Neonatal Abstinence Syndrome: 2018 Report

Bureau of Epidemiology

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pennsylvania
DEPARTMENT OF HEALTH

Introduction

Neonatal Abstinence Syndrome (NAS) is withdrawal experienced by a newborn due to prenatal substance exposure. Opioids have been identified as one of the main drugs causing NAS in infants, although other drugs such as benzodiazepines and barbiturates have also been associated with NAS. Incidence of NAS in the United States has been increasing substantially since 2004. Recent reports suggest that incidence increased 433 percent from 1.5 per 1,000 live births in 2004 to 8.0 per 1,000 live births in 2014 (Jilani, et al., 2019). NAS surveillance, including in Pennsylvania, has typically relied on hospital discharge data, which are not available in real time. This results in a delay in allocation of public health resources to high burden areas. Although several states have implemented mandated reporting of NAS from medical facilities to state health departments, differences in reporting methods and case definitions limit interstate data comparisons (Jilani, et al., 2019).

On Jan. 10, 2018, Governor Wolf declared a 90-day disaster emergency for the opioid epidemic. With this declaration, NAS, related to opioid use, became a reportable condition to the Pennsylvania Department of Health (Department) per Chapter 27 of the Pennsylvania Health and Safety code, and rapid case ascertainment was requested. The purpose of the initiative was to strengthen state and local response to NAS by providing deidentified aggregate data to describe the burden of NAS in Pennsylvania, identify high incidence locations for targeted intervention and reduce the statewide incidence of NAS.

Since the intial emergency declaration, six subsequent renewals have been issued to continue the overall efforts towards preventing new addictions and improving outcomes for those affected by the opioid epidemic. The most recent extension occurred on June 14, 2019, and makes NAS reportable through Sept. 12, 2019.

This report summarizes the first calendar year of this initiative and includes data from infants born Jan. 10 through Dec. 31, 2018.

Methods

To achieve the goal of rapid case ascertainment, the Bureau of Epidemiology instituted a web-based reporting system using REDCap Cloud for employees within birthing facilities and pediatric hospitals to report cases electronically.

After conducting a literature review and consulting with other state health departments, the Bureau of Epidemiology developed a surveillance case definition for facilities to use when determining which infants to report to the Department. Because authority to report NAS cases derives from the opioid emergency declaration, the case definition limited infant exposure to only those infants with opioid exposure and did not include infants that may experience NAS due to other drugs. Similarly, because NAS is the exhibition of symptoms related to withdrawal, only symptomatic infants were included in the case definition; asymptomatic infants are excluded. The final case definition for NAS was documented as an infant who is:

- Diagnosed with neonatal abstinence syndrome (NAS) defined as clinical diagnosis of an infant in the neonatal period (birth up to 28 days of life) who has symptoms of withdrawal because of prenatal exposure to opiate drugs, either via prescription, medical therapy (MAT), or illegal use (ICD-10 codes P96.1 and P04.49 only, if available);

- A resident of Pennsylvania (reporting only babies born to mothers who resided in Pennsylvania before the baby's birth); and

- Was born on or after 1/10/2018.

A one-page case report form, limited to the most vital clinical data, was developed and designed in REDCap Cloud by Jan. 26, 2018. A copy of the case report form is provided in Appendix A. Rapid case ascertainment did not allow for collection of variables like length of stay, cost of stay or types of treatment throughout the full duration of an infant stay. Further, limiting data collection to the most valuable parameters facilitated hospitals' abilities to comply with the reporting guidelines and to provide more timely and consistent reporting. Therefore, most of the data collection was centered around infant health parameters. Maternal details are limited.

A Department of Health team contacted all target facilities via phone call to confirm names and contact information of managers within all newborn nurseries or neonatal intensive care units (NICU), and these managers became the initial contact points for dissemination of the new reporting information. Case reporting guidance and a frequently asked questions document was provided via email on Feb. 8, 2018, to 93 birthing facilities. Two additional facilities were included shortly after the initial guidance release based upon reports of these facilities also providing care to infants with NAS. In addition to direct contact with managers, information was distributed via the Hospital and Healthsystem Association of Pennsylvania (HAP) to reach a wider target audience. Case reporters and nursery managers are contacted via email approximately every 90 days to provide updated reporting periods, data summaries and updated FAQs, as previous emergency declaration renewals expire.
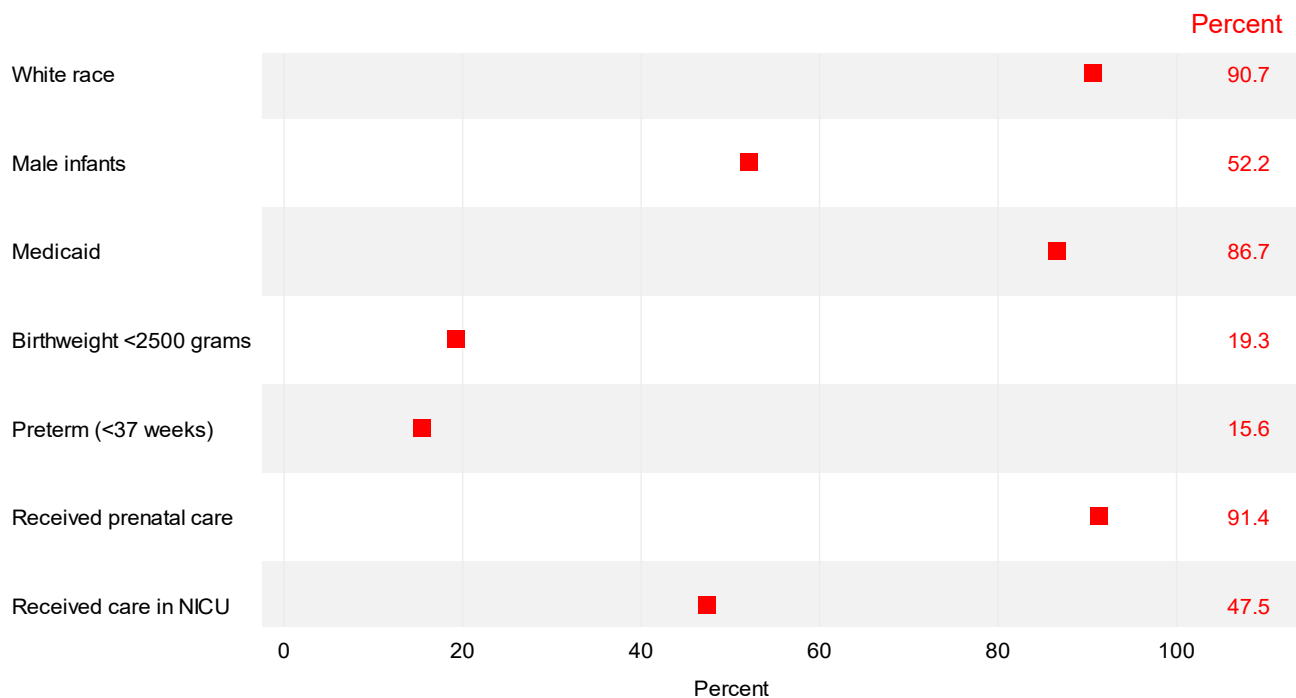
Analyses were performed on NAS cases in total and also by geographic region. Most analyses by geographic region were obtained by county of facility of birth and by county of maternal residence. Data analyzed by county of facility of birth gives indication of the burden on hospitals to provide the medical care and accommodations vital to many infants with NAS. Data analyzed by county of maternal residence provides information regarding the community impact and needs regarding addiction treatment and other referral to services for both mother and infant.

