County-Level Vulnerability to HIV, HCV, and Overdose Mortality

West Virginia, 2016-2017

Samantha Batdorf, MPH
Epidemiologist

WEST VIRGINIA Department of Health & Human Resources
BUREAU FOR PUBLIC HEALTH

Background

Between 2014 and 2015, nearly 200 people were diagnosed with HIV in an Indiana community of about 4,200 people.

The outbreak was unprecedented in size and unique in that it involved a rural population, historically at low risk for HIV.

"…the introduction of HIV into a rural community in the United States was not unexpected when considered in the context of increasing trends in injection use of prescription opioid analgesics and the new and steady rise in acute HCV infections in rural areas, particularly central Appalachia."

Peters, P. J., Pontones, P., Hoover, K. W., Patel, M. R., Galang, R. R., Shields, J., … Duwve, J. M. (2016). HIV infection linked to injection use of oxymorphone in Indiana, 2014-2015. *New England Journal of Medicine*, *375*(3), 229–239. https://doi.org/10.1056/NEJMoa1515195

Background, cont.

Investigators recognized that this community was not unique.

Like many other rural counties throughout the nation, this county had low levels of educational attainment, high unemployment, high poverty, and limited access to health care.

Other counties with high prevalence of injection drug use might be similarly vulnerable to rapid transmission of HIV or hepatitis C.

To identify counties at highest risk, scientists at CDC conducted a statistical regression analysis, published in the *Journal of Acquired Immune Deficiency Syndromes*.

CDC Vulnerability Assessment

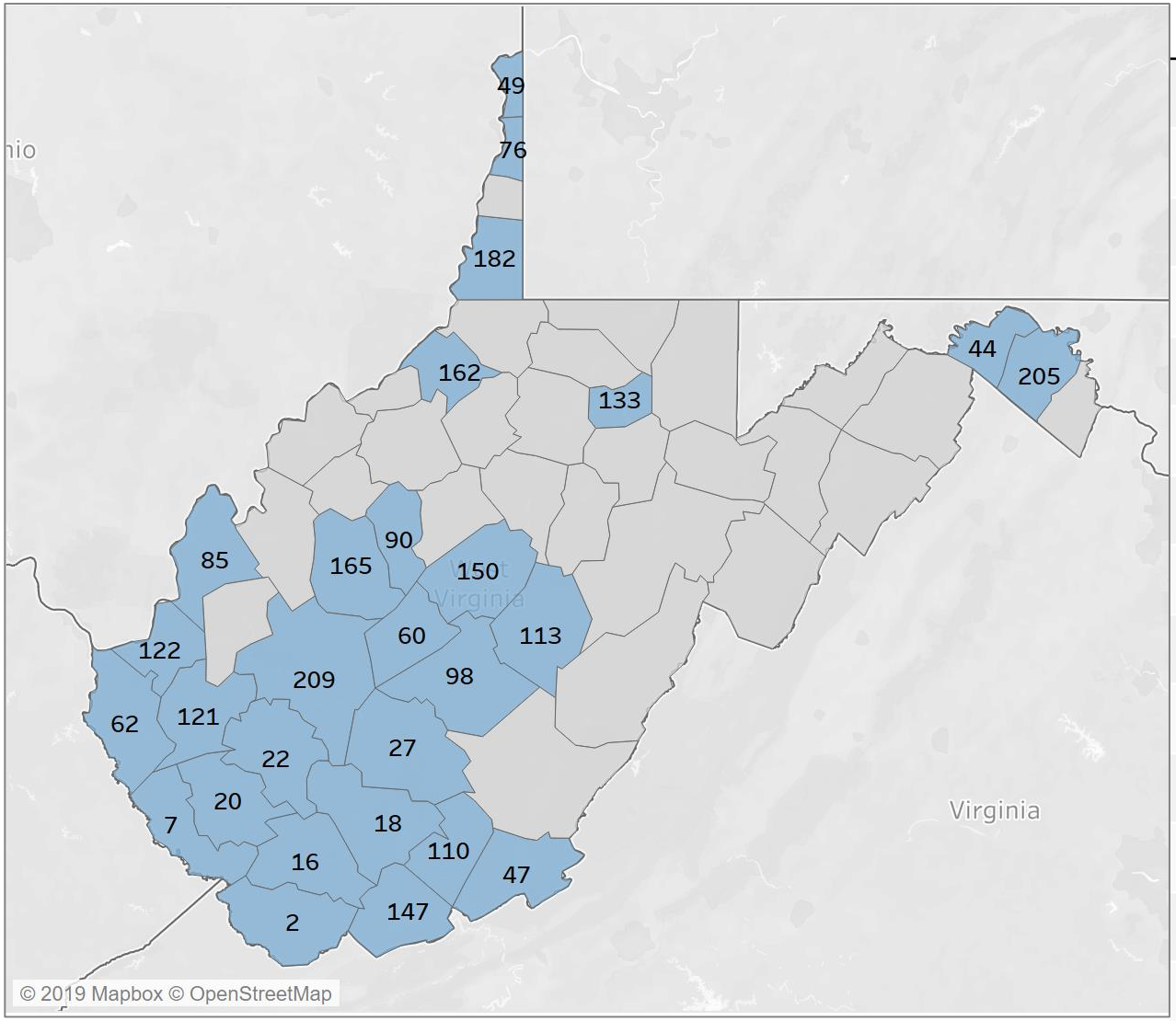
The CDC study used acute hepatitis C infection as a proxy measure for unsterile injection drug use (IDU).

Authors considered a range of measures that were plausibly related to IDU and determined which best predicted injection drug use.

Statistically significant measures included:

- Drug overdose deaths per 100,000 population
- Prescription opioid sales per 10,000 population
- Median per capita income
- Percent of population of white, non-Hispanic race/ethnicity
- Percent of population aged 16 and older who are unemployed
- DATA 2000 waivered physicians per 10,000 population

CDC Vulnerability Assessment, cont.



County	Rank	County	Rank
McDowell	2	Calhoun	90
Mingo	7	Nicholas	98
Wyoming	16	Summers	110
Raleigh	18	Webster	113
Logan	20	Lincoln	121
Boone	22	Cabell	122
Fayette	27	Taylor	133
Morgan	44	Mercer	147
Monroe	47	Braxton	150
Hancock	49	Tyler	162
Clay	60	Roane	165
Wayne	62	Marshall	182
Brooke	76	Berkeley	205
Mason	85	Kanawha	209

West Virginia's Vulnerability Assessment

West Virginia was awarded funding to complete a similar jurisdiction-level vulnerability assessment, using more recent and locally relevant data.

Using similar methods to CDC, two county-level vulnerability assessments were created:

1. Vulnerability to rapid transmission of HIV/HCV
2. Vulnerability to overdose mortality

Today's Aims

1. Briefly discuss methods for West Virginia's county-level vulnerability assessments.
2. Broaden awareness of factors associated with unsterile injection drug use and overdose mortality.
3. Share rankings generated by the two vulnerability assessments.
4. Discuss how these results can be shared and used to inform prevention and intervention strategies.

Methods

- Used a similar approach to CDC national assessment (multilevel negative binomial regression analysis), using two years of data for each measure (2016-2017)
- Selected potential indicators based on availability, reliability, and plausibility of a relationship with outcomes of interest
- Conducted univariable analyses to determine which indicators were associated with outcomes
- Used backwards selection to identify a set of indicators that best predicted outcomes of interest
- The outcomes of interest are 1) unsterile injection drug use (IDU) using acute hepatitis C infection plus chronic cases under the age of 40, as a proxy, and 2) all-drug overdose mortality.

West Virginia Vulnerability Assessment, cont.

A variety of factors potentially associated with unsterile injection drug use* and overdose mortality† were considered.

Access to Care

- Buprenorphine prescription rate*†
- Insured rate*
- Mental health providers†
- Vehicle access*†

Sociodemographic Factors

- Disability*†
- Education*
- Grandparents responsible for grandchildren*
- Income*
- Labor force*
- Poverty*
- Population density†
- Race†
- Unemployment
- Urban-rural classification†

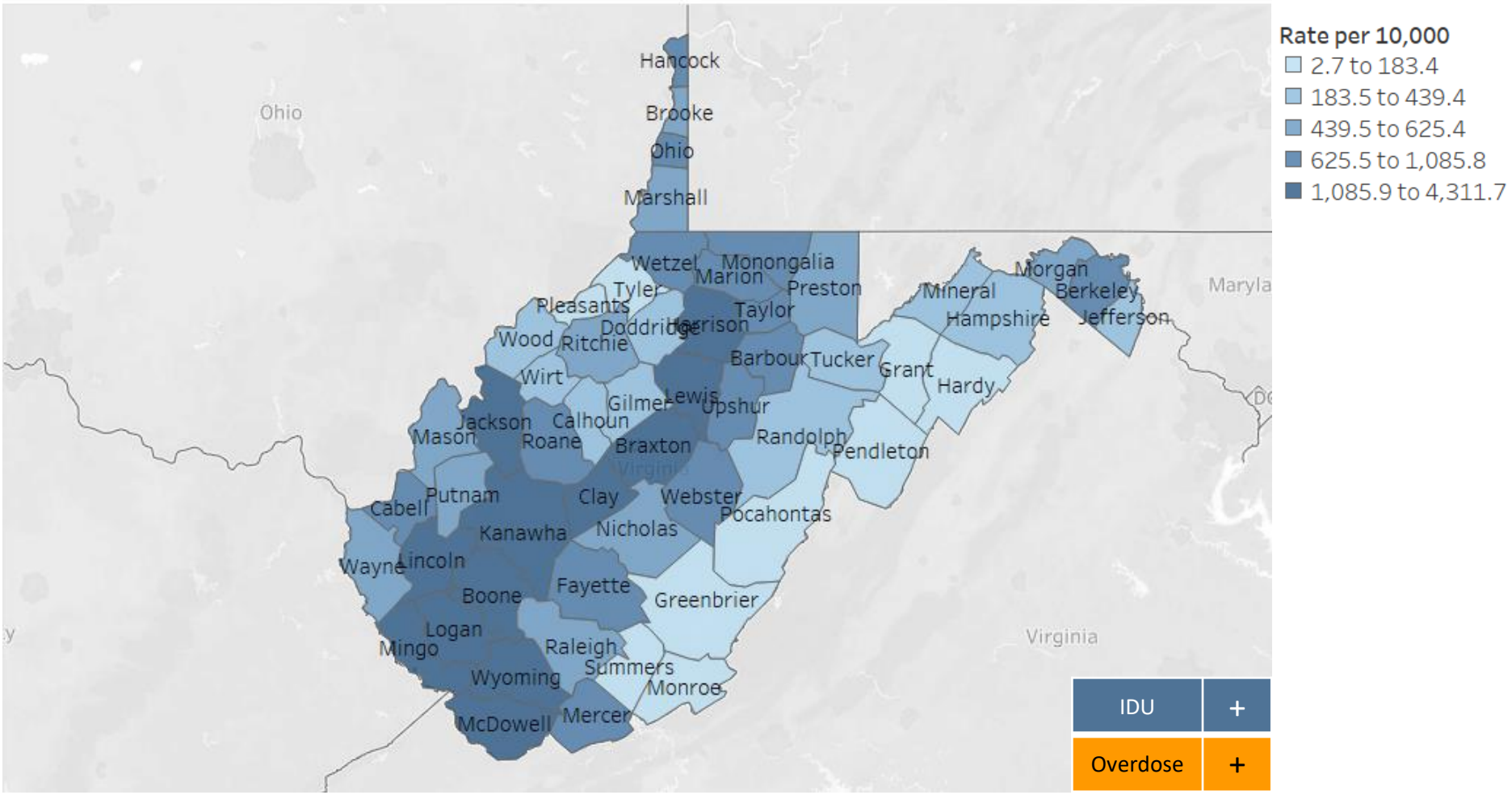
Access to Prescription Opioids

- Overlapping opioid/benzodiazepine prescriptions*†
- High-risk daily dose of an opioid
- Multiple provider episodes (pharmacy and prescriber*)
- Opioid prescription rate*†
- Opioid-naïve patients receiving long-acting/extended release opioids

