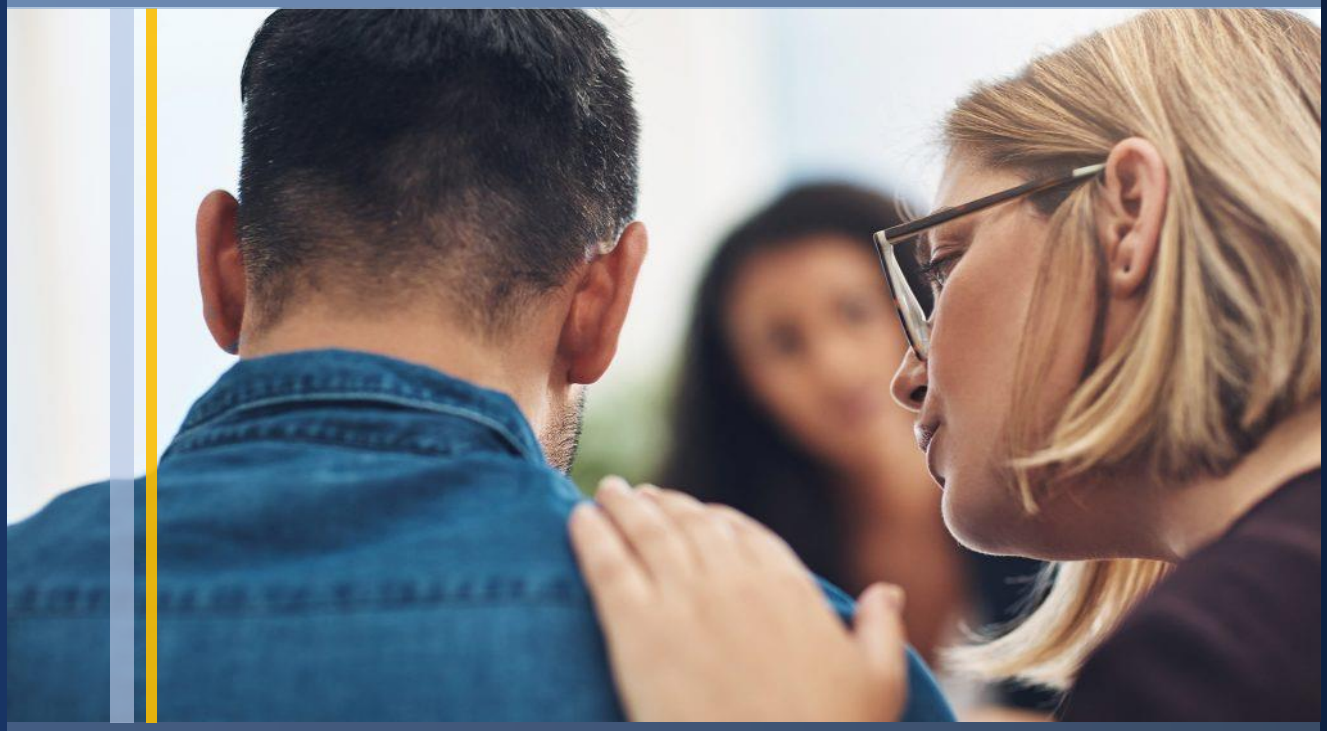

# Vulnerability Assessment for Opioid Overdoses and Bloodborne Infections Associated with Non-Sterile Injection Drug Use in Maine

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PUBLIC™ CONSULTING GROUP

July 2019

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*Prepared for*

Maine Department of Health and Human Services
Maine Center for Disease Control

*by*

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## Executive Summary

In 2017, Maine had the sixth highest opioid overdose death rate in the United States with a rate of 29.9 deaths per 100,000 persons per year compared to the national average of 14.5 deaths per 100,000 persons per year (National Institute of Drug Abuse, 2019). Public health officials have identified a link between the growing opioid epidemic and the spread of bloodborne infections such as human immunodeficiency virus (HIV), Hepatitis B, and Hepatitis C, especially within non-urban communities (Van Handel et al., 2016). To address the opioid epidemic, and specifically bloodborne infections associated with non-sterile injection opioid use, the U.S. Centers for Disease Control (U.S. CDC) developed a vulnerability index to identify communities at risk for opioid overdoses and bloodborne infections (Van Handel et al., 2016).

The U.S. CDC is funding state governments to conduct jurisdiction-level vulnerability assessments to identify sub-state areas at high risk for opioid overdoses and bloodborne infections associated with nonsterile injection drug use. The Maine Center for Disease Control and Prevention (Maine CDC), a unit within Maine Department of Health and Human Services was awarded the vulnerability assessment grant from the U.S. CDC; it contracted Public Consulting Group, Inc. (PCG) to oversee the coordination of the assessment.

The aims of the vulnerability assessment were to:

1. Use a data-driven social indicator approach to identify sub-state areas at high risk for opioid overdoses and bloodborne infections associated with non-sterile injection opioid use
2. Use findings from the vulnerability assessment to make recommendations for interventions that strategically allocate services to sub-state areas at greatest risk

The assessment was conducted from February to July of 2019. It was guided by a 15-member Vulnerability Assessment Stakeholder Group representing 13 organizations throughout Maine. It employed a multi-step approach to achieve its aims. Steps included compiling a list of 120 candidate indicator variables; using two statistical approaches to identify the most vulnerable areas (Social Vulnerability Index and Poisson regression modelling); reviewing the literature and national best practices for prevention, harm reduction, treatment/recovery, and law enforcement/criminal justice approaches; evaluating existing services available in the most vulnerable areas in Maine; and making recommendations for strategically placed interventions

Opioid-related statistical analyses were conducted at the county and subcounty levels, but bloodborne infection analyses only were done at the county level because data were not available at the subcounty level. The bloodborne infection analyses indicated that Penobscot, Kennebec, and Washington Counties were the most vulnerable followed by Androscoggin, Somerset, and Waldo Counties.

Findings from the opioid-related statistical analyses revealed nine highly vulnerable subcounty areas (Portland area of Cumberland County, the northern and southern areas of Kennebec County, the northern and Bangor areas of Penobscot County, the northern and southern areas of Somerset County, and the northern and southern areas of Washington County). The Portland area of Cumberland County, the southern area Kennebec County, and the entirety of Washington County were the most vulnerable areas.

After synthesizing the opioid-related findings with the bloodborne infection findings, this assessment identified five sub-state areas that interventions should target: *Kennebec County*, *Penobscot County*, *the Portland area of Cumberland County*, *Somerset County*, and *Washington County*.

Overall, the evaluation of existing prevention, harm reduction, treatment/recovery, and law enforcement/criminal justice services in the most vulnerable areas revealed a lack of services in Somerset County, northern Penobscot County, and Washington County (especially in the northern area). The Portland Area of Cumberland County, Augusta area of Kennebec County, and Bangor area of Penobscot County have the most services.

Harm reduction services, including naloxone, syringe exchange programs, and pre-exposure prophylaxis (PrEP), are available in many sub-state areas. However, it is unclear if there is adequate availability of naloxone in the most vulnerable areas due to a lack of data at the sub-state level. Regarding PrEP, the state has compiled a list of PrEP providers, but findings from recent healthcare provider surveys suggest that providers are underprescribing it. There are only seven certified syringe exchange locations statewide and the programs have limited operating hours. There are no syringe exchanges in three of the most vulnerable areas: Somerset County, the northern area of Penobscot County, and the northern area of Washington County. Other states, such as Nevada and Minnesota, have taken innovative approaches to increasing access to clean syringes including allowing the purchase of syringes from vending machines and pharmacies.

A variety of treatment and recovery services are located throughout Maine. Services investigated include *2-1-1 Maine*, substance use treatment providers, Opioid Health Homes (OHHs), medication-assisted treatment (MAT) providers (methadone and buprenorphine), recovery community centers, recovery residences, and general healthcare providers (hospitals, mental health providers, Rural Health Clinics, and Federally Qualified Health Centers). Currently, no centralized clearinghouse of treatment and recovery services exists in Maine, making it difficult to determine if the information compiled for this assessment is up to date and comprehensive. Maine should explore creating a treatment and recovery services web-based database, which is updated on an ongoing basis to help providers and patients find available services. The database should include information about services provided, location, capacity, waitlists, and costs. Maine can utilize the expertise of nearby states, such as Massachusetts and Rhode Island, that recently created databases.

Among the most vulnerable counties, Somerset County has the fewest substance use treatment providers, all located only in the southernmost area of the county. Furthermore, there are no Opioid Health Homes in Somerset County, the northern area of Washington County, and the northern area of Penobscot County. There are ten methadone clinics and 742 buprenorphine providers in Maine, but coverage is limited in northern Washington County, the very northern area of Penobscot County, and most of Somerset County (buprenorphine providers are only located in the southernmost area). Strategies used by other states to increase the number of MAT providers include providing DATA 2000 waiver training to facilitate provider participation in MAT (Virginia) and enacting laws that require all health care facilities have a physician who is authorized to prescribe MAT (Maryland).

There are seven recovery community centers in Maine, but neither Kennebec County nor Somerset County have one. Similarly, despite there being 101 recovery residences in Maine, none exist in Somerset County and northern Washington County. Furthermore, fewer than one-third of recovery residences in Maine allow residents to take MAT.

Maine has six Adult Drug Treatment Courts (ADTCs) and three Family Treatment Drug Courts (FTDCs). However, access is restricted to individuals in certain counties. Residents of Kennebec and Somerset Counties do not have access to an ADTC, and residents of Cumberland, Somerset, and Washington Counties do not have access to a FTDC. Maine also has an alternative sentencing program, open to any resident in Maine, but it requires the participant to pay for the program. Regarding law enforcement, it is unclear how many local law enforcement agencies in Maine have pre-charge diversion programs. Thus, a thorough assessment should be conducted to determine where pre-charge diversion programs are needed. Several county jails in Maine have started offering MAT to inmates, but among the most vulnerable counties, neither Somerset County nor Washington County jails currently provide MAT to inmates.

## Recommendations

Findings from this assessment indicate several areas of focus for improved services in the most vulnerable areas in Maine. With the help of the stakeholder group, PCG developed two sets of recommendations. The first set is intended for the Maine CDC HIV, STD, and Viral Hepatitis Program and specifically focus on short-term recommendations associated with bloodborne infections. The second set include both opioid overdose and bloodborne infection recommendations and most will require coordination among multiple state and/or private agencies.

### Maine CDC HIV, STD, and Viral Hepatitis Program Recommendations

*Prevention*

1. Work with community prevention organizations to incorporate overdose and bloodborne infection prevention into the services they provide. Prioritize working with organizations in the most vulnerable areas.
2. Continue working with community partners in the most vulnerable areas and encourage them to increase access to free or reduced-cost HIV, Hepatitis B, and Hepatitis C testing. Assist them with implementing non-invasive testing methods such as rapid HIV testing via oral swabs and Hepatitis C testing via finger pricks.

*Harm Reduction*

1. Research additional sources of state, federal, and private funding for syringe exchange programs. Use funding to open syringe exchange programs in Somerset County and northern Washington County and expand operating hours and staff at the seven existing exchange locations.
2. Continue to provide PrEP education to healthcare providers and patients and focus efforts in the most vulnerable areas.

*Treatment and Recovery*

1. Explore ways to increase availability of telehealth for hepatitis.

### Recommendations for Other State Government and/or Private Agencies

*Prevention*

1. Encourage the Maine Department of Education and Maine CDC's Division of Disease Prevention to implement evidence-based substance use and bloodborne infection prevention programs in schools. Programs should specifically target high-risk youth, such as those who have experienced adverse childhood experiences.
2. Work with the Maine legislature on legislation requiring that HIV, Hepatitis B, and Hepatitis C testing be offered to all individuals receiving hospital or primary care services. Look to the 2010 New York state law that mandates HIV testing be offered to all people between the ages of 13 and 64 who are receiving hospital or primary care services.

### *Harm Reduction*

1. Investigate the feasibility of implementing innovative syringe exchange programs such as satellite syringe exchange units, vending machines, and pharmacy exchanges.
2. Explore implementing a safe injection site pilot program in the most vulnerable urban areas, such as Bangor and Portland.
3. Thoroughly assess naloxone availability in the most vulnerable areas and investigate ways to expand access if needed.
4. Implement comprehensive case management programs for active substance users, especially in the most vulnerable areas. Programs should not require an individual be enrolled in substance use treatment to receive services.

### *Treatment and Recovery*

1. Employ strategies used by other states to increase the number of MAT providers in the most vulnerable areas, especially in Somerset County and northern Washington County. For example, Virginia conducts trainings on addiction treatment that include a DATA 2000 waiver training to encourage MAT participation and Maryland law requires that all health care facilities have a physician who is authorized to prescribe MAT.
2. Encourage organizations in the most vulnerable areas to become Opioid Health Home hubs, especially organizations in Somerset County and northern Washington County. This will ensure that all individuals in treatment and recovery have access to comprehensive case management services.
3. Develop a centralized web-based database of treatment and recovery services, similar to Massachusetts and Rhode Island, which is updated on an ongoing basis and contains information about capacity, waitlists, services provided, location, and cost.
4. Provide screening, brief intervention, and referral to treatment (SBIRT) trainings to staff (clinical and non-clinical) at general healthcare organizations. Look to programs being implemented in other states, such as the ASSERT program in Connecticut and Massachusetts.
5. Encourage providers at general healthcare organizations to become Opioid Health Home spokes, buprenorphine prescribers, PrEP prescribers, and to incorporate bloodborne infection testing into their clinical workflows.
6. Increase the availability of telehealth for MAT, HIV, Hepatitis B, and Hepatitis C.
7. Work with the Maine Association of Recovery Residences to increase the number of recovery residences in areas outside of Cumberland County and require that residencies accept individuals on MAT.

8. Assist the Portland Recovery Community Center, which serves as the Maine Recovery Hub, in opening centers in vulnerable areas that do not currently have one (Kennebec County and Somerset County).
9. Partner with the Maine State Housing Authority, Community Housing of Maine, local jurisdictions, and other local community organizations to create homelessness programs based on the Housing First model. Prioritize opening programs in vulnerable areas that currently do not have programs.

### *Law Enforcement and Criminal Justice*

1. Encourage the Maine Judicial Branch to expand access to Adult Drug Treatment Courts and Family Treatment Drug Courts.
2. Explore sources of funding to reduce the participation cost of alternative sentencing programs so that all eligible individuals can participate.
3. Assess what law enforcement and other first responder agencies (*e.g.,* fire department, EMS) are doing to address the opioid epidemic in the most vulnerable areas. Work with the agencies to implement programs like the Portland Police Department's *Law Enforcement Addiction Advocacy Program (LEAAP)*, Gloucester, Massachusetts' *Angel Project*, and Lucas County Ohio's *Drug Abuse Response Team*.
4. Work with the Somerset and Washington County sheriff's departments to implement MAT in county jails.

## Introduction and Background

In 2017, Maine had the sixth-highest opioid overdose death rate in the United States, with a rate of 29.9 deaths per 100,000 persons per year compared to the national average of 14.5 deaths per 100,000 persons per year (National Institute of Drug Abuse, 2019). Public health officials have identified a link between the growing opioid epidemic and the spread of bloodborne infections such as human immunodeficiency virus (HIV), Hepatitis B, and Hepatitis C, especially within non-urban communities (Van Handel et al., 2016). Given Maine's high opioid overdose rate, it is plausible that non-sterile injection opioid use is contributing to the increase in rates of new bloodborne infections in Maine. Rates of acute Hepatitis B and C have increased by 457 percent and 314 percent, respectively, since 2015 [Maine Center for Disease Control and Prevention (Maine CDC), 2018a; Maine CDC 2018b].

To address the opioid epidemic and specifically bloodborne infections associated with non-sterile injection opioid use, the U.S. Centers for Disease Control (U.S. CDC) developed a vulnerability index to identify communities at risk for opioid overdoses and bloodborne infections (Van Handel et al., 2016). Subsequently, states such as Tennessee have conducted similar vulnerability assessments to identify communities that are particularly vulnerable so that prevention and intervention services can be mounted where they are needed most (Rickles et al., 2018).

Building upon findings from the national and Tennessee assessments, the U.S. CDC funded state governments to conduct jurisdiction-level vulnerability assessments to identify sub-state areas at high risk for opioid overdoses and bloodborne infections associated with nonsterile injection opioid use. The Maine CDC, a unit within Maine's Department of Health and Human Services, was awarded the vulnerability assessment grant from the U.S. CDC; it contracted with Public Consulting Group, Inc. (PCG) to oversee the coordination of the assessment. The assessment was conducted from February through July of 2019.

The aims of the vulnerability assessment were to:

1. Use a data-driven social indicator approach to identify sub-state areas at high risk for opioid overdoses and bloodborne infections associated with non-sterile injection opioid use.
2. Use findings from the vulnerability assessment to make recommendations for interventions that strategically allocate services to sub-state areas at greatest risk.

## Methodology

This section describes the methods used in the assessment including the role of the stakeholder group; identification of indicator and outcome variables; determination of sub-state areas; statistical methods used to identify the most vulnerable sub-state areas; research on existing services and resources; and recommendations for strategically-placed interventions.

### Stakeholder group

The vulnerability assessment was guided by a 15-member Vulnerability Assessment Stakeholder Group representing 13 organizations throughout Maine, Table 1. Although many existing groups understand elements of the issues that were addressed in this vulnerability assessment, none had detailed knowledge of all the subject areas to constitute a proper stakeholder group. Therefore, we formulated a stakeholder group that was explicitly tied to existing groups through a delegation model. We also expanded it to encompass people with knowledge of subjects not adequately represented by existing groups. By asking existing groups to send delegates to the Vulnerability Assessment Stakeholder Group, we broadened the reach of the group without over-burdening its size and current demand of participants.


**Table 1. Organizations Represented in the Vulnerability Assessment Stakeholder Group**

| |
|---|
| American Liver Foundation |
| Cumberland County Sheriff's Department |
| Health Equity Alliance |
| India Street Public Health Center |
| Maine CDC HIV, STD, and Viral Hepatitis Program |
| Maine Emergency Medical Services |
| Maine Health Data Organization |
| Maine General Medical Center/Health Reach Harm Reduction |
| Northern New England Poison Control Center |
| Prescription Monitoring Advisory Council |
| Statewide Epidemiology Outcomes Workgroup |
| Syndromic Surveillance Stakeholder Workgroup |
| University of New England |

## Meeting and Agenda Topics

The stakeholder group met five times over the course of the project.

### *Meeting 1: Project Goals, Stakeholder Group Role, and Assessment Methodology*

Agenda topics: Purpose of the vulnerability assessment; role of stakeholder group; suggestions for additional representation; discussion of data sources, use agreements and methods; initial discussion of candidate indicator and outcome variables; data sources for use in Maine and their administrators or coordinators; discussion of groups and resources already addressing reductions in opioid overdoses and bloodborne infections (protective resources).

### *Meeting 2: Assessment Methodology and Indicator and Outcome List Finalization*

Agenda topics: Detailed review of methodology for conducting the vulnerability assessment; finalization of candidate indicator and outcome variables.

### *Meeting 3: Review of Results and Themes for Intervention Plan*

Agenda topics: Review of initial findings; discussion and identification of patterns; methods for collecting information on protective resources and services.

### *Meeting 4: Comprehensive Results Review and Intervention Plan*

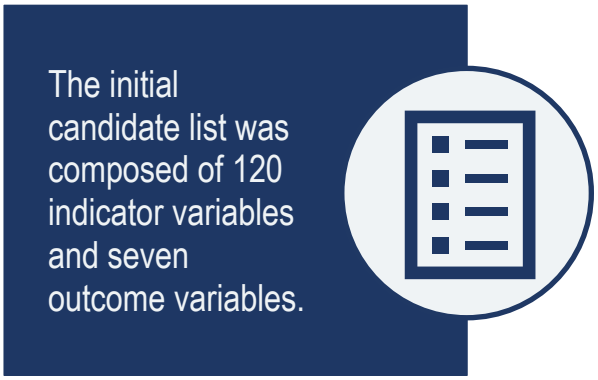
Agenda topics: Review of findings on available resources and services (*e.g.,* prevention, harm reduction, treatment, criminal justice) in the most vulnerable communities; discussion of initial recommendations for strategically place interventions.

### *Meeting 5: Plan to Allocate Services and Disseminate Information*

Agenda topics: Finalization of recommendations for strategically placed interventions; discussion of ways to disseminate findings to key stakeholders including dashboards, fact sheets, and presentations at public health and healthcare provider meetings or conferences.

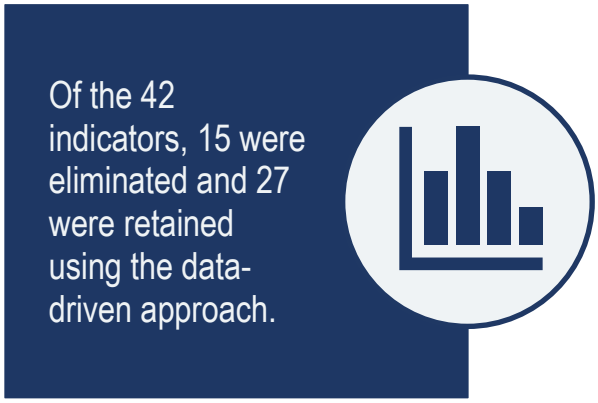
## Identification of Indicator and Outcome Variables

PCG conducted a literature review and compiled a list of indicator and outcome variables associated with opioid overdoses and bloodborne infections linked to non-sterile injection opioid use. During the first stakeholder group meeting, the group members added additional indicators based on their experiences and expertise. In total, the initial candidate list was composed of 120 indicator variables and seven outcome variables. The number of indicator variables was greater than the national and Tennessee assessments, which included 48 and 78 indicator variables, respectively (Rickles et al., 2018; Van Handel et al., 2016).




During the second stakeholder meeting 78 indicator variables were eliminated and 42 were retained. All seven outcome variables were retained. The list was reduced using the following exclusion criteria:

1. Not available at sub-state level
2. Not likely to be strongly related to opioid overdoses or bloodborne infections associated with non-sterile injection opioid use in Maine
3. Not likely to vary between sub-state areas
4. Overlaps strongly with another indicator
5. Stems from a poor-quality data source




Following the second stakeholder meeting. PCG further reduced the size of the indicator list using a data-driven approach. An indicator was eliminated if it 1) had insufficient raw counts at that sub-state level (*e.g.,* county, subcounty) or 2) was strongly correlated with other indicators. Of those strongly correlated, the indicator with the highest quality data was retained. Of the 42 indicators, 15 were eliminated and 27 were retained using the data-driven approach.

Table 2 contains information about the 27 indicator variables including their operational definitions, data sources, and years. The most recent three years of data were used when available, and the number of years used ranged from one to five. When multiple years of data were available, the average was used in the analyses. Table 3 contains similar

information about the seven outcome variables. In total, eleven indicator data sources and four outcome data sources were used in the statistical analyses.