Findings

As of June 8, 2019, a total of 2,140 cases of NAS meeting the case defintion have been reported among infants born on or after Jan. 10, 2018, through Dec. 31, 2018. Out of 95 birthing facilities and pediatric hospitals who received direct communication from the Department, a total of 87 facilities (92 percent) reported cases. This includes facilities that reported having zero cases, facilities reporting cases that did not meet the Department case definition, or facilities that reported infants who were a duplicate of a transfer facility's case report. As a subset of those facilities, 85 facilities (89 percent) reported cases to the Department that met case definition and were included in the final case count.

The majority of infants with NAS had mothers reported as being white (91 percent), and about half of the infants were male (52 percent). The primary payer was indicated as Medicaid for 87 percent of mothers to infants with NAS compared to 34 percent of 2017 statewide births (Division of Health Informatics, Pennsylvania Department of Health, 2019). Nineteen percent of infants with NAS had a low birthweight (less than 2500 grams) compared to 8 percent of all infants born statewide in 2017 (Division of Health Informatics, Pennsylvania Department of Health, 2019). While 16 percent of NAS cases were born premature (less than 37 weeks gestation), only approximately 9 percent of 2017 statewide infants were born premature (Division of Health Informatics, Pennsylvania Department of Health, 2019). Ninety-one percent of mothers to infants with NAS were reported to have received any prenatal care. Forty-seven percent of NAS cases received care in a NICU. Figure 1 shows the demographics and birth characteristics of infants with NAS.

Figure 1 – Demographic Characteristics and Birth Parameters of Infants with NAS

SOURCE: Pennsylvania Department of Health, Bureau of Epidemiology (2019)

Of all NAS cases, 90 percent were tested for laboratory evidence of prenatal drug exposure. Eighty-four percent of those with completed laboratory tests had a positive lab result. Among the infants with a positive lab result, 85 percent tested positive for some form of opioids; 68 percent tested positive for drugs commonly associated with Medication-Assisted Treatment (MAT); and 22 percent tested positive for opiates, oxycodone or fentanyl.

Almost all facilities (97 percent) reported using a Finnegan or Modified Finnegan scoring method to assess severity of withdrawal in infants. Table 1 displays data on clinical assessment and laboratory testing of infants with NAS.
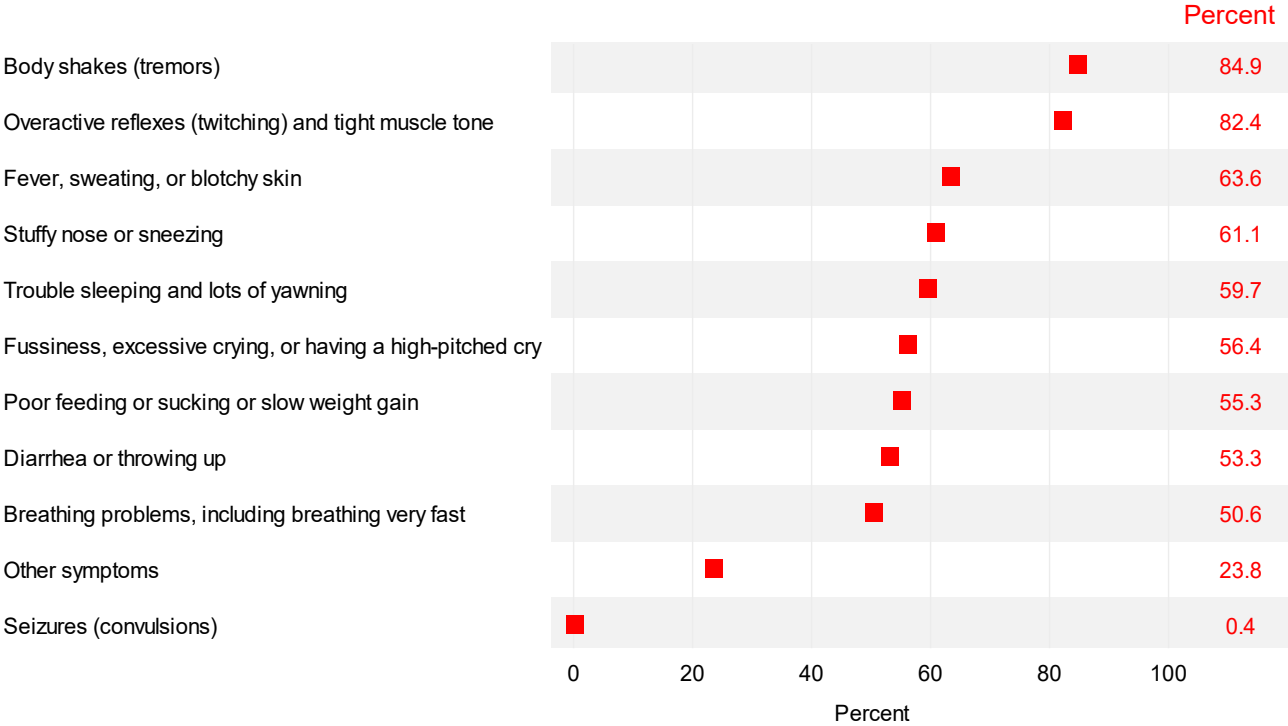
Table 1 – NAS Assessment and Testing Characteristics