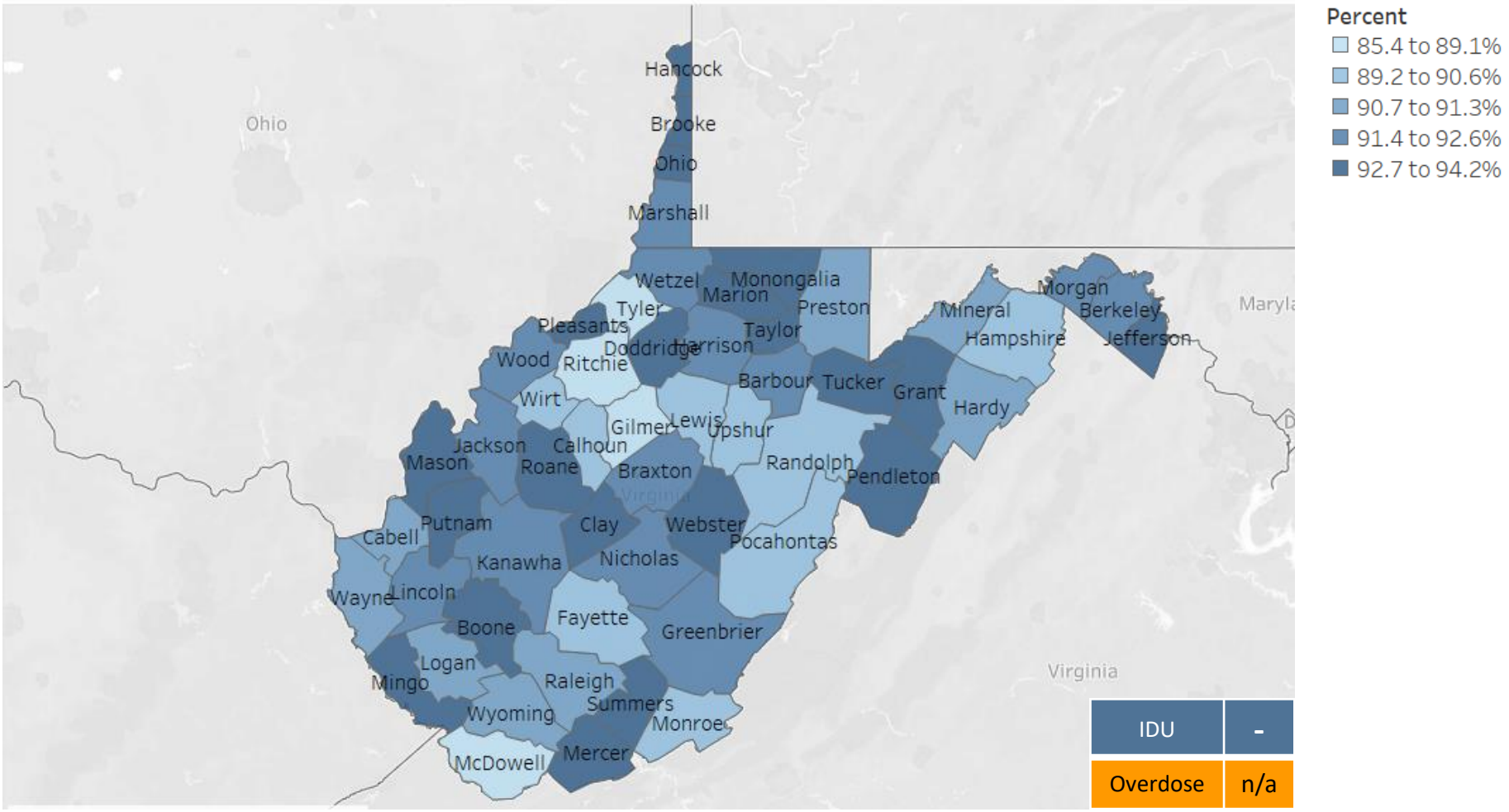
Prevalence of Drug Use

- Drug-related arrests
- Drug-related exposure calls to the WV Poison Center†
- Drug-related hospitalizations*†
- Hepatitis C infections†
- Intrauterine substance exposure
- Overdose mortality

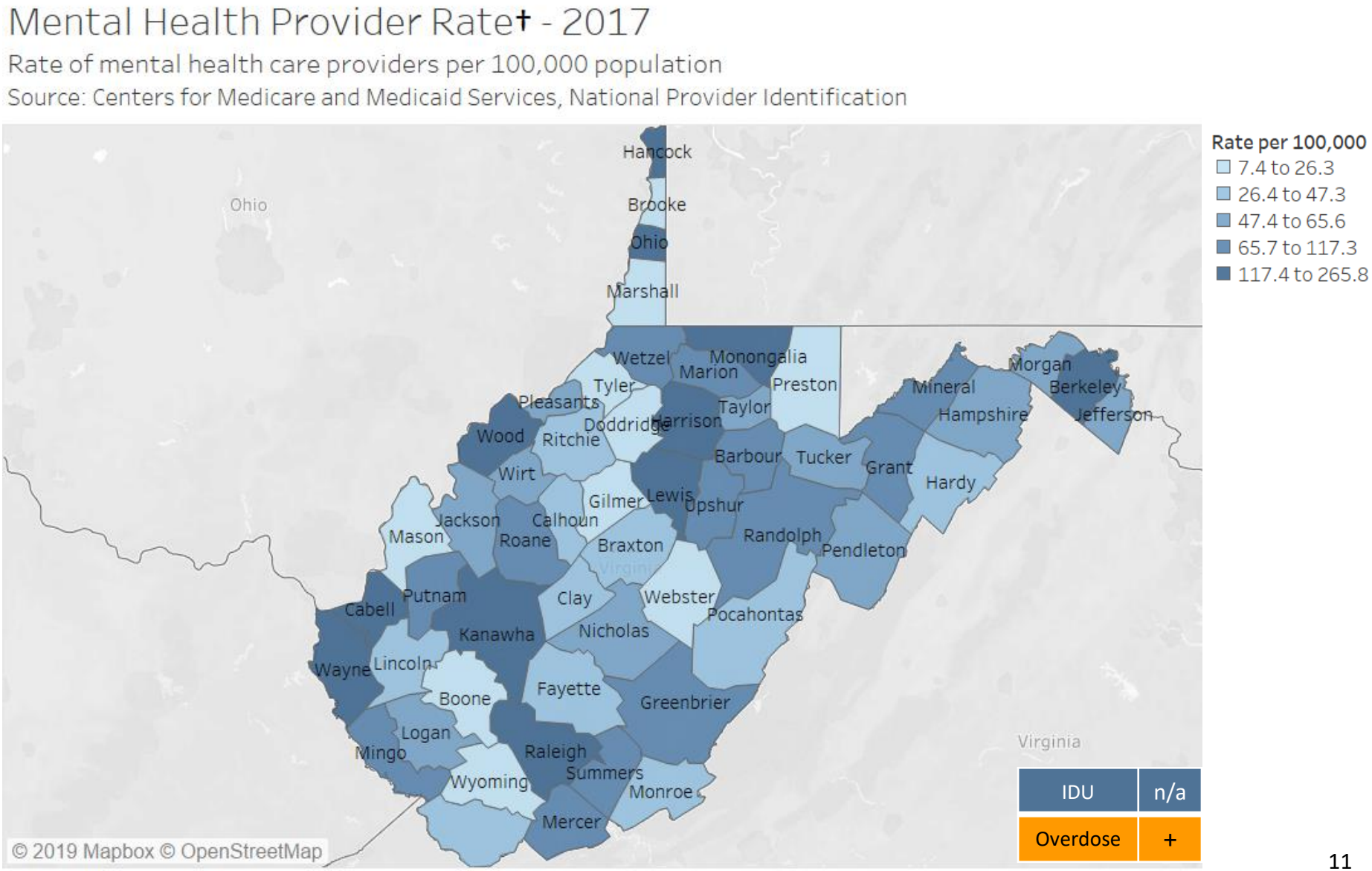
Buprenorphine Prescription Rate*† - 2017