**Table 2. Finalized List of Indicator Variables and Associated Data Sources**

| Data Source | Indicator | Operational Definition | Level & Years |
|---|---|---|---|
| **American Community Survey** | Population decline | Population decline between 2000 and 2017 | County and ZIP code<br><br>2013–2017* |
| | Population age 18–29 | Population age 18–29 divided by the estimated total county/subcounty population | |
| | Population age 36–54 | Population age 36–54 (age group with highest overdose rate in Maine) divided by the estimated total county/subcounty population | |
| | Median household income | Median household income for each jurisdiction | |
| | Poverty | Number of persons in poverty divided by the estimated total county/subcounty population | |
| | Adults without a high school diploma | Number of persons aged ≥25 years with less than a 12th grade education divided by the total county/subcounty population aged ≥ 25 years | |
| | Unemployment | Number of civilian persons unemployed and actively seeking work divided by the estimated total county/subcounty population aged ≥ 16 years | |
| | Vacant housing units | Number of vacant housing units divided by the total number of housing units in a county/subcounty | |
| | Disability | Number of persons with a disability dived by the total county/subcounty population | |
| | Households without vehicle access | Number of households with a vehicle divided by total households per county/subcounty | |
| | Uninsured | Number of persons uninsured divided by the total county/subcounty population | |
| **Uniformed Crime Reporting** | Violent crimes | Number of violent crimes (murder, nonnegligent manslaughter, forcible rape, robbery, and aggravated assault) divided by the total county/subcounty population | County<br><br>2015–2017 |
| | Property crimes | Number of property crimes (burglary, larceny-theft, motor vehicle theft, and arson) divided by the total county/subcounty population | |
| | Drug-related arrests | Number of drug-related arrests divided by the total county/subcounty population | |
| | Total arrests | Total arrests divided by the total county/subcounty population | |
| | Operating under the influence | Number of arrests for operating under the influence divided by the total county/subcounty population | |

| Data Source | Indicator | Operational Definition | Level & Years |
|---|---|---|---|
| ***2-1-1 Maine*** | Information calls for mental health services | Number of information calls for mental health services to *2-1-1 Maine* divided by the total county/subcounty population | County and ZIP code<br><br>2015–2017 |
| | Information calls for substance use services | Number of information calls for substance use services to *2-1-1 Maine* divided by the total county/subcounty population | |
| **National Provider Identifier Registry** | Primary care providers | Number of primary care providers [National Provider Identifier (NPI) codes: 208D00000X, 207Q00000X 207R00000X, 364SA2200X 364SF0001X, 363LA2200X, 363LF0000X 363LP2300X, 363AM0700X] divided by the total county/subcounty population | County and ZIP code<br><br>2019 |
| | Mental health providers | Number of mental health providers (NPI codes: 64SP0808X, 2084P0800X, 101Y00000X, 106H00000X, 103T00000X, 104100000X, 363LP0808X) divided by total county/subcounty population | |
| **SAMHSA Treatment Locator** | Buprenorphine providers | Number of buprenorphine providers divided by the total county/subcounty population | County and ZIP code<br><br>2019 |
| | Methadone clinics | Is there a methadone clinic present within the jurisdiction? (1 = yes) | |
| **Prescription Drug Monitoring Program** | Prescribed doses of schedule II-IV drugs | Number of prescribed doses of schedule II-IV drugs divided by the total county/subcounty population | County and ZIP code<br><br>2015–2017 |
| **Northern New England Poison Center** | Poison control calls regarding opioid use | Number of calls to Northern New England Poison Center from health centers about opioid abuse cases divided by the total county/subcounty population | County and ZIP code<br><br>2016–2018 |
| | Poison control calls regarding opioid-related suicide attempts | Number of calls to Northern New England Poison Center call from health centers about opioid-related suicide attempts divided by the total county/subcounty population | |
| **Maine Drug Enforcement Agency** | Opioid and derivatives drug sale investigations | Number of Maine Drug Enforcement Agency opioid and opioid derivative sale investigations divided by the total county/subcounty population | County and ZIP code<br><br>2017–2018 |
| | Non-opioid illicit drug sale investigations | Number of Maine Drug Enforcement Agency non-opioid illicit drug sale investigations divided by the total county/subcounty population | |

| Data Source | Indicator | Operational Definition | Level & Years |
|---|---|---|---|
| **Behavioral Risk Factor Surveillance Survey** | Adults reporting poor/fair health | Percentage of adults reporting fair or poor health (age-adjusted) | County and ZIP code<br><br>2015–2017 |
| | Adults reporting poor physical health | Average number of physically unhealthy days reported in past 30 days (age-adjusted). | |
| | Adults with poor mental health | Number of mentally unhealthy days reported in past 30 days (age-adjusted) | |
| | Current smokers | Number of current cigarette smokers (smoke every day or somedays) divided by the total county/subcounty population | |
| | Adults at-risk for heavy alcohol consumption | Number of male respondents who reported having more than two drinks per day and female respondents who reported having more than one drink per day divided by the total county/subcounty population | |
| | Adults who did not go to the doctor due to cost | Number of persons who could not access medical care because of cost divided by total county/subcounty population | |
| **Maine Syndromic Surveillance** | Mental health-related emergency department visits | Mental health-related emergency department visits (ICD-10-CM F20 - F48) divided by the total county/subcounty population | County and ZIP code<br><br>2017–2018 |
| **Maine Vital Statistics** | Suicides | Number suicides divided by the total county/subcounty population | County and ZIP code<br><br>2015–2017 |
| | Injury-related fatalities | Number of injury deaths divided by the total county/subcounty population | |

***Due to small populations in the counties and subcounty areas, we used five-year estimates for all ACS analyses. See U.S. Census ACS guidance at https://www.census.gov/programs-surveys/acs/guidance/estimates.html**

**Table 3. Finalized List of Outcome Variables and Associated Data Sources**

| Data Source | Outcome | Operational Definition | Level & Years |
|---|---|---|---|
| **Maine CDC Infectious Disease Surveillance** | Acute Hepatis C | Number of acute hepatitis C divided by total county/subcounty population | County<br><br>2015–2017 |
| | Acute Hepatitis B | Number of acute hepatitis B cases divided by total county/subcounty population | |
| | HIV | Number of HIV cases divided by total county/subcounty population | |
| **Maine Syndromic Surveillance** | Non-fatal overdoses, opioids only (excluding heroin/fentanyl) | Number of emergency department visits due to non-fatal opioid overdoses (excluding heroin/fentanyl) divided by total county/subcounty population | County & ZIP code<br><br>2017–2018 |
| | Non-fatal overdoses, heroin/fentanyl only | Number of emergency department visits due to non-fatal heroin/fentanyl overdoses divided by total county/subcounty population | |

| Data Source | Outcome | Operational Definition | Level & Years |
|---|---|---|---|
| **Maine Emergency Medical Services** | Naloxone administration rate | Number of Maine Emergency Medical Services naloxone administration incidents divided by total county/subcounty population | County and ZIP code<br><br>2015–2017 |
| **Maine Vital Statistics** | Opioid-related mortality rate | Number of overdose deaths attributed to any opioids divided by total county/subcounty population | County and ZIP code<br><br>2015–2017 |

## Determination of Sub-State Areas

The vulnerability assessment included both county and subcounty analyses. It was important to conduct analyses at the subcounty level because of the large size and diversity within of Maine's 16 counties. Additionally, the small number of counties inhibited the use of statistical techniques such as Poisson regression.

Analyses could not be conducted at ZIP code level due to the small population in most of Maine's 433 ZIP Code Tabulation Areas (ZTCAs), which resulted in very small raw counts of each indicator and outcome variable. PCG met with Michelle Van Handel, the U.S. CDC Project Officer for the assessment and the first author on the national vulnerability assessment (Van Handel et al, 2016), for guidance on subcounty analyses. She advised dividing counties into two or three smaller subcounty areas.

The vulnerability assessment included both county and subcounty analyses, a decision influenced by geographic and demographic factors.

The 16 counties were divided into a total of 31 areas which included three counties whose populations were too small to divide and 28 subcounty areas (See Table 4). Counties were divided either into urban and rural areas, coastal and inland areas (east and west), or northern and southern areas. Data for each subcounty were then extracted using ZTCAs. See Figures A-1 and A-2 in Appendix A for maps of the county and subcounty areas.

**Table 4. Counties and Associated Subcounty Areas**

| County | Subcounty Area |
|---|---|
| **Androscoggin** | 1. Lewiston/Auburn and everything to the south (Androscoggin_South)<br>2. Everything north of Lewiston/Auburn (Androscoggin_North) |
| **Aroostook** | 1. Houlton and everything to the south (Aroostook_South)<br>2. Caribou and everything to the north (Aroostook_North) |
| **Cumberland** | 1. Portland peninsula, area just west of city to airport, and South Portland (Cumberland_Portland)<br>2. Suburbs outside of Portland on the east side of the county (Cumberland_East)<br>3. Everything at Sebago Lake and west (Cumberland_West) |
| **Franklin** | 4. Farmington and everything to the south (Franklin_South)<br>5. Everything north of Farmington (Franklin_North) |
| **Hancock** | Did not divide |
| **Kennebec** | 1. Augusta and everything to the south (Kennebec_South)<br>2. Waterville and everything to the north (Kennebec_North) |
| **Knox** | Did not divide |
| **Lincoln** | 1. Wiscasset and everything to the west (Lincoln_West)<br>2. Waldoboro and everything to the east (Lincoln_East) |
| **Oxford** | 1. Paris and everything to the south (Oxford_South)<br>2. Rumford and everything to the north (Oxford_North) |
| **Penobscot** | 1. Bangor and Old Town (Penobscot_Bangor)<br>2. Everything to the west of Bangor and Old Town (Penobscot_West)<br>3. Everything to the north of Bangor and Old Town (Penobscot_North) |
| **Piscataquis** | Did not divide |
| **Sagadahoc** | 1. Everything west of the water (Sagadahoc_West)<br>2. Everything east of the water (Sagadahoc_East) |
| **Somerset** | 1. Skowhegan and everything to the south (Somerset_South)<br>2. Everything else north of Skowhegan (Somerset_North) |
| **Waldo** | 1. Everything coastal in the east (Waldo_East)<br>2. Everything else inland in the west (Waldo_West) |
| **Washington** | 1. Southern coast including Jonesboro, Machias, and Lubec (Washington_South)<br>2. Everything else to the north including Calais (Washington_North) |
| **York** | 1. Everything on Interstate 95 and the eastern coast (York_East)<br>2. Everything else to the west (York_West) |

## Indentification of Most Vulnerable Sub-State Areas

Following completion of the steps outlined above, PCG took a multi-step approach, similar to the one used in the national (Van Handel et al., 2016) and Tennessee (Rickles et al., 2018) assessments, to identify counties and subcounty areas with greatest vulnerability to opioid overdoses and bloodborne infections associated with non-sterile injection drug use. Two methods recommend by the U.S. CDC were used: 1) Poisson regression and 2) Social vulnerability index (SVI).

The SVI was used in both the county and subcounty analyses and the Poisson regression only was used in the subcounty analyses because it could not be performed at the county level, given the small number of counties in Maine. Thus, Poisson regression was not used for the bloodborne infection-related outcomes due to lack of available subcounty data.

### Poisson Regression Modelling

Stepwise Poisson regression modeling was conducted using standard R packages to identify indicator variables showing statistically significant associations with the opioid-related outcome variables (non-fatal opioid overdoses, non-fatal heroin/fentanyl overdoses, naloxone administration incidents, and opioid-related mortalities) and identify the most vulnerable subcounty areas. Separate Poisson regression models were run for each outcome.

Prior to conducting the stepwise Poisson regressions, 16 of the 27 indicators were eliminated and 11 were retained. The 11 retained indicators varied by outcome. To determine which indicators would be retained, 5,000 simulations of seven randomly selected indicators were conducted for each outcome. Then, the most consistent top three statistically significant protective factors and top eight statistically significant risk factors were selected for each outcome.

**Protective factor ▶** An indicator that was *negatively* associated with the outcome, meaning that higher levels of the indicator were associated with lower rates of the given outcome

**Risk factor ▶** An indicator that was *positively* associated with the outcome, meaning that higher levels of the indicator were associated with higher rates of that outcome

After identifying the indicators, separate stepwise Poisson regression models were run for each outcome with the aim of finding the most parsimonious model that had the best fit with the fewest number of statistically significant indicators. A composite vulnerability score then was calculated for each subcounty area using the statistically significant indicator variables for that outcome.

More specifically, for each subcounty area, PCG multiplied the subcounty area's value for each indicator variable by the indicator variable's regression coefficient from the final regression model and summed to produce an overall vulnerability score (Rickles et al., 2018; Van Handel et al., 2016). Then, the subcounty areas were ranked for each outcome by their composite vulnerability score from lowest to highest, with higher scores indicating higher vulnerability.

## Social Vulnerability Index

The SVI is a methodology previously used by the U.S. CDC (Flanagan et al., 2011) to determine geographical areas most vulnerable to public health emergencies. It was originally developed for natural disasters, but now is being applied to other public health emergencies, including the opioid epidemic. Unlike Poisson regression, SVI is a descriptive statistics approach and does not assess if the indicator variables are associated with the outcome variables.

Before conducting the SVI analyses, 16 of the 27 indicators were eliminated and 11 were retained. The 11 indicators were chosen using the Poisson regression results as a starting point and covered five domains: *substance use*, *mental health*, *physical health*, *socioeconomic*, and *law enforcement* (See Table 5). Next, for each sub-state area, a percentile rank was calculated for each of the 11 indictors. Then, a composite vulnerability score was created for each sub-state area that was a sum of the individual indicator percentile ranks. Finally, the subcounty areas were ranked by their composite vulnerability score from lowest to highest, with higher scores indicating higher vulnerability.

**Table 5. Social Vulnerability Index Domains and Associated Indicators**

| Domain | Indicator |
|---|---|
| **Substance Use** | *2-1-1 Maine* substance use referral calls (*per capita* rate) |
| | Doses of schedule II–IV drugs prescribed (*per capita* rate) |
| **Mental health** | Mental health-related emergency department visits (*per capita* rate) |
| | Number of poor mental health days in the past month (*per capita* rate) |
| **Physical Health** | Injury-related mortality (*per capita* rate) |
| | Number of poor physical health days in past month (*per capita*) |
| **Socioeconomic** | Adults without high school diploma (*per capita* rate) |
| | Unemployment (*per capita* rate) |
| **Law Enforcement** | Maine DEA investigations of opioid sales (*per capita* rate) |
| | Maine DEA investigations of non-opioid illicit drug sales (*per capita* rate) |

## Research on Existing Services and Resouces

To achieve the second aim of the assessment—to use findings to make recommendations for interventions that strategically allocate services to sub-state areas at greatest risk—PCG first undertook an evaluation of existing services and resources. Reviews of the literature and national best practices were conducted to identify what prevention, harm reduction, treatment/recovery, and law enforcement/criminal justice services and approaches communities are using across the country to address opioid overdoses and bloodborne infections associated with non-sterile injection opioid use. We then determined their existence and prevalence in Maine.

These would include *prevention* approaches such as outreach, educational groups, and community coalitions; *harm reduction* approaches such as syringe exchange programs, pre-exposure prophylaxis (PrEP), and naloxone administration; *treatment* approaches such as substance use treatment providers, recovery residences, recovery centers, methadone clinics, buprenorphine providers, and mental health providers; and *law enforcement/criminal justice approaches* such as diversion programs and drug courts.

## Recommendations for Strategically-Placed Interventions

The final step in the assessment involved synthesizing the results from the statistical analyses with information gleaned from the literature search for risk factors, a review of existing resources in Maine, and identification of successful interventions used in other states to develop a list of potential recommendations for addressing opioid overdoses and bloodborne infections in the most vulnerable communities in Maine. As part of this process, PCG worked with the Maine CDC and the stakeholder group to identify gaps in services and prioritize recommendations.

# Results

## Opioid Overdoses and Mortalies

### County rates

*Per capita* rates of non-fatal opioid overdoses, non-fatal heroin/fentanyl overdoses, naloxone administration incidents, and opioid-related mortalities consistently were highest in Kennebec, Washington, and Penobscot Counties. Additionally, Cumberland County was ranked in the top five for non-fatal opioid overdoses, non-fatal heroin/fentanyl overdoses, and naloxone administration incidents, while Somerset was ranked in the top five for non-fatal opioid overdoses, non-fatal heroin/fentanyl overdoses, and opioid-related mortalities.

It is noteworthy that there was a consistent pattern of higher *per capita* rates seen in counties along Interstate 95, namely Cumberland, Kennebec, and Penobscot Counties and to a lesser extent York and Androscoggin Counties.

Table 6 lists the top five counties with the highest rate for each of the opioid-related outcomes. See Figures A-3 to A-6 in Appendix A for county rate maps of each opioid-related outcome.

**Table 6. Most Vulnerable Counties Based on Rates**

| County* | Non-Fatal Opioid Overdoses | Non-Fatal Heroin/Fentanyl Overdoses | Naloxone Administration Incidents | Opioid-Related Mortalities |
|---|---|---|---|---|
| Androscoggin | | | | |
| Cumberland | ✓ | ✓ | ✓ | |
| Kennebec | ✓ | ✓ | ✓ | ✓ |
| Lincoln | | | | ✓ |
| Penobscot | ✓ | ✓ | ✓ | ✓ |
| Piscataquis | | | | |
| Somerset | ✓ | ✓ | | ✓ |
| Washington | ✓ | ✓ | ✓ | ✓ |
| York | | | ✓ | |

***Checkmark indicates that the county's rate was ranked in the top five for that particular outcome.**

## Subcounty rates

*Per capita* rates for all four opioid-overdose outcomes were generally the highest in southern Kennebec County, the Portland area of Cumberland County, and northern and southern Washington County (entire county). Additionally, subcounty data indicated that metro areas often had higher *per capita* rates of opioid overdoses than lower-density areas in a given county.

For example, the Portland area of Cumberland County and Bangor area of Penobscot County had higher *per capita* rates of non-fatal opioid overdoses, non-fatal heroin/fentanyl overdoses, and naloxone administration incidents compared to the more rural areas. Portland also had a higher *per capita* opioid mortality rate than the other areas of Cumberland County.

Table 7 lists the top five subcounty areas with the highest rate for each of the opioid-related outcomes. See Tables A-1 to A-4 in Appendix A for the subcounty rates for each opioid-related overdose outcome. It was not possible to create subcounty maps.

**Table 7. Most Vulnerable Subcounty Areas Based on Rates**

| Subcounty area* | Non-Fatal Opioid Overdoses | Non-Fatal Heroin/Fentanyl Overdoses | Naloxone Administration Incidents | Opioid-Related Mortalities |
|---|---|---|---|---|
| Cumberland_Portland | ✓ | ✓ | ✓ | ✓ |
| Kennebec_North | ✓ | | | |
| Kennebec_South | ✓ | ✓ | ✓ | ✓ |
| Lincoln_West | | | | ✓ |
| Penobscot_Bangor | | ✓ | | |
| Washington_North | ✓ | ✓ | ✓ | ✓ |
| Washington_South | ✓ | ✓ | ✓ | ✓ |
| York_East | | | ✓ | |

*** Checkmark indicates that the subcounty area's rate was ranked in the top five for that particular outcome.**

## Social Vulnerability Index (SVI) Results

Results of the county-level SVI analyses revealed that Somerset, Washington, Penobscot, Piscataquis, and Kennebec Counties were the most vulnerable counties. These findings are consistent with those from the subcounty SVI analyses that showed that the entirety of Piscataquis and Washington Counties as well as the northern area of Penobscot County and the southern area of Somerset County were most vulnerable. See Table 8 for county SVI rankings and Table 9 for subcounty SVI rankings. Figure A-10 in Appendix A contains a county map of SVI scores.

**Table 8. County SVI Rankings**

| County | SVI Score* | County | SVI Score |
|---|---|---|---|
| Hancock | 0 | Oxford | 0.53 |
| Cumberland | 0.07 | Androscoggin | 0.60 |
| Waldo | 0.13 | Franklin | 0.67 |
| Sagadahoc | 0.20 | Kennebec | 0.73 |
| Aroostook | 0.27 | Piscataquis | 0.80 |
| York | 0.27 | Penobscot | 0.87 |
| Knox | 0.40 | Washington | 0.93 |
| Lincoln | 0.47 | Somerset | 1 |

***SVI scores range from 0 to 1. *Counties with higher SVI scores are more vulnerable***

**Table 9. Subcounty SVI Rankings**

| County | SVI Score* | County | SVI Score |
|---|---|---|---|
| Cumberland_East | 0 | Sagadahoc_East | 0.53 |
| Hancock | 0.03 | Aroostook_South | 0.57 |
| Sagadahoc_West | 0.07 | Androscoggin_South | 0.6 |
| Lincoln_West | 0.1 | Cumberland_West | 0.63 |
| York_West | 0.13 | Penobscot_Bangor | 0.67 |
| Knox | 0.17 | Kennebec_North | 0.7 |
| Waldo_East | 0.2 | Penobscot_West | 0.73 |
| Aroostook_North | 0.23 | Kennebec_South | 0.77 |
| Waldo_West | 0.27 | Oxford_North | 0.8 |
| Lincoln_West | 0.3 | Somerset_North | 0.83 |
| Oxford_South | 0.3 | Piscataquis | 0.87 |
| Cumberland_Portland | 0.37 | Washington_South | 0.9 |
| York_East | 0.4 | Penobscot_North | 0.93 |
| Androscoggin_North | 0.43 | Somerset_South | 0.97 |
| Franklin_South | 0.47 | Washington_North | 1 |
| Franklin_North | 0.5 | | |

***SVI scores range from 0 to 1. *Counties with higher SVI scores are more vulnerable.***

## Poisson Regression Results

### *Non-Fatal Opioid Overdoses*

Results of the Poisson regression analyses revealed that *per capita* rates of injury-related mortalities, doses of prescribed schedule II–IV drugs, opioid-related poison control calls, and *2-1-1 Maine* substance abuse referral calls were statistically significant positive predictors of non-fatal opioid overdoses meaning that higher *per capita* rates of these indicators were predictive of higher non-fatal opioid-overdose *per capita* rates. *Per capita* rates of MDEA opioid-related sale investigations and vacant housing were statistically significant negative predictors meaning that higher rates of these indicator were predictive of lower non-fatal opioid overdose *per capita* rates.

Table 10 lists the 11 indictors included in the non-fatal opioid overdose Poisson regression model with their associated statistical significance information and indication if they were statistically significant positive or negative predictors.

**Table 10. Non-Fatal Opioid-Related Overdose Indicators**

| Indicator | Statistical Significance (*P*- Value) |
|---|---|
| **Doses of prescribed schedule II–IV drug[1]** | < 0.0001 |
| **Injury-related mortality[1]** | < 0.0001 |
| **MDEA opioid-related sales investigations[2]** | < 0.0001 |
| ***2-1-1 Maine* substance use-related referral calls[1]** | < 0.01 |
| **Opioid-related poison control calls[1]** | < 0.01 |
| **Vacant housing[2]** | < 0.0001 |
| **Buprenorphine providers** | *n.s.* |
| **Mental health-related ED visit** | *n.s.* |
| **Adults without a high school diploma** | *n.s.* |
| **Population age 18 to 29** | *n.s.* |
| **Uninsured** | *n.s.* |

**[1]Statistically significant positive predictors of non-fatal opioid overdoses**

**[2]Statistically significant negative predictors of non-fatal opioid overdoses**

**Abbreviations: n.s.= indicator that was not a statistically significant predictor of non-fatal opioid overdoses**

When the subcounty areas were ranked by the composite vulnerability scores, the Portland area of Cumberland County, southern and northern areas of Kennebec County, the northern area of Washington County, and the southern area of Somerset County were at greatest risk for non-fatal opioid overdoses. These counties are consistent with those with the highest non-fatal opioid overdose *per capita* rates. See Table 11 for the regression rank, *per capita* rate rank, and *per capita* rate for each subcounty area.

**Table 11. Non-Fatal Opioid Overdose Subcounty Rankings and *Per Capita* Rates**

| Subcounty Area | Regression Rank | Rate Rank | Rate |
|---|---|---|---|
| Franklin_North | 1 | 1 | 32.89 |
| Lincoln_East | 2 | 13 | 89.43 |
| Hancock | 3 | 3 | 64.28 |
| Waldo_East | 4 | 2 | 49.44 |
| York_West | 5 | 18 | 104.61 |
| Cumberland_East | 6 | 9 | 82.20 |
| Androscoggin_North | 7 | 12 | 88.03 |
| Oxford_South | 8 | 6 | 65.75 |
| Aroostook_North | 9 | 8 | 76.23 |
| Knox | 10 | 7 | 71.79 |
| Waldo_West | 11 | 5 | 65.46 |
| Aroostook_South | 12 | 4 | 65.10 |
| Franklin_South | 13 | 14 | 95.89 |
| Lincoln_West | 14 | 15 | 98.27 |
| York_East | 15 | 16 | 100.53 |
| Oxford_North | 16 | 22 | 110.95 |
| Somerset_North | 17 | 20 | 109.27 |
| Sagadahoc_West | 18 | 10 | 82.74 |
| Penobscot_West | 19 | 11 | 87.98 |
| Piscataquis | 20 | 23 | 111.59 |
| Sagadahoc_East | 21 | 19 | 105.99 |
| Cumberland_West | 22 | 17 | 103.25 |
| Washington_South | 23 | 29 | 154.91 |
| Androscoggin_South | 24 | 24 | 114.82 |
| Penobscot_Bangor | 25 | 26 | 130.06 |
| Penobscot_North | 26 | 21 | 109.74 |
| Kennebec_North | 27 | 27 | 139.69 |
| Somerset_North | 28 | 25 | 122.53 |
| Washington_North | 29 | 28 | 143.57 |
| Kennebec_South | 30 | 30 | 174.07 |
| Cumberland_Portland | 31 | 31 | 198.91 |

***Subcounty areas are ordered by Poisson regression composite vulnerability scores. Higher rankings for the regression and rates are indicative of greater vulnerability.**

### *Non-Fatal Heroin/Fentanyl overdoses*

Results of the Poisson regression analyses revealed that *per capita* rates of buprenorphine providers, *2-1-1 Maine* substance abuse referral calls, and adult residents without a high school diploma were statistically significant positive predictors of non-fatal heroin/fentanyl overdoses, meaning that higher *per capita* rates of these indicators were predictive of higher non-fatal heroin/fentanyl overdose *per capita* rates. *Per capita* rates of MDEA opioid-related sales investigations, vacant housing, and residents who were current daily smokers were statistically significant negative predictors, meaning that higher rates of these indicators were predictive of lower non-fatal heroin/fentanyl overdose rates. Table 12 lists the 11 indictors included in the non-fatal heroin/fentanyl overdose Poisson regression model, along with their associated statistical significance information and indication if they were statistically significant positive or negative predictors.

**Table 12. Non-Fatal Heroin/Fentanyl Overdose Indicators**

| Indicator | Statistical Significance (*P*- Value) |
|---|---|
| **Buprenorphine providers[1]** | < 0.0001 |
| **Current daily smokers[2]** | < 0.01 |
| ***2-1-1 Maine* substance use-related referral calls[1]** | < 0.001 |
| **MDEA opioid-related sales investigations[2]** | < 0.0001 |
| **Adults without high school diploma[1]** | < 0.01 |
| **Vacant housing[2]** | < 0.0001 |
| **Injury-related mortality** | *n.s.* |
| **Mental health providers** | *n.s.* |
| **Mental health-related ED visit rate** | *n.s.* |
| **Opioid-related poison control calls** | *n.s.* |
| **Population age 18 to 29** | *n.s.* |

**[1]Statistically significant positive predictors of non-fatal heroin/fentanyl overdoses**

**[2]Statistically significant negative predictors of non-fatal heroin/fentanyl overdoses**

**Abbreviations: n.s.= indicator that was not a statistically significant predictor of non-fatal heroin/fentanyl overdoses**

When the subcounty areas were ranked by composite vulnerability scores calculated from the regression results, the Portland area of Cumberland County, the northern and southern areas of Washington County, the southern area of Kennebec County, and the northern area of Penobscot County were at greatest risk for non-fatal heroin/fentanyl overdoses. These counties are similar to those with the highest non-fatal heroin/fentanyl overdose *per capita* rates. See Table 13 for the regression rank, *per capita* rate rank, and *per capita* rate for each subcounty area.