Testing or Assessment	Response	%
Tested for laboratory evidence of substance exposure	Yes, result known	79.4
	Yes, result pending	11.1
	No, not tested	9.5
Positive laboratory result (if tested and known)	Yes, positive	83.6
	No, negative	16.4
Of those testing positive, any form of opioids found	Yes	85.1
	No	14.9
Of those testing positive, addiction treatment drugs found	Yes	68.3
	No	31.7
Of those testing positive, opiates, oxycodone, or fentanyl found	Yes	22.0
	No	78.0
Used Finnegan or Modified Finnegan scoring	Yes	97.5
	No	2.5

SOURCE: Pennsylvania Department of Health, Bureau of Epidemiology (2019)

Ninety-four percent of infants with NAS showed three or more symptoms. The most common symptom exhibited by infants with NAS was "body shakes (tremors)" reported in 85 percent of cases. The second and third most common symptoms were "overactive reflexes (twitching) and tight muscle tone" (82 percent) and "fever, sweating or blotchy skin" (64 percent). Seizures were rarely reported (0.4 percent). Figure 2 describes symptoms experienced by infants with NAS.
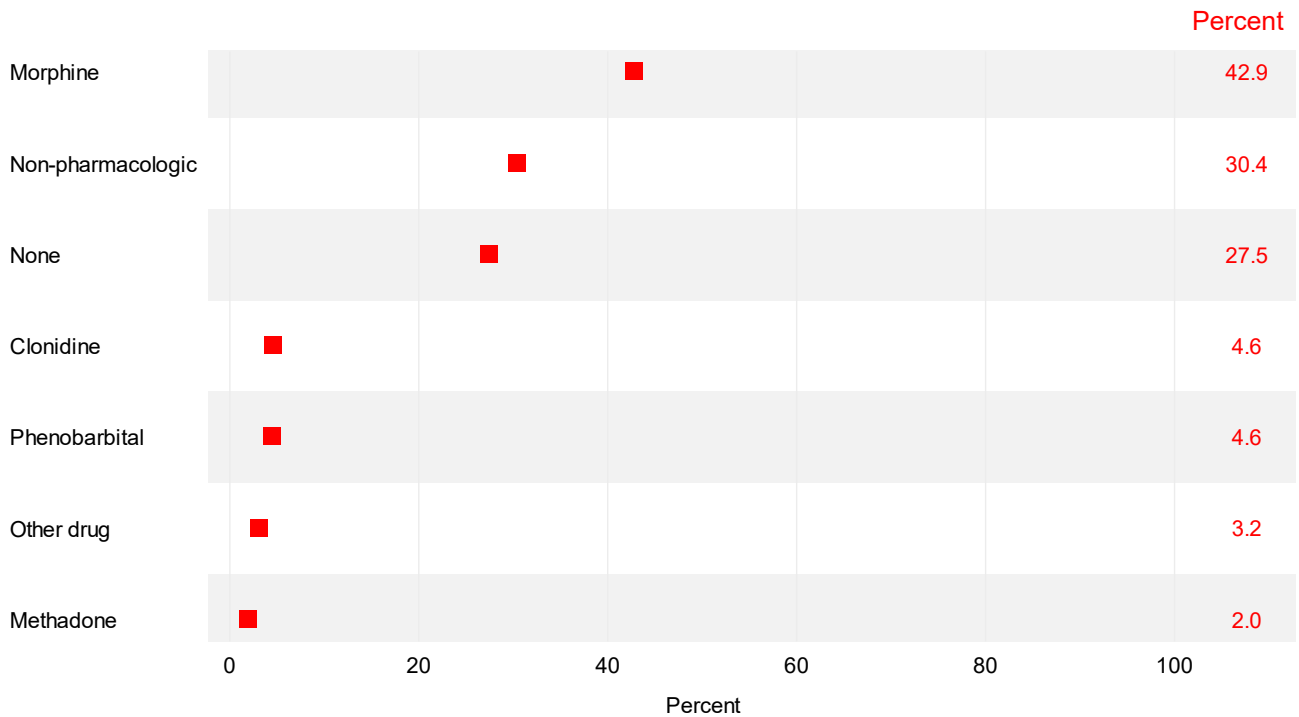
Figure 2 – Percent of NAS Infants Exhibiting Specific Symptoms

Symptom	Percent
Body shakes (tremors)	84.9
Overactive reflexes (twitching) and tight muscle tone	82.4
Fever, sweating, or blotchy skin	63.6
Stuffy nose or sneezing	61.1
Trouble sleeping and lots of yawning	59.7
Fussiness, excessive crying, or having a high-pitched cry	56.4
Poor feeding or sucking or slow weight gain	55.3
Diarrhea or throwing up	53.3
Breathing problems, including breathing very fast	50.6
Other symptoms	23.8
Seizures (convulsions)	0.4

SOURCE: Pennsylvania Department of Health, Bureau of Epidemiology (2019)

In NAS cases, 43 percent of infants were reported to have received morphine and 30 percent received non-pharmacologic treatments. Twenty-eight percent of infants were documented as receiving no treatment. (Treatment types are not mutually exclusive.) Figure 3 displays types of treatment received by infants with NAS.