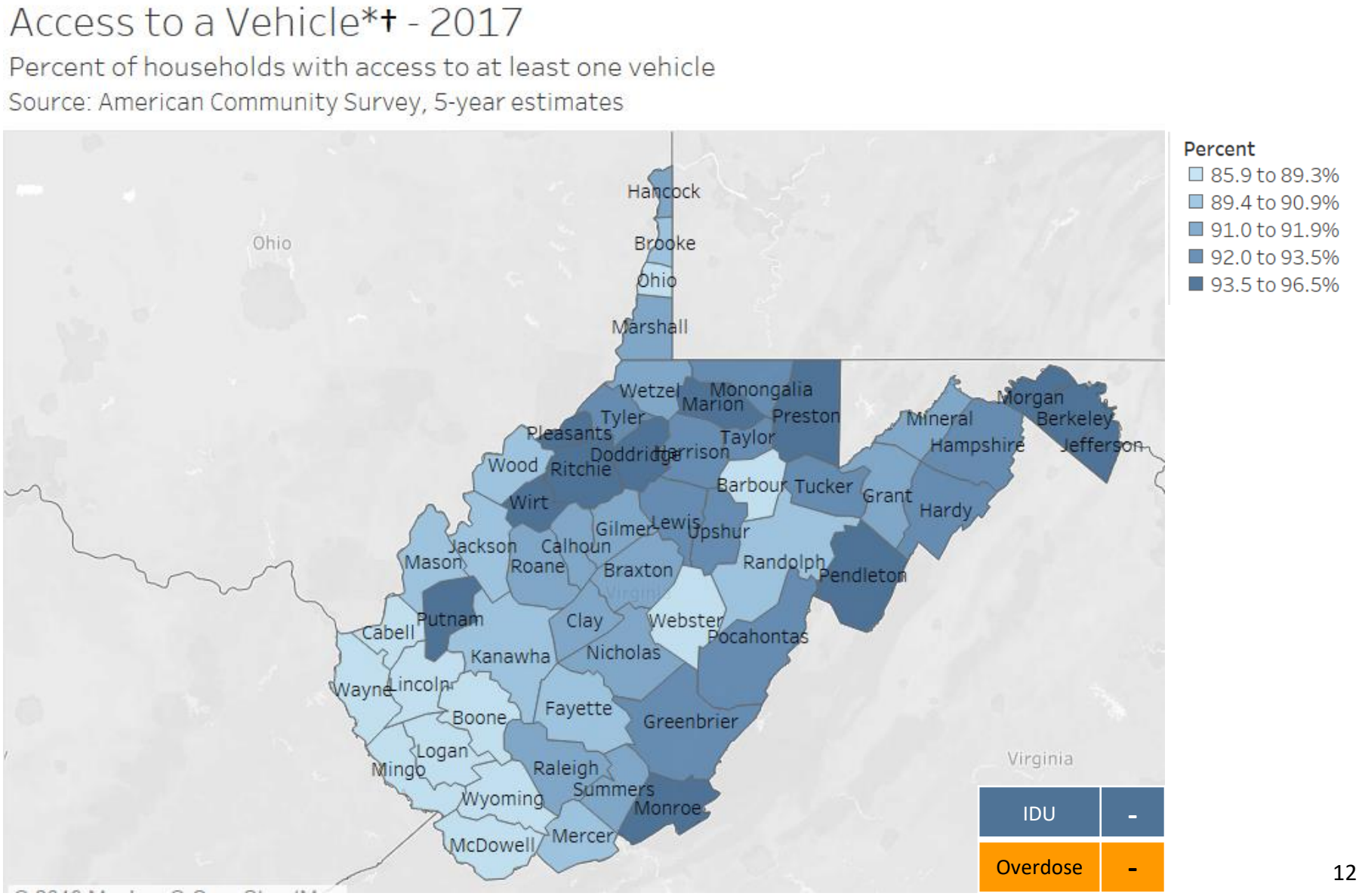
Health Insurance* - 2017



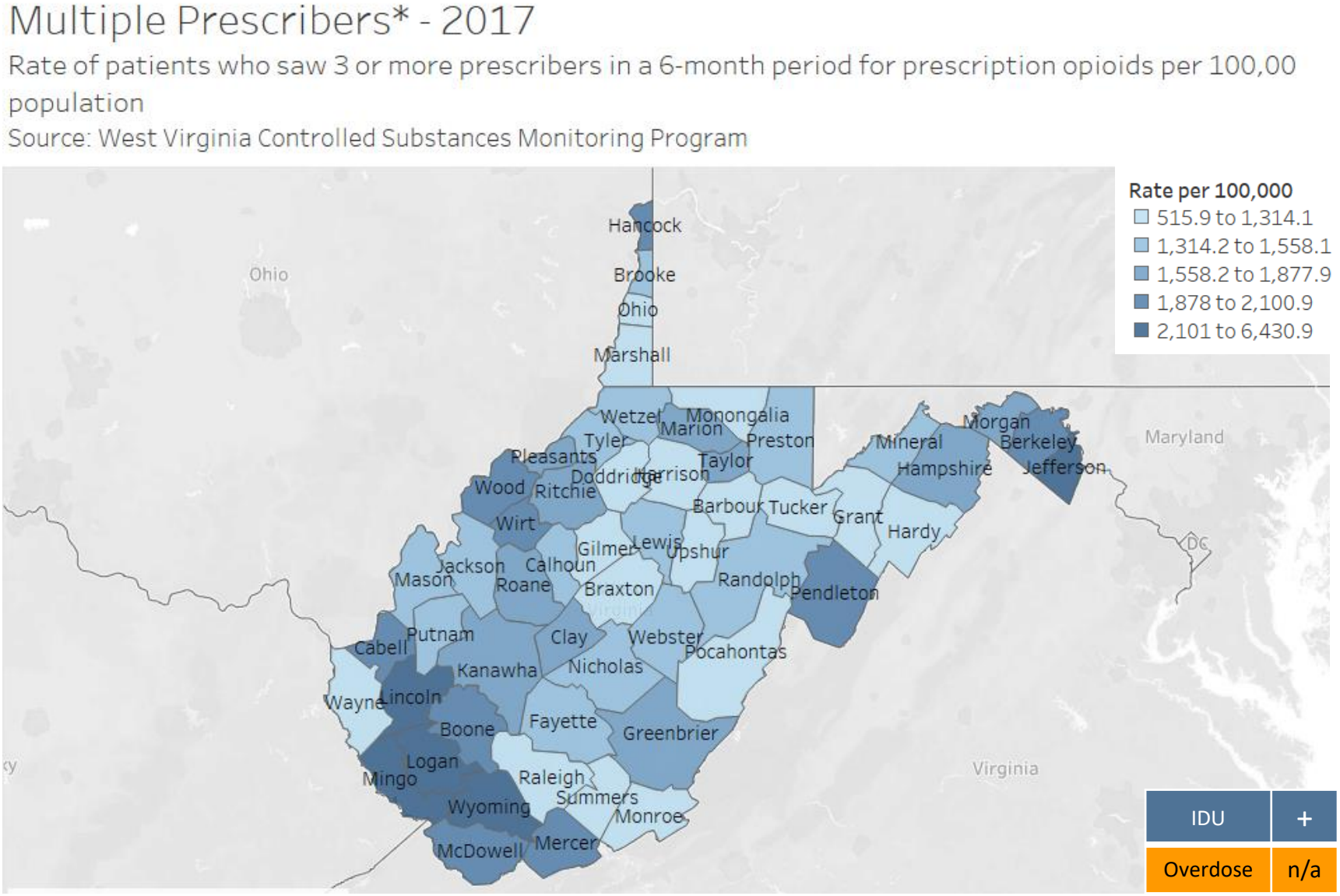
Mental Health Provider Rate† - 2017



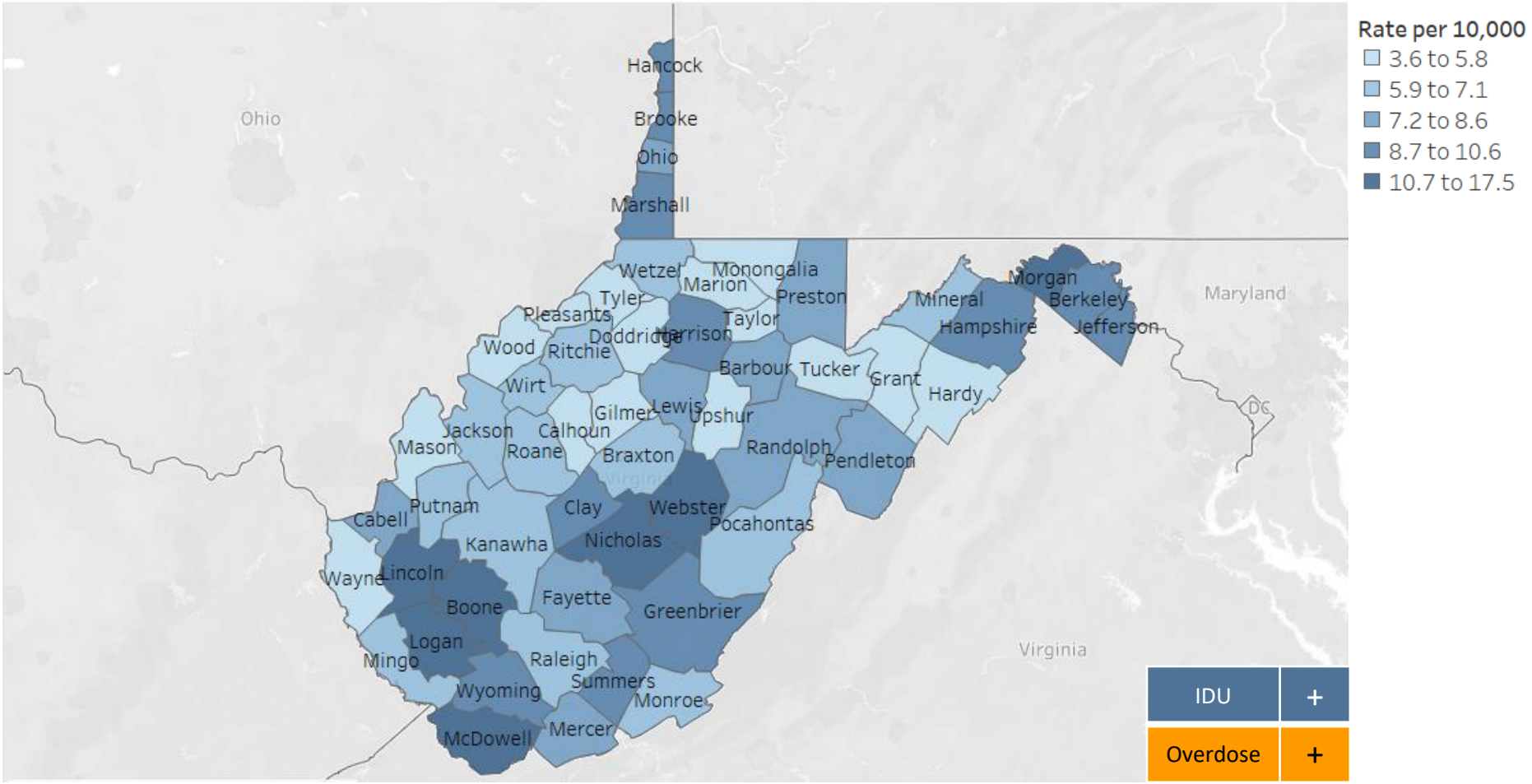
Access to a Vehicle*† - 2017



Multiple Prescribers* - 2017



Opioid Prescription Rate*† - 2017

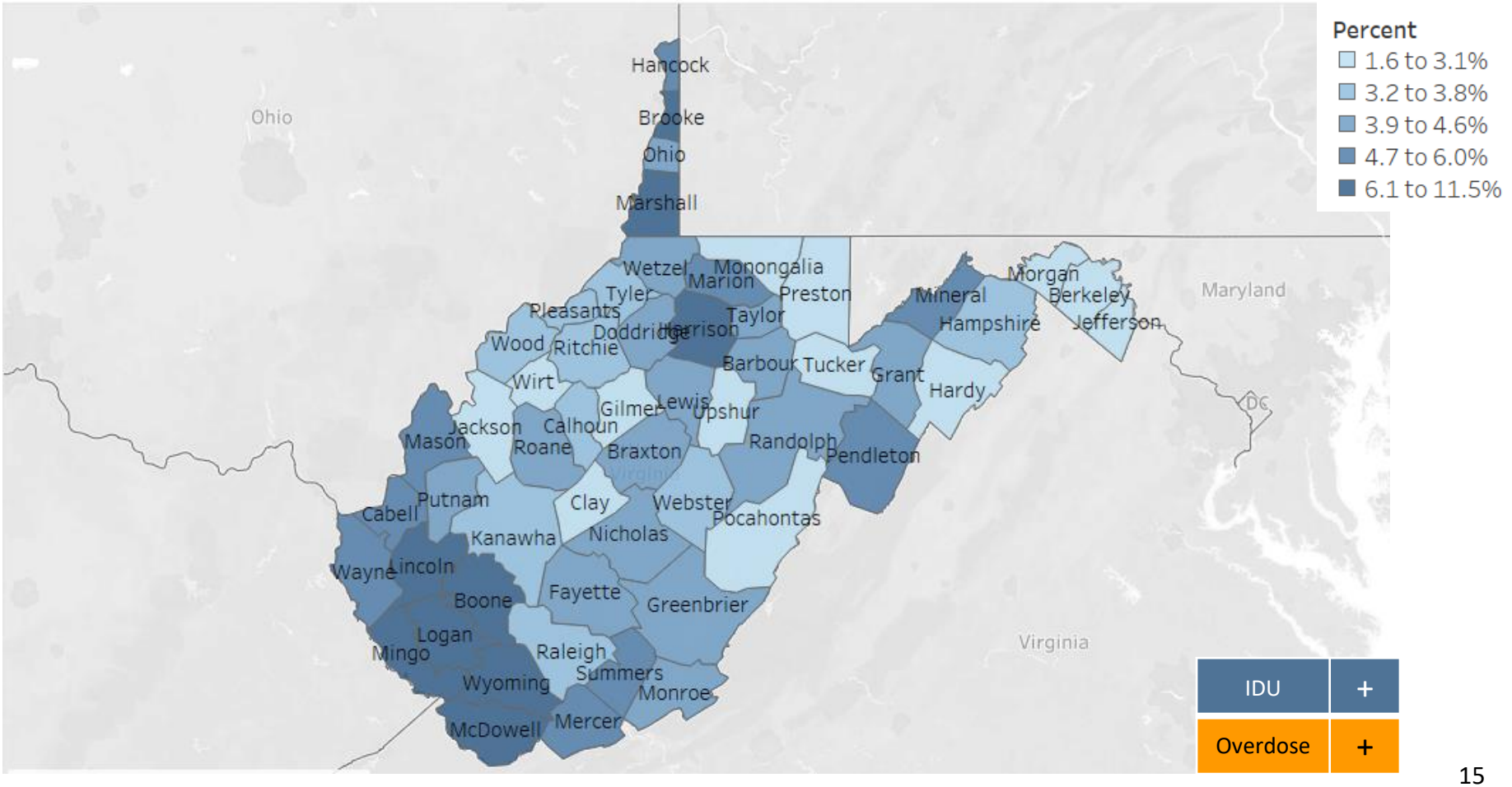


Benzodiazepine and Opioid Prescriptions*† - 2017

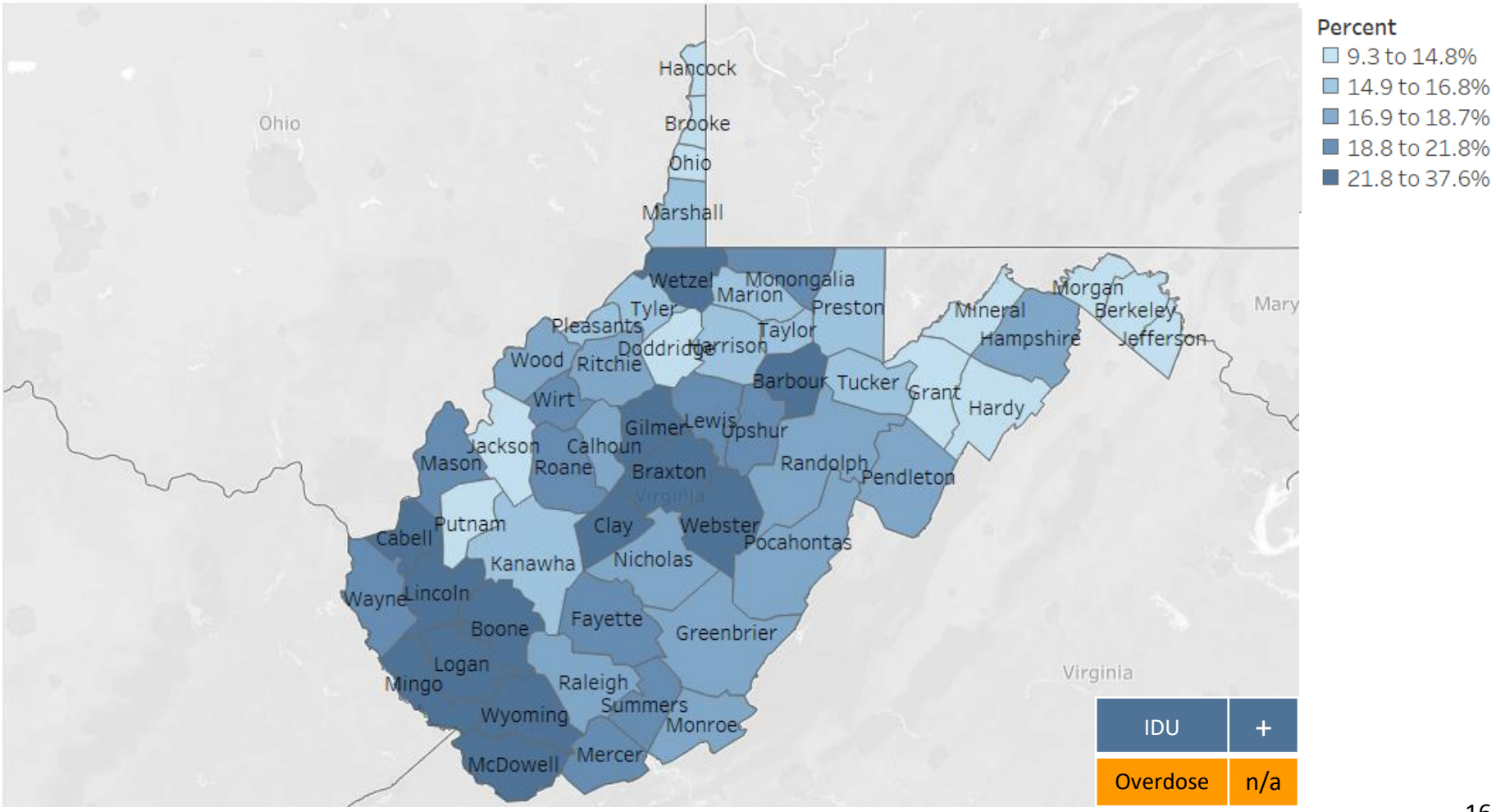
Overlapping Benzodiazepine and Opioid Prescriptions*† - 2017