**Table 13. Non-Fatal Opioid Overdose Subcounty Rankings and *Per Capita* Rates**

| Subcounty Area* | Regression Rank | Rate Rank | Rate |
|---|---|---|---|
| Lincoln_East | 1 | 5 | 24.67 |
| Aroostook_South | 2 | 3 | 15.50 |
| Waldo_East | 3 | 2 | 14.83 |
| York_West | 4 | 15 | 36.41 |
| Knox | 5 | 6 | 27.71 |
| Oxford_North | 6 | 7 | 27.74 |
| Franklin_North | 7 | 1 | 13.15 |
| Waldo_West | 8 | 4 | 18.33 |
| Hancock | 9 | 8 | 28.36 |
| York_East | 10 | 19 | 41.85 |
| Somerset_North | 11 | 22 | 46.83 |
| Oxford_South | 12 | 9 | 28.93 |
| Lincoln_West | 13 | 12 | 33.69 |
| Penobscot_West | 14 | 14 | 36.09 |
| Aroostook_North | 15 | 10 | 29.54 |
| Sagadahoc_East | 16 | 23 | 47.11 |
| Franklin_South | 17 | 25 | 54.79 |
| Androscoggin_North | 18 | 11 | 31.24 |
| Sagadahoc_West | 19 | 16 | 38.61 |
| Cumberland_West | 20 | 18 | 40.72 |
| Androscoggin_South | 21 | 21 | 45.15 |
| Somerset_South | 22 | 20 | 43.67 |
| Cumberland_East | 23 | 13 | 34.53 |
| Piscataquis | 24 | 17 | 39.21 |
| Kennebec_North | 25 | 26 | 57.94 |
| Penobscot_Bangor | 26 | 27 | 60.13 |
| Penobscot_North | 27 | 24 | 53.87 |
| Washington_South | 28 | 31 | 106.84 |
| Kennebec_South | 29 | 30 | 98.68 |
| Washington_North | 30 | 28 | 75.56 |
| Cumberland_Portland | 31 | 29 | 78.14 |

***Subcounty areas are ordered by Poisson regression composite vulnerability scores. Higher rankings for the regression and rates are indicative of greater vulnerability.**

### *Naloxone Administration Incidents*

Results of the Poisson regression analyses revealed that *per capita* rates of mental health providers, injury-related mortalities, *2-1-1 Maine* substance abuse referral calls, buprenorphine providers, and doses of prescribed schedule II–IV drugs as well as the population change since 2000 were statistically significant positive predictors of naloxone administration incidents. Higher rates of these indicators were predictive of higher non-fatal opioid-overdose rates. *Per capita* rates of MDEA opioid-related sales investigations was a statistically significant negative predictor, meaning that more *per capita* sale investigations were predictive of lower naloxone administration incident rates. Table 14 lists the 11 indictors included in the naloxone administration Poisson regression model, along with their associated statistical significance information and indication if they were statistically significant positive or negative predictors.

**Table 14. Naloxone Administration Incident Indicators**

| Indicator | Statistical Significance (*P*- Value) |
|---|---|
| **Buprenorphine providers[1]** | < 0.0001 |
| **Doses of prescribed schedule II–IV drugs[1]** | < 0.0001 |
| **Injury-related mortality rate[1]** | < 0.0001 |
| **MDEA opioid-related sales investigations[2]** | < 0.0001 |
| **Mental health providers[1]** | < 0.0001 |
| **Population change since 2000[1]** | < 0.0001 |
| **Substance use-related referral calls [1]** | < 0.0001 |
| **Adults without a high school diploma** | *n.s.* |
| **MDEA non-opioid illicit drug sales investigation rate** | *n.s.* |
| **Mental health-related ED visit rate** | *n.s.* |
| **Methadone clinics** | *n.s.* |

**[1]Statistically significant positive predictors of naloxone administration incidents**

**[2]Statistically significant negative predictors of naloxone administration incidents**

**Abbreviations: n.s.= indicator that was not a statistically significant predictor of naloxone administration incidents**

When the subcounty areas were ranked by the composite vulnerability scores calculated from the regression results, the Portland area of Cumberland County, the northern and southern areas of Washington County, the Bangor area of Penobscot County, and the southern area of Kennebec County were at greatest risk for naloxone administration. These subcounty areas are fairly similar to those with the highest naloxone administration incident *per capita* rates. See Table 15 for the regression rank, *per capita* rate rank, and *per capita* rate for each subcounty area.

**Table 15. Naloxone Administration Incidents Subcounty Rankings and *Per Capita* Rates**

| Subcounty Area* | Regression Rank | Rate Rank | Rate |
|---|---|---|---|
| Lincoln_East | 1 | 8 | 96.63 |
| Aroostook_North | 2 | 3 | 73.90 |
| Androscoggin_North | 3 | 4 | 76.22 |
| Sagadahoc_West | 4 | 6 | 79.98 |
| Franklin_South | 5 | 10 | 107.31 |
| Waldo_West | 6 | 2 | 69.58 |
| Waldo_East | 7 | 11 | 107.35 |
| Sagadahoc_East | 8 | 15 | 126.60 |
| Hancock | 9 | 14 | 121.95 |
| Franklin_North | 10 | 9 | 98.66 |
| Aroostook_South | 11 | 1 | 41.71 |
| Oxford_North | 12 | 16 | 135.40 |
| Oxford_South | 13 | 12 | 108.23 |
| Penobscot_West | 14 | 21 | 166.49 |
| Penobscot_North | 15 | 7 | 96.06 |
| Knox | 16 | 5 | 78.09 |
| Lincoln_West | 17 | 20 | 161.91 |
| Androscoggin_South | 18 | 1 | 41.71 |
| York_East | 19 | 29 | 290.52 |
| Somerset_North | 20 | 18 | 141.77 |
| Piscataquis | 21 | 22 | 168.90 |
| York_West | 22 | 25 | 216.41 |
| Cumberland_West | 23 | 13 | 117.80 |
| Kennebec_North | 24 | 23 | 204.65 |
| Cumberland_East | 25 | 17 | 137.26 |
| Somerset_South | 26 | 19 | 141.77 |
| Washington_South | 27 | 27 | 260.75 |
| Kennebec_South | 28 | 28 | 274.27 |
| Penobscot_Bangor | 29 | 26 | 227.50 |
| Washington_North | 30 | 31 | 341.45 |
| Cumberland_Portland | 31 | 30 | 305.91 |

***Subcounty areas are ordered by Poisson regression composite vulnerability scores. Higher rankings for the regression and rates are indicative of greater vulnerability.**

## Opioid-Related Mortalities

Results of the Poisson regression analyses revealed that *per capita* rates of buprenorphine providers and mental-health related emergency department visits were statistically significant positive predictors of opioid-related mortalities meaning that higher *per capita* rates of these indicators were predictive of higher opioid-related mortality *per capita* rates. Table 16 lists the 11 indictors included in the opioid-related mortality Poisson regression model, along with their associated statistical significance information and indication if they were statistically significant positive or negative predictors.

**Table 16. Opioid-Related Mortalities Indicators**

| Indicator | Statistical Significance (*P*- Value) |
|---|---|
| **Buprenorphine provider rate[1]** | < 0.01 |
| **Mental health-related ED visit rate[1]** | < 0.05 |
| **Adults at-risk for heavy alcohol use** | *n.s.* |
| **Adults without a high school diploma** | *n.s.* |
| **Current daily smokers** | *n.s.* |
| **Disability rate** | *n.s.* |
| **Doses of prescribed schedule II–IV drugs** | *n.s.* |
| ***2-1-1 Maine* mental health referral calls** | *n.s.* |
| **MDEA opioid-related sales investigations** | *n.s.* |
| **Methadone clinics** | *n.s.* |
| **Mental health providers** | *n.s.* |

**[1]Statistically significant positive predictors of opioid-related mortalities**

**Abbreviations: n.s.= indicator that was not a statistically significant predictor of opioid-related mortalities**

When the subcounty areas were ranked by the composite vulnerability scores calculated from the Poisson regression results, the northern area of Penobscot County, southern area of Kennebec County, Portland area of Cumberland County, and the northern and southern areas of Washington County were at greatest risk for opioid-related mortalities. These counties are fairly similar to those with the highest opioid-related mortality *per capita* rates. See Table 17 for the regression rank, *per capita* rate rank, and *per capita* rate for each subcounty area.

**Table 17. Opioid-Related Mortality Subcounty Rankings and *Per Capita* Rates**

| Subcounty Area* | Regression Rank | Rate Rank | Rate |
|---|---|---|---|
| York_West | 1 | 12 | 8.55 |
| Sagadahoc_East | 2 | 9 | 7.85 |
| Sagadahoc_West | 3 | 1 | 3.68 |
| Penobscot_West | 4 | 24 | 15.04 |
| York_East | 5 | 22 | 14.43 |
| Oxford_South | 6 | 3 | 5.26 |
| Cumberland_West | 7 | 13 | 8.73 |
| Aroostook_South | 8 | 11 | 8.27 |
| Waldo_West | 9 | 14 | 8.73 |
| Franklin_South | 10 | 8 | 7.61 |
| Franklin_North | 11 | 15 | 8.77 |
| Lincoln_East | 12 | 2 | 4.11 |
| Androscoggin_North | 13 | 4 | 6.35 |
| Somerset_North | 14 | 5 | 6.94 |
| Cumberland_East | 15 | 6 | 7.54 |
| Hancock | 16 | 18 | 13.23 |
| Lincoln_West | 17 | 29 | 24.33 |
| Androscoggin_North | 18 | 23 | 14.86 |
| Oxford_North | 19 | 17 | 11.77 |
| Knox | 20 | 16 | 10.92 |
| Waldo_East | 21 | 10 | 8.24 |
| Aroostook_North | 22 | 4 | 6.35 |
| Penobscot_Bangor | 23 | 20 | 13.98 |
| Somerset_South | 24 | 26 | 17.79 |
| Piscataquis | 25 | 21 | 14.07 |
| Kennebec_North | 26 | 25 | 15.18 |
| Penobscot_North | 27 | 19 | 13.30 |
| Kennebec_South | 28 | 28 | 21.47 |
| Cumberland_Portland | 29 | 27 | 17.85 |
| Washington_South | 30 | 30 | 28.49 |
| Washington_North | 31 | 31 | 30.23 |

***Subcounty areas are ordered by Poisson regression composite vulnerability scores. Higher rankings for the regression and rates are indicative of greater vulnerability.**

## Summary of Opiod-Related Results

### *County*

The synthesis of the SVI result and *per capita* opioid-related rates indicated that Penobscot and Washington Counties were the most vulnerable to the opioid epidemic, followed by Kennebec and Somerset Counties. Further, although Androscoggin and Piscataquis are not the most vulnerable counties in-terms of *per capita* rates, these counties may be at risk for an increase in rates based on the results of the SVI analyses. Table 18 lists the counties that were ranked in the top five for either the SVI or an opioid-related outcome.

Penobscot and Washington Counties are most vulnerable to the opioid epidemic, followed by Kennebec and Somerset Counties.

**Table 18. Counties Most Vulnerable to Opioid Overdoses and Mortalities**

| County* | SVI | Non-Fatal Opioid Overdoses | Non-Fatal Heroin/Fentanyl Overdoses | Naloxone Administration Incidents | Opioid-Related Mortalities |
|---|---|---|---|---|---|
| Androscoggin | ✓ | | | | |
| Cumberland | | ✓ | ✓ | ✓ | |
| Kennebec | | ✓ | ✓ | ✓ | ✓ |
| Lincoln | | | | | ✓ |
| Penobscot | ✓ | ✓ | ✓ | ✓ | ✓ |
| Piscataquis | ✓ | | | | |
| Somerset | ✓ | ✓ | ✓ | | ✓ |
| Washington | ✓ | ✓ | ✓ | ✓ | ✓ |
| York | | | | ✓ | |

***Checkmark indicates the county was ranked in the top five for the SVI or that opioid-related outcome.**

### *Subcounty*

Taken together, findings from the SVI and the Poisson Regression analyses revealed that nine subcounty areas are highly vulnerable. The Portland area of Cumberland County, the southern area of Kennebec County, and the entirety of Washington County are at greatest risk. Table 19 lists the subcounty areas that were ranked in the top five for the SVI or an opioid-related Poisson regression model.

At the subcounty level, the Portland area of Cumberland County, the southern area of Kennebec County, and all of Washington County are at greatest risk.

**Table 19. Subcounty Areas Most Vulnerable to Opioid Overdoses and Mortalities**

| Subcounty Area* | Social Vulnerability Index | Non-Fatal Opioid Overdoses | Non-Fatal Heroin/Fentanyl Overdoses | Naloxone Administration Incidents | Opioid-Related Mortalities |
|---|---|---|---|---|---|
| Cumberland_Portland | | ✓ | ✓ | ✓ | ✓ |
| Kennebec_South | | ✓ | ✓ | ✓ | ✓ |
| Kennebec_North | ✓ | ✓ | | | |
| Penobscot_Bangor | | | | ✓ | |
| Penobscot_North | | | ✓ | | ✓ |
| Piscataquis | ✓ | | | | |
| Somerset_South | ✓ | ✓ | | | |
| Washington_North | ✓ | ✓ | ✓ | ✓ | ✓ |
| Washington_South | ✓ | | ✓ | ✓ | ✓ |

***Checkmark indicates the subcounty area was ranked in the top five for the SVI or that opioid-related regression model**

## Bloodborne Infection Results

### County Rates

*Per capita* county rates varied between the three bloodborne infections, but Kennebec, Washington, and Penobscot Counties consistently had higher rates. High rates of acute Hepatitis B and C were found in eastern counties, namely Penobscot, Washington, Hancock, and Androscoggin Counties. High rates of HIV incidents were found in southern counties with larger metro areas, namely Cumberland, Androscoggin, and Kennebec. See Figures A-7 to A-9 in Appendix A for county rate maps of each of the three bloodborne infection outcomes.

### SVI Results

Results of the county-level SVI analyses revealed that Somerset, Washington, Penobscot, Piscataquis, and Kennebec Counties were the most vulnerable counties. See Table 20 for county SVI rankings.

**Table 20. SVI Ranking for Bloodborne Infections Associated with Non-Sterile Drug Injections**

| County | SVI Score* |
|---|---|
| Hancock | 0 |
| Cumberland | 0.07 |
| Waldo | 0.13 |
| Sagadahoc | 0.20 |
| Aroostook | 0.27 |
| York | 0.27 |
| Knox | 0.40 |
| Lincoln | 0.47 |

| County | SVI Score |
|---|---|
| Oxford | 0.53 |
| Androscoggin | 0.60 |
| Franklin | 0.67 |
| Kennebec | 0.73 |
| Piscataquis | 0.80 |
| Penobscot | 0.87 |
| Washington | 0.93 |
| Somerset | 1 |

***SVI scores range from 0 to 1. Counties with higher SVI scores are more vulnerable**

## Summary of Bloodborne Infection Results

The synthesis of the SVI results and *per capita* bloodborne infection rates indicated that Penobscot, Kennebec, and Washington Counties are most vulnerable to bloodborne infections, followed by Androscoggin, Somerset, and Waldo Counties. Further, although Piscataquis was not a vulnerable county in terms of *per capita* rates, it may be at risk for an outbreak based on the results of the SVI analyses. Table 21 lists the counties that were ranked in the top five for the SVI or a bloodborne infection outcome.

The synthesis of the SVI results and *per capita* bloodborne infection rates indicated that Penobscot, Kennebec, and Washington Counties are most vulnerable to bloodborne infections.

**Table 21. Counties Most Vulnerable to Bloodborne Infections Associated Non-Sterile Injection Drug Use**

| County* | SVI | HIV | Acute Hepatis C | Acute Hepatitis B |
|---|---|---|---|---|
| Androscoggin | | ✓ | | ✓ |
| Cumberland | | | | ✓ |
| Kennebec | ✓ | | ✓ | ✓ |
| Knox | | | ✓ | |
| Hancock | | | ✓ | |
| Penobscot | ✓ | ✓ | ✓ | ✓ |
| Piscataquis | ✓ | | | |
| Somerset | ✓ | ✓ | | |
| Waldo | | ✓ | | ✓ |
| Washington | ✓ | ✓ | ✓ | |

***Checkmark indicates the county area was ranked in the top five for the SVI or that bloodborne infection outcome**

## Intervention Target Areas

There was a large degree of overlap in the opioid and bloodborne infection results. It is important to consider both counties and subcounty areas because bloodborne infection analyses only were included in county-level analyses.

### Top Priority Counties

1. Penobscot
2. Washington
3. Kennebec
4. Somerset

### Top Priority Subcounty Areas

1. Portland area of Cumberland
2. Southern Kennebec
3. Northern and southern Washington (entire county)

Combining the subcounty and county results, the assessment determined that the Portland area of Cumberland County, Kennebec County, Penobscot County, Washington County, and Somerset County should be targeted.

## Existing Services and Gaps in Services

The review of national best practices, services in other states, and existing services in Maine helped to identify gaps in prevention, harm reduction, treatment/recovery, and law enforcement/criminal justice services in the most vulnerable areas. The subsequent sections discuss the findings from the review.

### Prevention

Maine currently has several federally funded opioid use prevention initiatives including *Drug Free Communities (DFC)* and community coalitions; the *Strategic Prevention Framework for Prescription Drugs (SPF-Rx)* program; the *Partnerships for Success (PFS 2015)*; the *Statewide Epidemiology Outcomes Workgroup (SEOW)*; and *the Prescription Drug Overdose: Prevention for States* program.

The DFC program is housed in the Office of National Drug Control Policy and provides funding to local communities throughout the country to identify and respond to substance use at the local level [Community Anti-Drug Coalitions of America (CADCA), 2019)]. Evaluation studies have shown that DFCs have contributed to reductions in substance use to levels lower than national averages. The program initially was founded in 1998 and the number of grantees has grown to more than 2000 nationally since then. Grantees receive up to $125,000 per year for up to five years and are eligible to reapply after completion of the initial funding period.

Despite the increased number of grantees, only about 33 percent of organizations that submit applications receive funding. In Maine, there currently are 18 community organizations receiving DFC funding (See Figure B-1 in Appendix B). In addition to DFCs, there are non-DFC funded drug-free community coalitions throughout Maine. Currently, there is no publicly available list of non-DFC community coalitions in Maine.

*SPF-Rx* and *PFS 2015* are substance use prevention programs funded by the U.S. Substance Abuse and Mental Health Services Administration (SAMHSA) and managed by the Maine CDC. The overarching goal of *SPF-Rx* is to decrease the number of individuals living with opioid use disorder (Maine CDC, 2018c). A core goal of the *PFS 2015* program is to reduce prescription drug misuse among individuals 12 to 25 years of age (Maine CDC, 2018d).

Both *SPF-Rx* and *PFS 2015* utilize SAMHSA's Strategic Prevention Framework (SPF) model, which is designed to build capacity and infrastructure at the state and local levels to support substance use prevention efforts; support communities in identifying prescription drug misuse problems and mount programs to address them; and prevent the onset and reduce the progression of prescription drug misuse in the community (Maine CDC, 2018c; Maine CDC 2018d).

*PFS 2015* and *SPF-Rx* use statewide and community-level strategies including public awareness campaigns, training and resources for medical professionals, promotion of prescription drug monitoring program (PDMP) registration, and drug take-back days. Figure B-2 in Appendix B illustrates the 21 community prevention organizations receiving *SPF-Rx* and *PFS 2015* funding. Currently, all organizations receive funding from both programs. Although a community prevention organization is not located in every county in Maine, all counties are reached because many organizations are responsible for more than one county.

Maine's *SEOW*, which is supported by the Maine CDC and funded by *PFS 2015*, employs an epidemiological analyst/SEOW Coordinator to track substance use consumption, protective factors, and consequences associated with substances (including prescription drugs/opioids) (Maine CDC 2018d). The *SEOW* focuses on substance use prevention rather than treatment. The SEOW Coordinator also is responsible for disseminating the findings using a variety of methods including a data dashboard, webinars, issue briefs, and annual statewide profile.


The *Prevention for States* program is funded by the U.S. CDC and managed by the Maine Office of Substance Abuse and Mental Health Services (SAMHS), which oversees the PDMP (Maine SAMHS, 2018). The overall goal of *Prevention for States* is to prevent and reduce prescription drug overdoses by strengthening resources needed to enhance the PDMP and supporting targeted interventions in high-burden communities. The 2018 *Prevention for States* evaluation report revealed that registration in the PDMP increased by 38 percent from 2017 to 2018; use of the PDMP increased, as evidenced by solicited reports (queries), which increased by 450% since 2015; and there was a 23 percent reduction in the number of prescriptions dispensed and a 28 percent reduction in the overall dosage of opioid agonists since 2015 (Maine SAMHS, 2018).

In addition to the existing prevention programs, Governor Janet Mills has outlined prevention initiatives in her *2019 Opioid Response Plan*, including implementing prevention programs in schools and high-risk areas and improving training and awareness of health care professional (Office of the Governor Janet T. Mills, 2019a).

## Harm Reduction

Harm reduction aims to reduce the negative consequences associated with continued substance use. It accepts that an individual may continue to use the substance and focuses on minimizing consequences (Harm Reduction Coalition, 2019). Comprehensive harm reduction typically includes easy access to naloxone, syringe exchange programs, and pre-exposure prophylaxis (PrEP) [National Center on Addiction and Substance Abuse (CASA), 2017].

## Naloxone

Although naloxone is available in communities throughout Maine, Governor Janet Mills has recognized the urgent need to expand availability. In her *2019 Opioid Response Plan*, the governor outlined key initiatives to expand access including allocating U.S. SAMHSA funds to purchase 35,000 doses of naloxone for distribution throughout the state (Office of the Governor Janet T. Mills, 2019a). Other naloxone initiatives in the governor's *Opioid Response Plan* include training family and friends of those at risk of an overdose on naloxone administration; encouraging providers prescribing more than 100 morphine milligram equivalents (MME) to co-prescribe naloxone; and evaluating the efficacy of naloxone distribution boxes in state owned and occupied facilities. Although not specifically related to naloxone, a Good Samaritan Law was passed in March of 2019 (LD 329, 2019), which exempts persons who report a drug-related medical emergency from criminal liability (Office of the Governor Janet T. Mills, 2019a).

## Syringe Exchange Programs

There are three certified syringe exchange programs in Maine that operate exchanges in seven locations. See Figure B-3 in Appendix B for a map of the seven syringe exchange locations. The organizations managing the syringe exchanges and their associated exchange locations include the 1) City of Portland (Portland); 2) Maine General Medical Center/Health Reach Harm Reduction (Augusta and Waterville); and 3) Health Equity Alliance (Bangor, Belfast, Ellsworth, and Machias). There are no syringe exchange programs in three of the most vulnerable areas: Somerset County, northern Penobscot County, and northern Washington County

In general, the seven syringe exchanges have limited operating hours and only provide services a few days a week. This is largely due to the limited state and federal funding and the fact that most of the funding comes from private donations. In 2018 and 2019, Maine allocated $75,000 per year in funding to certified syringe exchange programs and it is not clear if this funding will continue after 2019 (LD 1707, 2018). This funding is managed by the Maine CDC, who distributes it to the three certified syringe exchange programs. In 2019, a bill (LD 1689, 2019) was proposed that would allocate an estimated $1.7 million dollars in state funding to exchanges, but the bill has been tabled in committee. Currently, no federal funds are allocated to support syringe exchanges despite the ban on the use of federal funding being lifted in January of 2016.

The review also found innovative syringe exchange programs in other states. For example, Nevada has a vending machine program, which provides sterile syringes, alcohol wipes, safe sex supplies, and a sharps disposal box that registered individuals can access twice a week (CASA, 2017). The Minnesota Department of Health's Pharmacy Syringe Access Initiative is a program enabling the purchase of clean syringes from pharmacies throughout the state, including many large pharmacy chains (*e.g.,* CVS, Walgreens, Walmart). This program also has a web-based database where individuals can locate participating pharmacies in their counties (Minnesota Department of Health, 2019)

### Pre-Exposure Prophylaxis (PrEP)

PrEP in an FDA approved HIV prevention medication in which people who have tested negative for HIV take Truvada® once a day to reduce their risk of infection. It can be prescribed by licensed healthcare providers (*e.g.,* primary care providers) and an individual's insurance company may cover some or all of the cost. Currently, no state funding is allocated for PrEP, but it is covered by MaineCare. Gilead, the makers of PrEP, also offers the *Gilead Advancing Access* program, which provides financial support and/or assistance with co-payments (Frannie Peabody Center, 2019). Additionally, the Patient Access Network Foundation and the Patient Access Foundation both offer payment assistance for PrEP (Frannie Peabody Center, 2019).

The Maine CDC maintains a list of providers who prescribe PrEP, but report that it is under-prescribed. Results of two Maine CDC HIV, STD and Viral Hepatitis Program surveys revealed that few healthcare providers are prescribing PrEP despite being aware of it (Maine CDC, 2016). Currently, the Maine CDC is educating providers throughout the state to ensure that high-risk individuals are prescribed PrEP.