Figure 3 – Treatment Type for Infants with NAS

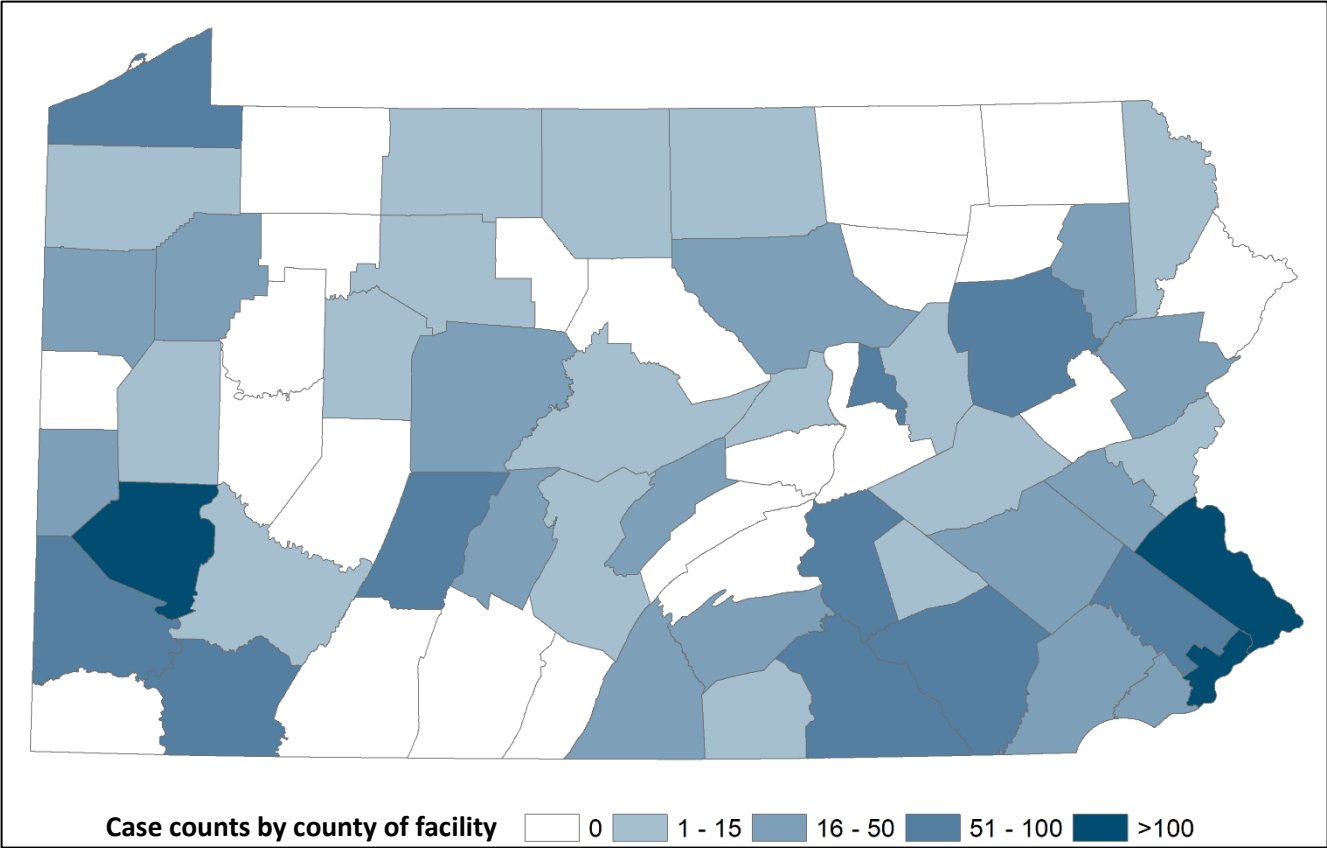|	Percent
Morphine	42.9
Non-pharmacologic	30.4
None	27.5
Clonidine	4.6
Phenobarbital	4.6
Other drug	3.2
Methadone	2.0

SOURCE: Pennsylvania Department of Health, Bureau of Epidemiology (2019)

Case Counts

NAS case counts were generated at the county level in two different ways: by county of facility and by county of maternal residence. Darker shaded areas of the maps represent counties with higher case counts. The ranges of case counts by color are defined in a legend at the bottom of each map.

Map 1 shows cases of NAS by county of facility. This map highlights counties with the greatest hospital burden for treating infants with NAS. Map 2 displays NAS cases by county of maternal residence and highlights where most women are living at the time of giving birth to an infant with NAS. As expected, the resident counties with highest case counts also represent the most densely populated areas.
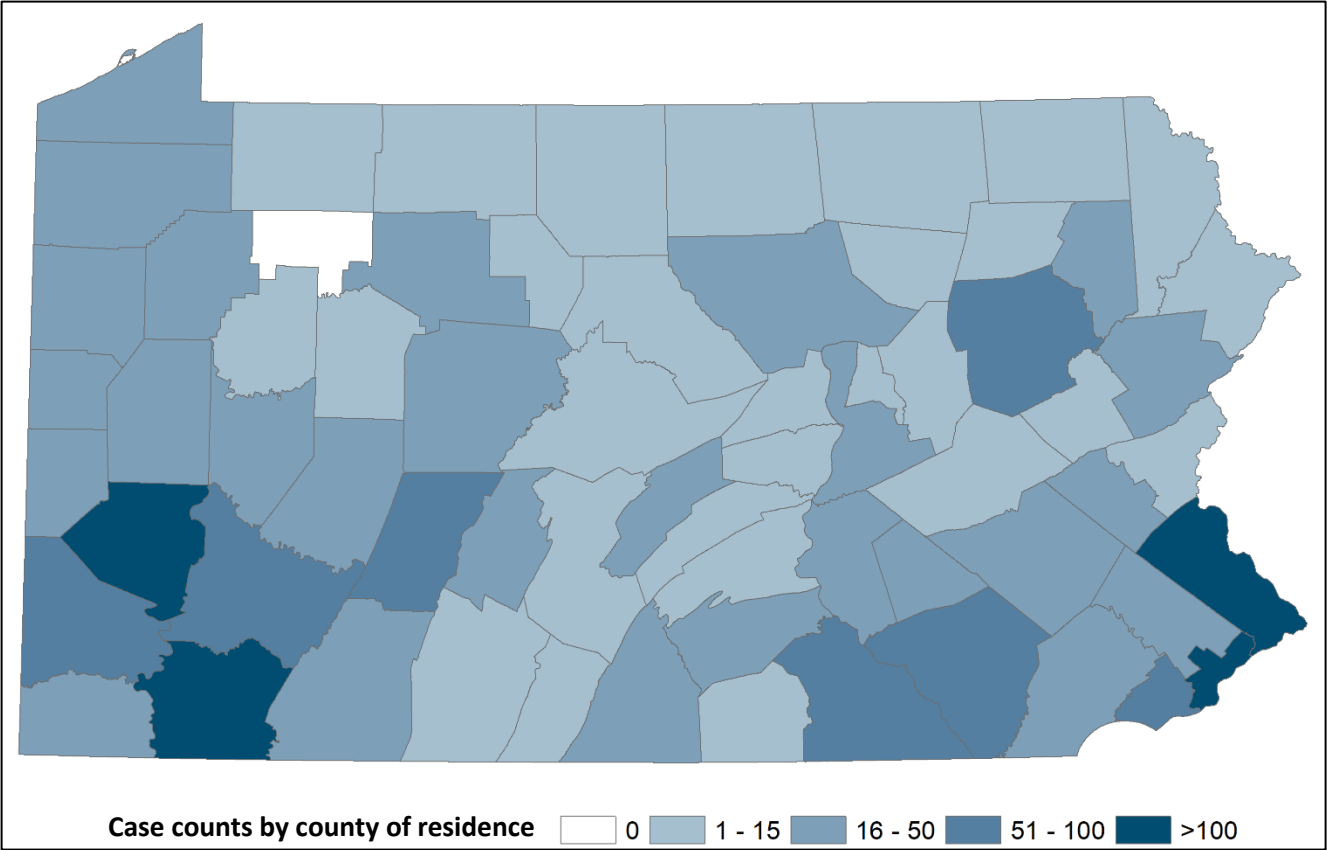
Map 1 – NAS Case Counts, by County of Facility

SOURCE: Pennsylvania Department of Health, Bureau of Epidemiology (2019)

Case counts by county of facility ranged from zero cases to 482 cases in Allegheny County. A total of 22 counties had zero cases reported. Seventeen of these 22 counties do not have birthing hospitals or pediatric hospitals.