Percent of patients with overlapping opioid and benzodiazepine prescriptions among those who were prescribed an opioid

Source: West Virginia Controlled Substances Monitoring Program



Poverty* - 2017

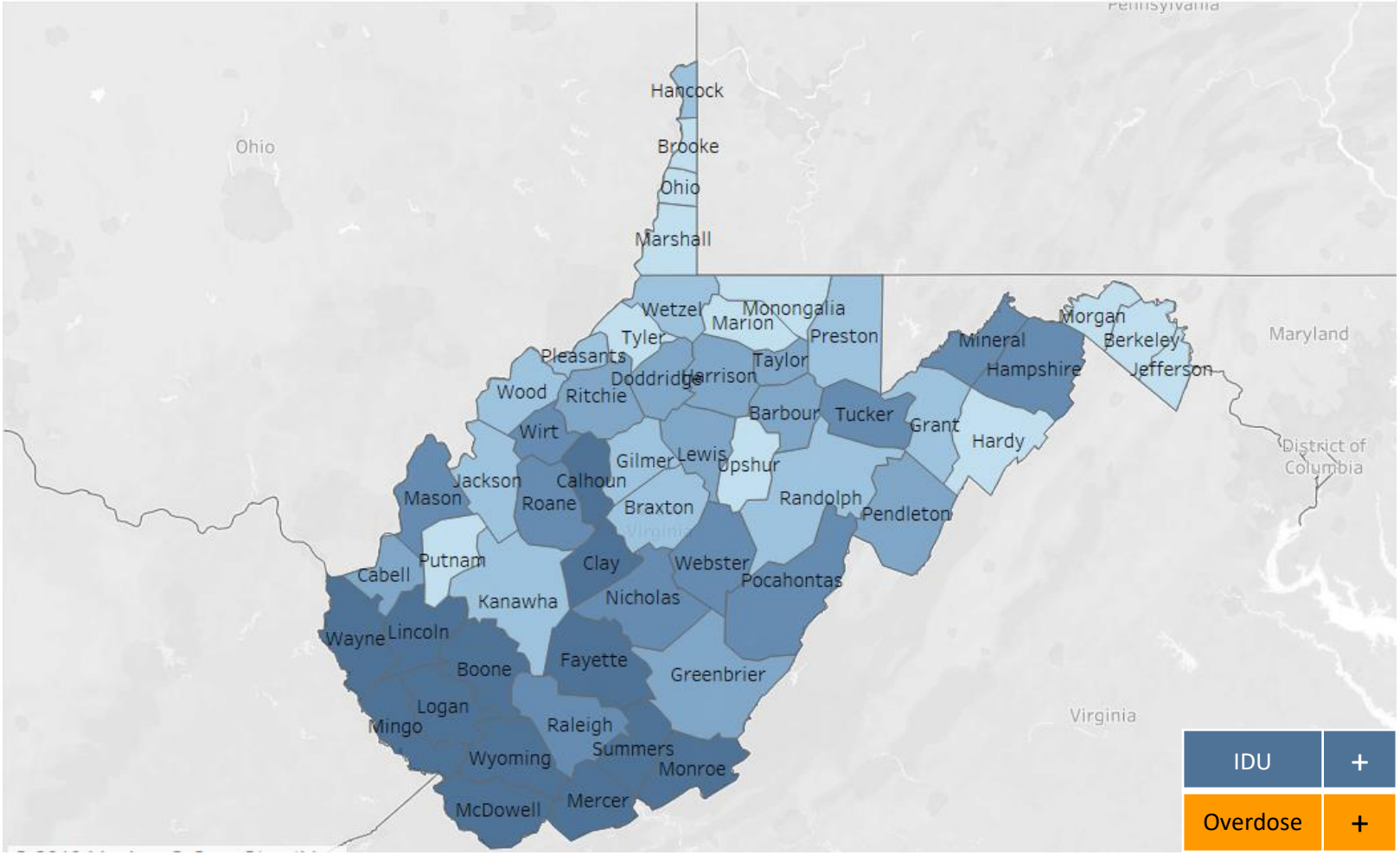


Disability*† - 2017

Disability*† - 2017

Percent of noninstitutionalized population reporting at least one of the following: hearing, vision, cognitive, ambulatory, self-care, or independent living difficulty

Source: American Community Survey (5-year estimates)

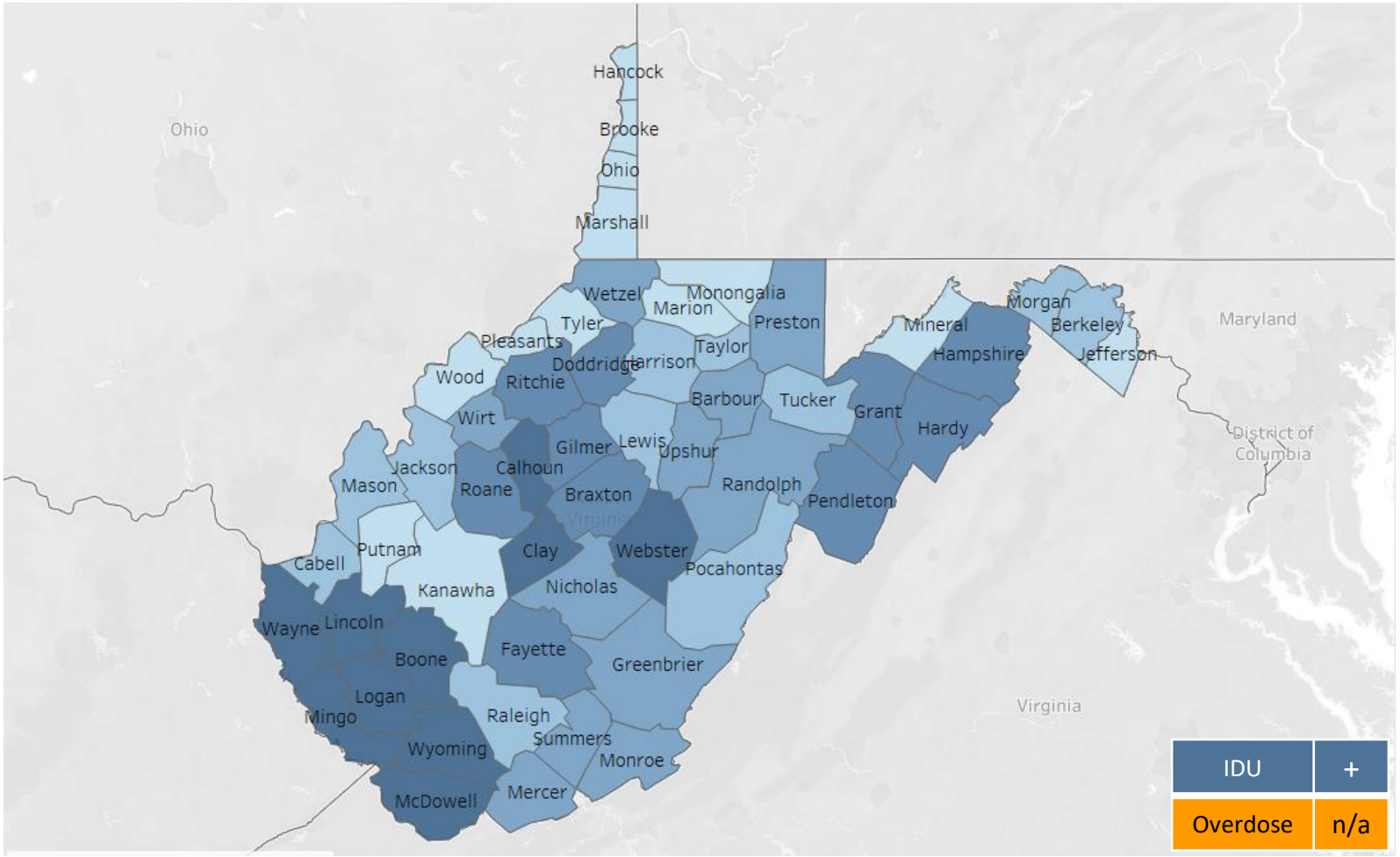


Education* - 2017

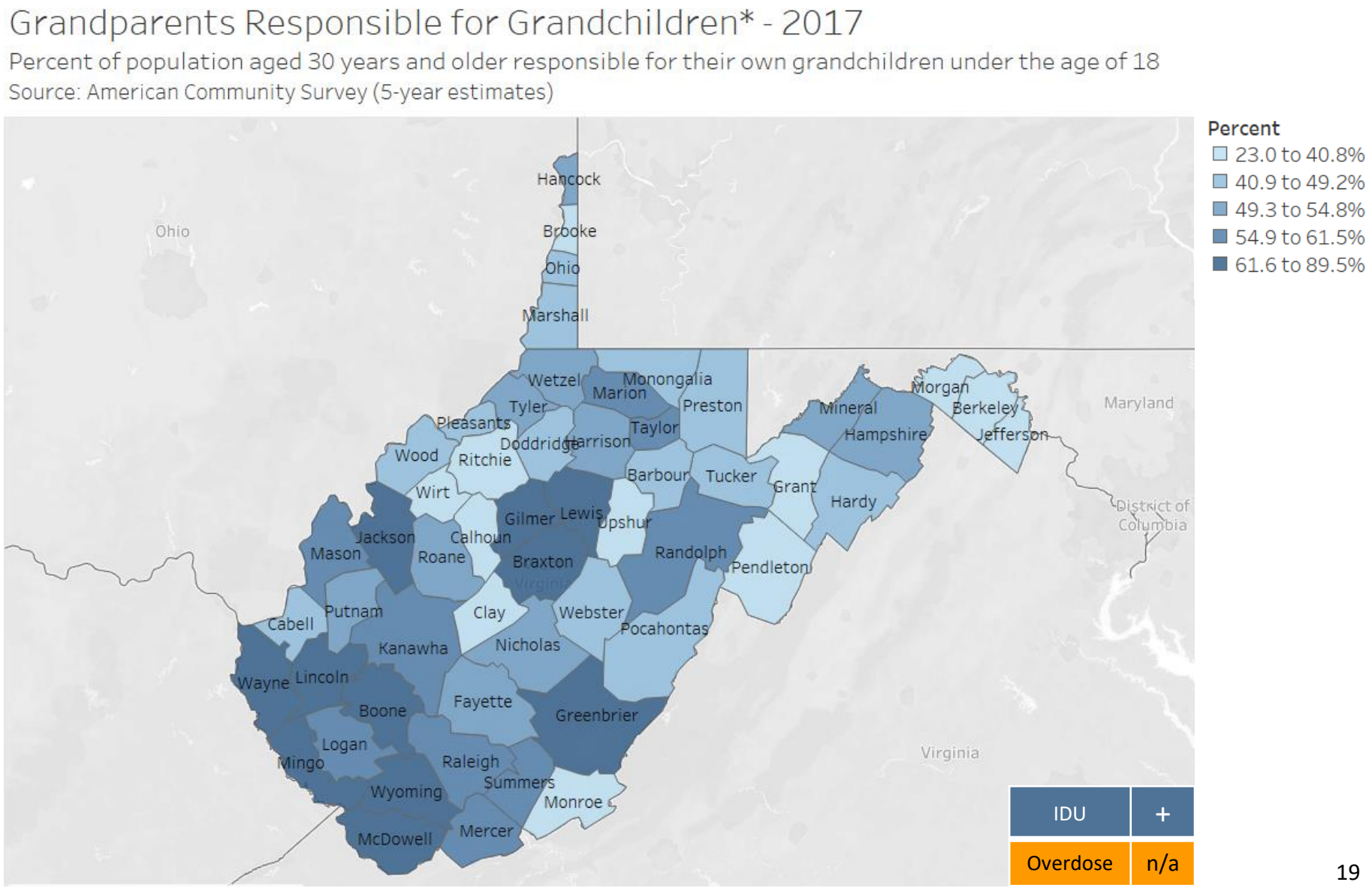
Education* - 2017

Percent of county residents aged 25 and older with less than a 12th grade education (no diploma)