## Treatment and Recovery

A variety of treatment and recovery services are located throughout Maine. Services include *2-1-1 Maine*, substance use treatment providers, Opioid Health Homes (OHHs), medication-assisted treatment (MAT) providers, recovery community centers, and recovery residences. There is some overlap in services provided between the different categories. For example, all Opioid Health Homes and many substance use treatment providers also prescribe MAT.

It is noteworthy that no centralized clearinghouse of treatment and recovery services in Maine exists that contains information about capacity, waitlists, location, and services provided. This made it difficult to determine if the information compiled for this assessment is up-to-date and comprehensive. Maine has started to address this issue. For example, in July of 2019, the state announced that Washington County and the Department of Health and Human Services will work with Healthy Acadia on a pilot project to create a phone system, available to anyone in Washington County to locate substance use disorder treatment and recovery services (Teboe, 2019).

Additionally, *2-1-1 Maine* maintains an updated resource list for a variety of services, including substance use treatment and recovery (*2-1-1 Maine*, 2019). The Opioid Task Force is compiling service information and exploring methods for creating a centralized list. Other states, such as Massachusetts and Rhode Island, recently have created web-based service databases. Rhode Island required its Department of Health to develop and maintain a real-time database of available inpatient and outpatient services (CASA, 2017), and Massachusetts created the *Massachusetts Behavioral Health Access* website, which helps providers locate openings (Massachusetts Behavioral Health Access, 2019).

### 2-1-1 Maine

*2-1-1 Maine* is a toll-free helpline that provides information and referrals for substance use treatment, including outpatient facilities, hospitals, and prevention programs, support groups, and other support services (*e.g.,* childcare, transportation, parenting skill development). Their seven Resource Coordinators are located throughout the state and are responsible for working with local organizations to ensure that the resource list is up to date (*2-1-1 Maine*, 2019).

### Substance Use Treatment Providers

The U.S. SAMHSA Behavioral Health Treatment Services Locator (US SAMHSA, 2019a) lists 157 substance use treatment providers in Maine. Providers on the list include individual providers, medical practices, and community treatment organizations. Figure B-4 in Appendix B illustrates the locations of the substance use treatment providers in Maine. Among the vulnerable areas, only the Portland area of Cumberland County has a substantial number of providers.

Kennebec County has several providers in the Augusta and Waterville areas, but few in other areas of the county. Similarly, Penobscot has many providers in the Bangor area, but very few in other areas of the county. Washington County has a small number of providers in the southern inland and coastal areas, but very few in the northern areas, and Somerset has the fewest providers of the most vulnerable areas.

### Opioid Health Homes

The 62 Opioid Health Homes (OHHs) in Maine utilize a “hub and spoke” team-based care model approach. Figure B-5 in Appendix B illustrates the locations of the OHHs in Maine. OHHs provide integrated, office-based MAT, dependency counseling, and comprehensive care management for eligible MaineCare members and uninsured individuals with opioid use disorder (MaineCare Services, 2019). The OHH “hub” is an intensive outpatient program (IOP) that treats patients in the acute phase of the recovery process. The hubs also are responsible for connecting patients to other social services. After the individual is stabilized, their long-term care is transferred to “spokes,” typically primary care providers in the individual’s local community (MaineHealth, 2019). There are no OHHs in Somerset County, northern Washington County, or northern Penobscot County.

### Medication Assisted Treatment

Currently, there are ten methadone clinics (U.S. SAMHSA, 2019b) and 742 buprenorphine providers (U.S. SAMHSA, 2019c) in Maine. Among the most vulnerable areas, there are no methadone clinics in Somerset County. There are three in Penobscot County (Bangor), three in Cumberland County (Portland, South Portland, Westbrook), one in Kennebec County (Waterville), and one in Washington County (Calais).

Buprenorphine providers are located throughout Maine, but coverage is limited in northern Washington County, the very northern area of Penobscot County, and a majority of Somerset County (providers are only located in the southernmost area). In recent years, other states have employed various strategies to increase the number of MAT providers. For example, Virginia conducts trainings on addiction treatment that include a DATA 2000 waiver training, which the federal government requires that physicians complete to prescribe buprenorphine. Maryland law requires that all health care facilities have a physician who is authorized to prescribe MAT (CASA, 2017).

### Recovery Community Centers

Recovery community centers are non-profit centers that offer local networks of non-medical, recovery support services (Recovery Research Institute, 2019). There are seven recovery community centers in Maine, and the Portland Recovery Community Center serves as the Maine Recovery Hub providing technical support to organizations throughout the state. Figure B-6 in Appendix B illustrates the recovery community center locations in Maine. Neither Kennebec County nor Somerset County have a recovery community center.

### Recovery Residences

There are 101 recovery residences located throughout Maine (See Figure B-7 in Appendix B). Recovery residences include peer-run houses, monitored sober living homes, supervised housing, and residential treatment housing (U.S. SAMHSA, 2019d). In addition to person-specific services, residences typically require attendance at Narcotics Anonymous (NA) or Alcoholics Anonymous (AA) meetings and employment (U.S. SAMHSA, 2019c). There are no recovery residences in Somerset County or Washington County. In Kennebec County, a majority of residences are in the Augusta area, and Penobscot County has few residences outside of Bangor. Currently, only 28 of the 101 recovery residences in the state allow residents to take MAT (See Figure B-8 in Appendix B).

### General Medical Services

This assessment also inventoried general medical services including hospitals, rural health clinics, Federally Qualified Health Centers, and mental health providers. Figures B-9 to B-12 in Appendix B illustrate the locations of the general medical services in Mane. Overall, Somerset County, northern Penobscot County, and northern Washington County have very few general medical services.

Although it is not known if the general medical services inventoried offer substance use prevention or treatment services, they could potentially be encouraged to implement substance use programs in the future. For example, the state could provide screening,

brief intervention, and referral to treatment (SBIRT) trainings and encourage providers to become OHH spokes, buprenorphine prescribers, and PrEP prescribers. Maine can also implement similar programs to those being implemented in other states. For example, Project ASSERT is an emergency department program in Connecticut and Massachusetts where non-clinician health advocates conduct SBIRT, and New York has a program that incorporates SBIRT into primary care practices and emergency departments (CASA, 2017).

## Law Enforcement and Criminal Justice

### Drug Treatment Courts

The six Adult Drug Treatment Courts (ADTCs) in Maine are located in Alfred (York County), Portland (Cumberland County), Auburn (Androscoggin County), Bangor (Penobscot County), Machias (Washington County), and Calais (Washington County) (See Figure B-13 in Appendix B). ADTCs are open to adults 18 years and older who have committed nonviolent crimes or probation violations and have a diagnosed substance use disorder (State of Maine Judicial Branch, 2019a). Offenders must be residents in a county where there is an ADTC to participate. Unfortunately, there are no ADTCs in Kennebec and Somerset Counties, which are two of the most vulnerable counties. ADTC programs involve judicial monitoring, treatment, case management services, and other services such as housing, employment, and medical care. After successfully completing the program, offenders receive a reduced sentence.

Maine has three Family Treatment Drug Courts (FTDCs) that are located in Augusta (Kennebec County), Lewiston (Androscoggin), and Bangor (Penobscot). These are civil courts that work with parents with substance use disorders whose children are at risk of abuse or neglect due to the parents' drug use (State of Maine Judicial Branch, 2019b). FTDCs integrate substance use disorder treatment, child welfare services, mental health, and social services agencies. Maine's three FTDCs work with families with open Department of Health and Human Services Child Protective cases in Androscoggin, Franklin, Oxford, Kennebec, Penobscot, and Piscataquis Counties (also shown in Figure B-13 in Appendix B). Among the most vulnerable counties, Cumberland, Somerset, and Washington do not have access to a FTDC.

### Alternative Sentencing Programs

In addition to treatment courts, Maine also has an alternative sentencing program, which offers first- and second-time non-violent offenders an alternative to jail (Maine Pretrial Services, 2017). This program is open to any resident in Maine, but a judge must sentence an offender to the program. The offenders serve the equivalent of his or her sentence in a residential setting where they perform community service daily and attend substance use education nightly. Offenders must pay for the cost of the program.

## Law Enforcement and First Responder Interventions

It is unclear how many local law enforcement agencies in Maine have implemented pre-charge diversion programs for individuals with substance use disorders. In their 2017 report, the Maine Opioid Collaborative Law Enforcement Task Force recommended that the state support and encourage effective pre-charge law enforcement programs. More specifically, the task force stated that the state should "develop treatment/recovery resources in each prosecutorial district that would be available to all law enforcement agencies in that jurisdiction to contact for treatment/recovery services" (Maine Opioid Collaborative Law Enforcement Task Force, 2017).

Maine should prioritize working with law enforcement and other first responder agencies (*e.g.,* fire departments, emergency medical services) in the most vulnerable areas and assess what they are doing to address the opioid epidemic in their jurisdictions. Additionally, the state should look to successful programs being implemented in Maine and other states.

In 2016, the Portland Police Department started the Law Enforcement Addiction Advocacy Program (LEAAP). The LEAAP Substance Use Disorder Liaison targets known drug users and provides support and treatment options, educates police officers and the community, and provides assistance to family members and friends in need of help for their loved ones with substance use disorders (City of Portland, 2019) Further, in April of 2019, Knox County announced a new initiative involving a collaboration between the county's four law enforcement agencies and local health care and community organizations. The goal of the collaboration is to create a network of addiction and recovery resources (Abbot, 2019).

Outside of Maine, the Gloucester Police Department in Massachusetts created the Angel Project that permits individuals to turn in their drugs without being arrested and connects them to a volunteer who guides them to treatment programs (CASA, 2017). In Ohio, the Lucas County Sheriff's Office's Drug Abuse Response Team connects law enforcement officers with individuals who have experienced an overdose. Officers help individuals through the recovery process for two years (CASA, 2017). In Manchester, New Hampshire, every fire station is designated as a safe environment for individuals with substance use disorder who are seeking treatment. An individual can come to any station 24 hours day and a firefighter will take them to a treatment facility (City of Manchester, 2019).

### Substance Use Disorder Treatment in Jails and Prisons

It is imperative that jails and prisons provide evidence-based treatments for individuals with substance use disorders (CASA, 2017). Penobscot, Kennebec, and Cumberland Counties recently began providing MAT to inmates. Currently, neither Somerset County nor Washington County jails provide MAT. Maine will begin offering MAT to inmates at several state correctional facilities, including the Maine Correctional Center, the Bolduc Correctional Facility, and the Southern Maine Women's Reentry Center. Inmates must be within six months of release to participate in this pilot program (Abbate, 2019).

## Summary of Services in the Most Vulneable Areas

Overall, the evaluation of existing prevention, harm reduction, treatment/recovery, and law enforcement/criminal justice services in the most vulnerable areas revealed a lack of services in Somerset County, northern Penobscot County, and Washington County (especially in the northern area). The Portland area of Cumberland County, Augusta area of Kennebec, and Bangor area of Penobscot County have access to the most services.

## Overall Assessment Summary, Recommendations, and Dissemination Plan

The vulnerability assessment described in this report used the U.S. CDC's vulnerability index methodology (Van Handel et al., 2016) to identify communities in Maine that are particularly vulnerable to opioid overdoses and bloodborne infections associated with non-sterile injection opioid use.

The aims of the assessment were to:

1. Use a data-driven social indicator approach to identify sub-state areas at high risk for opioid overdoses and bloodborne infections associated with non-sterile injection opioid use
2. Use findings from the vulnerability assessment to make recommendations for interventions that strategically allocate services to sub-state areas at greatest risk

The assessment was conducted from February to July of 2019. It was guided by a 15-member Vulnerability Assessment Stakeholder Group representing 13 organizations throughout Maine. It employed a multi-step approach to achieve its aims. Steps included compiling a list of 120 candidate indicator variables; using two statistical approaches to identify the most vulnerable areas (Social Vulnerability Index and Poisson regression modelling); reviewing the literature and national best practices for prevention, harm reduction, treatment/recovery, and law enforcement/criminal justice approaches; evaluating existing services available in the most vulnerable areas in Maine; and making recommendations for strategically placed interventions

Opioid-related statistical analyses were conducted at the county and subcounty levels, but bloodborne infection analyses only were done at the county level because data were not available at the subcounty level. The bloodborne infection analyses indicated that Penobscot, Kennebec, and Washington Counties were the most vulnerable followed by Androscoggin, Somerset, and Waldo Counties.

Findings from the opioid-related statistical analyses revealed nine highly vulnerable subcounty areas (Portland area of Cumberland County, the northern and southern areas of Kennebec County, the northern and Bangor areas of Penobscot County, the northern and southern areas of Somerset County, and the northern and southern areas of Washington County). The Portland area of Cumberland County, the southern area Kennebec County, and the entirety of Washington County were the most vulnerable areas.

After synthesizing the opioid-related findings with the bloodborne infection findings, this assessment identified five sub-state areas that interventions should target: Kennebec County, Penobscot County, the Portland area of Cumberland County, Somerset County, and Washington County.

Overall, the evaluation of existing prevention, harm reduction, treatment/recovery, and law enforcement/criminal justice services in the most vulnerable areas of Maine revealed a lack of services in Somerset County, northern Penobscot County, and Washington County (especially in the northern area). The Portland Area of Cumberland County, Augusta area of Kennebec, and Bangor area of Penobscot County have access to the most services.

## Recommendations

Findings from this assessment indicate several areas of focus for improved services in the most vulnerable areas in Maine. With the help of the stakeholder group, PCG developed two sets of recommendations. The first set is intended for the Maine CDC HIV, STD, and Viral Hepatitis Program, and specifically focus on short-term recommendations associated with bloodborne infections. The second set include both opioid overdose and bloodborne infection recommendations and most will require coordination among multiple state and/or private agencies.

### Maine CDC HIV, STD, and Viral Hepatitis Program Recommendations

*Prevention*

1. Work with community prevention organizations to incorporate overdose and bloodborne infection prevention into the services they provide. Prioritize working with organizations in the most vulnerable areas.
2. Continue working with community partners in the most vulnerable areas and encourage them to increase access to free or reduced cost HIV, Hepatitis B, and Hepatitis C testing. Assist them with implementing non-invasive testing methods such as rapid HIV testing via oral swabs and Hepatitis C testing via finger pricks.

*Harm Reduction*

1. Research additional sources of state, federal, and private funding for syringe exchange programs. Use funding to open syringe exchange programs in Somerset County and northern Washington County and expand operating hours and staff at the seven existing exchange locations.
2. Continue to provide PrEP education to healthcare providers and patients and focus efforts in the most vulnerable areas.

*Treatment and Recovery*

1. Explore ways to increase availability of telehealth for hepatitis.

## Recommendations for Other State Government and/or Private Agencies

### *Prevention*

1. Encourage the Maine Department of Education and Maine CDC's Division of Disease Prevention to implement evidence-based substance use and bloodborne infection prevention programs in schools. Programs should specifically target high-risk youth, such as those who have experienced adverse childhood experiences.
2. Work with the Maine legislature on legislation requiring that HIV, Hepatitis B, and Hepatitis C testing be offered to all individuals receiving hospital or primary care services. Look to the 2010 New York state law that mandates HIV testing be offered to all people between the ages of 13 and 64 who are receiving hospital or primary care services.

### *Harm Reduction*

1. Investigate the feasibility of implementing innovative syringe exchange programs such as satellite syringe exchange units, vending machines, and pharmacy exchanges.
2. Explore implementing a safe injection site pilot program in the most vulnerable urban areas, such as Bangor and Portland.
3. Thoroughly assess naloxone availability in the most vulnerable areas and investigate ways to expand access if needed.
4. Implement comprehensive case management programs for active substance users, especially in the most vulnerable areas. Programs should not require an individual be enrolled in substance use treatment to receive services.

### *Treatment and Recovery*

1. Employ strategies used by other states to increase the number of MAT providers in the most vulnerable areas, especially in Somerset County and northern Washington County. For example, Virginia conducts trainings on addiction treatment that include a DATA 2000 waiver training to encourage MAT participation and Maryland law requires that all health care facilities have a physician who is authorized to prescribe MAT.
2. Encourage organizations in the most vulnerable areas to become Opioid Health Home hubs, especially organizations in Somerset County and northern Washington County. This will ensure that all individuals in treatment and recovery have access to comprehensive case management services.
3. Develop a centralized web-based database of treatment and recovery services, similar to Massachusetts and Rhode Island, which is updated on an ongoing basis and contains information about capacity, waitlists, services provided, location, and cost.
4. Provide screening, brief intervention, and referral to treatment (SBIRT) trainings to staff (clinical and non-clinical) at general healthcare organizations. Look to programs being implemented in other states, such as the ASSERT program in Connecticut and Massachusetts.

5. Encourage providers at general healthcare organizations to become Opioid Health Home spokes, buprenorphine prescribers, PrEP prescribers, and to incorporate bloodborne infection testing into their clinical workflows.
6. Increase the availability of telehealth for MAT, HIV, Hepatitis B, and Hepatitis C.
7. Work with the Maine Association of Recovery Residences to increase the number of recovery residences in areas outside of Cumberland County and require that residencies accept individuals on MAT.
8. Assist the Portland Recovery Community Center, which serves as the Maine Recovery Hub, in opening centers in vulnerable areas that do not currently have one (Kennebec County and Somerset County).
9. Partner with the Maine State Housing Authority, Community Housing of Maine, local jurisdictions, and other local community organizations to create homelessness programs based on the "Housing First" model. Prioritize opening programs in vulnerable areas that currently do not have programs.

### *Law Enforcement and Criminal Justice*

1. Encourage the Maine Judicial Branch to expand access to Adult Drug Treatment Courts and Family Treatment Drug Courts.
2. Explore sources of funding to reduce the participation cost of alternative sentencing programs so that all eligible individuals can participate.
3. Assess what law enforcement and other first responder agencies (*e.g.,* fire department, EMS) are doing to address the opioid epidemic in the most vulnerable areas. Work with the agencies to implement programs like the Portland Police Department's Law Enforcement Addiction Advocacy Program (LEAAP), Gloucester, Massachusetts' Angel Project, and Lucas County Ohio's Drug Abuse Response Team.
4. Work with the Somerset and Washington County sheriff's departments to implement MAT in county jails.

## Dissemination Plan

In collaboration with the stakeholder group, PCG identified several strategies for disseminating the findings. The primary dissemination method is distribution of the fact sheet and executive summary to a diverse set of organizations throughout the state. Secondary dissemination methods, which are more time-intensive, include presenting findings at local meetings in the most vulnerable areas and at conferences. This section outlines the proposed groups to target.

### Healthcare and Substance Use Treatment Providers

- Provide the fact sheet and executive summary to hospitals, Federally Qualified Health Centers, primary care practices, and substance use treatment providers in the most vulnerable counties.

### Law Enforcement and Criminal Justice Agencies

- Provide the fact sheet and the executive summary to county sheriff's departments, town/city police departments, district attorney's offices, state prisons, and county jails.

### Local Social Service Organizations

- Provide the fact sheet and executive summary to local organizations providing social services related to employment, housing, substance use prevention (*e.g.,* Drug Free Communities), and child welfare.

### Local Government Leadership

- Present findings at city/town council meetings and school board meetings in the most vulnerable areas.
- Provide the fact sheet and executive summary to town and city governments throughout the state.

### Maine CDC Division of Disease Prevention

- Present findings at the bi-monthly Tobacco and Substance Use Prevention Advisory Board meeting.

### Maine Director of Opioid Response

- Meet with Gordon Smith, the Director of Opioid Response, to discuss findings.

### Professional Associations and Conferences

- Provide the fact sheet and executive summary to a variety health-related, law enforcement, and criminal justice professional associations such as the

Maine Medical Association, Maine Hospital Association, Maine Association of Police, and Maine State Bar Association.

- Present findings at conferences, including the 2019 Northeast Epidemiology Conference and 2019 Maine Prevention Professionals Conference.

### Public Health District Coordinating Councils (DCC)

- Provide the fact sheet and executive summary to the nine DCCs in the state.
- Present findings at DCC meetings in the most vulnerable counties: District 2 (Cumberland), District 5 (Somerset and Kennebec), District 6 (Penobscot), and District 7 (Washington).

### Statewide Epidemiology Outcomes Workgroup

- Present findings at the quarterly SEOW opioid data meeting.

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# Appendix A. County and Subcounty Maps and Rates

### Figure A-1. Counties

**Figure A-2. Subcounty Areas**

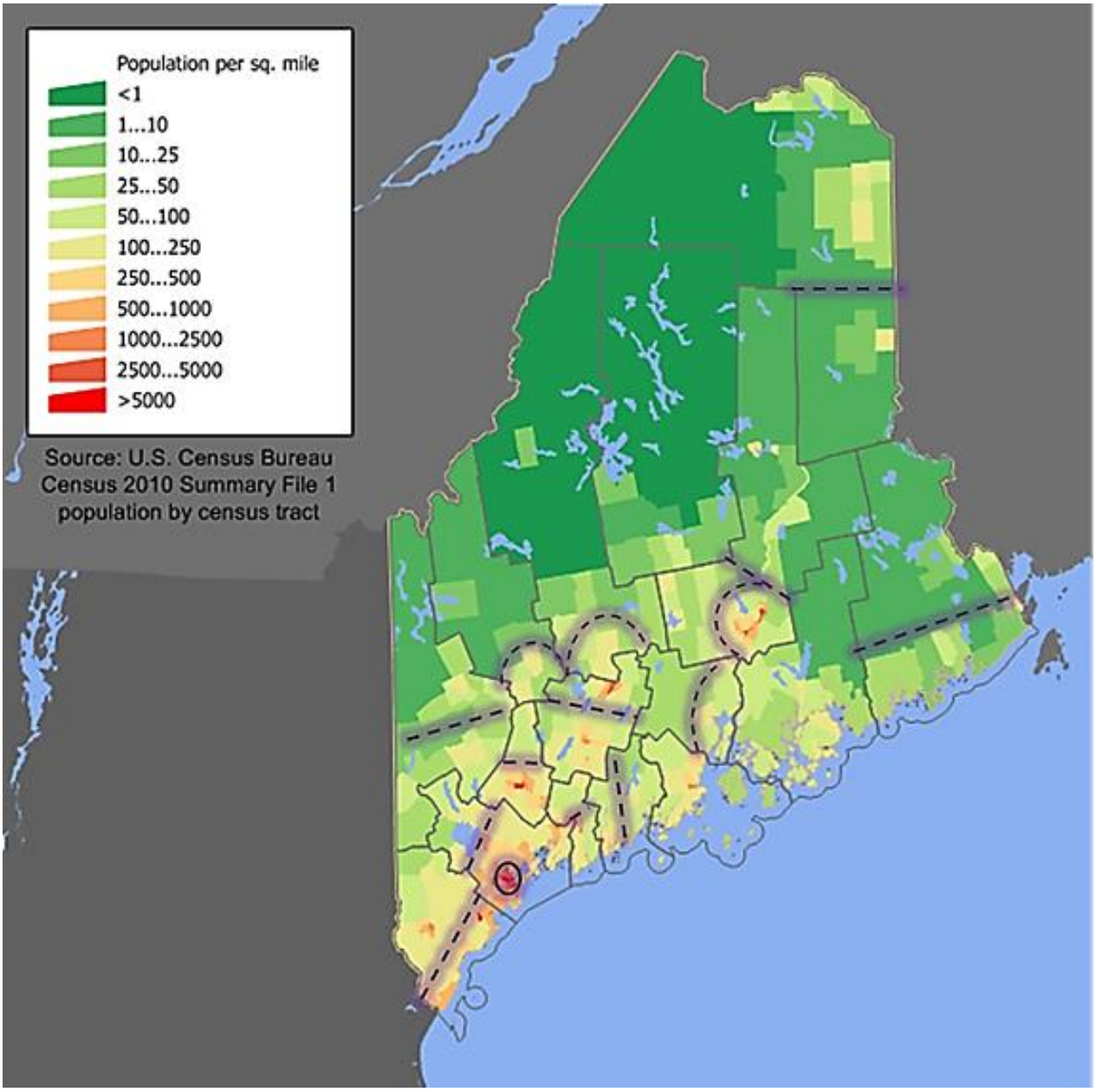
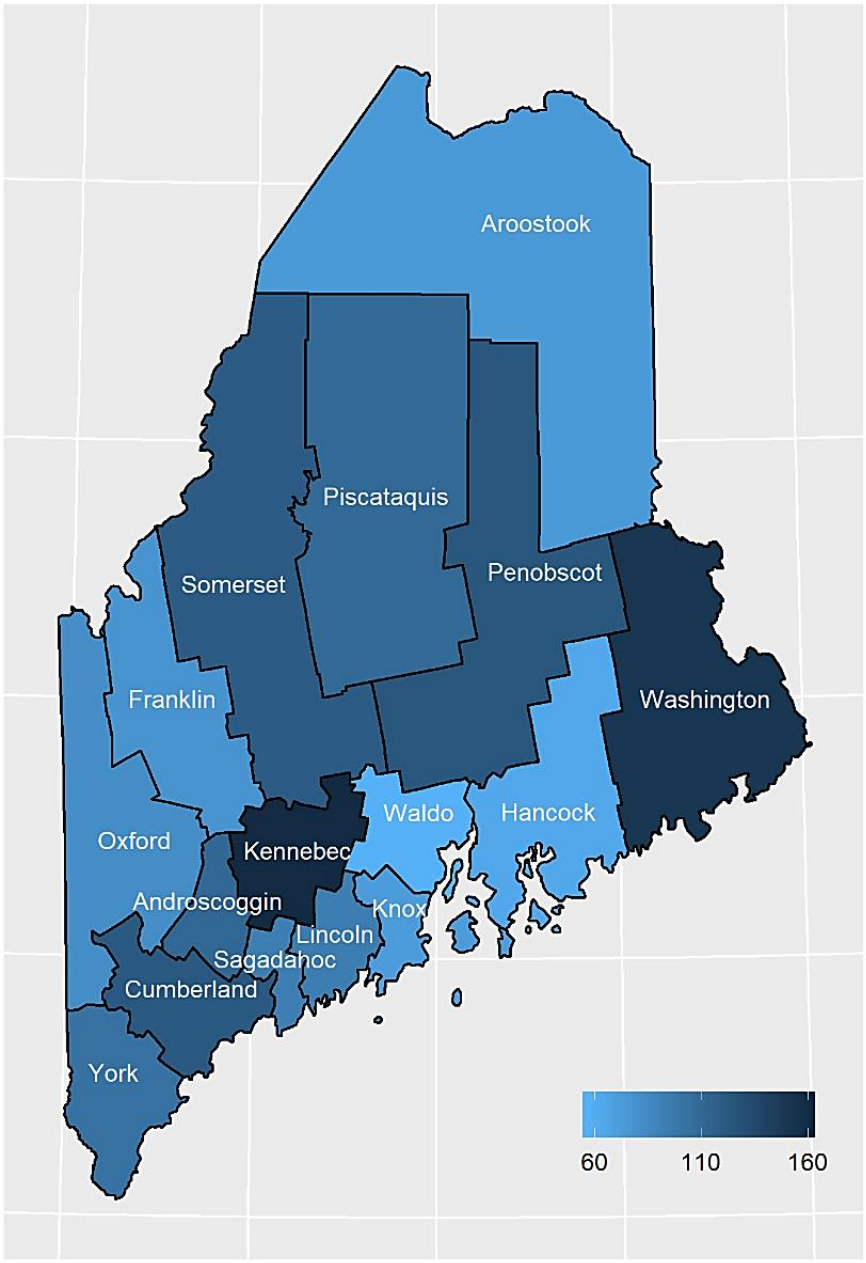