Map 2 – NAS Case Counts, by County of Maternal Residence

Case counts by county of residence

| | 0 | | 1 - 15 | | 16 - 50 | | 51 - 100 | | >100 |

SOURCE: Pennsylvania Department of Health, Bureau of Epidemiology (2019)

Case counts by county of residence ranged from zero cases (reported by one county) to 263 in Philadelphia County. For a list of case counts by county of facility and by county of residence, see Table 2.

Table 2 – NAS Case Counts, by County of Facility and by County of Maternal Residence

County	# Birthing Facilities in County	# Cases by Facility County	# Cases by Resident County	County	# Birthing Facilities in County	# Cases by Facility County	# Cases by Resident County
Adams	1	2	15	Lackawanna	1	36	32
Allegheny	9	470	249	Lancaster	4	67	61
Armstrong	1	0	21	Lawrence	0	0	37
Beaver	1	20	29	Lebanon	1	2	16
Bedford	0	0	8	Lehigh	3	50	27
Berks	2	19	20	Luzerne	3	79	65
Blair	2	40	29	Lycoming	1	21	24
Bradford	1	0	2	McKean	1	1	2
Bucks	3	118	122	Mercer	2	44	33
Butler	1	6	40	Mifflin	1	21	18
Cambria	1	74	52	Monroe	1	18	21
Cameron	0	0	3	Montgomery	6	81	48
Carbon	0	0	11	Montour	1	75	4
Centre	1	6	11	Northampton	2	4	12
Chester	3	38	38	Northumberland	0	0	16
Clarion	1	0	12	Perry	0	0	11
Clearfield	1	44	29	Philadelphia	8	255	263
Clinton	0	0	14	Pike	0	0	4
Columbia	1	1	9	Potter	1	2	1
Crawford	1	11	39	Schuylkill	1	4	14
Cumberland	2	20	27	Snyder	0	0	1
Dauphin	2	79	39	Somerset	0	0	18
Delaware	4	49	52	Sullivan	0	0	1
Elk	1	8	17	Susquehanna	0	0	10
Erie	3	72	39	Tioga	1	1	3
Fayette	1	87	106	Union	1	2	4
Forest	0	0	0	Venango	1	34	34
Franklin	2	41	32	Warren	1	0	1
Fulton	0	0	4	Washington	1	52	59
Greene	0	0	29	Wayne	1	6	5
Huntingdon	1	2	10	Westmoreland	1	7	51
Indiana	1	0	16	Wyoming	0	0	11
Jefferson	1	3	5	York	3	68	64
Juniata	0	0	7	Total	95	2,140	2,107[1]

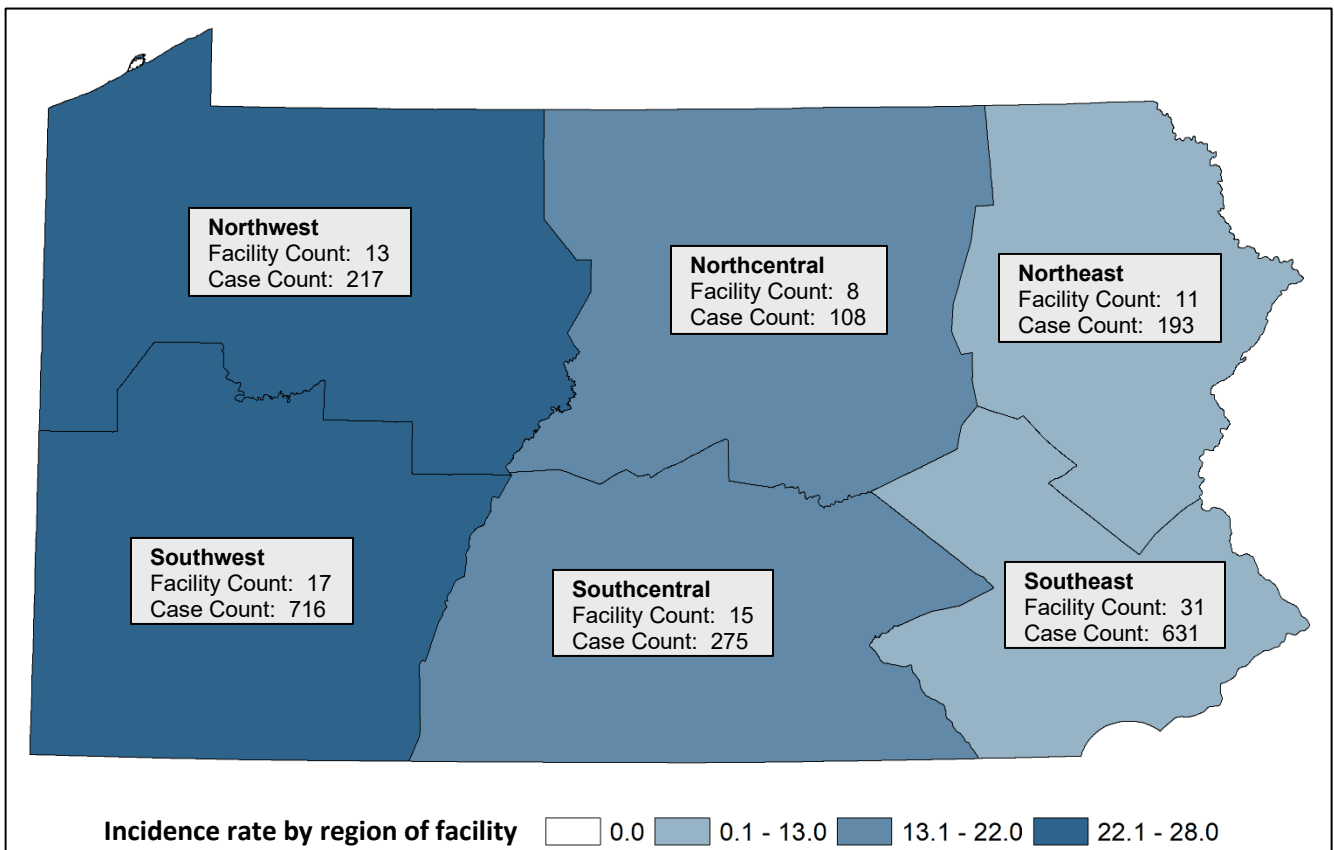[1] Total is less than the total case count due to missing data.