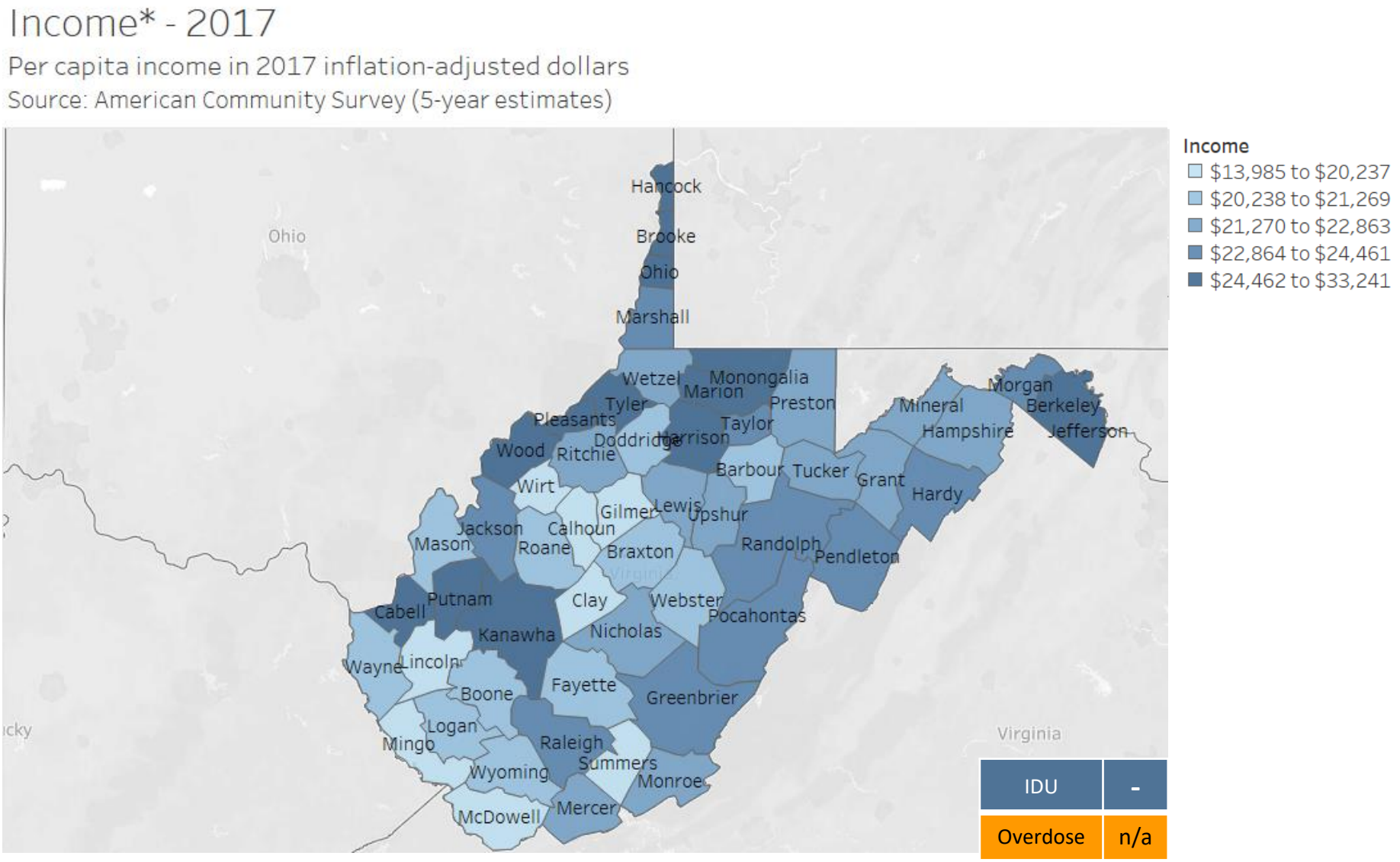
Source: American Community Survey (5-year estimates)



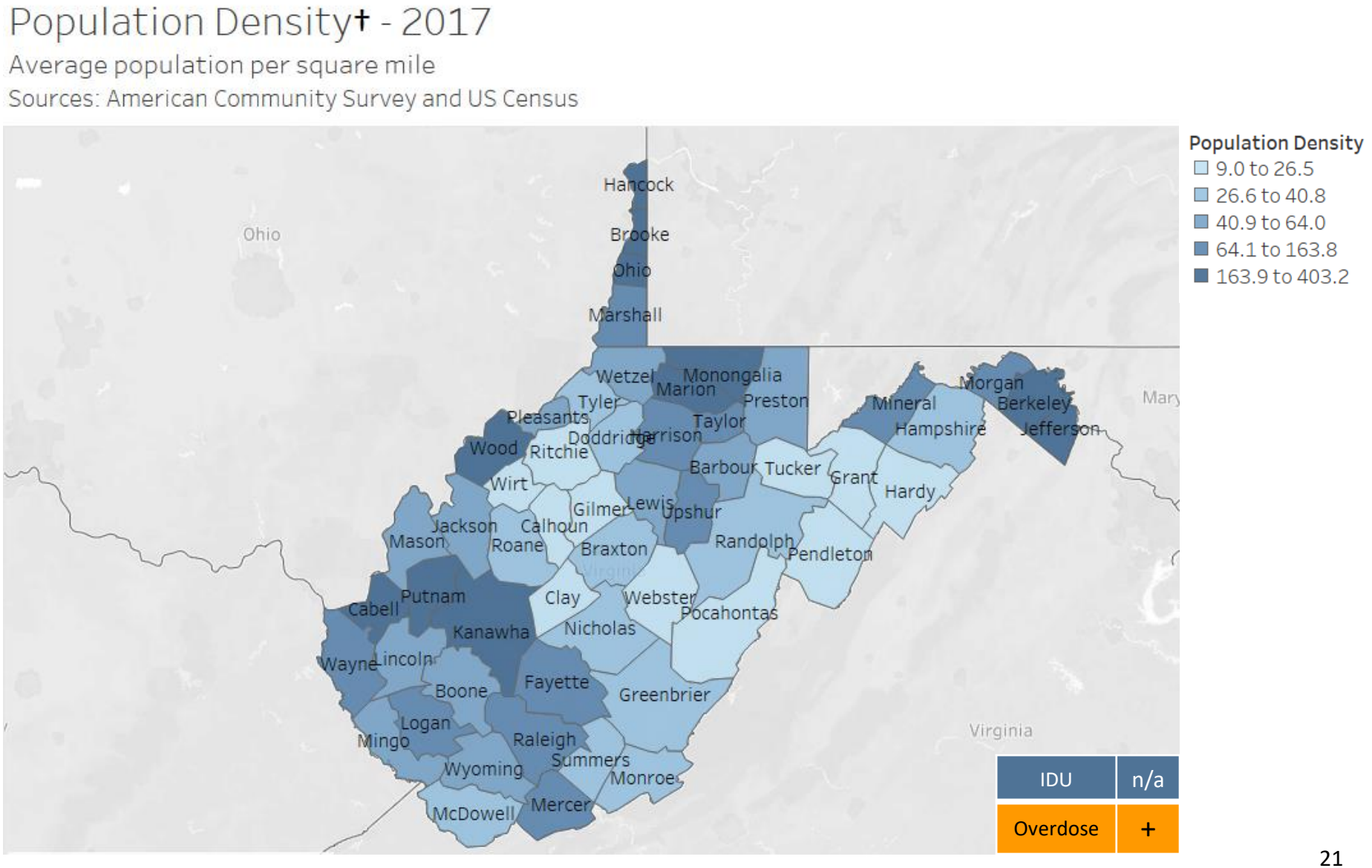
Grandparents Responsible for Grandchildren* - 2017



