# Neonatal Abstinence Syndrome Surveillance Annual Report 2021

Tennessee Department of Health
Division of Family Health and Wellness

**A Note to the Reader:**

In some cases (particularly in looking at data at the regional level), the counts included in this report are small and therefore may be statistically unreliable. Therefore, readers should interpret all findings with caution. We especially encourage caution in interpreting findings and comparing differences across regions.

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# Executive Summary

The dramatic increase in maternal opioid use in the US and Tennessee from 2000-2017 paralleled a ten-fold increase in incidence of babies born with Neonatal Abstinence Syndrome (NAS) in Tennessee. NAS is a condition in which a newborn experiences withdrawal from certain drugs, often opioids, used during pregnancy. The Tennessee Department of Health (TDH) established NAS as a reportable condition on January 1, 2013. Since then, Tennessee had seen annual increases in the number of cases reported to TDH until 2018, which marked the first decrease in the number of cases. However, the convergence of the opioid epidemic and COVID-19 pandemic in 2020 created new health challenges resulting in an increase in the number of opioid overdoses that appeared to parallel an increase in the number of reported NAS cases.

During the 2021 surveillance period, 734 cases of NAS were reported to the TDH surveillance portal. This marked a decrease in the rate of cases of NAS per 1,000 live births following a slight increase in the prior year. Like last year, this reporting period converged with the COVID-19 pandemic, which affected the capacity of hospital staff to report cases. Due to the effect of COVID-19 on hospital reporting and to provide additional detail on NAS surveillance in Tennessee, analyses of hospital discharge and birth statistical data are also included in this year's report. NAS cases were identified from hospital discharge data using the ICD-10 diagnostic code P96.1 (neonatal withdrawal symptoms from maternal use of drugs of addiction).

**Key Findings**

- The number of cases reported to TDH decreased from 835 in 2020 to 734.
- The rate of cases reported to TDH decreased from 10.2 in 2020 to 9.1 per 1,000 live births.
- The proportion of reported cases of NAS remained slightly higher in males (50.8%) than females (49.2%) in 2021.
- The number of cases with a NAS diagnosis code of P96.1 increased from 793 to 830.
- The rate of cases with a NAS diagnosis code of P96.1 stayed consistent from 2020 to 2021 at 10.2 per 1,000 live births
- 51% (N=415) of mothers who had a baby diagnosed with NAS received inadequate prenatal care, and among these mothers, 35% (N=147) received no prenatal care.
- Most of the mothers with infants with NAS were insured through TennCare.
- 69.2% of mothers who had a baby diagnosed with NAS reported smoking tobacco or other nicotine containing products during pregnancy, which is 6 times higher than the reported smoking rate among mothers who had a live born infant without NAS.
- 29.9% of babies with NAS were admitted to the NICU. This rate of NICU stay for babies with NAS is 3 times higher than the average for live born infants in Tennessee.

- The geographic distribution of cases of NAS varied across the counties of Tennessee. Counties in east Tennessee continued to have the highest rates.
- Exposure to various substances varied across geographic regions:
    - Across the state most cases of NAS (59.4%) involved Medication Assisted Treatment (MAT). However, exposure to MAT varied geographically, ranging from 25.7% in Shelby County to 74.4% in the East Health Region.
    - Regions with the highest proportions of cases due to prescription medication(s) included Hamilton (72.7% of reported cases), Jackson-Madison (100% of reported cases), and Mid-Cumberland (64.9% of reported cases). In contrast, prescription medication(s) was identified as the source of exposure in 23.0% of cases in Shelby County and 25.8% of cases in Davidson.
    - Illicit drugs or diverted medications as the source of exposure decreased slightly statewide, from 31.7% in 2020 to 30.2% in 2021. In Shelby County, over 50% of NAS cases were exposed to illicit substances, compared to an average of 29.9% in Eastern Tennessee.

Findings from this year's report highlight the ongoing need for primary prevention of NAS by:

1) Preventing substance use among women of childbearing age
2) Screening for substance use in pregnancy
3) Improving access to treatment for substance use disorders and other mental health conditions
4) Reducing the stigma associated with substance use disorders and other mental health conditions
5) Providing client-centered family planning
6) Connecting families to care coordination and support services and
7) Collaborating with partners to identify and address health disparities in substance use disorders and NAS.

# Introduction

NAS is a condition in which an infant undergoes withdrawal from a substance to which he or she was exposed in-utero. Substances, such as opioids, antidepressants, benzodiazepines, and barbiturates, may cause NAS when used during pregnancy. The most common substances causing NAS are opioids. Neonatal opioid withdrawal syndrome (NOWS) is a newer term used to describe opioid-only withdrawal signs. This can include legally prescribed opioids, including pain relievers (e.g., morphine) and MAT opioid agonists (e.g., buprenorphine, methadone), or illegally obtained opioids (e.g., heroin). Maternal use of other substances, such as cigarettes, benzodiazepines, and gabapentin, may influence the onset, severity, or duration of the withdrawal syndrome. In addition, a pregnant woman may obtain a substance through drug diversion, i.e., transfer of a legally prescribed controlled substance from the individual for whom it was prescribed to another person for an unprescribed use.