Incidence Rates

Using the total case count of 2,140 cases and total 2017 resident births of 134,112 infants, the statewide incidence rate for NAS cases is approximately 16.0 cases per 1,000 births.

Two separate maps were created to display NAS incidence rates per 1,000 births by community health district regions. One map shows incidence rates by geographic region of facility, and one map shows incidence rates by geographic region of maternal residence. Darker shaded areas represent higher incidence rates, and a legend at the bottom of the maps defines the incidence rate ranges by color.
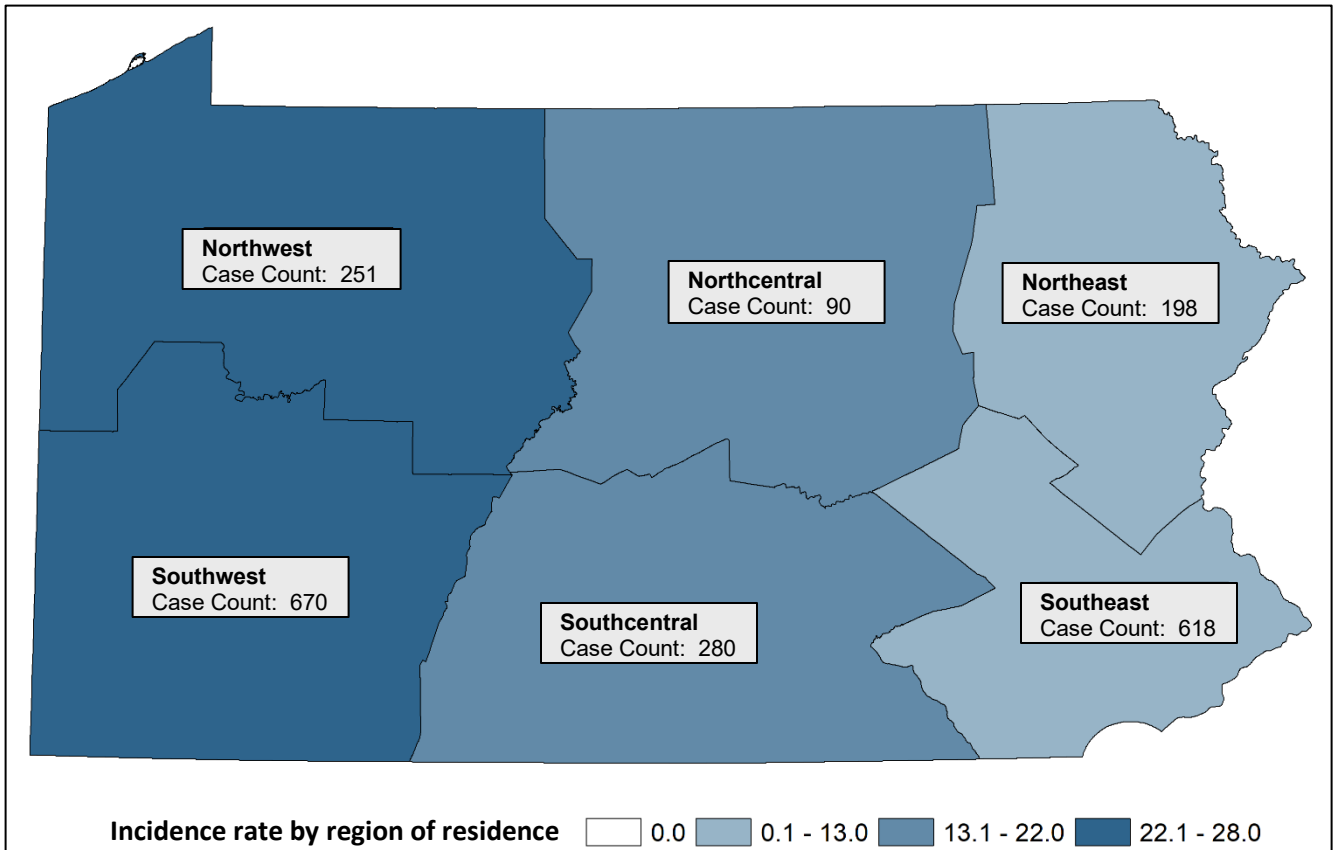
Map 3 highlights the areas with greatest rate of NAS cases per live births within regional facilities. Map 4 shows regions with the greatest rate of women giving birth to infants with NAS by region of maternal residence.

Map 3 – NAS Incidence Rates per 1,000 Births, by Region of Facility

SOURCE: Pennsylvania Department of Health, Bureau of Epidemiology (2019)

Map 4 – NAS Incidence Rates per 1,000 Births, by Region of Maternal Residence

SOURCE: Pennsylvania Department of Health, Bureau of Epidemiology (2019)

See Table 3 for regional incidence rates and a list of counties included within each regional boundary. The incidence rate by facility region ranges from 10.7 NAS cases per 1,000 births in the southeast to 27.0 NAS cases per 1,000 births in the southwest. The incidence rate by region of residence ranges from 10.4 in the southeast to 28.0 cases per 1,000 births in the northwest.

Table 3 – NAS Incidence Rates per 1,000 Births, by Region of Facility and by Region of Maternal Residence

Region[2]	# Facilities	Rates by Facility County	Rates by Resident County
NW	13	27.0	28.0
SW	17	27.0	26.0
NC	8	15.3	14.3
SC	15	15.5	15.4
NE	11	12.0	12.7
SE	31	10.7	10.4

SOURCE: Pennsylvania Department of Health, Vital Statistics; Pennsylvania Department of Health, Bureau of Epidemiology (2019)

Table 4 provides county-level incidence rates by county of maternal residence. It also includes the number of facilities per county, the total number of county births by county of facility, and the total number of county births by county of residence.