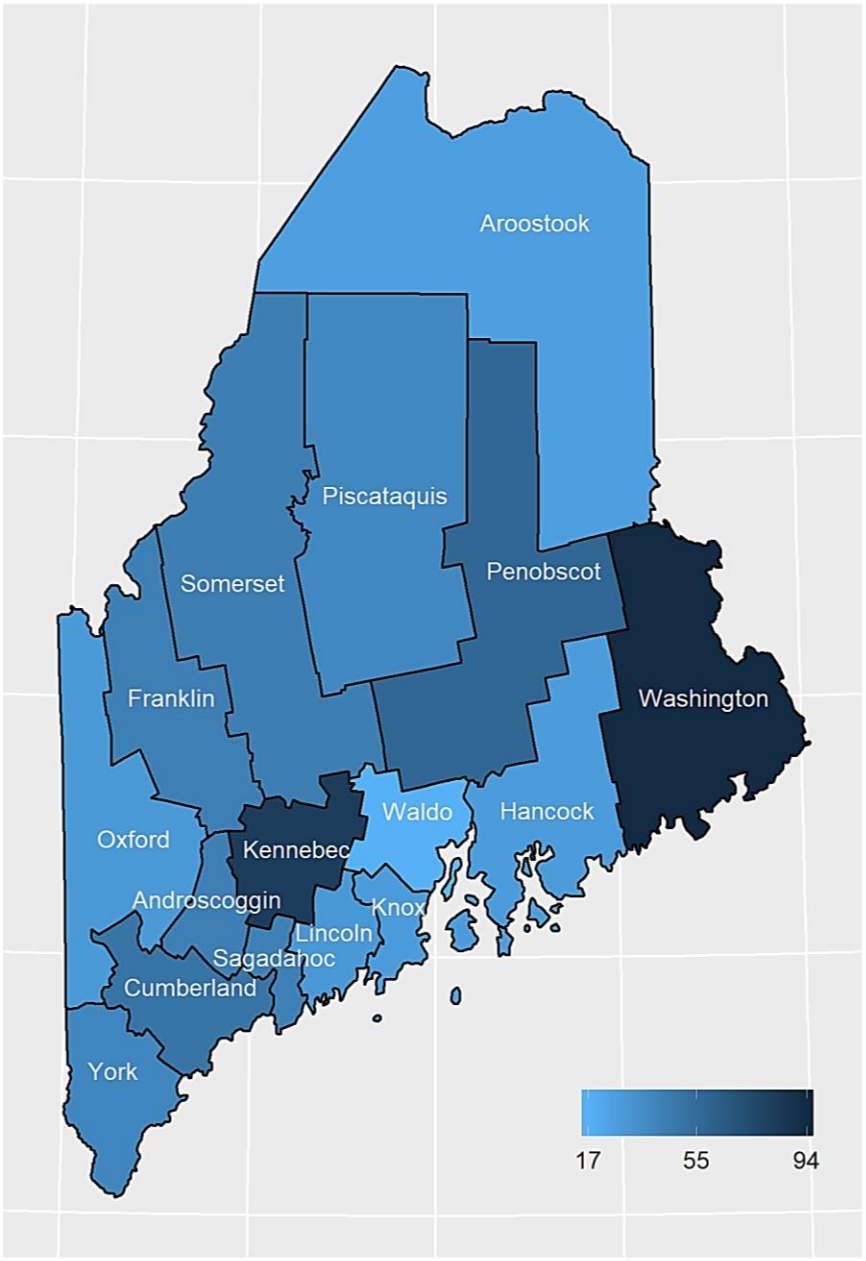
**Figure A-3. Non-Fatal Opioid Overdose *Per Capita* Rates**




| County | Rate |
|---|---|
| Waldo | 57.3 |
| Hancock | 63.3 |
| Knox | 71.8 |
| Aroostook | 73.4 |
| Franklin | 77.9 |
| Oxford | 82.1 |
| Sagadahoc | 93.9 |
| Lincoln | 94.1 |
| York | 102.5 |
| Piscataquis | 109.1 |
| Androscoggin | 110.4 |
| Somerset | 119.6 |
| Cumberland | 121.7 |
| Penobscot | 123.8 |
| Washington | 150.8 |
| Kennebec | 160.4 |

**Counties with higher rates are shown in darker colors.**

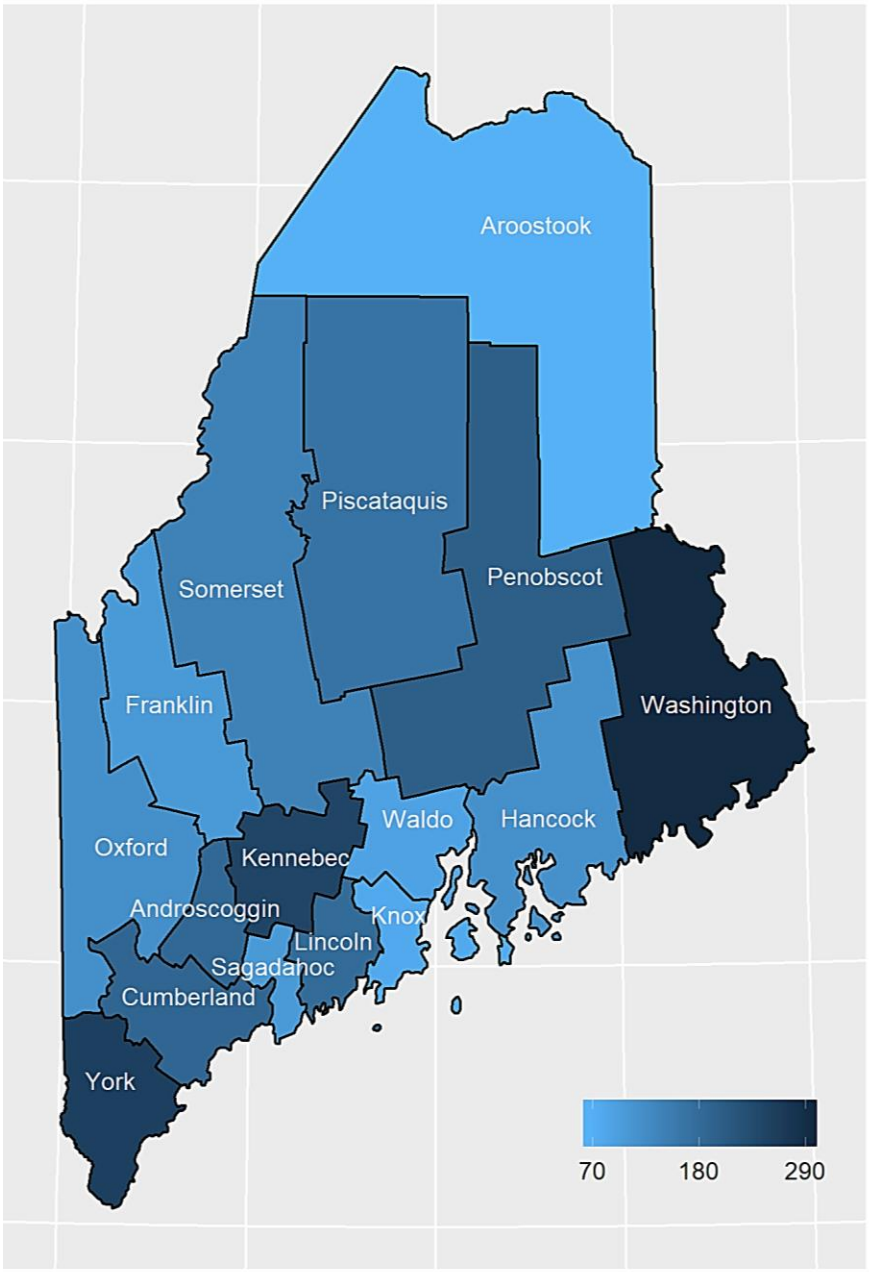
**Figure A-4. Non-Fatal Heroin Overdose *Per Capita* Rates**




| County | Rate |
|---|---|
| Waldo | 16.5 |
| Aroostook | 26.1 |
| Hancock | 27.5 |
| Knox | 27.7 |
| Oxford | 28.8 |
| Lincoln | 29.4 |
| Piscataquis | 38.3 |
| York | 39.2 |
| Sagadahoc | 42.7 |
| Androscoggin | 42.9 |
| Franklin | 43.1 |
| Somerset | 44.1 |
| Cumberland | 49.1 |
| Penobscot | 57.1 |
| Kennebec | 82.45 |
| Washington | 94.27 |

**Counties with higher rates are shown in darker colors.**

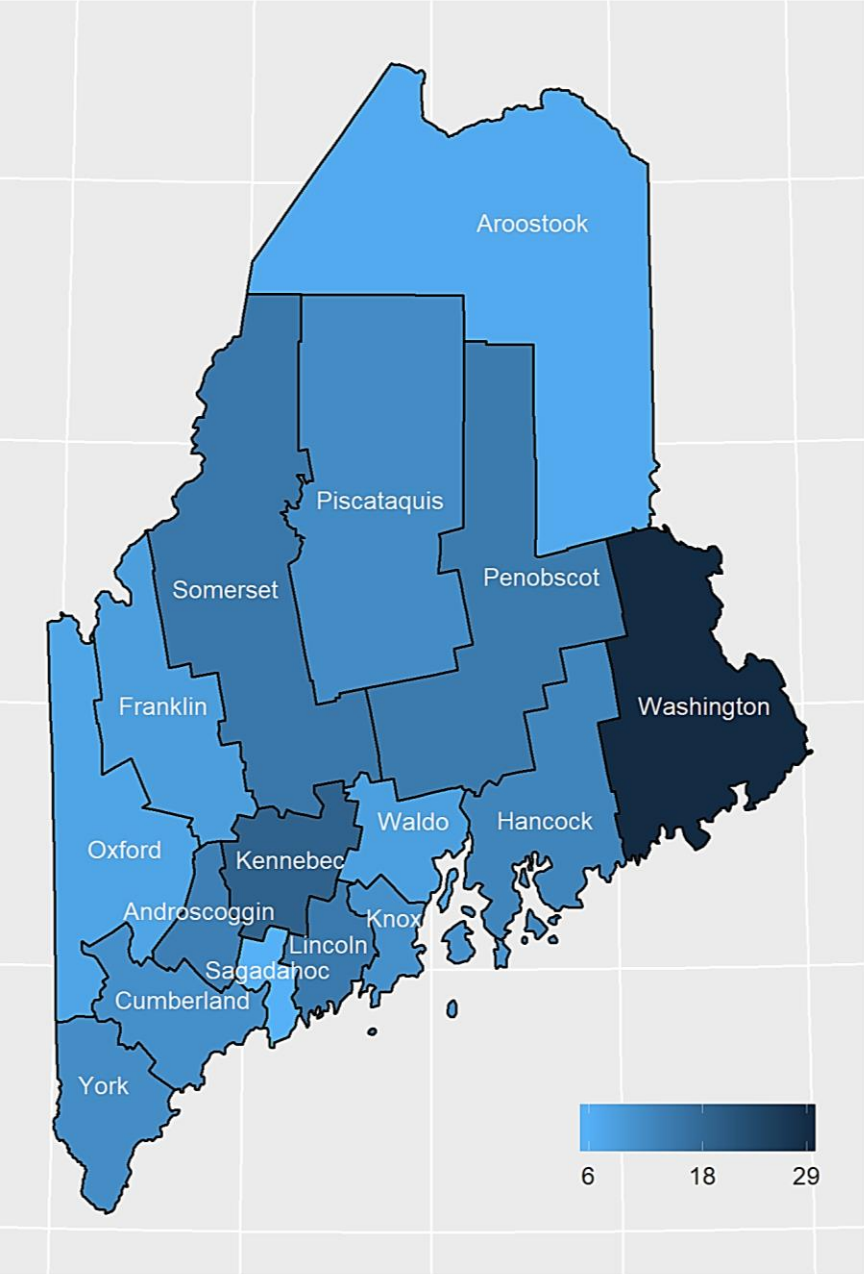
**Figure A-5. Naloxone Administration Incident *Per Capita* Rates**




| County | Rate |
|---|---|
| Aroostook | 66.1 |
| Knox | 78.1 |
| Waldo | 89.1 |
| Sagadahoc | 102.4 |
| Franklin | 102.7 |
| Hancock | 118.4 |
| Oxford | 118.8 |
| Somerset | 141.2 |
| Piscataquis | 165.1 |
| Lincoln | 177.8 |
| Androscoggin | 184.0 |
| Cumberland | 188.5 |
| Penobscot | 200.3 |
| Kennebec | 246.5 |
| York | 254.6 |
| Washington | 295.4 |

**Counties with higher rates are shown in darker colors.**

**Figure A-6. Opioid-Related Mortality *Per Capita* Rates**




| County | Rate |
|---|---|
| Sagadahoc | 5.7 |
| Aroostook | 6.8 |
| Oxford | 7.6 |
| Waldo | 8.5 |
| Franklin | 8.8 |
| Knox | 10.9 |
| Cumberland | 11.2 |
| York | 11.6 |
| Piscataquis | 11.8 |
| Hancock | 12.9 |
| Androscoggin | 13.7 |
| Penobscot | 14.7 |
| Lincoln | 14.7 |
| Somerset | 15.0 |
| Kennebec | 19.0 |
| Washington | 29.3 |

**Counties with higher rates are shown in darker colors.**

**Table A-1. Subcounty Non-Fatal Opioid Overdose *Per Capita* Rates**

| Subcounty Area | Rate |
|---|---|
| Franklin_North | 32.9 |
| Waldo_East | 49.4 |
| Hancock | 64.3 |
| Aroostook_South | 65.1 |
| Waldo_West | 65.5 |
| Oxford_South | 65.7 |
| Knox | 71.8 |
| Aroostook_North | 76.2 |
| Cumberland_East | 82.2 |
| Sagadahoc_West | 82.7 |
| Penobscot_West | 88.0 |
| Androscoggin_North | 88.0 |
| Lincoln_East | 89.4 |
| Franklin_South | 95.9 |
| Lincoln_West | 98.3 |
| York_East | 100.5 |
| Cumberland_West | 103.3 |
| York_West | 104.6 |
| Sagadahoc_East | 106.0 |
| Somerset_North | 109.3 |
| Penobscot_North | 109.7 |
| Oxford_North | 111.0 |
| Piscataquis | 111.6 |
| Androscoggin_South | 114.8 |
| Somerset_South | 122.5 |
| Penobscot_Bangor | 130.1 |
| Kennebec_North | 139.7 |
| Washington_North | 143.6 |
| Washington_South | 154.9 |
| Kennebec_South | 174.1 |
| Cumberland_Portland | 198.9 |

**Table A-2. Subcounty Non-Fatal Heroin/Fentanyl Overdose *Per Capita* Rates**

| Subcounty Area | Rate |
|---|---|
| Franklin_North | 13.2 |
| Waldo_East | 14.8 |
| Aroostook_South | 15.5 |
| Waldo_West | 18.3 |
| Lincoln_East | 24.7 |
| Knox | 27.7 |
| Oxford_North | 27.7 |
| Hancock | 28.4 |
| Oxford_South | 28.9 |
| Aroostook_North | 29.5 |
| Androscoggin_North | 31.2 |
| Lincoln_West | 33.7 |
| Cumberland_East | 34.5 |
| Penobscot_East | 36.1 |
| York_West | 36.4 |
| Sagadahoc_West | 38.6 |
| Piscataquis | 39.2 |
| Cumberland_West | 40.7 |
| York_East | 41.8 |
| Somerset_South | 43.7 |
| Androscoggin_South | 45.1 |
| Somerset_North | 46.8 |
| Sagadahoc_East | 47.1 |
| Penobscot_North | 53.9 |
| Franklin_South | 54.8 |
| Kennebec_North | 57.9 |
| Penobscot_Bangor | 60.1 |
| Washington_North | 75.6 |
| Cumberland_Portland | 78.1 |
| Kennebec_South | 98.7 |
| Washington_South | 106.8 |

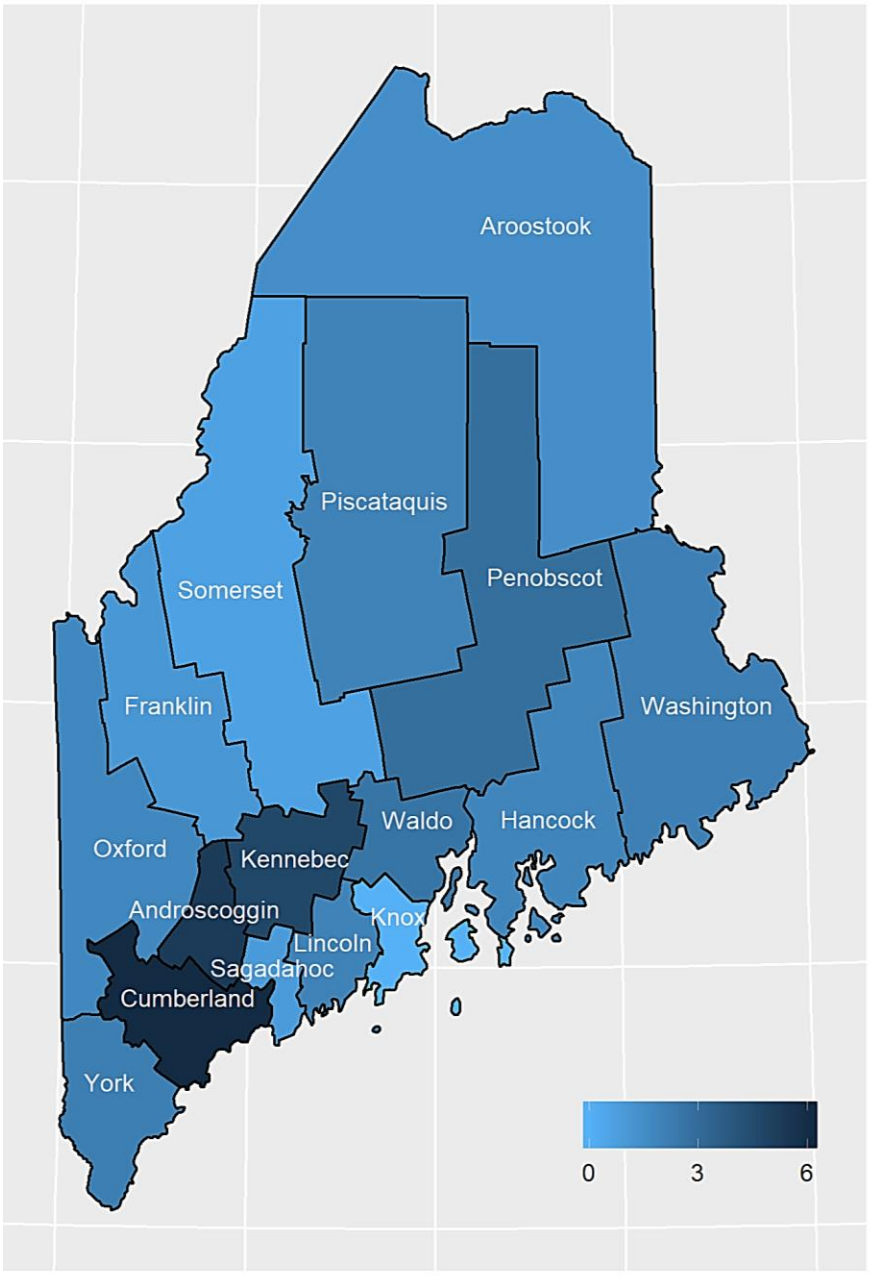
**Table A-3. Subcounty Naloxone Administration Incident *Per Capita* Rates**

| Subcounty Area | Rate |
|---|---|
| Aroostook_South | 41.7 |
| Waldo_West | 69.6 |
| Aroostook_North | 73.9 |
| Androscoggin_North | 76.2 |
| Knox | 78.1 |
| Sagadahoc_West | 80.0 |
| Penobscot_North | 96.1 |
| Lincoln_East | 96.6 |
| Franklin_North | 98.7 |
| Franklin_South | 107.3 |
| Waldo_East | 107.4 |
| Oxford_South | 108.2 |
| Cumberland_West | 117.8 |
| Hancock | 121.9 |
| Sagadahoc_East | 126.6 |
| Oxford_North | 135.4 |
| Cumberland_East | 137.3 |
| Somerset_North | 141.2 |
| Somerset_South | 141.8 |
| Lincoln_West | 161.9 |
| Penobscot_West | 166.5 |
| Piscataquis | 168.9 |
| Kennebec_North | 204.6 |
| Androscoggin_South | 205.2 |
| York_West | 216.4 |
| Penobscot_Bangor | 227.5 |
| Washington_South | 260.8 |
| Kennebec_South | 274.3 |
| York_East | 290.5 |
| Cumberland_Portland | 305.9 |
| Washington_North | 341.5 |

**Table A-4. Subcounty Opioid-Related Mortality *Per Capita* Rates**

| Subcounty Area | Rate |
|---|---|
| Sagadahoc_West | 3.7 |
| Lincoln_East | 4.1 |
| Oxford_South | 5.3 |
| Aroostook_North | 6.4 |
| Somerset_North | 6.9 |
| Cumberland_East | 7.5 |
| Androscoggin_North | 7.6 |
| Franklin_South | 7.6 |
| Sagadahoc_East | 7.9 |
| Waldo_East | 8.2 |
| Aroostook_South | 8.3 |
| York_West | 8.5 |
| Cumberland_West | 8.7 |
| Waldo_West | 8.7 |
| Franklin_North | 8.8 |
| Knox | 10.9 |
| Oxford_North | 11.8 |
| Hancock | 13.2 |
| Penobscot_North | 13.3 |
| Penobscot_Bangor | 14.0 |
| Piscataquis | 14.1 |
| York_East | 14.4 |
| Androscoggin_South | 14.9 |
| Penobscot_West | 15.0 |
| Kennebec_North | 15.2 |
| Somerset_South | 17.8 |
| Cumberland_Portland | 17.9 |
| Kennebec_South | 21.5 |
| Lincoln_West | 24.3 |
| Washington_South | 28.5 |
| Washington_North | 30.2 |