In 2013, Tennessee became the first state in the nation to require reporting of NAS for public health surveillance purposes. Hospitals and providers are required to report all diagnoses of NAS within 30 days of diagnosis. Hospital reporting can provide timely information on number and rate of NAS cases, including geographical differences, and details about each NAS diagnosis, including the source of exposure. This report provides an analysis of data reported to TDH during 2021. Data from new sources (hospital discharge data and birth statistical data) were also analyzed and incorporated into this year's report.

# Statewide Data

## *Data Sources*

Multiple data sources were utilized in the development of this year's report in order to provide a more complete picture of NAS in Tennessee. Each data source has its benefits and limitations. The primary source of data continues to be the NAS Surveillance System, which contains information on NAS cases reported by hospitals. In Tennessee hospitals and providers are required to report cases of NAS within 30 days of diagnosis. Historically, the data provided by hospitals through NAS reporting has been timely and can provide detailed information on symptoms, exposures, and laboratory results. Due to the effect of COVID-19 on reporting, data from the Hospital Discharge Data System (HDDS) and the Birth Statistical Data Systems were incorporated in this year's report. NAS cases were identified using the ICD-10 diagnostic code P96.1 (neonatal withdrawal symptoms from maternal use of drugs of addiction). These secondary sources can provide additional data on demographics and maternal history, but information on symptoms and exposures cannot be analyzed.

## *Effect of the COVID-19 Pandemic on Reporting*

In 2021, there was a decrease in the consistency and timeliness of hospital reporting through the NAS surveillance portal. This decrease was mainly due to the staffing and infrastructure burdens hospitals were facing during the COVID-19 pandemic. The NAS Surveillance Program continues to work closely with hospitals to improve the reporting process.

**Highlights: 2021 Statewide Data**

NAS Surveillance System Data (from hospital reporting):

- The number of cases reported to TDH decreased from 835 in 2020 to 734.
- The rate of cases of NAS reported decreased from 10.2 in 2020 to 9.1 per 1,000 live births.
- More males were diagnosed with NAS than females.

Hospital Discharge Data:

- The number of cases with a diagnosis code of P96.1 increased from 793 to 830.
- The rate of cases with a diagnosis code of P96.1 stayed consistent between 2020 and 2021 at 10.2 per 1,000 live births.

## *Case Reports*

In 2021, providers reported 734 cases of NAS to the surveillance portal. An additional 595 cases of infants with *in-utero* drug exposure but no clinical signs of withdrawal were also reported; these infants are not included in this analysis as clinical withdrawal is the definitive characteristic of NAS.

Many cases (90.2%; n=663) were reported by the baby's birth hospital, and 9.4% (n=69) were reported after the baby was transferred to another facility.

## *Number and Rate of Reported Cases*

In contrast to 2020 surveillance data, the number and rate of reported NAS cases declined. In 2021, 0.91% (n=734) of live births were diagnosed with NAS, a decrease from 1.03% of live births (n=835) in 2020 (*See Technical Note*) (**Figure 1**). The NAS Surveillance Program continues to assist hospitals who have experienced delays in reporting. Any additional 2021 cases that are submitted after publication of this report will be included in next year's report.