Table 4 – NAS Incidence Rates per 1,000 Births, by County of Facility and by County of Maternal Residence

County	# Facilities	# Births by County of Facility	# Births by County of Residence	Rate of NAS Cases by County of Residence
Adams	1	527	895	16.8
Allegheny	9	18,600	12,836	19.4
Armstrong	1	450	677	31.0
Beaver	1	871	1,546	18.8
Bedford	0	261	434	18.4
Berks	2	4,441	4,708	4.2
Blair	2	1,346	1,203	24.1
Bradford	1	599	563	3.6
Bucks	3	4,645	4,876	25.0
Butler	1	964	1,739	23.0
Cambria	1	1,883	1,264	41.1

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[2] Region counties: Northcentral (NC): Bradford, Centre, Clinton, Columbia, Lycoming, Montour, Northumberland, Potter, Snyder, Sullivan, Tioga, Union. Northeast (NE): Carbon, Lackawanna, Lehigh, Luzerne, Monroe, Northampton, Pike, Susquehanna, Wayne, Wyoming. Northwest (NW): Cameron, Clarion, Clearfield, Crawford, Elk, Erie, Forest, Jefferson, Lawrence, McKean, Mercer, Venango, Warren. Southcentral (SC): Adams, Bedford, Blair, Cumberland, Dauphin, Franklin, Fulton, Huntingdon, Juniata, Lebanon, Mifflin, Perry, York. Southeast (SE): Berks, Bucks, Chester, Delaware, Lancaster, Montgomery, Philadelphia, Schuylkill. Southwest (SW): Allegheny, Armstrong, Beaver, Butler, Cambria, Fayette, Greene, Indiana, Somerset, Washington, Westmoreland.

County	# Facilities	# Births by County of Facility	# Births by County of Residence	Rate of NAS Cases by County of Residence
Cameron	0	0	44	68.2
Carbon	0	4	591	18.6
Centre	1	1,451	1,163	9.5
Chester	3	5,819	5,088	7.5
Clarion	1	113	383	31.3
Clearfield	1	1,118	751	38.6
Clinton	0	50	384	36.5
Columbia	1	456	529	17.0
Crawford	1	627	940	41.5
Cumberland	2	1,661	2,606	10.4
Dauphin	2	6,006	3,396	11.5
Delaware	4	3,575	6,455	8.1
Elk	1	184	271	62.7
Erie	3	3,380	2,980	13.1
Fayette	1	849	1,149	92.3
Forest	0	0	21	0.0
Franklin	2	1,838	1,617	19.8
Fulton	0	1	121	33.1
Greene	0	1	261	111.1
Huntingdon	1	220	369	27.1
Indiana	1	692	780	20.5
Jefferson	1	124	478	10.5
Juniata	0	153	272	25.7
Lackawanna	1	2,367	2,065	15.5
Lancaster	4	7,599	7,229	8.4
Lawrence	0	29	861	43.0
Lebanon	1	825	1,582	10.1
Lehigh	3	8,476	4,261	6.3
Luzerne	3	3,481	3,258	20.0
Lycoming	1	1,061	1,171	20.5
McKean	1	177	309	6.5
Mercer	2	1,282	1,063	31.0
Mifflin	1	663	590	30.5
Monroe	1	1,028	1,452	14.5
Montgomery	6	14,046	8,637	5.6
Montour	1	1,815	217	18.4
Northampton	2	280	2,723	4.4
Northumberland	0	6	928	17.2
Perry	0	52	509	21.6
Philadelphia	8	17,887	21,064	12.5

County	# Facilities	# Births by County of Facility	# Births by County of Residence	Rate of NAS Cases by County of Residence
Pike	0	2	283	14.1
Potter	1	212	132	7.6
Schuylkill	1	691	1,308	10.7
Snyder	0	10	446	2.2
Somerset	0	44	641	28.1
Sullivan	0	0	44	22.7
Susquehanna	0	5	269	37.2
Tioga	1	222	292	10.3
Union	1	1,173	410	9.8
Venango	1	682	478	71.1
Warren	1	318	380	2.6
Washington	1	860	1,922	30.7
Wayne	1	454	372	13.4
Westmoreland	1	1,260	2,945	17.3
Wyoming	0	3	273	40.3
York	3	4,193	4,608	13.9
Total	95	134,112	134,112	

SOURCE: Pennsylvania Department of Health, Vital Statistics; Pennsylvania Department of Health, Bureau of Epidemiology (2019)

Data Limitations

The case data referenced in this report was obtained by those facilities that submitted cases. A simple case verification process is performed on reported cases based upon data submitted, but full medical record abstraction for case confirmation is not performed. Therefore, case data is dependent upon reporters consistently and accurately reporting information.

All 2017 statewide birth data used for relative comparisons to NAS case data were obtained from the Pennsylvania Department of Health Enterprise Data Dissemination Information Exchange (EDDIE). This data represents Pennsylvania resident births but would also include resident births occurring out-of-state. Incidence rate calculations were made using vital statistics birth record counts that were limited to Pennsylvania resident births occurring in Pennnsylvania. This data reflects the same target population for reporting NAS cases, as only Pennsylvania hospitals were contacted for reporting and the case definition was limited to resident births only. The vital statistics data also includes births that would occur outside of larger facilities, like home births or births occurring at smaller birth clinics. However, multiple smaller facilities reported to us that they would immediately transfer an infant suspected to have NAS to a larger facility better prepared to care for these infants. For this reason, it is unlikely that a large population of infants with NAS that were born at home or at smaller clinics

would not have subsequently been recognized and reported through the NAS reporting system. A total of eight facilities have not reported any NAS cases to the Department of Health, so there is a possibility that some cases were not reported. There is also potential that some facilities currently with limited capacity are only intermittantly reporting cases and, therefore, also underreporting. Further, in October 2018, the Philadelphia Department of Public Health (PDPH) released guidance for reporting cases to PDPH using a different case definition than the state definition. This guidance was distributed to Philadelphia facilities and also to three facilities in neighboring counties. Although the Department of Health and PDPH have made efforts to collaborate on case reporting and messaging to facilities, there is potential that misinterpretation or burden of dual reporting to PDPH and state could inadvertantly reduce case reporting.

This report is therefore intended to provide a reasonable estimation and means for future comparisons.

It should be noted that other data sources for NAS in Pennsylvania exist, such as the 2017 and 2018 research briefs by the Pennsylvania Healthcare Cost Containment Council (PHC4) and the data displayed within the Pennsylvania Opioid Data Dashboard webpage. All of these data sources differ in the type of data collected and the method of data collection. Readers should be aware that these differences exist and that the datasets will not directly align due to these differences.

Discussion

This report presents findings from Pennsylvania's first ever year of real-time NAS reporting. NAS burden in Pennsylvania is high, with 16 out of every 1,000 infants currently being born with NAS. This is higher than the 2014 reported national incidence of 8 per 1,000 live births, although differing case definitions could account for some of this variation (Jilani, et al., 2019).