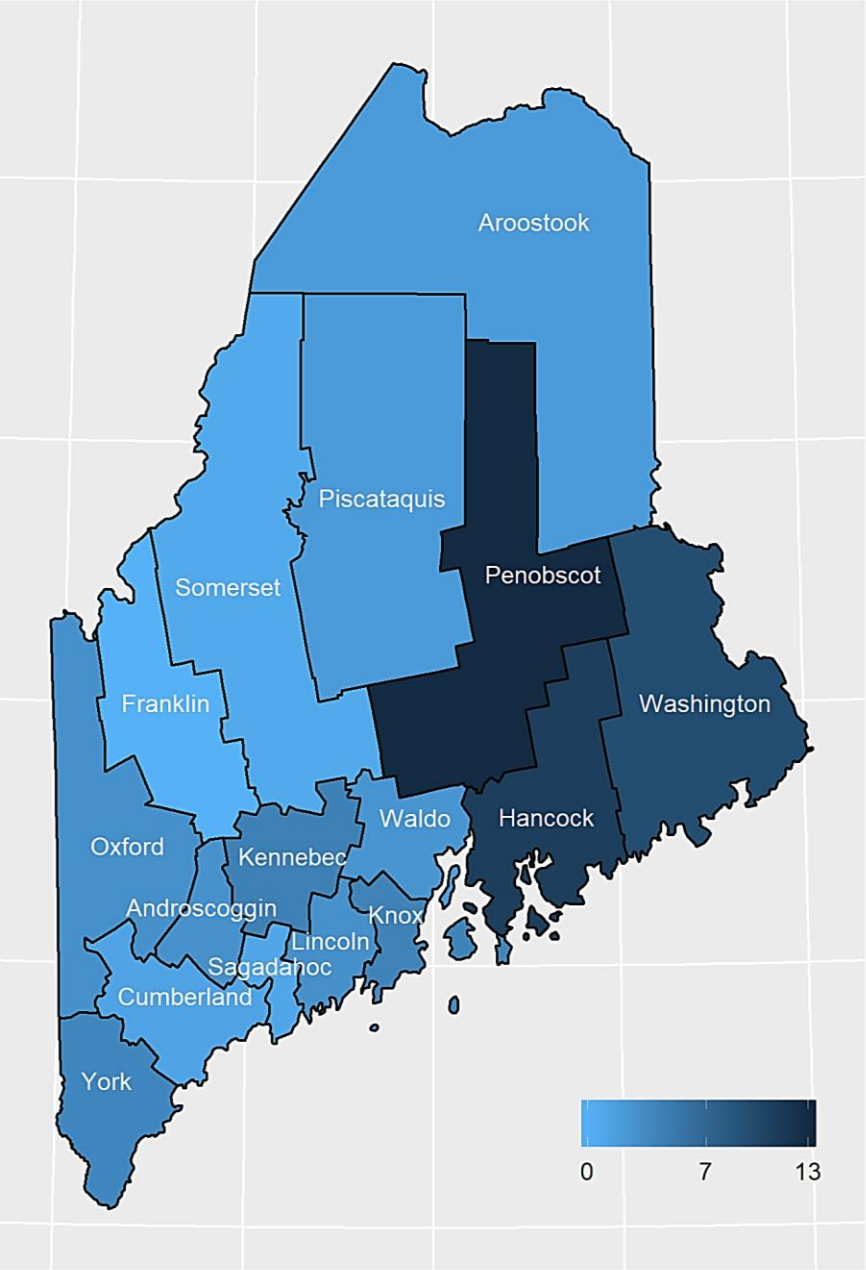
**Figure A-7. HIV *Per Capita* Rates**




| County | Rate |
|---|---|
| Knox | 0.0 |
| Somerset | 0.7 |
| Sagadahoc | 0.9 |
| Franklin | 1.1 |
| Aroostook | 1.5 |
| Oxford | 1.7 |
| Hancock | 1.8 |
| Lincoln | 2.0 |
| Piscataquis | 2.0 |
| Washington | 2.1 |
| York | 2.2 |
| Waldo | 2.5 |
| Penobscot | 2.8 |
| Kennebec | 4.7 |
| Androscoggin | 5.3 |
| Cumberland | 6.1 |

**Counties with higher rates are shown in darker colors.**

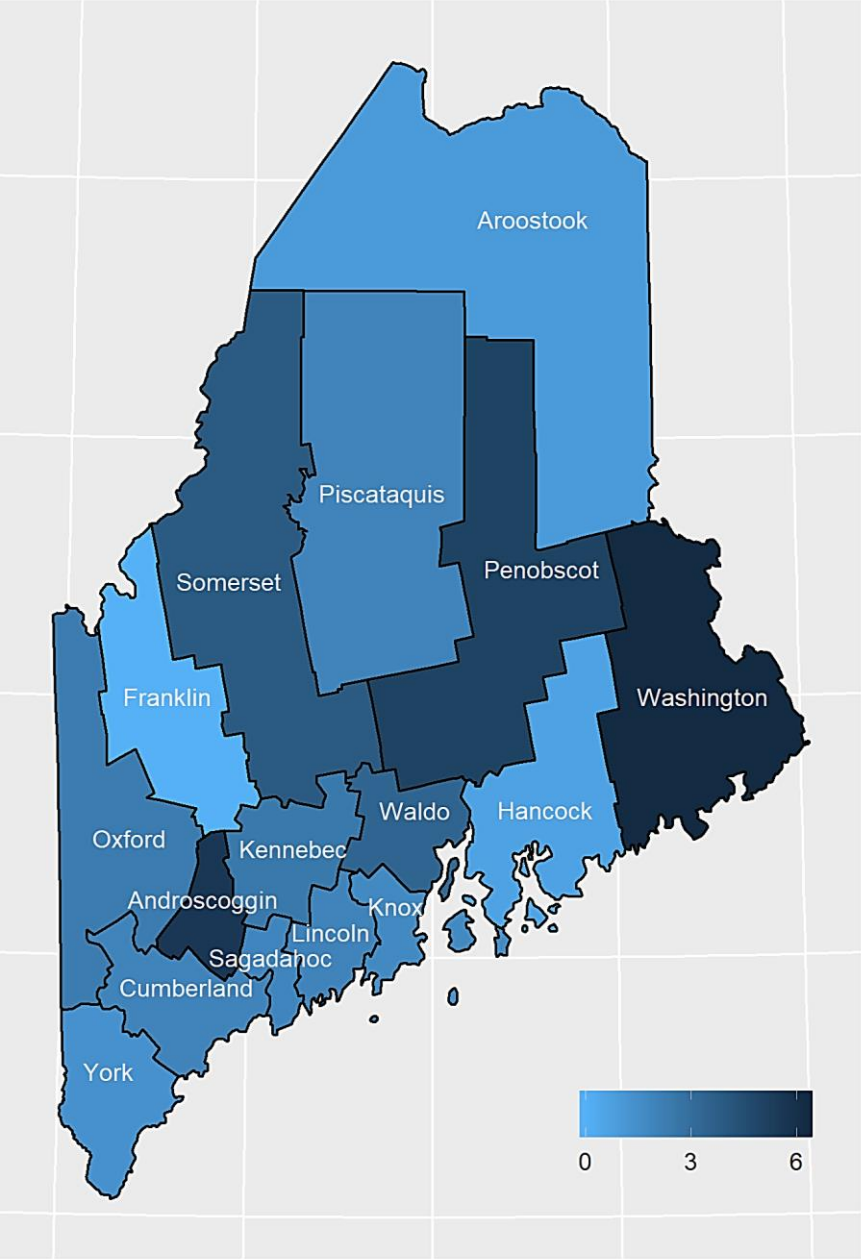
**Figure A-8. Acute Hepatitis B *Per Capita* Rates**




| County | Rate |
|---|---|
| Franklin | 0.0 |
| Somerset | 0.7 |
| Sagadahoc | 0.9 |
| Cumberland | 1.2 |
| Aroostook | 1.9 |
| Piscataquis | 2.0 |
| Waldo | 2.5 |
| Androscoggin | 2.8 |
| Oxford | 2.9 |
| Lincoln | 2.9 |
| York | 3.8 |
| Knox | 4.2 |
| Kennebec | 4.4 |
| Washington | 9.4 |
| Hancock | 11.0 |
| Penobscot | 13.1 |

**Counties with higher rates are shown in darker colors.**

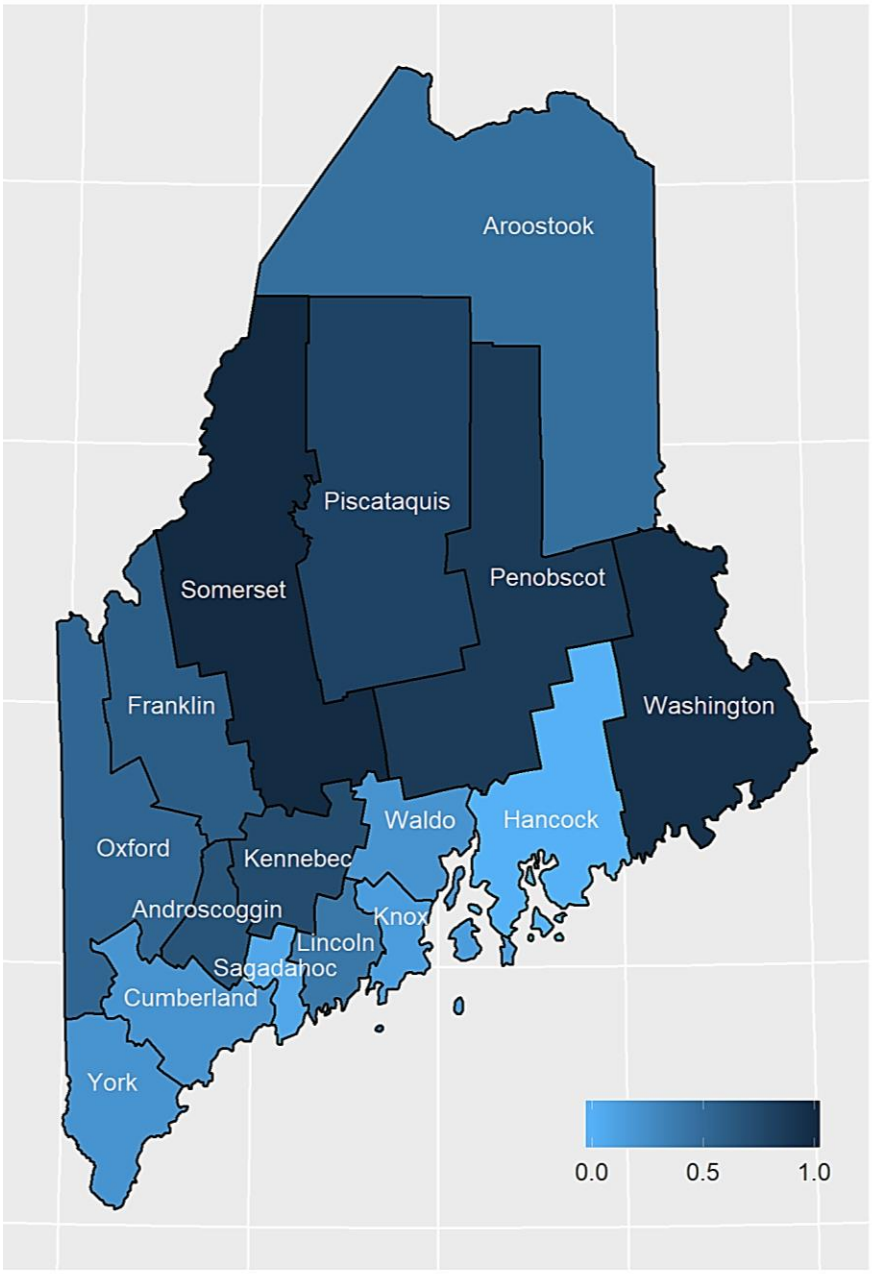
**Figure A-9. Acute Hepatitis C *Per Capita* Rates**




| County | Rate |
|---|---|
| Franklin | 0.0 |
| Hancock | 0.6 |
| Aroostook | 1.0 |
| York | 1.3 |
| Knox | 1.7 |
| Sagadahoc | 1.9 |
| Lincoln | 2.0 |
| Cumberland | 2.0 |
| Piscataquis | 2.0 |
| Oxford | 2.3 |
| Kennebec | 2.5 |
| Waldo | 3.4 |
| Somerset | 3.9 |
| Penobscot | 5.0 |
| Androscoggin | 5.6 |
| Washington | 6.3 |

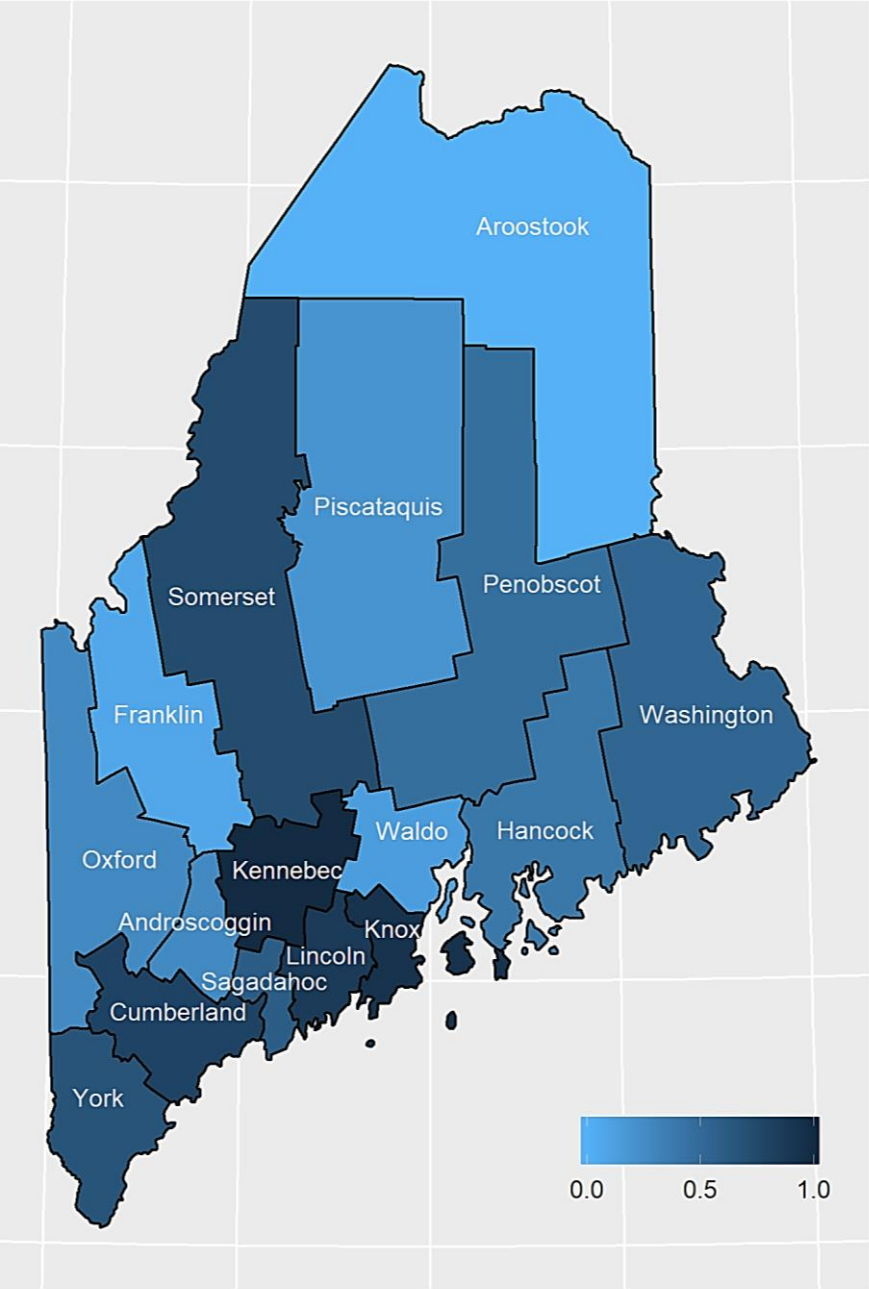
**Counties with higher rates are shown in darker colors.**