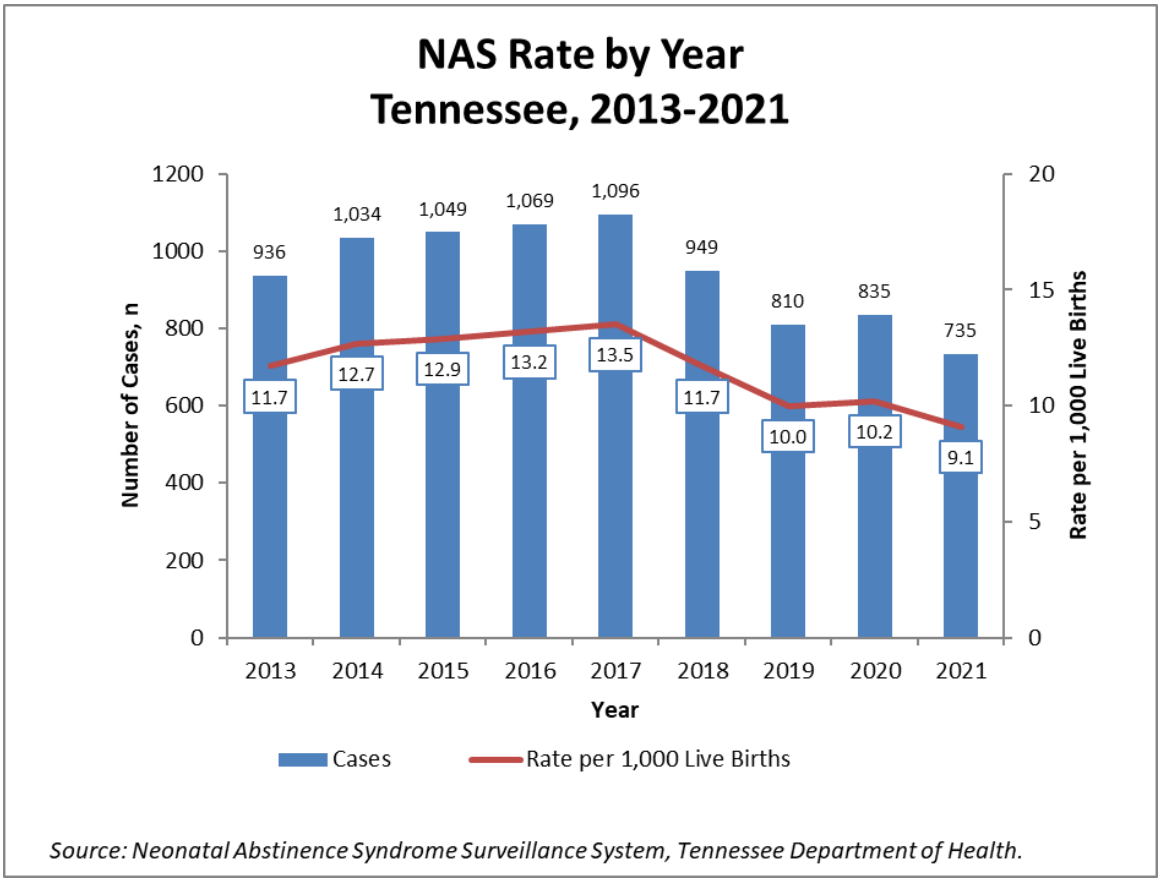
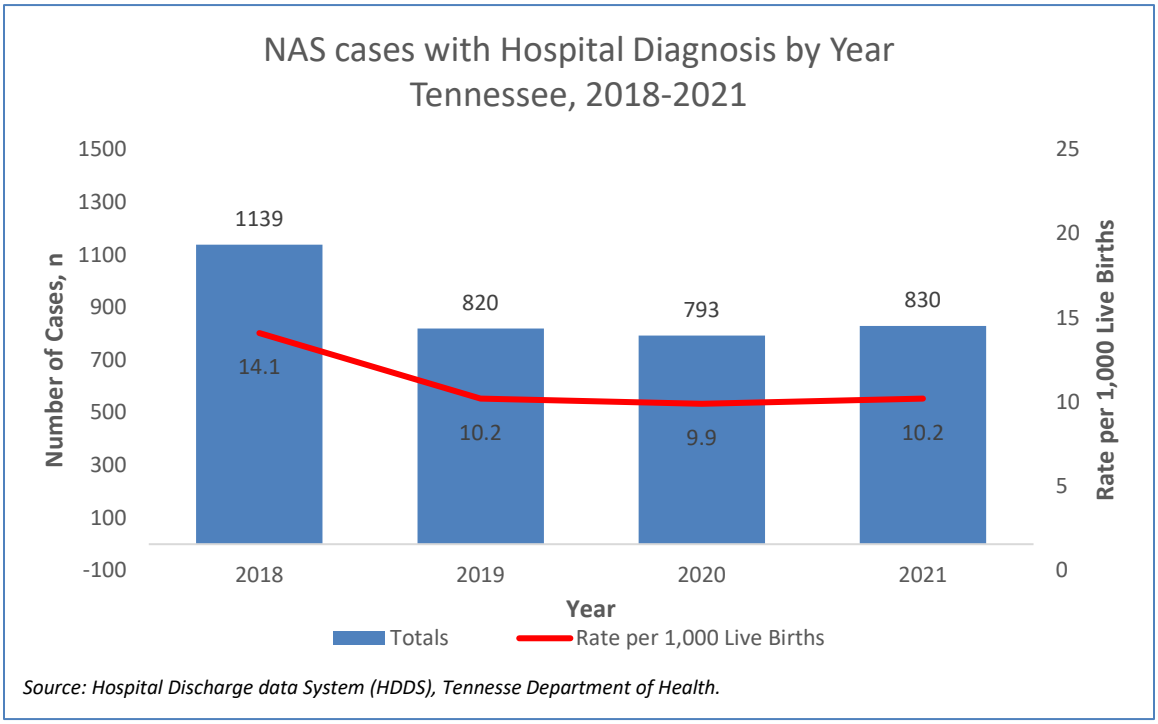



Figure 1: Number of Cases of Neonatal Abstinence Syndrome as a Percentage of Live Births, Tennessee 2013-2021.