Infants with NAS in Pennsylvania were typically born to mothers reported as being white race and using Medicaid as a primary payor. They were more likely to be born with low birthweight and premature, and both birth characteristics are associated with poorer health outcomes in newborns (March of Dimes, 2019). Most infants with NAS showed at least three symptoms of withdrawal. Almost half of infants with NAS received care in a NICU, and over 40 percent were treated with morphine during their hospital stay.

Maps 1 and 2 showing case counts by county of facility versus county of residence highlight differences in the measures of county-level cases. These maps draw attention to some counties having an in-migration of patients for care at a large facility, like Montour County with Geisinger Medical Center. Montour County has a low burden of NAS by resident population but has a high burden in terms of medical care. As shown in Table 4, the 217 total county births by county of residence increases by over 800 percent to 1,815 births by county of facility.

Many of the counties with greater case counts by county of residence than by county of facility are rural, and they do not have birthing facilities or pediatric hospitals near the resident address that are prepared to handle the medical care required for infants with NAS. For example,

Northumberland County does not have a large birthing facility or pediatric hospital within the county, but it is adjacent to Montour County. Table 4 shows that Northumberland has only six births by county of facility, but this increases to 928 births by county of residence. Many of these women would have traveled to Geisinger Medical Center in Montour for delivery and care.

Counties with large discrepancies between number of NAS cases by facility location and by maternal residence demonstrate the variability in resource needs across the state. Counties with a higher case count by maternal residence have a greater need for community services and resources like addiction treatment and support or early intervention for infants. Many counties with this imbalance can be found in northwestern counties such as Crawford and Lawrence and southwestern counties surrounding Allegheny County. Other counties, particularly those with large birthing or pediatric facilities, have a higher resource need for medical care of newborns with NAS. One of the recommended hospital-based nonpharmacologic treatments for infants with NAS indicates that newborns should have a quiet room with low lighting and noise and, optimally, be sharing a room with mothers. Many facilities do not have areas readily designed for this type of preferred accommodation. Further, almost half of infants with NAS require care in a NICU. This care is higher-level and more expensive to provide. The counties with these larger facilities demonstrate the cross-county collaboration required for referral services for women giving birth outside of their resident counties.

Maps 3 and 4 with incidence rates by region of facility and region of residence both show a pattern of increase from east to west across the state. The table of incidence rates by county of residence (Table 4) shows two counties, Greene and Fayette, with approximately one out of every 10 infants born having NAS and experiencing withdrawal. These counties share a border with each other and with West Virginia, a state which is also known to have a historically high number of opioid-involved overdose deaths and a large population of infants born with NAS (National Institute on Drug Abuse, 2019; Ko, et al., 2016). Of note, Greene County is one of the Pennsylvania counties without a hospital that cares for infants with NAS. Fayette County had one hospital (Uniontown) that cared for infants with NAS, but this facility's obstetrics and inpatient pediatric services are no longer provided as of June 30, 2019.

The total number of births was included in Table 4 with resident incidence rates by county to provide additional insight into the total population in the area, especially for counties with very high incidence rates. A high incidence rate in an area that also has a large number of resident births indicates a much greater community resource need than an area with relatively few births.

It's important to note that the data provided above corresponds only to NAS related to opioid exposure in pregnancy and does not include NAS caused by exposure to other drugs. It also does not include those infants who were exposed to opioids prenatally but did not exhibit signs of withdrawal at birth. The total case counts and rates of infants affected by substance use during pregnancy would increase with the inclusion of these criteria.

Citations

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Ko, J. Y., Patrick, S. W., Ton, V. T., Patel, R., Lind, J. N., & Barfield, W. D. (2016, August 12). Incidence of Neonatal Abstinence Syndrome – 28 States, 1999-2013. *Morbidity and Mortality Weekly Report,* pp. 799-802.

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Appendix A: Neonatal Abstinence Syndrome Case Report Form

Neonatal Abstinence Syndrome (NAS) Case Report Form

Facility:

Infant's Name: Infant's Date of Birth:

Mother's Full Name: Mother's Date of Birth:

Mother's Address:

Mother's Race: White; Black; Asian; Native Hawaiian/Pacific Islander; American Indian/Alaska Native; Not Specified/Unknown

Ethnicity: Hispanic; Non-Hispanic; Not Specified / Unknown

Infant's gender: Infant's birthweight: Infant's gestational age(w/d):

Apgar 1 minute: Apgar 5 min: Infant's MRN:

Neonate Assessment Scoring Method: Finnegan; Modified Finnegan; Other; None

     If Finnegan or Modified Finnegan, highest score:

Infant signs/symptoms of withdrawal (check all that apply):   Body shakes (tremors); Seizures (convulsions); Overactive reflexes (twitching) and tight muscle tone; Fussiness, excessive crying, or having a high-pitched cry; Poor feeding or sucking or slow weight gain; Breathing problems, including breathing very fast; Fever, sweating, or blotchy skin; Trouble sleeping and lots of yawning; Diarrhea or throwing up; Stuffy nose or sneezing; Other (specify)

Laboratory testing evidence in neonate for substance exposure: Yes -positive result; No -negative result; Pending; Not tested

     If yes, results of testing: If yes, source of lab sample:

Medications or therapy used to treat infant (check all that apply):   Clonidine; Chlorpromazine; Diazepam; Methadone; Morphine; Phenobarbital; Other drug; Nonpharmacologic therapy; No treatment

Infant cared for in (check all that apply):   Newborn nursery; Neonatal Intensive Care Unit; Other

Evidence of any maternal drug use in any medical record (mother or infant):   Yes; No; Unknown

Principle source of payment for delivery: Private insurance; Medicaid; Self-pay; Other; Unknown

Maternal drugs used during prenatal period (includes only non-pregnancy related drugs):   Yes; No; Unknown
     If yes, check all that apply: Buprenorphine (Subutex or Suboxone); Fentanyl; Heroin; Methadone; Oxycodone (Oxycontin, Roxicodone); Opiates; Tramadol (Ultram); Alcohol; Tobacco, Cocaine; Other non-pregnancy related drugs; Unknown

Relating only to prenatal opioid use, indicate mother's treatment received during delivery and/or postpartum: Methadone; Buprenorphine (Subutex or Suboxone); Other; No treatment; Unknown

     Prenatal Visits: Yes; No; Unknown   If yes, number of prenatal visits: