- 45 i) a physician with specific board certification or training in addiction  
46 medicine, pain management, or psychiatry.  
47
- 48 2) “Behavioral Health Care Services,” pursuant to Section 25-1.5-502(1.5), C.R.S.,  
49 means services for the prevention, diagnosis, and treatment of, and the  
50 recovery from, mental health and substance use disorders.  
51
- 52 3) “Capacity” means the typical volume of health service encounters a health  
53 care professional can produce within the scope of his or her practice and  
54 scheduled clinical hours.  
55
- 56 4) “Catchment Area” means a discrete geographic area where a preponderance of  
57 the civilian noninstitutionalized population within the service area could  
58 reasonably expect to access behavioral health services within the service area  
59 without excessive travel, when it is adequately resourced.  
60
- 61 5) “Census Block Group” means a statistical division of a census tract defined by  
62 the United States Census Bureau.  
63
- 64 6) “Civilian Noninstitutionalized Population” are all people who live and sleep  
65 most of the time within the boundaries of a geographic area but are not housed  
66 in a group quarter such as a correctional institution, juvenile facility, military  
67 installation, or dormitory.  
68
- 69 7) “Colorado Health Systems Directory” means the clinician data system  
70 administered the Colorado Department of Public Health and Environment’s  
71 Primary Care Office (section 25-1.5-403, C.R.S.) which provides a  
72 comprehensive database of all licensed clinicians and health care sites in  
73 Colorado.  
74
- 75 8) “Encounter” means an instance of direct provider to patient interaction with  
76 the primary purpose of diagnosing, evaluating or treating a patient’s substance  
77 use disorder.  
78
- 79 9) “Minimally Adequate Treatment” means the minimum necessary health care  
80 service visits for diagnosis, treatment or recovery needed to address a specific  
81 or general medical or behavioral health care service need.  
82
- 83 10) “Prevalence” means the proportion of a population who has substance use  
84 disorder at some point within the previous year.  
85
- 86 11) “Polygon” means a closed, irregular geometric shape on a map surface that  
87 defines equivalent road travel distances from a central point within the shape.  
88

- 89 12) "Population Centroid" means the geometric center of a group of population  
90 points within a geographic shape (e.g., census block group).  
91
- 92 13) "State-Designated Health Professional Shortage Area," pursuant to Section 25-  
93 1.5-402(11) and Section 25-1.5-502(13), C.R.S., means an area of the state  
94 designated by the Primary Care Office in accordance with state-specific  
95 methodologies established by the State Board by rule pursuant to Section 25-  
96 1.5-404 (1)(a), C.R.S., as experiencing a shortage of health care professionals  
97 or behavioral health care providers.  
98
- 99 14) "State Designated Substance Use Disorder Health Professional Shortage Area"  
100 means a State-Designated Health Professional Shortage Area experiencing a  
101 shortage of behavioral health care providers providing behavioral health care  
102 services for substance use disorder.  
103
- 104 15) "Substance Use Disorder" means mild, moderate, or severe recurrent use of  
105 drugs and/or alcohol that causes clinically and functionally significant  
106 impairment of individuals. Impairment may include health concerns, disability,  
107 risky behavior, social impairment, and failure to perform significant  
108 responsibilities at work, school, or with family. The diagnosis may be applied to  
109 the abuse of one or more of ten separate classes of drugs including alcohol,  
110 caffeine, cannabis, hallucinogens, inhalants, opioids, sedatives, stimulants,  
111 tobacco, and other substances. The dependent use of tobacco and caffeine are  
112 not a primary focus of this rule.  
113

#### 114 **1.4 Substance Use Disorder Health Professional Shortage Area Determination Method** 115

- 116 1) Catchment areas are created for analysis of behavioral health care provider  
117 capacity by determining equivalent standard road travel distances from the  
118 population centroid of each census block group in Colorado.  
119
- 120 2) The population of each catchment area is the civilian noninstitutionalized  
121 population according to the most recent available data from United State Census  
122 Bureau at the time of analysis.  
123
- 124 3) The estimated burden of substance use disorder within each catchment area is  
125 determined by multiplying the civilian noninstitutionalized population in the  
126 catchment area (section 1.4(2)) by substance use disorder prevalence according to  
127 age and sex. Substance use disorder prevalence is determined using the most  
128 recent available data from the National Survey on Drug Use and Health  
129 administered by the U.S. Department of Health and Human Services, Substance Use  
130 and Mental Health Services Administration.  
131
- 132 4) The estimated behavioral health services demand for substance use disorder in

133 each catchment area is determined by multiplying the estimated burden of  
134 substance use disorder (section 1.4(3)) by the number of minimally adequate  
135 treatments as reported in the National Comorbidity Survey - Replication  
136 administered by the U.S. Department of Health and Human Services, Substance Use  
137 and Mental Health Services Administration.

138  
139 5) The estimated substance use disorder services supply in each catchment area is  
140 determined by evaluating a list of behavioral health care providers with a practice  
141 address within the catchment area and the behavioral health care providers'  
142 encounter productivity. The list of behavioral health care providers is derived from  
143 the most recent available data reported in the Colorado Health Systems Directory  
144 administered by the Colorado Department of Public Health and Environment's  
145 Primary Care Office. Each behavioral health care provider is assigned a behavioral  
146 health service 12 month productivity rate. The sum of encounter productivity for  
147 all practicing behavioral health care providers in the catchment area is the total  
148 estimated substance use disorder services supply in the catchment area.

149  
150 6) Designation of a census block group as a State Designated Substance Use Disorder  
151 Health Professional Shortage Area occurs when the supply of behavioral health  
152 service encounters falls below the per capita demand for minimally adequate  
153 treatment for those who experience substance use disorder within the catchment  
154 area.

155  
156 7) Current designation status of each region of the state will be posted at least  
157 annually on or about July 1 on a publicly accessible website.

## 158 159 **1.5 Data Sources**

160  
161 1) If current data from the sources cited above are unavailable, the department  
162 may rely upon a comparable data sources.

163  
164 2) To the extent available, reliable and practicable, the department will rely  
165 upon data collected within one year prior to analysis.

166  
167 3) Behavioral health care providers practice characteristics data may be derived  
168 from direct survey methods, claims analysis, peer reviewed and validated  
169 workforce research tools, and statistical methods.

## 170 171 **1.6 Review**

172 Shortage designation status will be reviewed in 2018 and at least every three years  
173 thereafter. More frequent review may be performed where data is available and analytical  
174 resources are available. Designation status of each area will remain effective for 36 months  
175 from the date of publication or when replaced by a more recent analysis.