**Figure A-10. Overall Social Vulnerability Index Map**



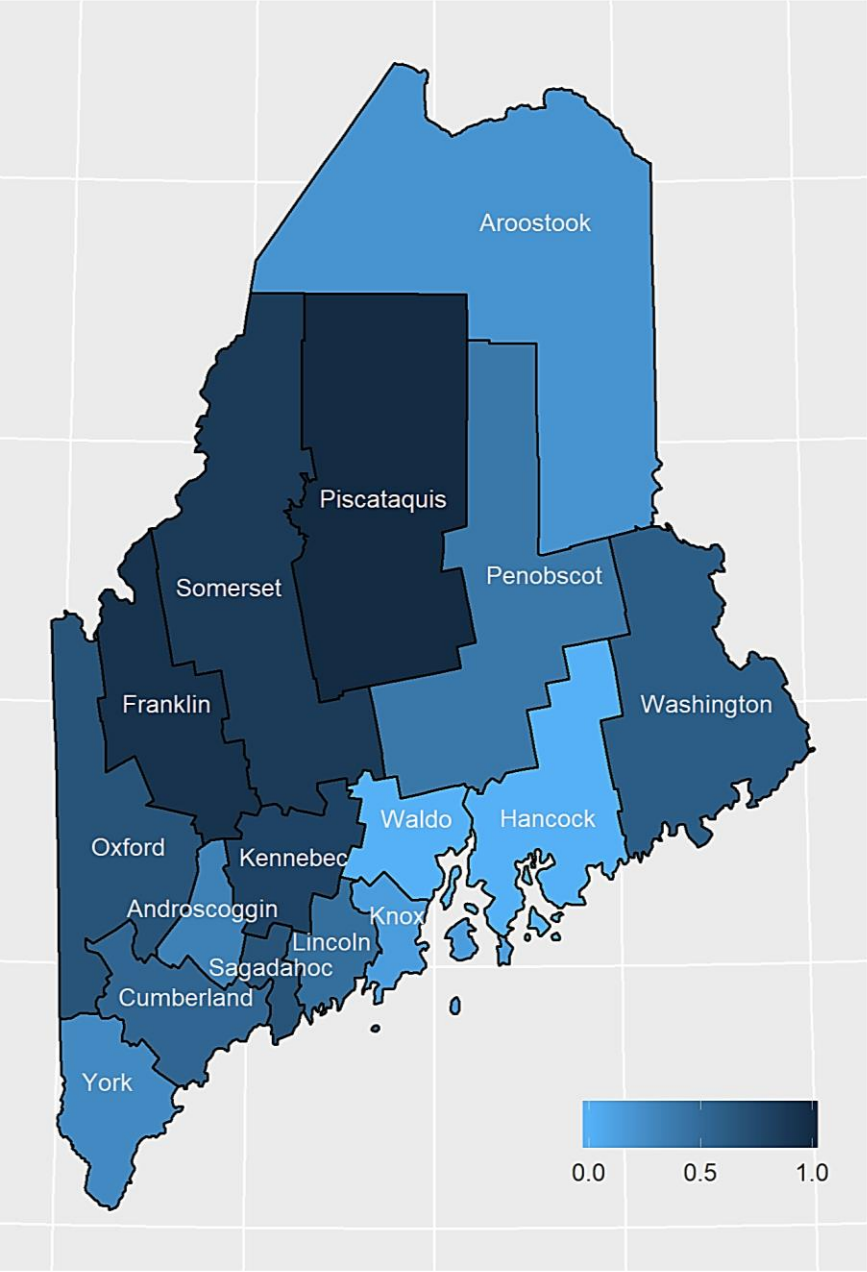

**Counties with higher rates are shown in darker colors.**

**Figure A-11. Social Vulnerability Index: Substance Use Domain Map**



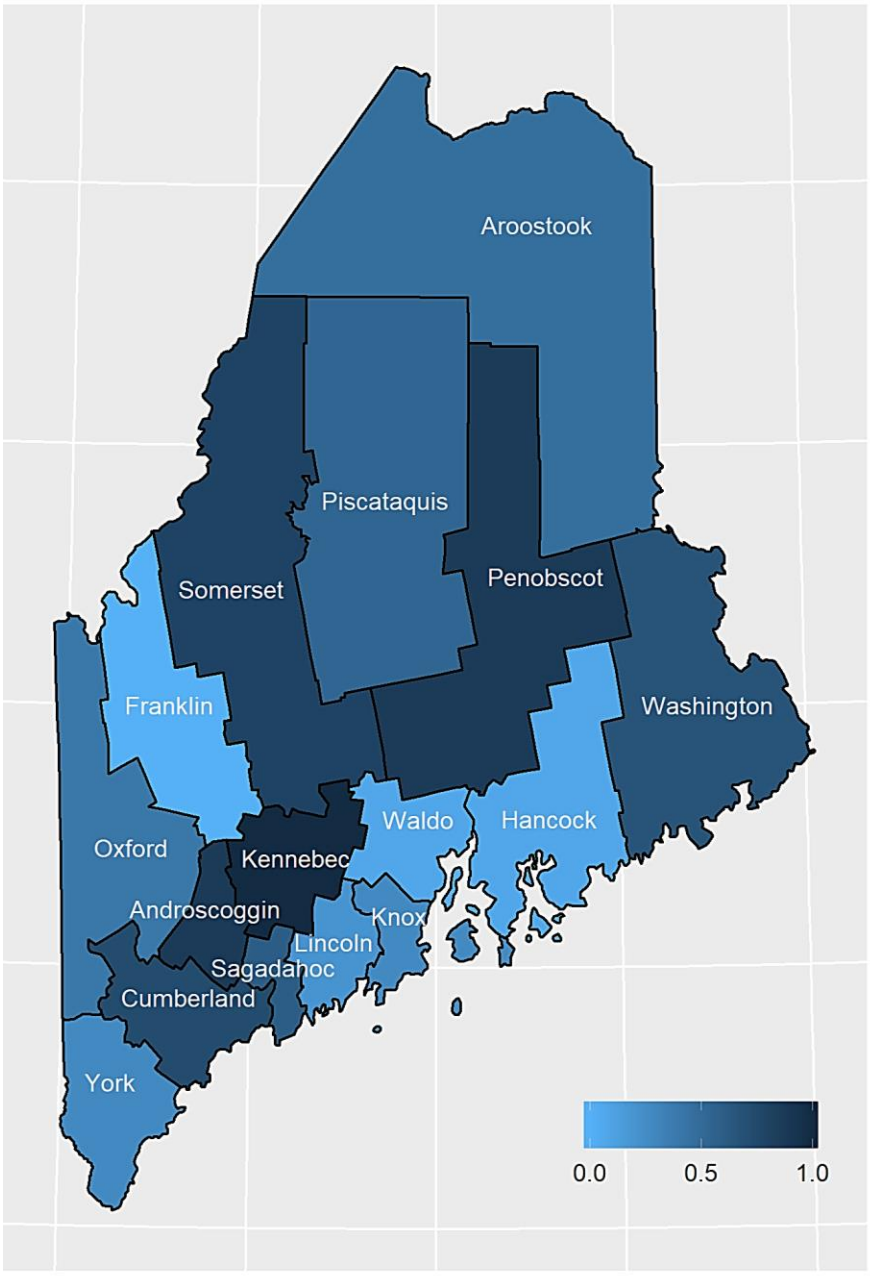

**Counties with higher rates are shown in darker colors.**

**Figure A-12. Social Vulnerability Index: Law Enforcement Domain Map**



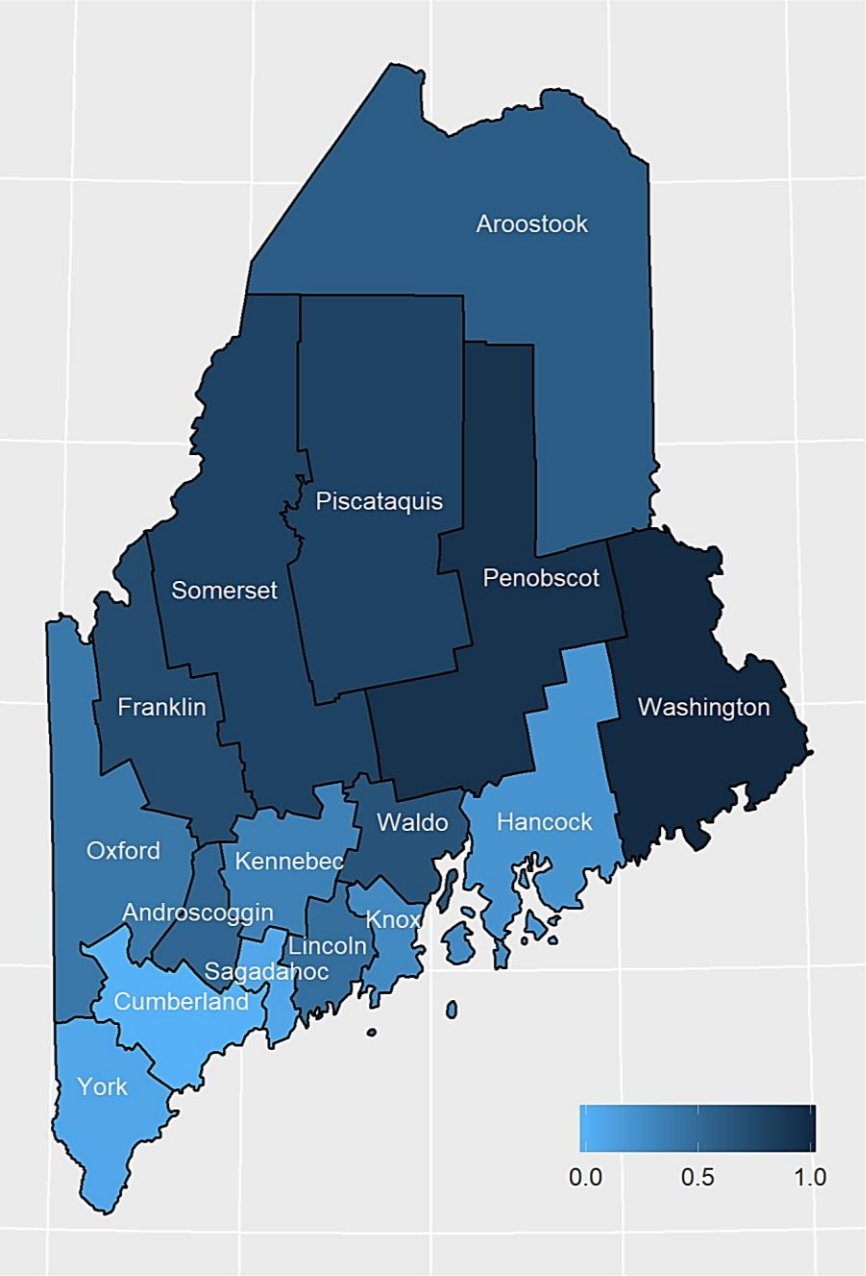

**Counties with higher rates are shown in darker colors.**

**Figure A-13. Social Vulnerability Index: Mental Health Domain Map**



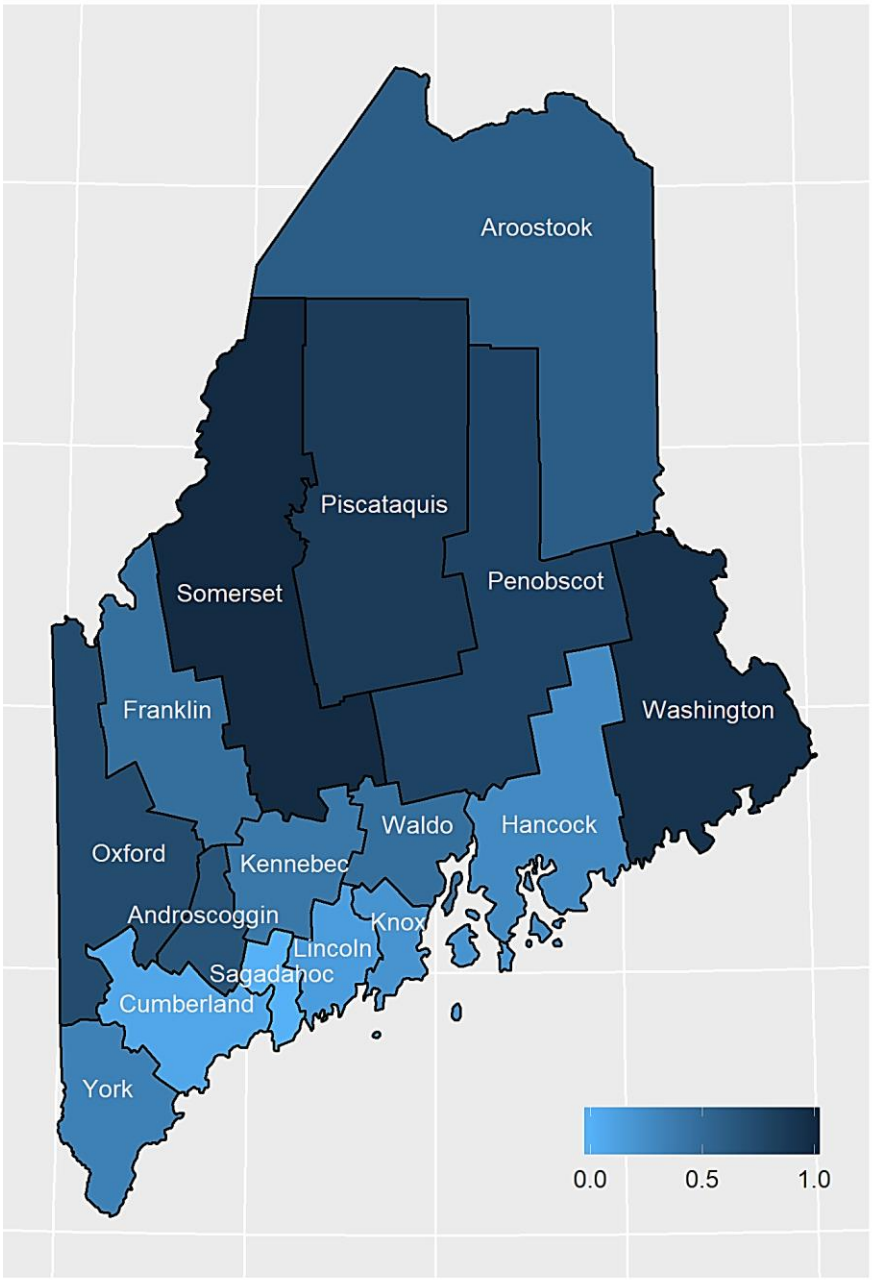

**Counties with higher rates are shown in darker colors.**

**Figure A-14. Social Vulnerability Index: Physical Health Domain Map**




**Counties with higher rates are shown in darker colors.**

**Figure A-15. Social Vulnerability Index: Socioeconomic Status Domain Map**




**Counties with higher rates are shown in darker colors.**

# Appendix B. Maps of Services in Maine

### Figure B-1. Drug Free Communities

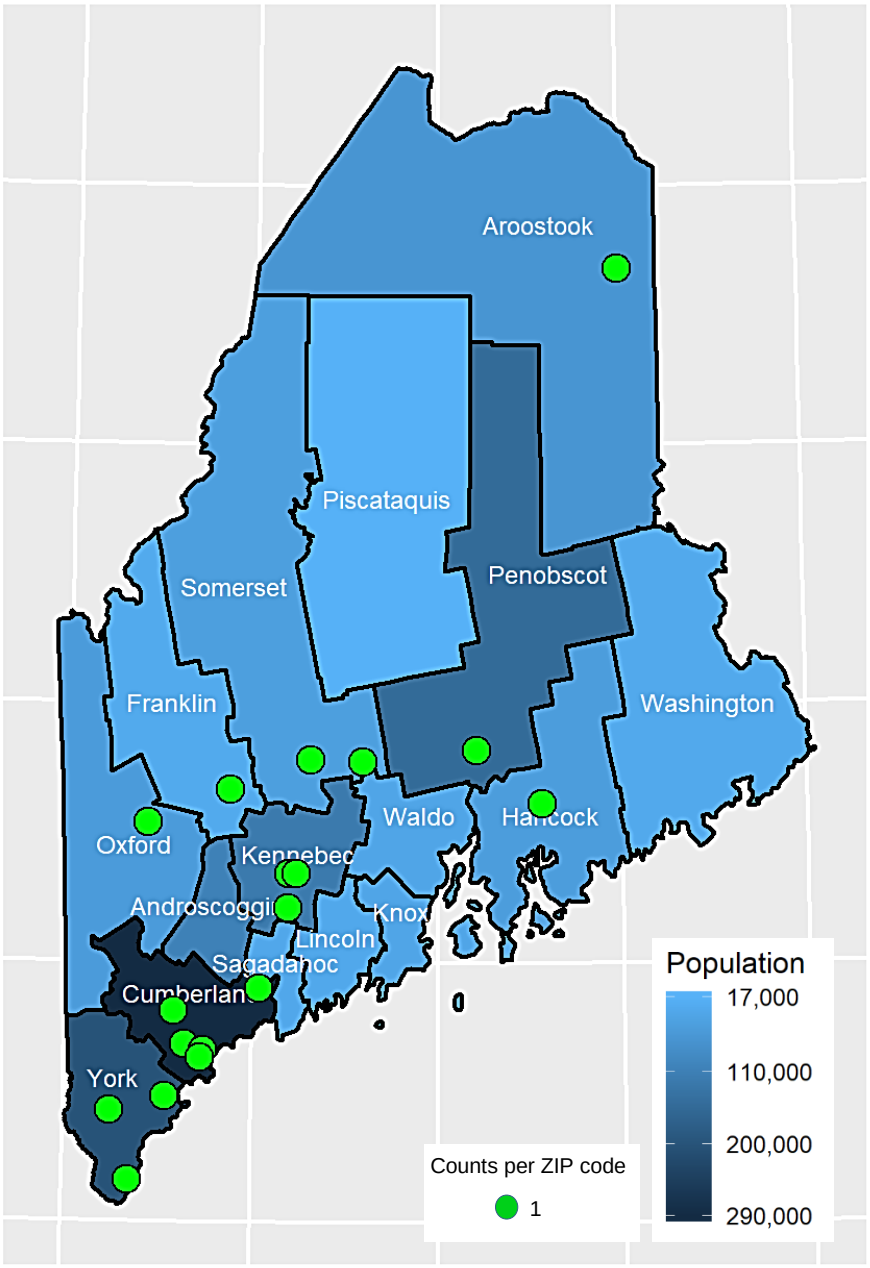


**Figure B-2. Community Prevention Organizations**

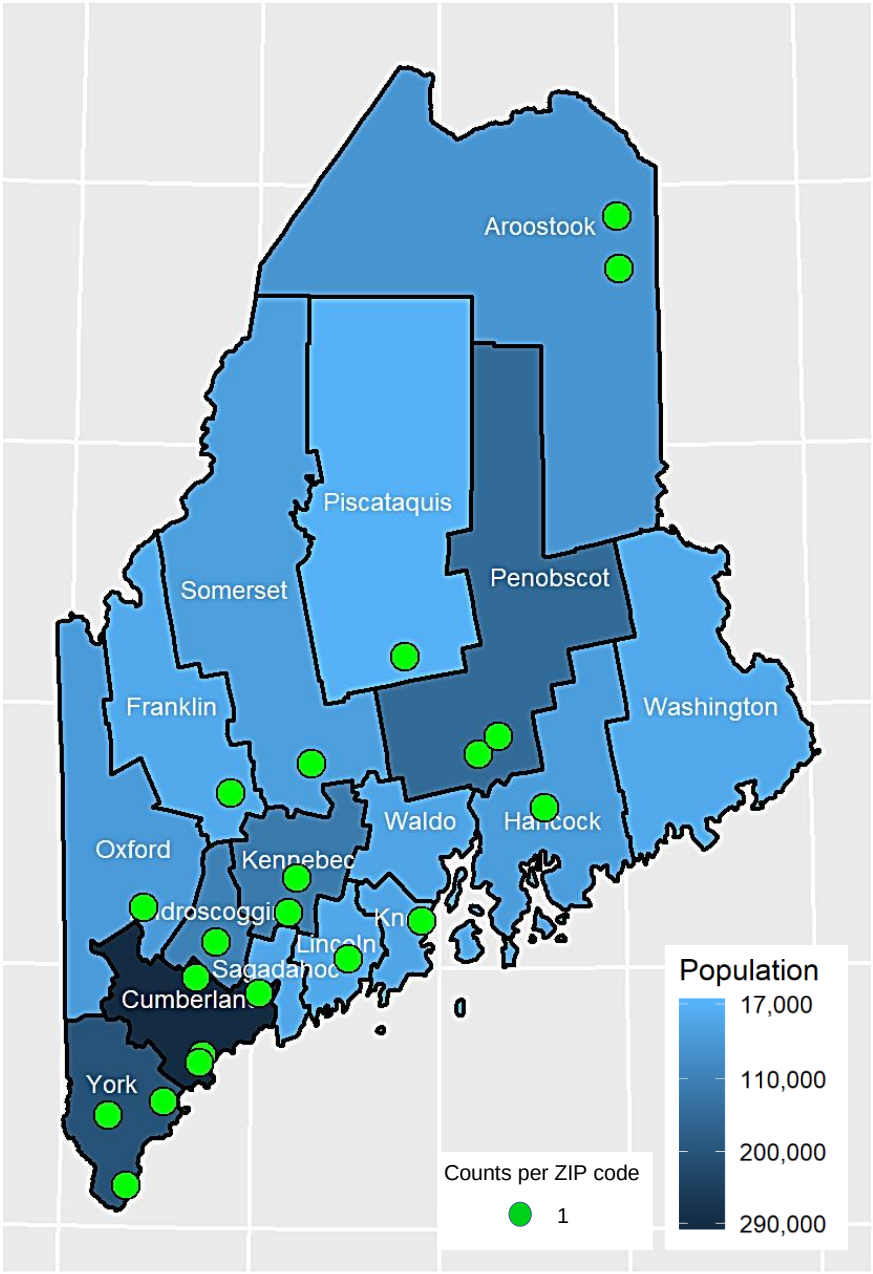