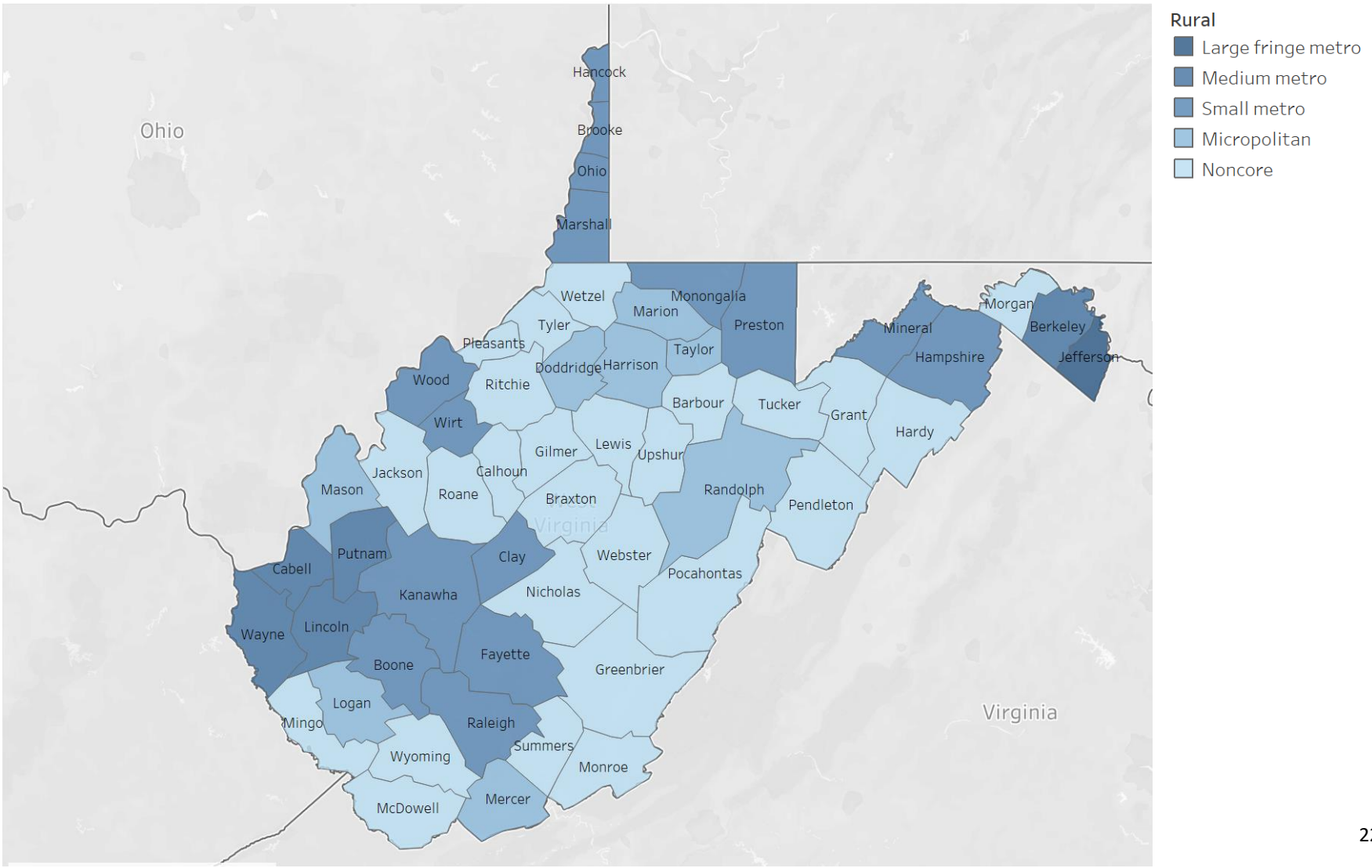
Per Capita Income* - 2017



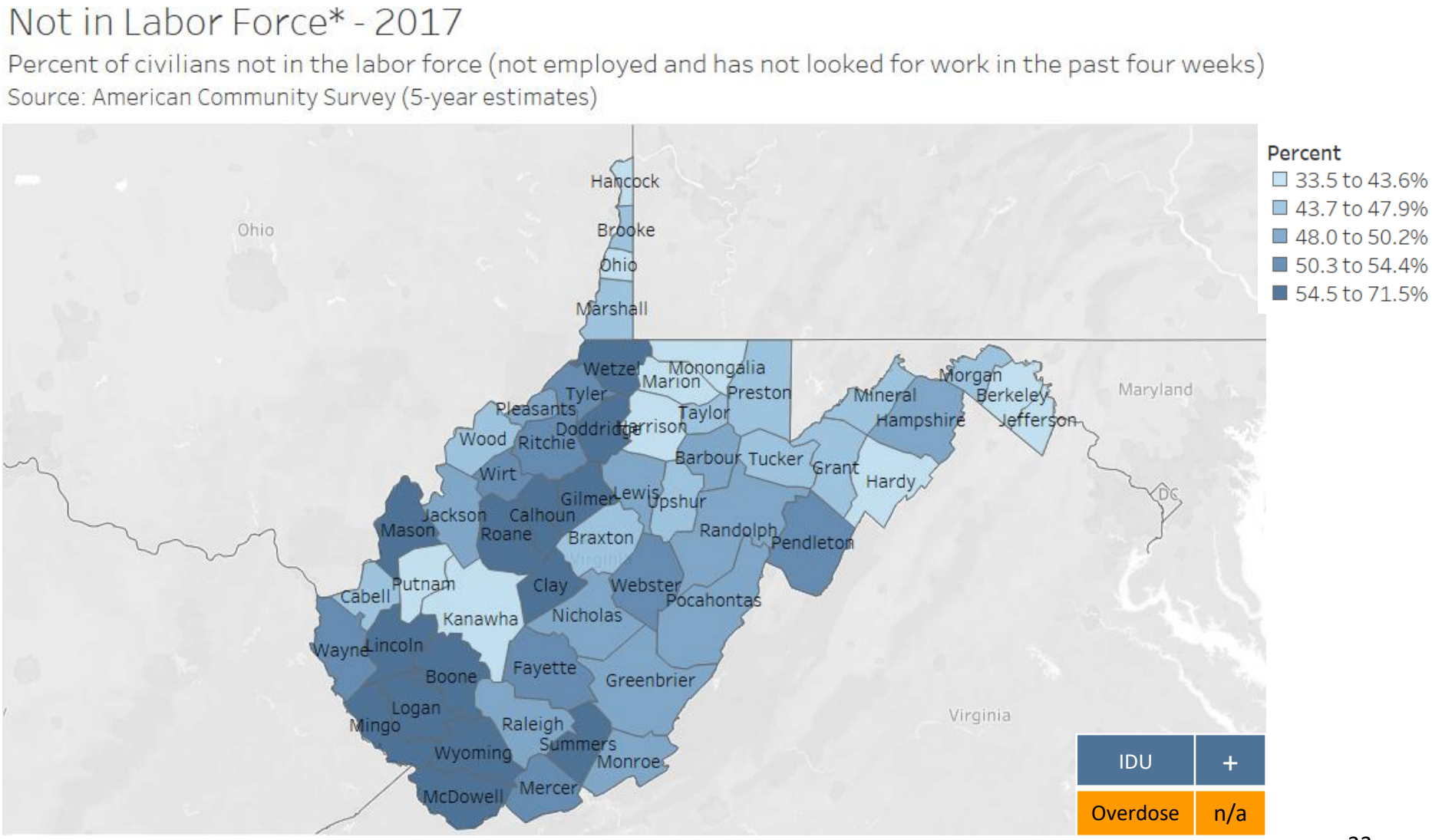
Population Density† - 2017



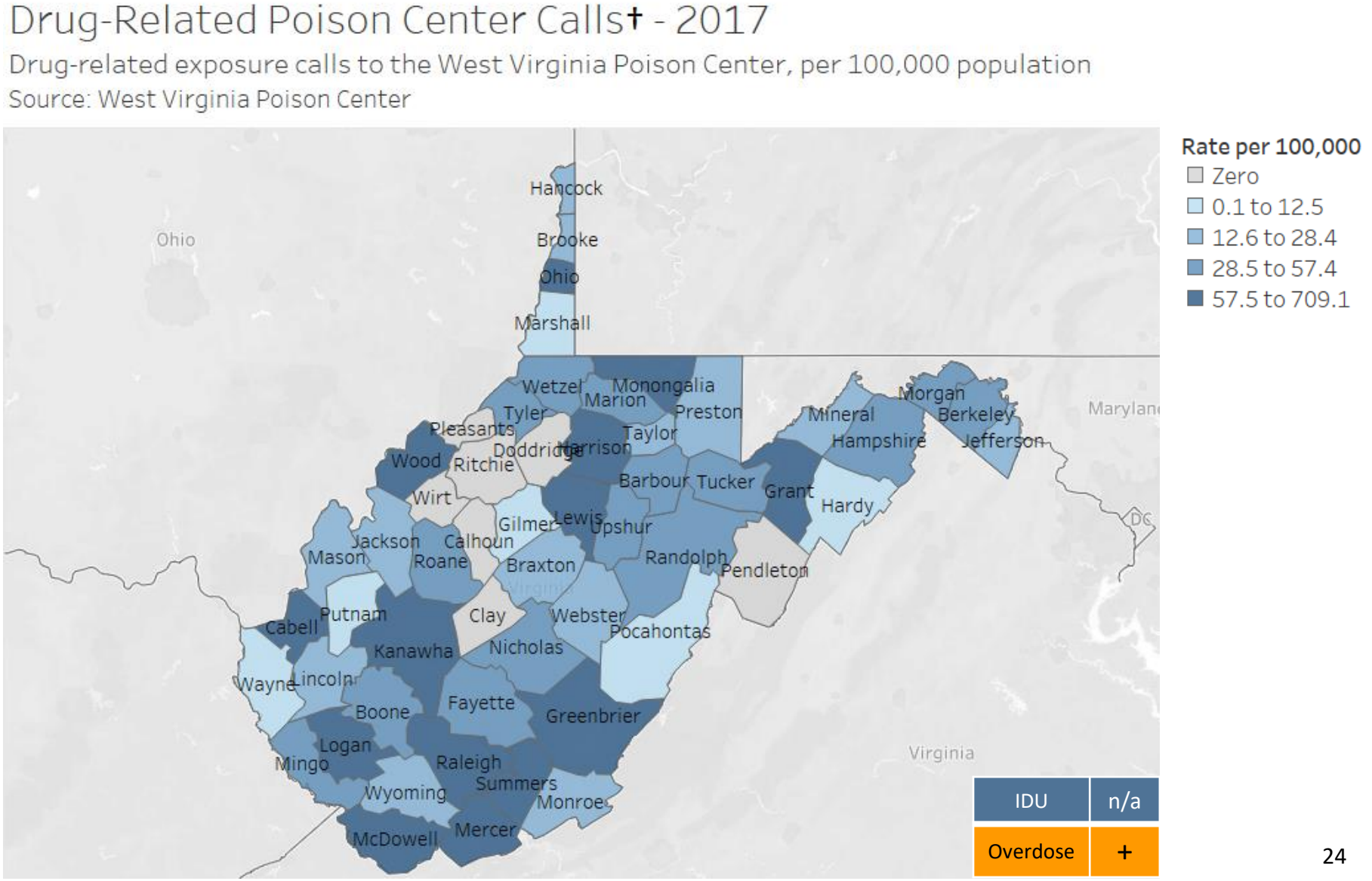
Urban-Rural Classification Scheme†



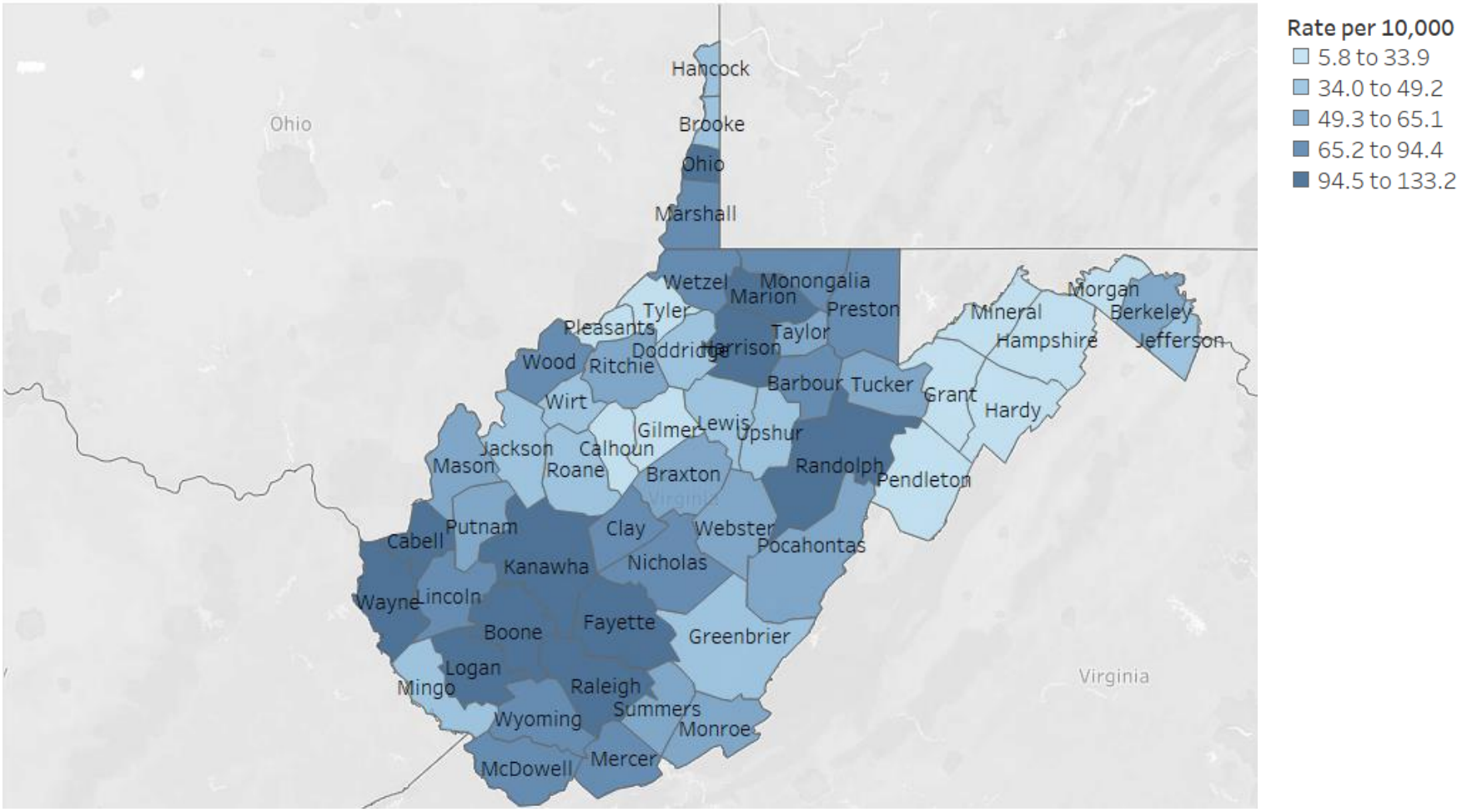
Not in the Labor Force* - 2017



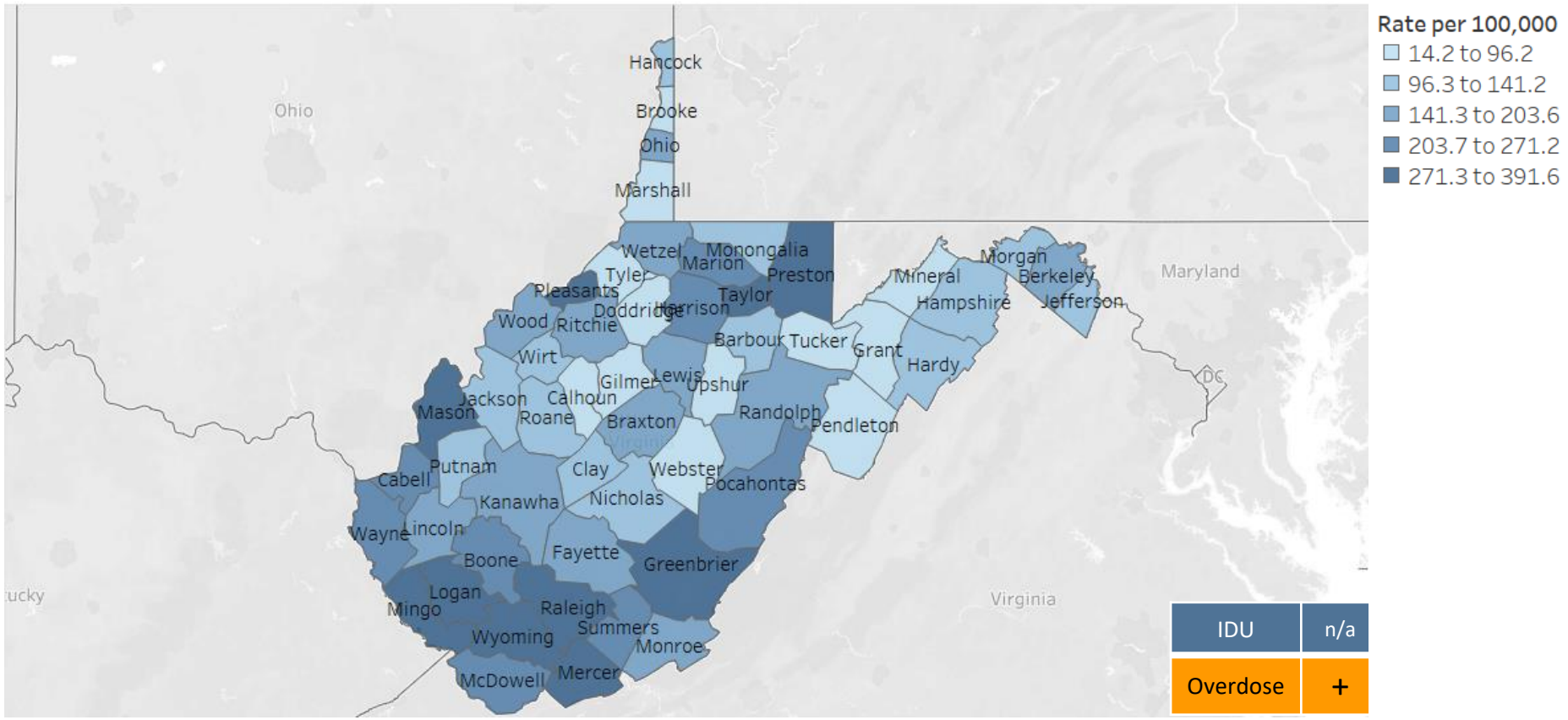
Drug-Related Poison Center Calls† - 2017



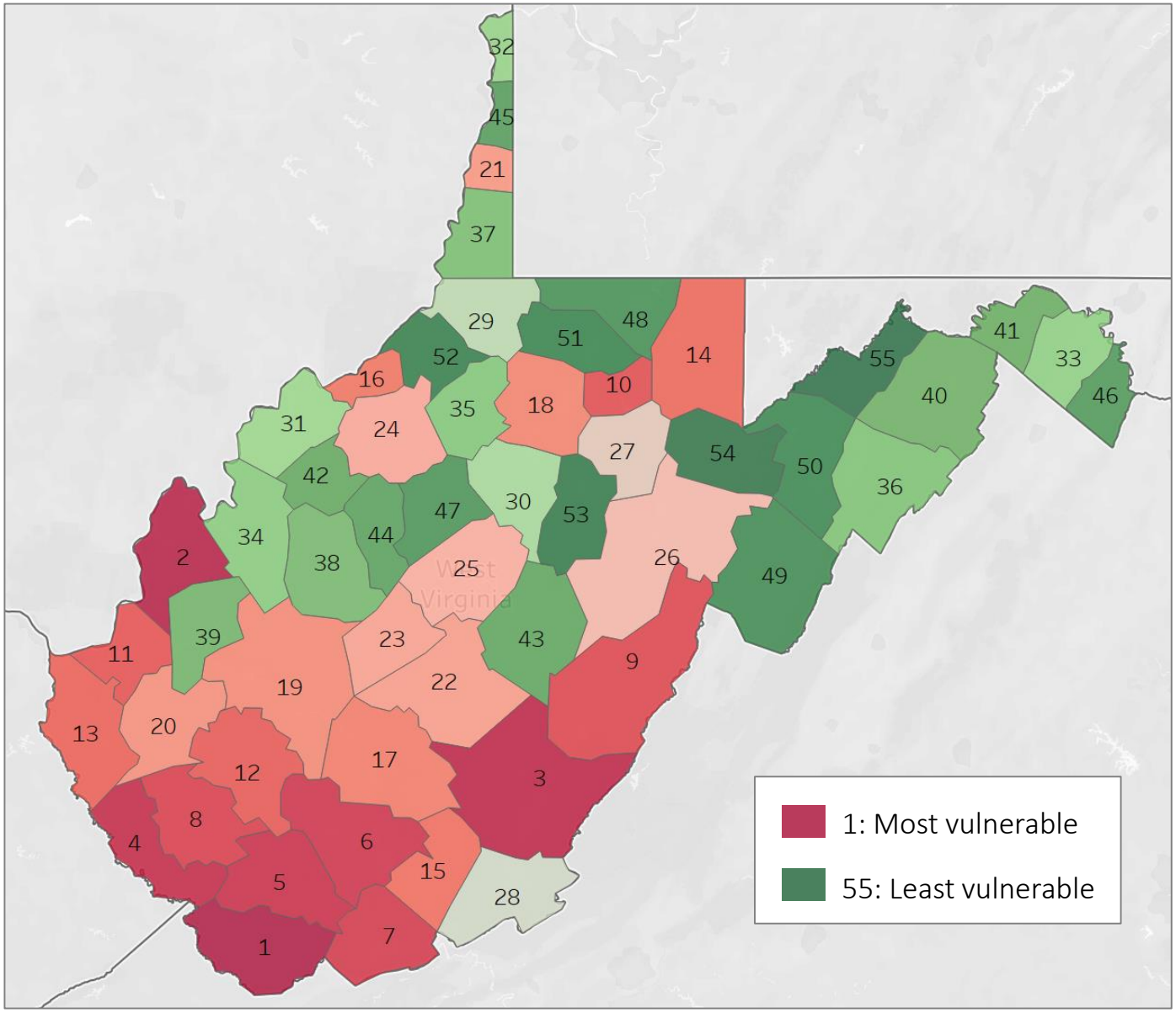
Drug-Related Hospitalizations*† - 2017



Hepatitis C Rate† - 2017



Vulnerability to Rapid Spread of HIV/HCV



Counties Ranking in Top 20%

1. McDowell
2. Mason
3. Greenbrier
4. Mingo
5. Wyoming
6. Raleigh
7. Mercer
8. Logan
9. Pocahontas
10. Taylor
11. Cabell

Vulnerability to Rapid Spread of HIV/HCV

County Rankings for HIV/HCV Vulnerability

1	McDowell*	12	Boone*	23	Clay*	34	Jackson	45	Brooke*
2	Mason*	13	Wayne*	24	Ritchie	35	Doddridge	46	Jefferson
3	Greenbrier	14	Preston	25	Braxton*	36	Hardy	47	Gilmer
4	Mingo*	15	Summers*	26	Randolph	37	Marshall*	48	Monongalia
5	Wyoming*	16	Pleasants	27	Barbour	38	Roane*	49	Pendleton
6	Raleigh*	17	Fayette*	28	Monroe*	39	Putnam	50	Grant
7	Mercer*	18	Harrison	29	Wetzel	40	Hampshire	51	Marion
8	Logan*	19	Kanawha*	30	Lewis	41	Morgan*	52	Tyler*
9	Pocahontas	20	Lincoln*	31	Wood	42	Wirt	53	Upshur
10	Taylor*	21	Ohio	32	Hancock*	43	Webster*	54	Tucker
11	Cabell*	22	Nicholas*	33	Berkeley*	44	Calhoun*	55	Mineral

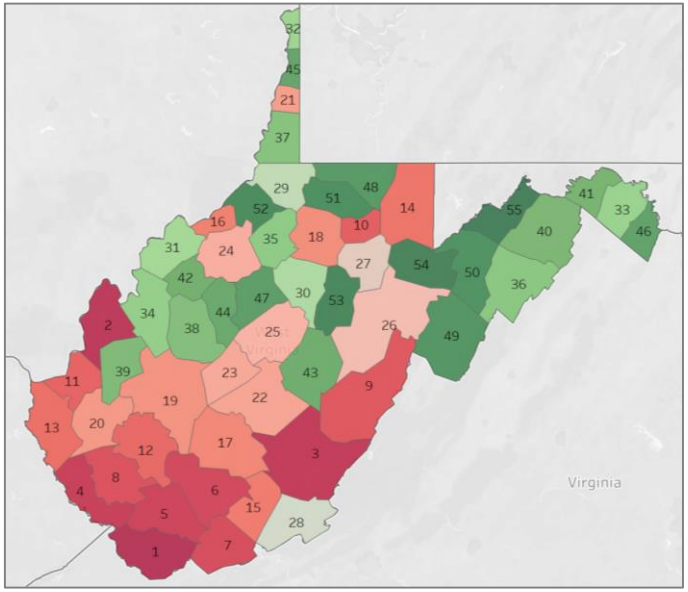
Highest Rank = Most Vulnerable

*Identified in CDC assessment for HIV/HCV vulnerability

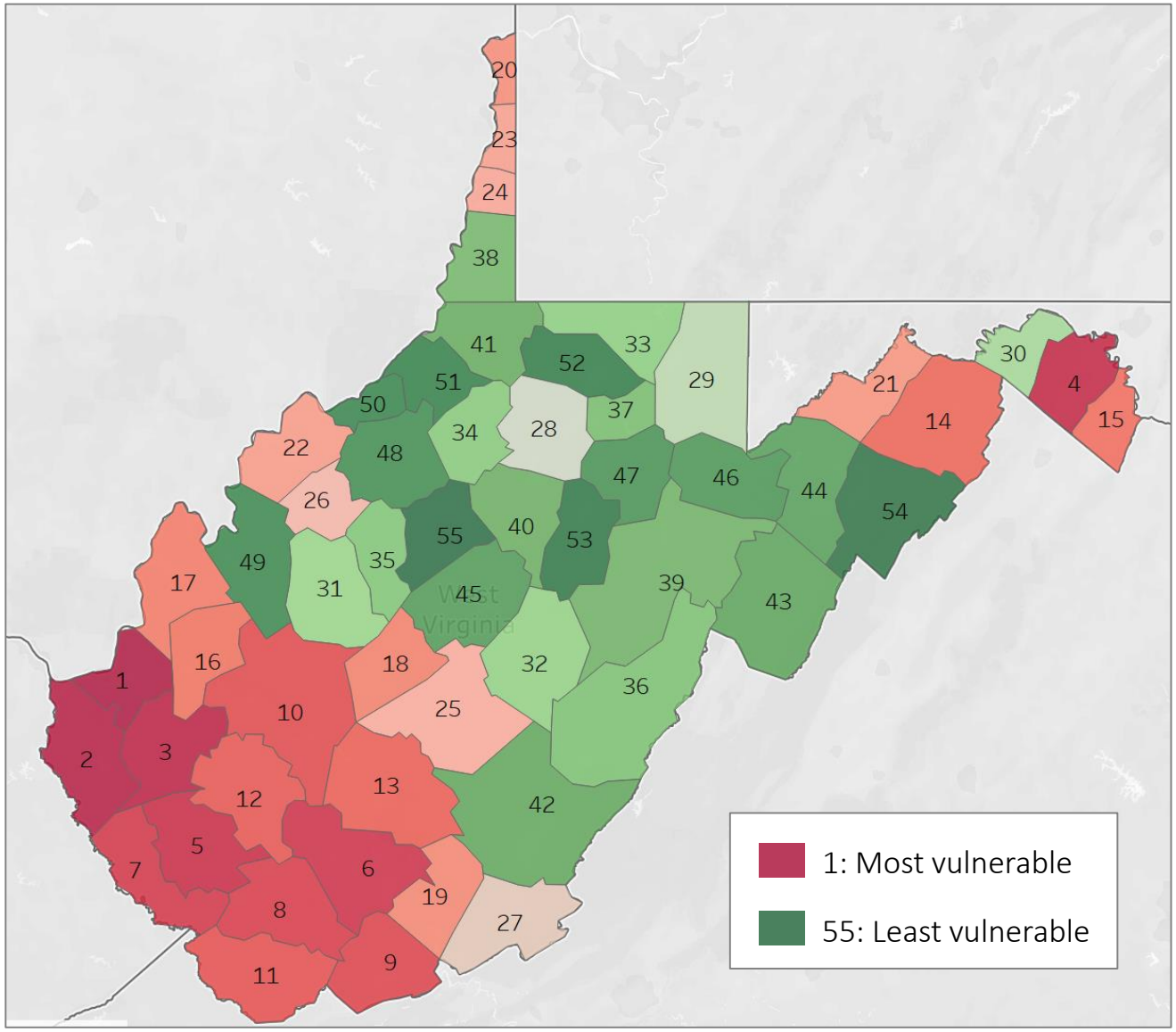
Vulnerability to Rapid Spread of HIV/HCV

Of the ten variables associated with the IDU proxy that were included in the model-building process, three were significantly associated ($p<0.05$) in the multivariable model:

- Self-reported disability (+)
- Health insurance (-)
- Drug-related hospitalizations (+)



Rankings for Overdose Mortality



Counties Ranking in Top 20%

1. Cabell
2. Wayne
3. Lincoln
4. Berkeley
5. Logan
6. Raleigh
7. Mingo
8. Wyoming
9. Mercer
10. Kanawha
11. McDowell

Rankings for Overdose Mortality

County Rankings for Overdose Mortality

1	Cabell*	12	Boone*	23	Brooke*	34	Doddridge	45	Braxton*
2	Wayne*	13	Fayette*	24	Ohio	35	Calhoun*	46	Tucker
3	Lincoln*	14	Hampshire	25	Nicholas*	36	Pocahontas	47	Barbour
4	Berkeley*	15	Jefferson	26	Wirt	37	Taylor*	48	Ritchie
5	Logan*	16	Putnam	27	Monroe*	38	Marshall*	49	Jackson
6	Raleigh*	17	Mason*	28	Harrison	39	Randolph	50	Pleasants
7	Mingo*	18	Clay*	29	Preston	40	Lewis	51	Tyler*
8	Wyoming*	19	Summers*	30	Morgan*	41	Wetzel	52	Marion
9	Mercer*	20	Hancock*	31	Roane*	42	Greenbrier	53	Upshur
10	Kanawha*	21	Mineral	32	Webster*	43	Pendleton	54	Hardy
11	McDowell*	22	Wood	33	Monongalia	44	Grant	55	Gilmer

