North Dakota Department of Health
HIV·STD·TB
VIRAL HEPATITIS PROGRAM

North Dakota County Vulnerability Index Report

Background

During the last decade in North Dakota, new hepatitis C infections have been on the rise, especially among people age 35 and younger. In 2017, NDDoH instituted a process to determine the primary risk factor for these infections. Eighty-eight percent (88%) of those who were assessed identified that they had injected drugs and that was likely to have caused their infection.

In 2014, a community of people who injected drugs were linked to an outbreak of HIV infection in a rural US community. This instance, coupled with North Dakota's rise in reports of HCV infections, raises the concern about the vulnerability of North Dakota communities for an of outbreak of HIV infections.

This analysis aims to determine which areas of North Dakota have the factors which put them at highest risk of HIV and/or hepatitis C outbreak due among persons who inject drugs.

Study Design

An ecological study was performed using hepatitis C infection in those under 35 as a proxy for injection drug use. See ***Outcome Variable Methodology*** to determine how this measure was calculated

Data that were included in the model to determine indicator variables ranged from drug overdose mortality, access to prescription opioids, access to medical care, drug related criminal activity and sociodemographic characteristics associated with the geographic areas. A full listing of the variables that were considered in the model will be available in the larger publication of this analysis.

Data were used from 2016-2017 as they were available. They were also treated as continuous numerical variables unless the variable was a yes or no response.

Methods

Regression modeling was used to identify a set of indicators that contained the least number of variables that remained statistically significant that could be strongest proxy measure for injection drug use. This approach was used to identify the indicators with the strongest associations rather than indicators causally associated with explaining the rate of hepatitis C infection in people under the age of 35 in ND counties.

To calculate a vulnerability score for each county, a dataset was made that contained the values only for final indicators by county. Those values for those indicator variables are then multiplied by the indicator's regression coefficient and summed to produce a vulnerability score. Counties with higher scores indicated higher vulnerability to outbreak. These scores were then ranked in order from 1 to 53 with 1 being the most vulnerable.

SAS version 9.4 was used to perform this analysis.

Results

Primary Model

The initial analysis showed the following variables to be significant to explain injection drug use within ND counties.

1. Percent Uninsured
2. NCHS Urban/Rural Class
3. Percent Poverty
4. Teen Birthrate
5. Gonorrhea Rate
6. Percent Unemployed
7. Poor Health Rating
8. No Vehicle Access
9. No High School Diploma

Secondary Model

A second model was ran that contained additional variables with high-epidemiologic association with injection drug use that were not indicated in the primary model. The counties analyzed were limited only to the counties in which this data was available. This index produced results in which only one indicator remained significant to the model.

1. Amphetamine/Methamphetamine Incidents

The results for both models are shown in the section *North Dakota HIV/HCV Outbreak Vulnerability Index*.

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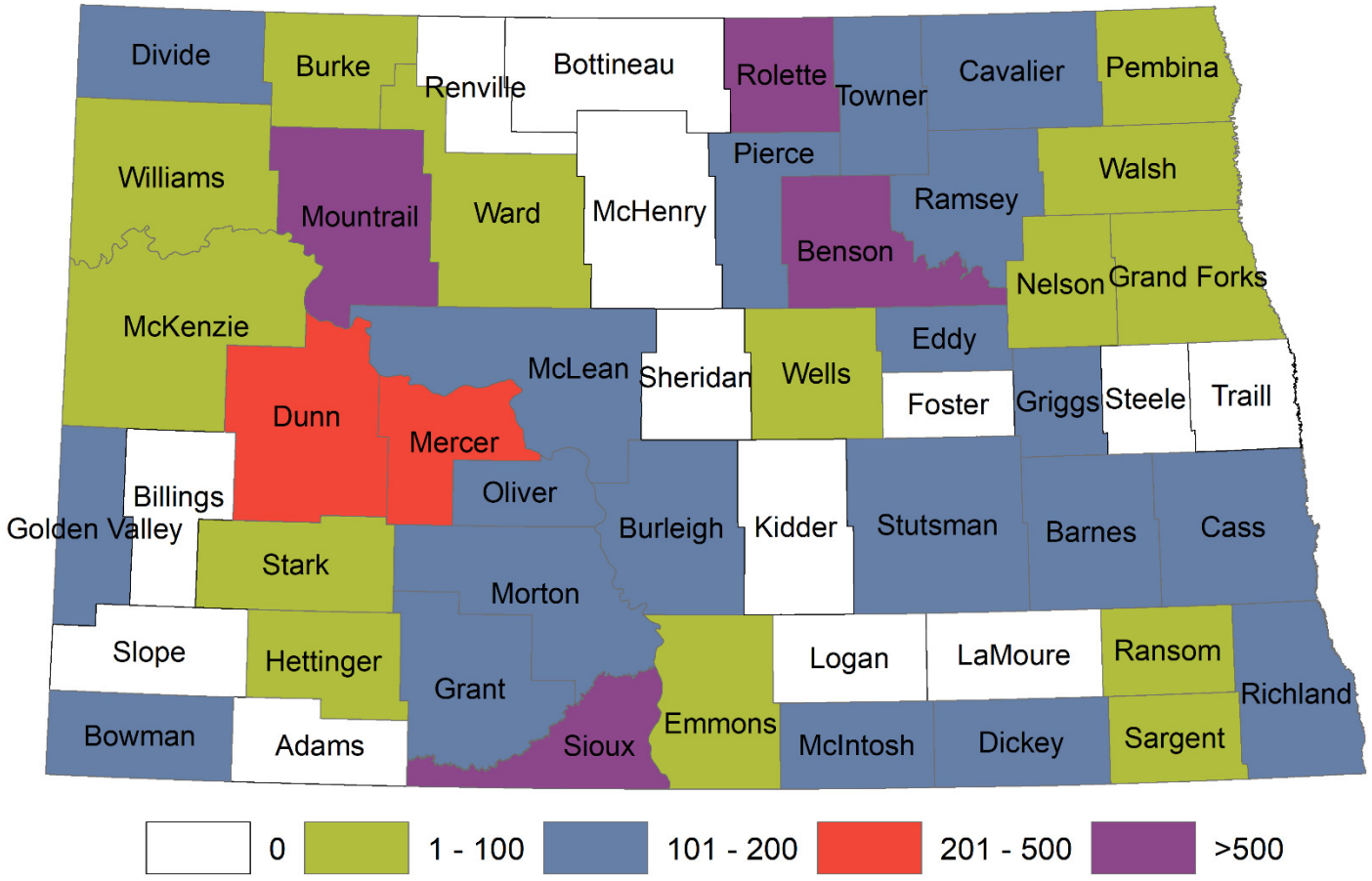
Outcome Variable Methodology