**Figure B-3. Syringe Exchanges Programs**

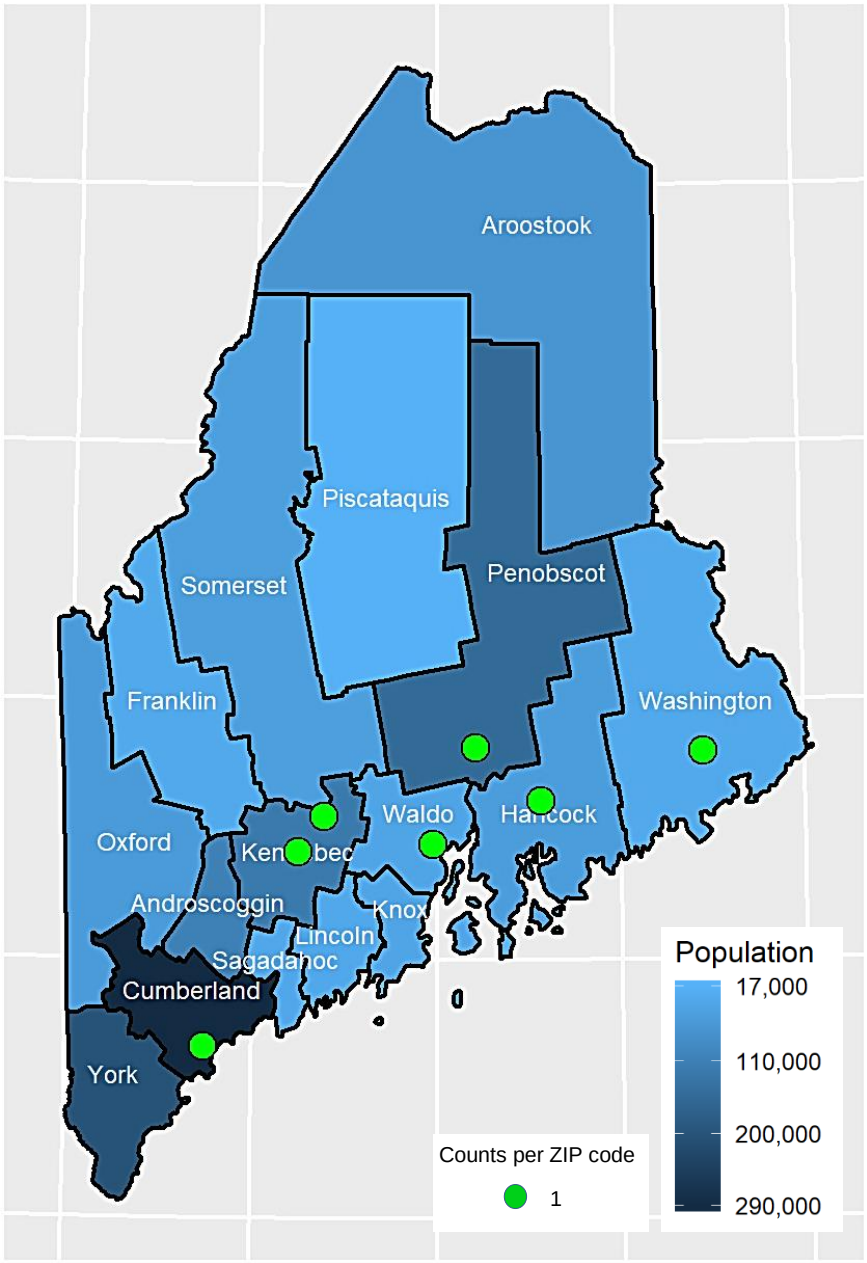


**Figure B-4. Substance Use Treatment Providers**

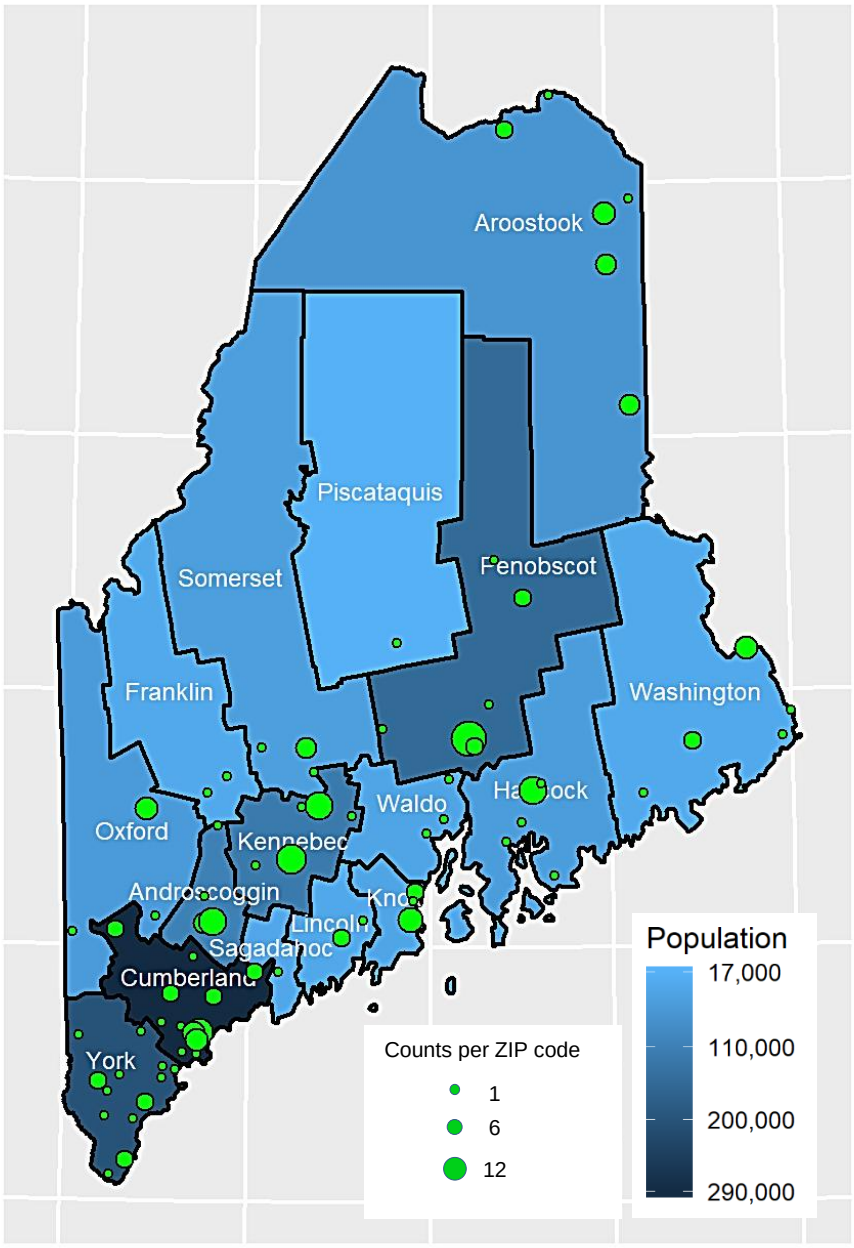


**Figure B-5. Opioid Health Homes**

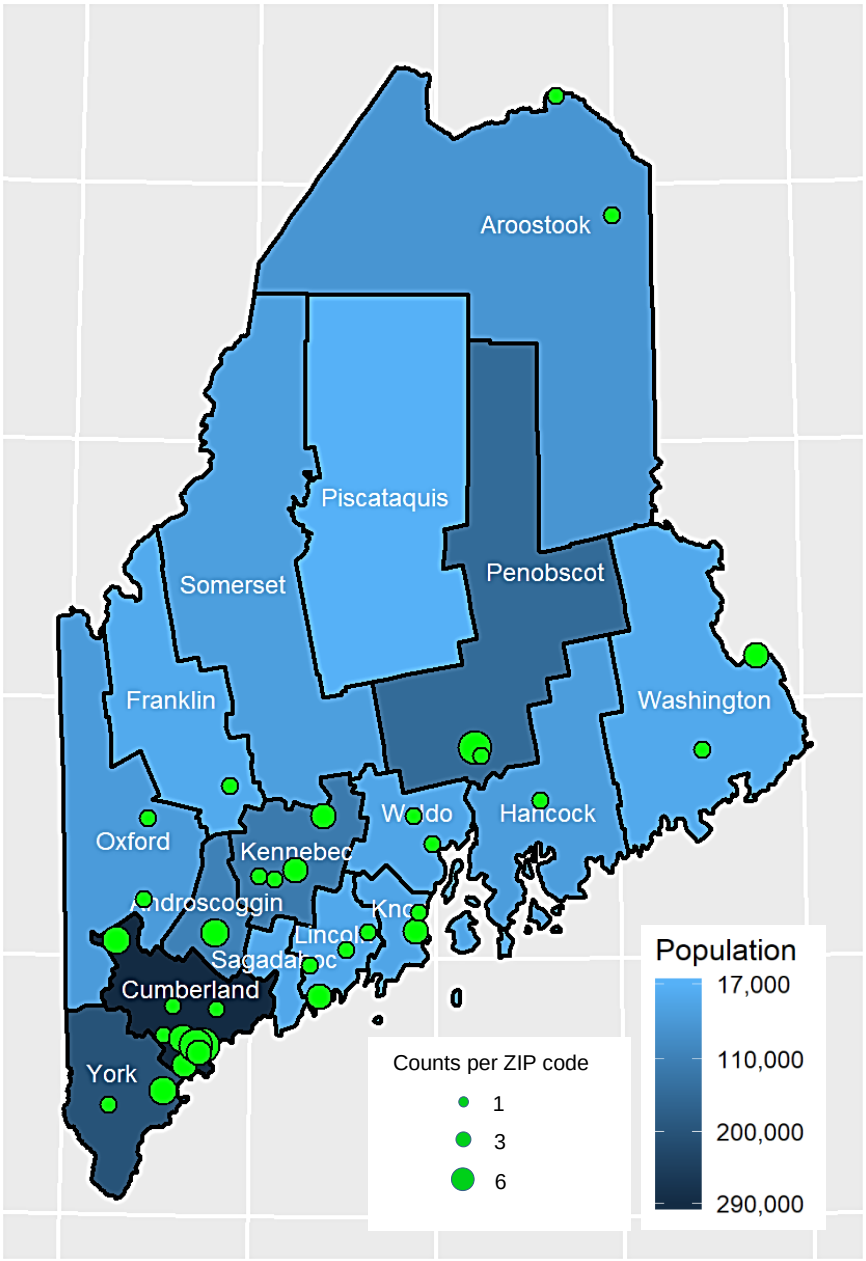


**Figure B-6. Recovery Community Centers**

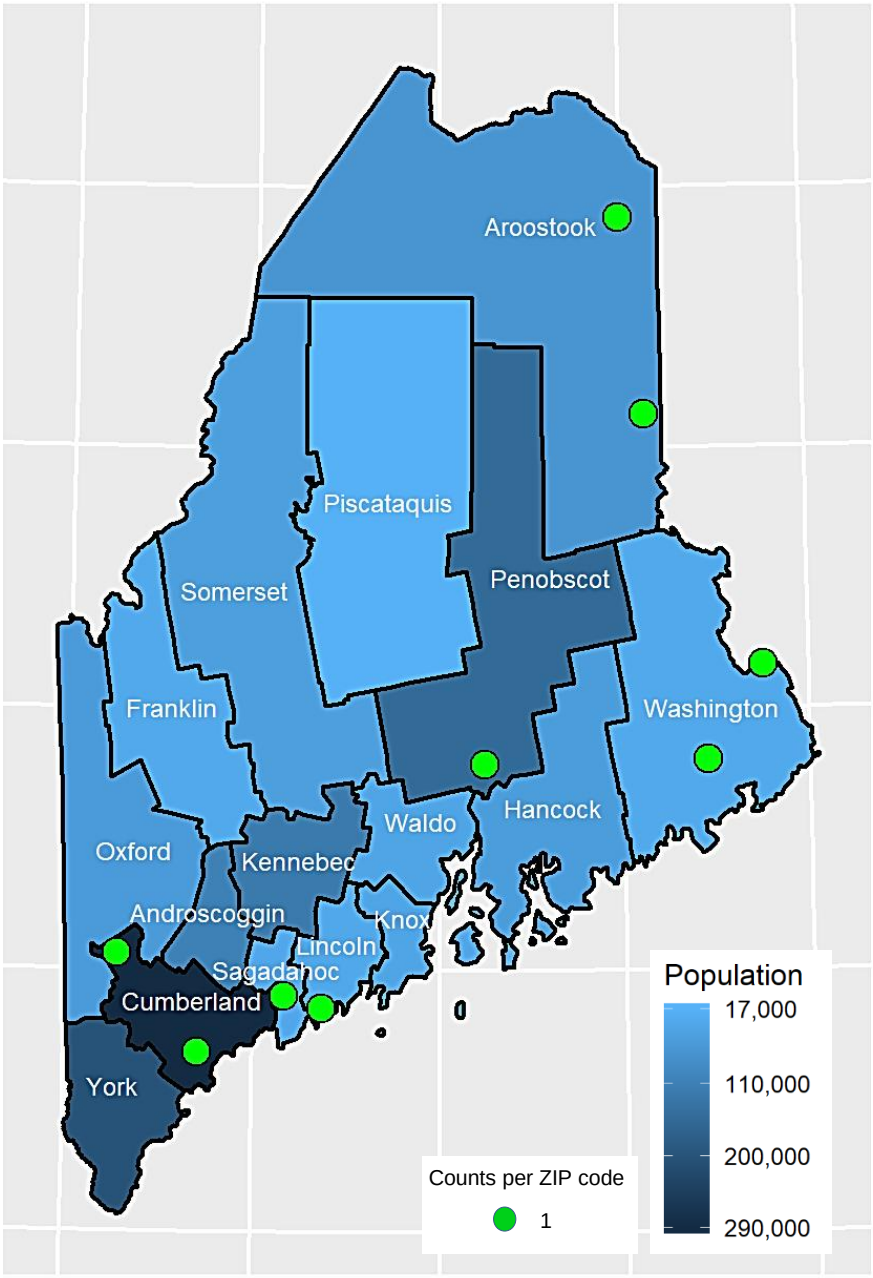


**Figure B-7. Recovery Residences**

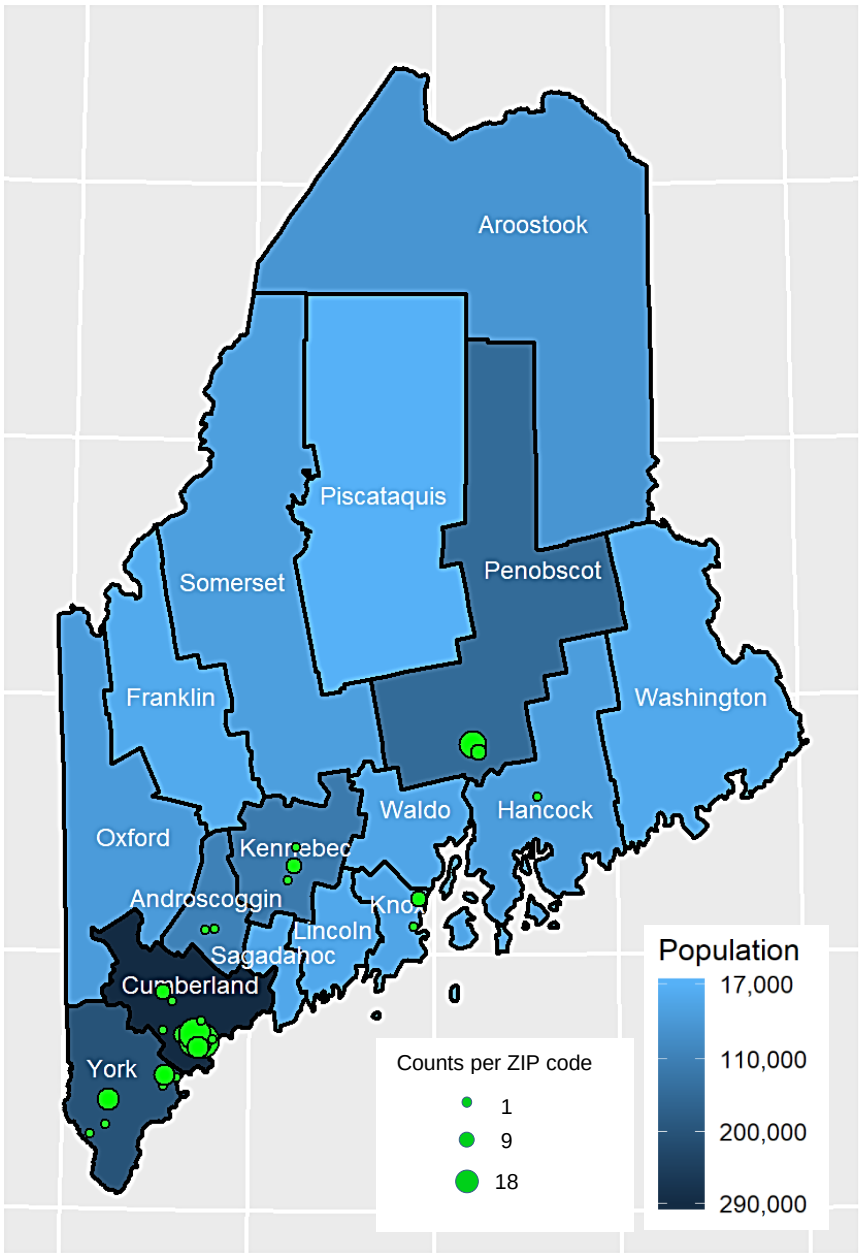


**Figure B-8. Recovery Residences Allowing Medication Assisted Treatment**

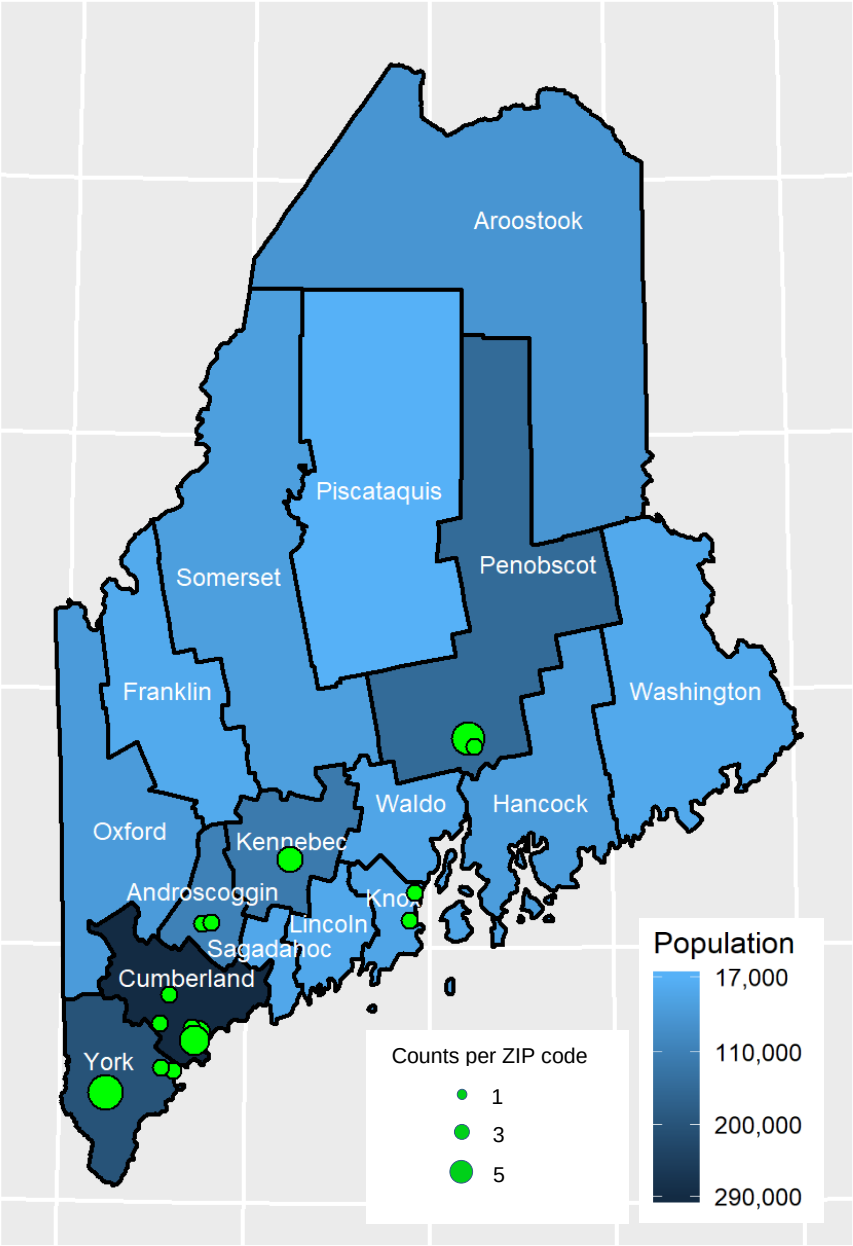


**Figure B-9. Acute Care, Psychiatric, and Veterans Administration Hospitals**

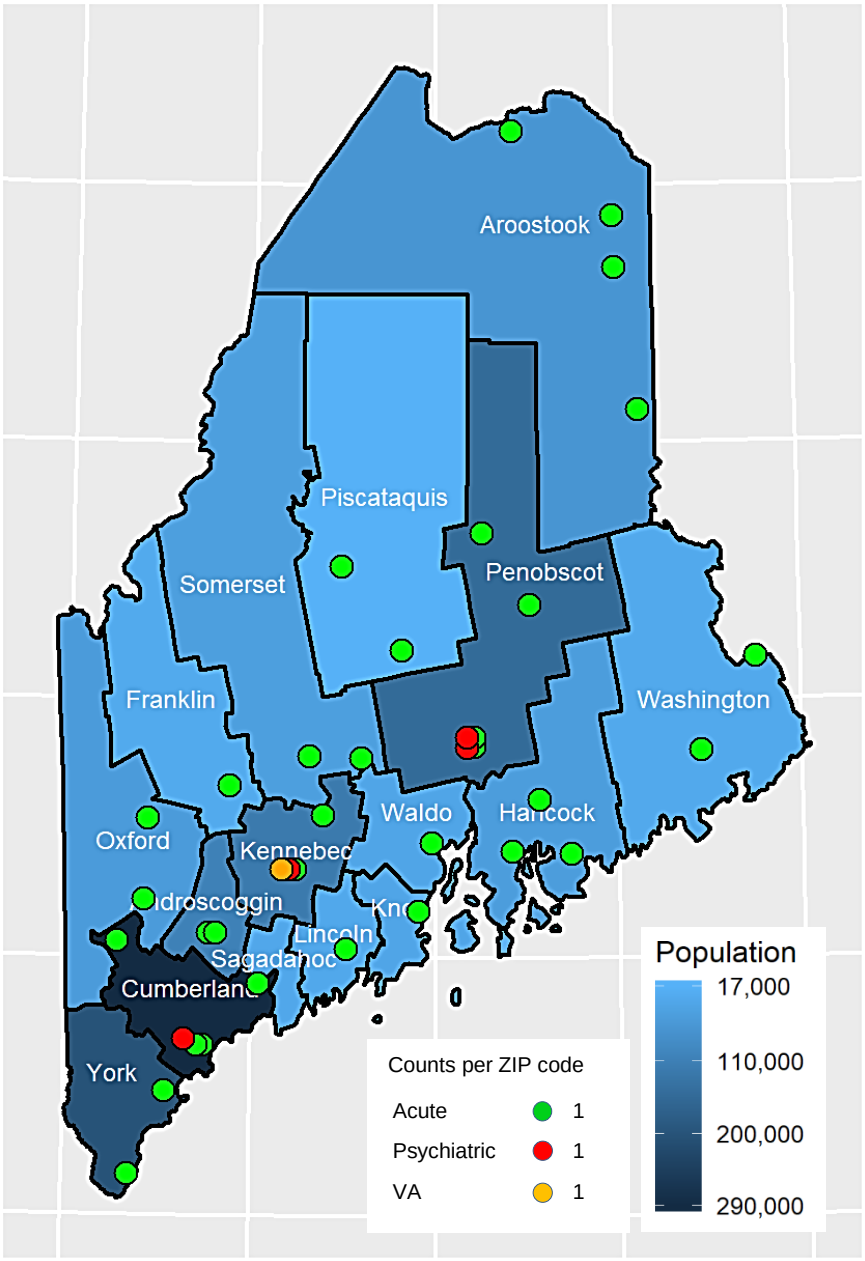


**Figure B-10. Rural Health Clinics**

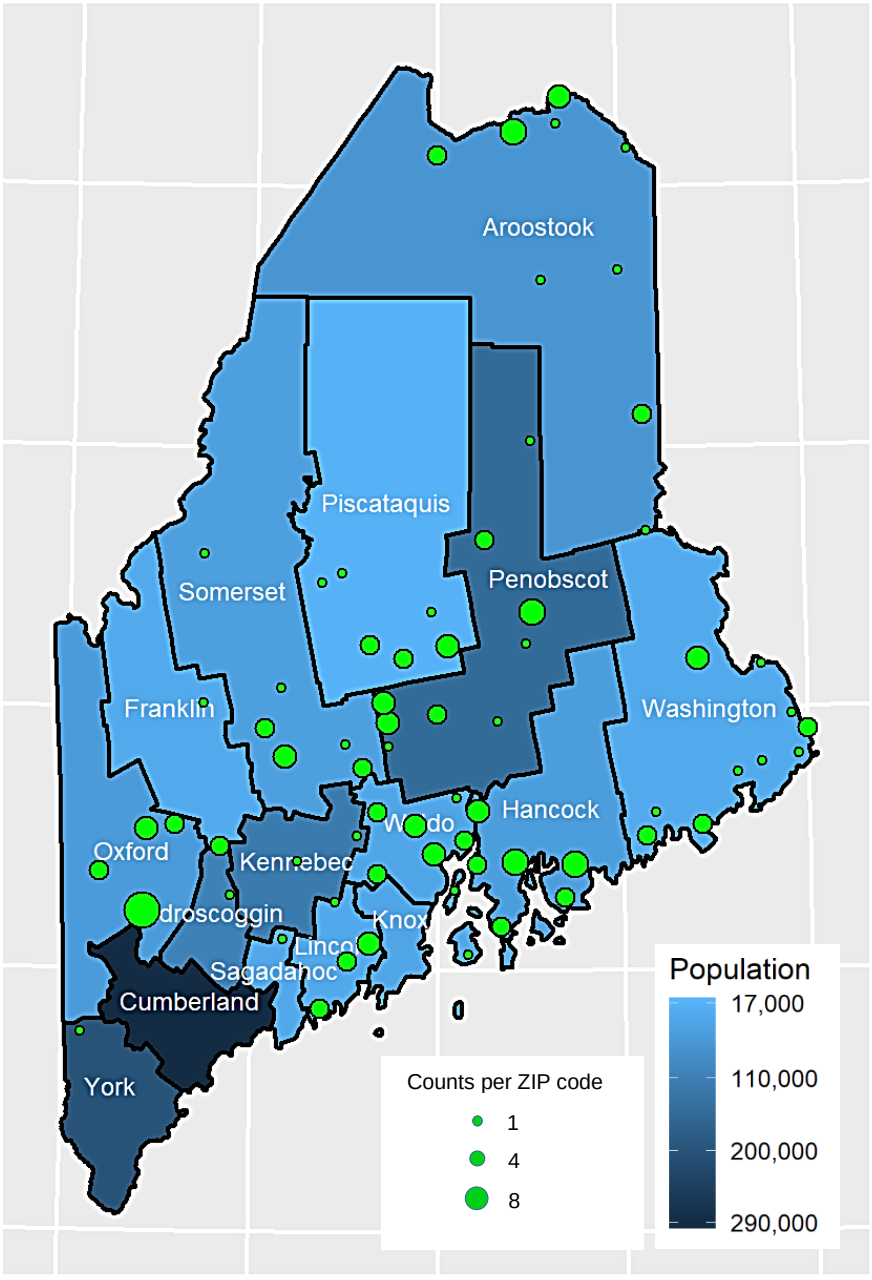


**Figure B-11. Federally Qualified Health Centers**

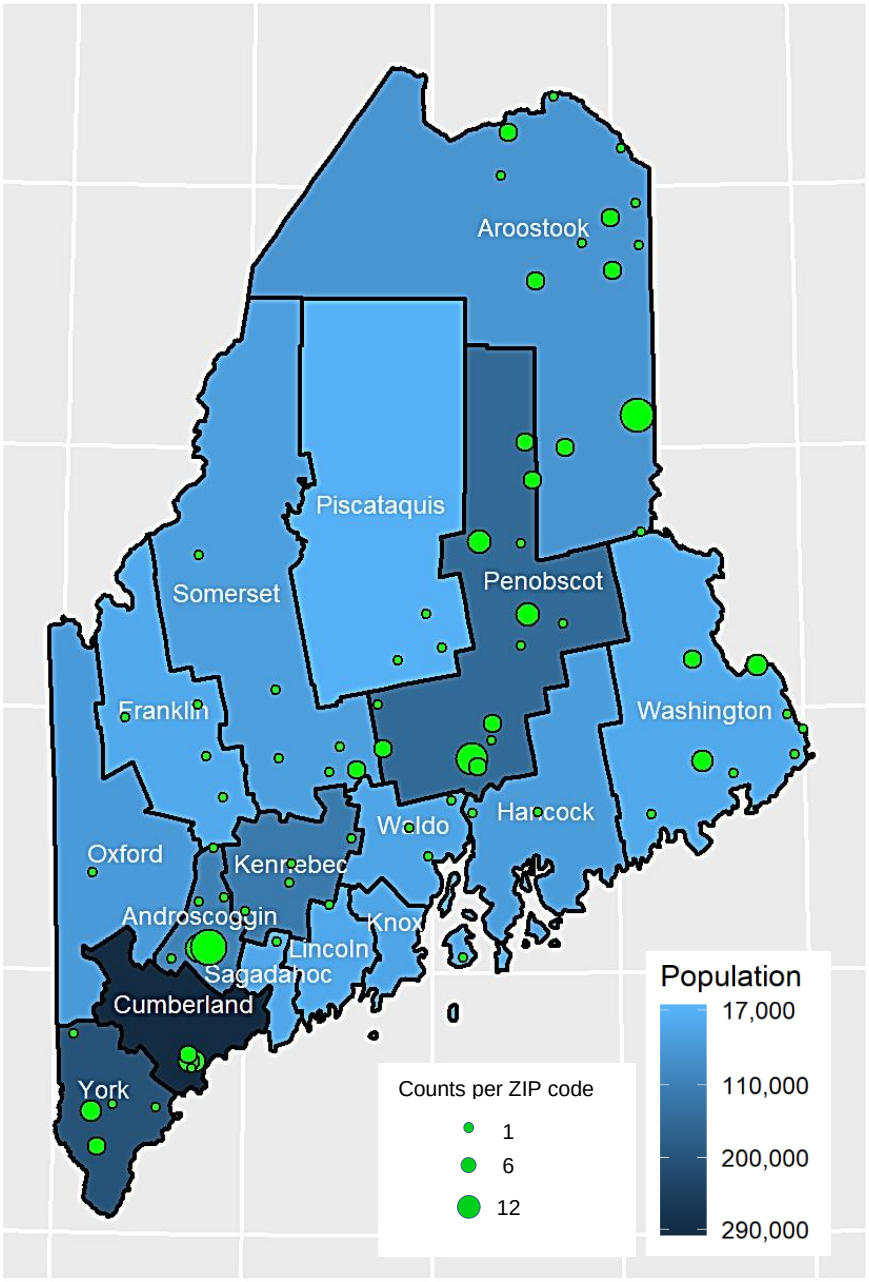


**Figure B-12. Mental Health Providers**

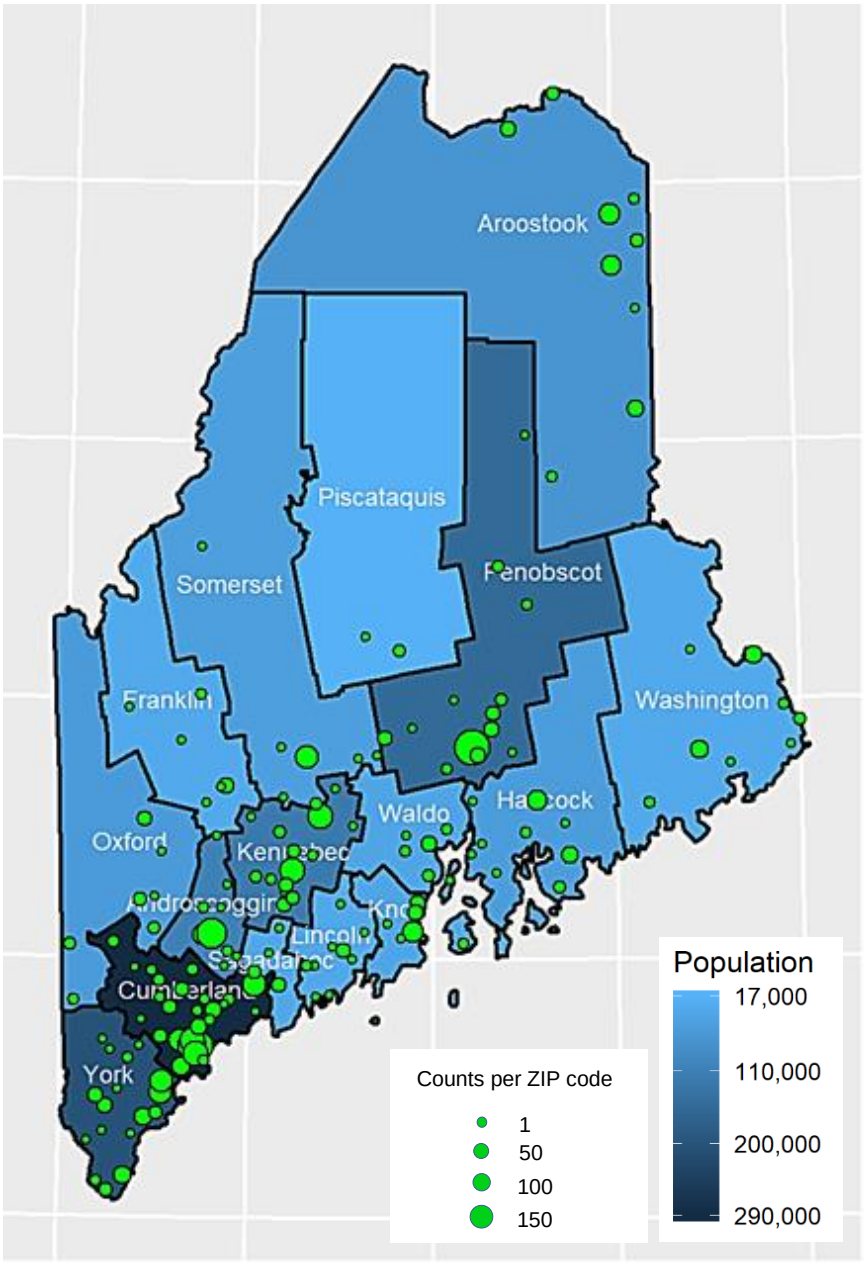


**Figure B-13. Adult Drug Treatment Courts and Family Treatment Drug Courts**

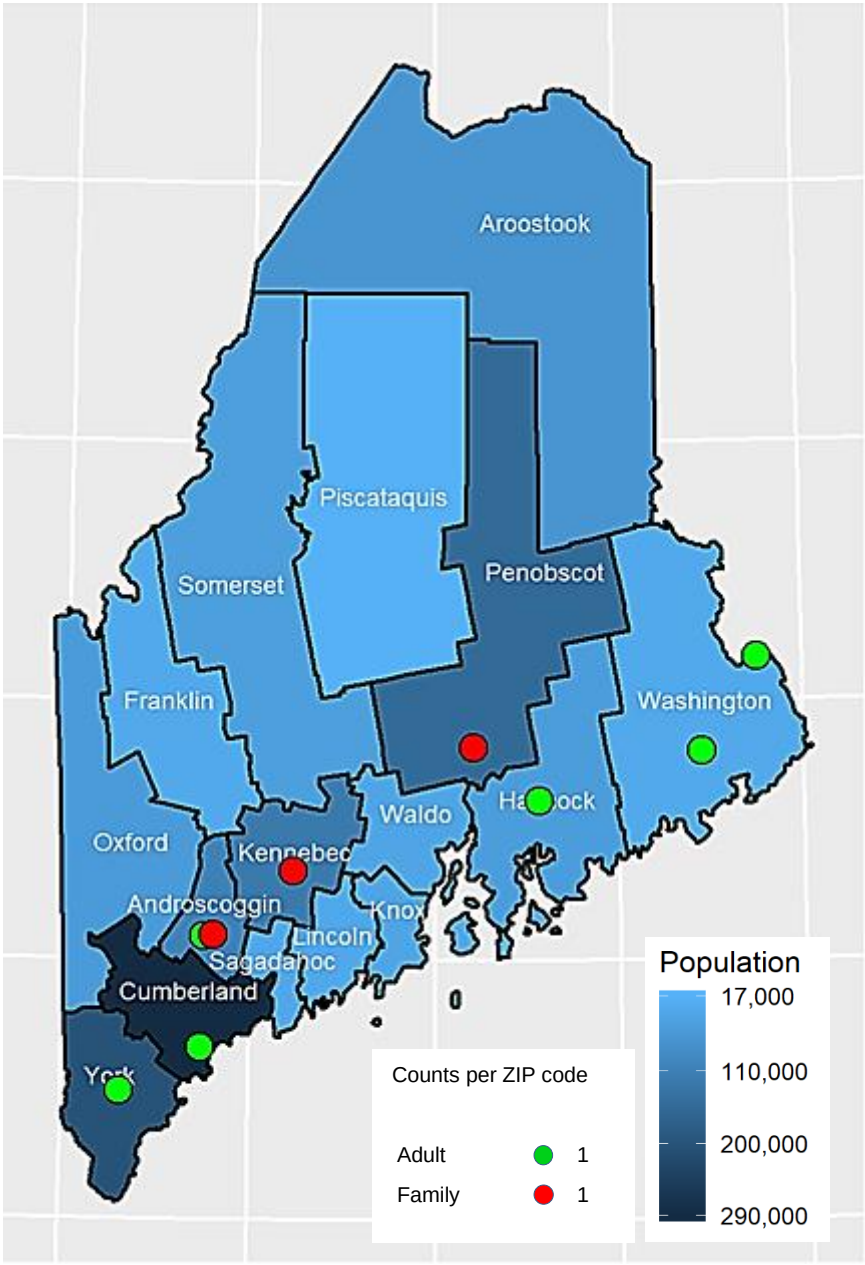


**Figure B-14. Buprenorphine Providers and Methadone Clinics**