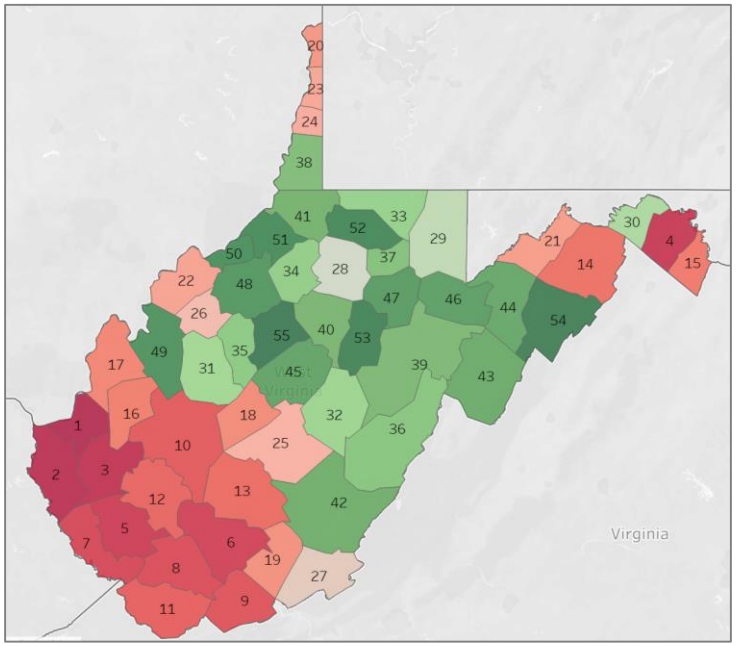
Highest Rank = Most Vulnerable

*Identified in CDC assessment for HIV/HCV vulnerability

Overdose Mortality

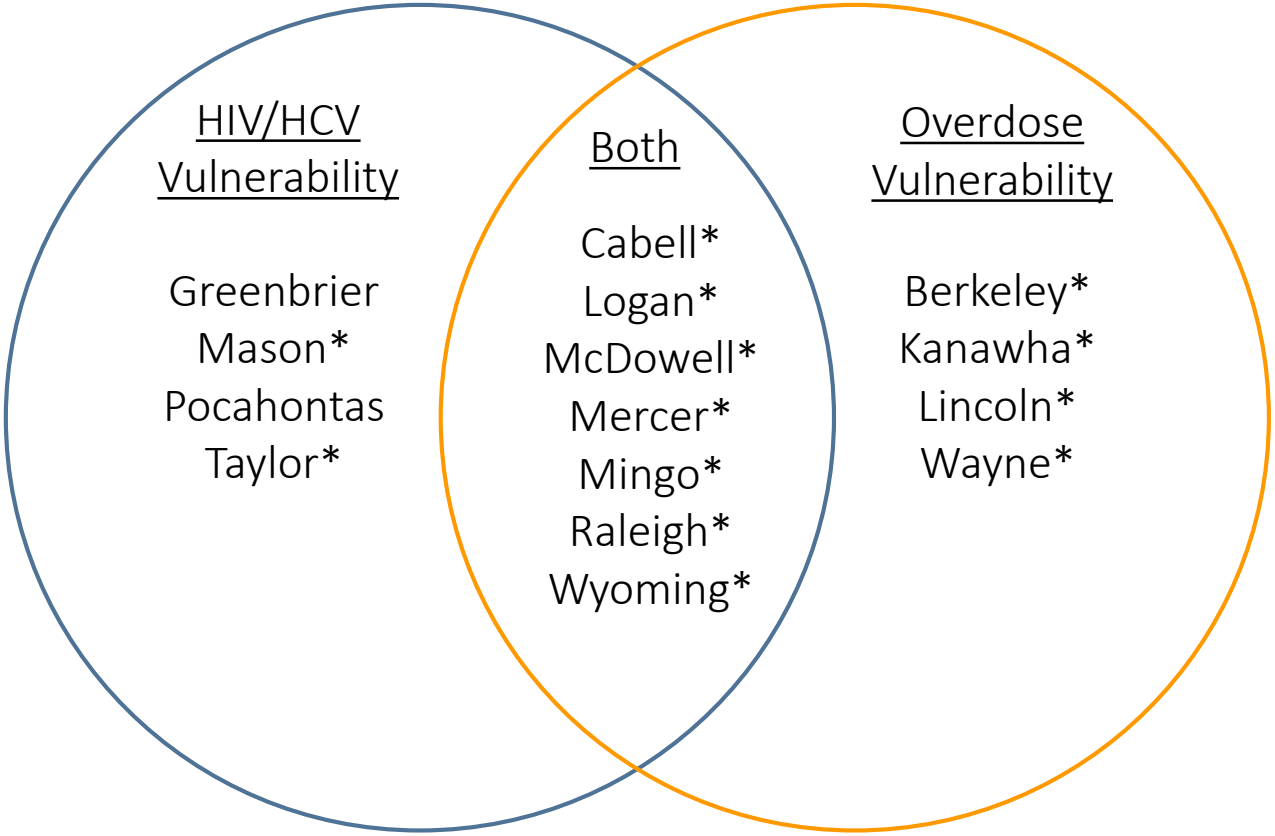
Of the eleven variables associated with overdose mortality, three were significantly associated ($p<0.05$) in the multivariable model:

- Self-reported disability (+)
- Drug-related exposure calls to the WV Poison Center (+)
- NCHS Urban-Rural Classification (More urban → higher counts)



Comparisons Between Assessments

Top 20% Vulnerable Counties



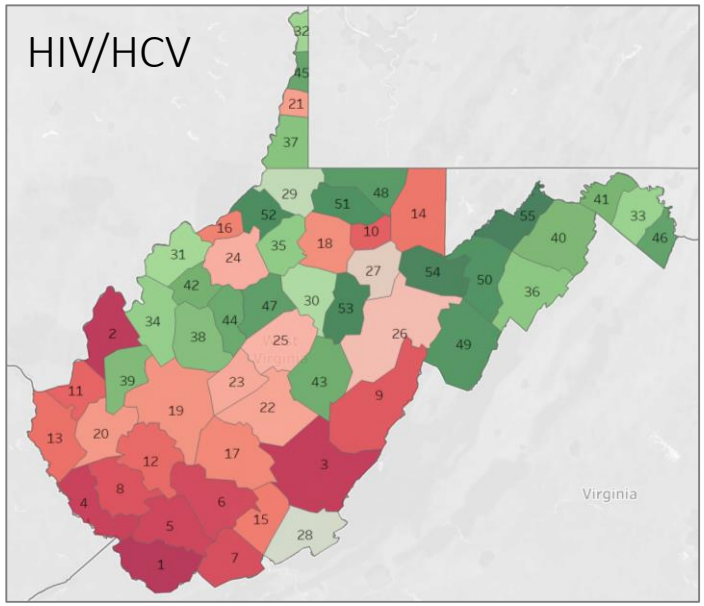
*Identified in CDC assessment for HIV/HCV vulnerability

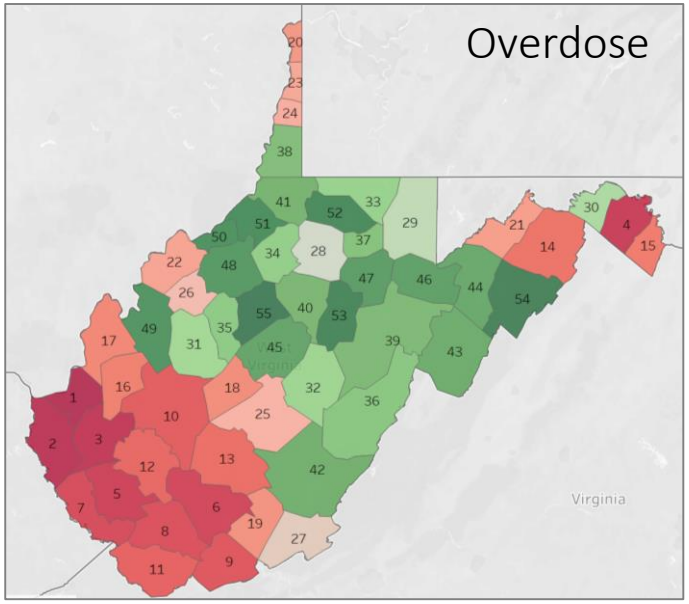
Limitations of Approach

- Ecological/point-in-time analyses cannot tell us which relationships are causally associated
- The acute hepatitis C surveillance case definition only includes symptomatic patients
- Chronic HCV cases reported among those under the age of 40 were chosen as an approximation of infection likely transmitted via IDU, since chronic cases are not investigated for risk factors
- Higher vulnerability does not mean that an outbreak or overdose mortality is inevitable, and lower vulnerability does not mean that counties are immune to these outcomes

Key Takeaways

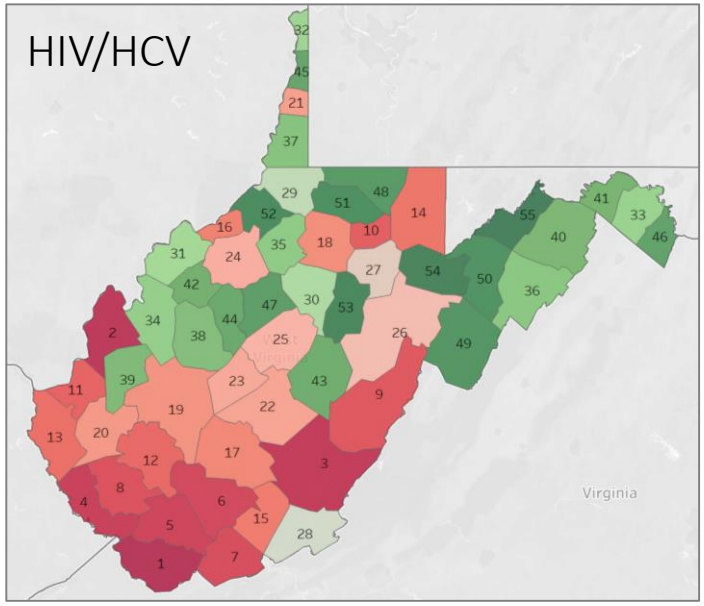
- Vulnerability to rapid transmission of HIV/HCV is widespread
- Vulnerability to overdose mortality is largely concentrated in the panhandles and the southwest portion of the state
- Unlike the CDC study, Greenbrier and Pocahontas counties were ranked high (top 20%) in vulnerability to rapid dissemination of HIV/HCV

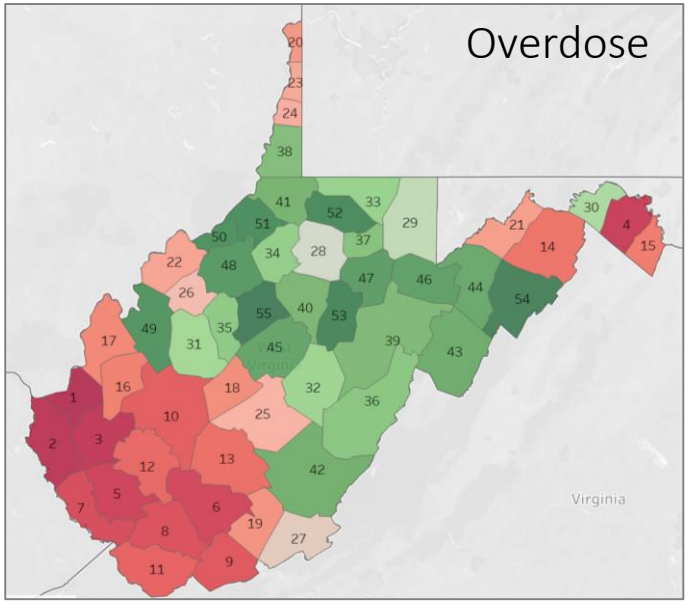




Key Takeaways, cont.

- Seven counties (Cabell, Logan, McDowell, Mercer, Mingo, Raleigh, Wyoming) were identified in the top 20% of vulnerable counties in both assessments, and also identified as vulnerable in CDC's assessment
- The southern portion of the state remains the most vulnerable to drug use-related morbidity and mortality





Key Takeaways, cont.

- Self-reported disability was the only indicator significantly associated with both outcomes of interest and should be explored further as a possible risk factor for injection drug use and overdose mortality
- A higher proportion of insured individuals in a county is associated with lower prevalence of unsterile injection drug use
- West Virginia Poison Center data and drug-related hospitalizations may be untapped resources for assessing areas at elevated risk of overdose mortality and injection drug use, respectively
- Most indicators associated with vulnerability are socioeconomic (self-reported disability, insurance coverage, urbanicity/rurality)
- It will be critical to engage partners outside of public health to address upstream risk factors for rapid transmission of HIV/HCV and overdose mortality

Moving Forward

What are the best ways to share these results with the people who need to know?

What challenges do we face that prevent or hinder solutions?

How can we use assessment results to justify needs and prioritize resources?

What questions do the assessments raise, and how can we can answer them?

Thank you!

CSTE provided technical assistance to West Virginia's Jurisdiction-Level Vulnerability Assessment through Thought Bridge Consulting LLC. The vulnerability assessment project and associated technical assistance was funded through CDC's National Center for Injury Prevention and Control, Cooperative Agreement Number 1NU1ROT000018-01-00. The findings are those of the consultants and do not necessarily represent the views of the Centers for Disease Control and Prevention.

Contact

Samantha Batdorf, MPH
Epidemiologist

West Virginia Department of Health and Human Resources
Bureau for Public Health
Office of Epidemiology and Prevention Services
350 Capitol Street, Room 125
Phone: 304-356-4244
Email: Samantha.Batdorf@wv.gov