Previously published methodologies for vulnerability assessments included acute hepatitis C incidence as the proxy measure for county-level vulnerability. However, the NDDoH has limited reports of acute hepatitis C and therefore must use overall Hepatitis C incidence with specific data criteria.

Data Criteria	Explanation
Newly diagnosed with hepatitis C in 2016 & 2017	The most current data year for local/national datasets
Between the ages of 15 and 34	Enhanced surveillance data shows that injection drug use is the primary risk factor for this age group
Disease status of acute, chronic or currently infected	Includes individuals with a quantitative RNA result, confirming hepatitis C diagnosis
Not diagnosed in a correctional facility	Limits bias for counties that house correctional facilities

The map below shows the rate of reported cases per 100,000 persons of hepatitis C between 2016 & 2017 that meet the specified criteria by county. The county infection rates utilize American Community Survey Census Estimates for 2016 & 2017 and the 15 to 34 age group.



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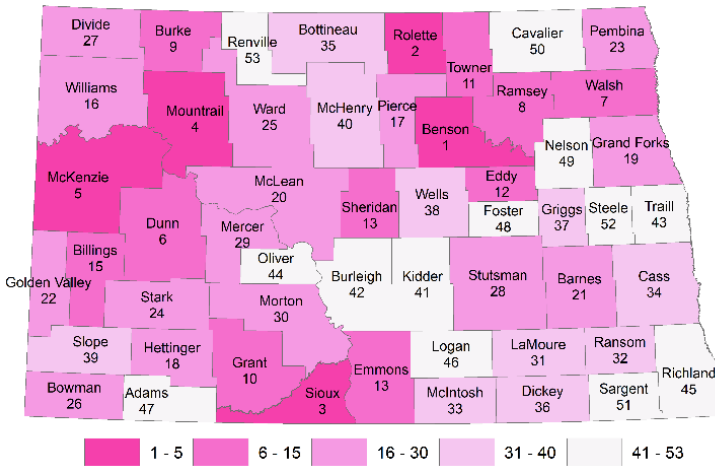
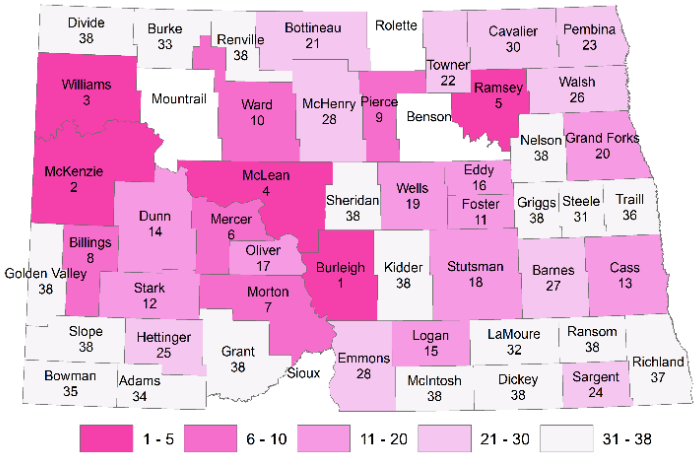
Primary Model



Secondary Model



County	Primary Model	Reduced Model	County	Primary Model	Reduced Model	County	Primary Model	Reduced Model
Adams	47	34	Hettinger	18	25	Sargent	51	24
Barnes	21	27	Kidder	41	38	Sheridan	13	38
Benson	1	*	LaMoure	31	32	Sioux	3	*
Billings	15	8	Logan	46	15	Slope	39	38
Bottineau	35	21	McHenry	40	28	Stark	24	12
Bowman	26	35	McIntosh	33	38	Steele	52	31
Burke	9	33	McKenzie	5	2	Stutsman	28	18
Burleigh	42	1	McLean	20	4	Towner	11	22
Cass	34	13	Mercer	29	6	Traill	43	36
Cavalier	50	30	Morton	30	7	Walsh	7	26
Dickey	36	38	Mountrail	4	*	Ward	25	10
Divide	27	38	Nelson	49	38	Wells	38	19
Dunn	6	14	Oliver	44	17	Williams	16	3
Eddy	12	16	Pembina	23	23			
Emmons	13	28	Pierce	17	9			
Foster	48	11	Ramsey	8	5			
Golden Valley	22	38	Ransom	32	38			
Grand Forks	19	20	Renville	53	38			
Grant	10	38	Richland	45	37			
Griggs	37	38	Rolette	2	*			

* Counties were removed from Secondary Model as not all variables were available.