## *HDDS and Birth Data*

In 2021, 830 cases of NAS were identified using the ICD-10 diagnostic code P96.1. The average hospital stay for a baby with a NAS diagnosis was 4.4 days, and 29.9% of babies with NAS were admitted to the NICU. This rate of NICU stay for babies with NAS is 3 times higher than the average for live born infants in Tennessee.




*Source: Hospital Discharge data System (HDDS), Tennesse Department of Health.*

Figure 2: Number of Cases with diagnosis code for Neonatal Abstinence Syndrome as a Percentage of Live Births, Tennessee 2018-2021.

While there was a decline in the number of reported NAS cases in 2021, there was a slight increase in the number and rate of infants with the NAS diagnostic code of P96.1 from 2020 to 2021 **(Figure 2).** This increase followed two consecutive years of decline in the number and rate of infants with the NAS diagnostic code. **Figure 3** highlights the change in case rates based on hospital discharge data from 2018 to 2021 in comparison to the NAS surveillance System data.

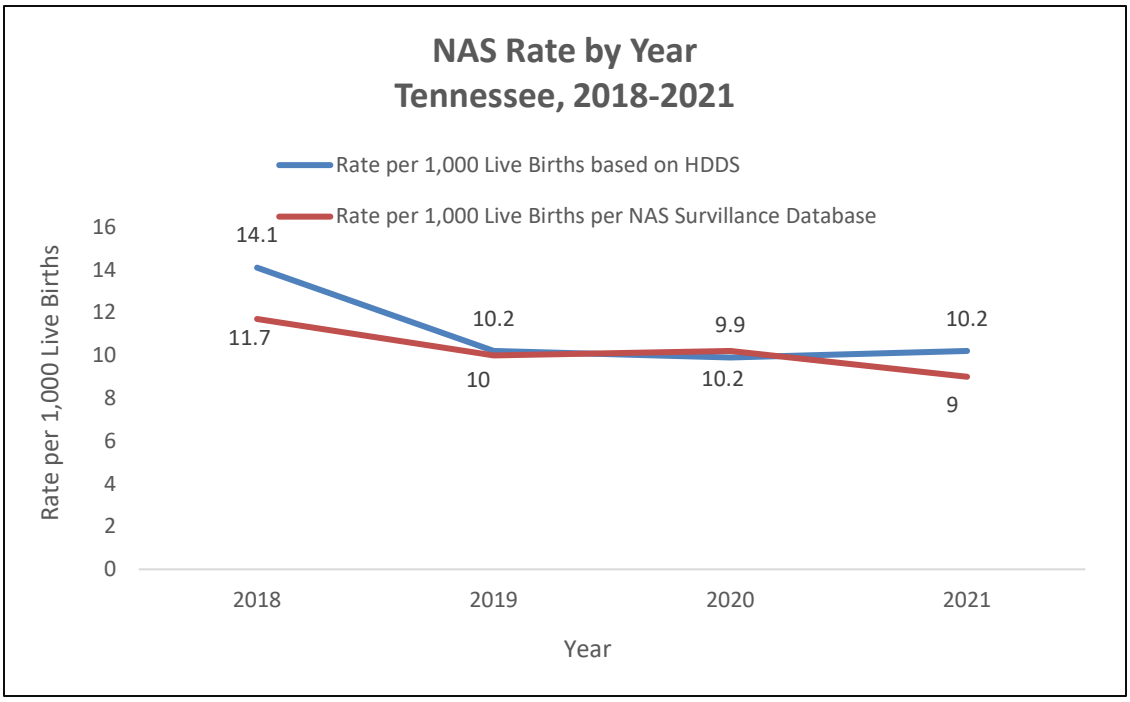



Figure 3: Rate of Cases of Neonatal Abstinence Syndrome as a Percentage of Live Births, Tennessee 2018-2021.

## *Maternal information*

Mothers who receive early and adequate prenatal care have better outcomes than mothers who do not. In 2021, 51% (n=415) of mothers who had babies diagnosed with NAS received inadequate prenatal care. Of the mothers who received inadequate prenatal care, 35.4% (n=147) mothers received no prenatal care **(Figure 4).** Prenatal care adequacy is measured using the Adequacy of Prenatal Care Utilization Index. This index combines information about the timing of prenatal care, the number of visits, and the infant's gestational age to classify prenatal care into one of four categories (inadequate, intermediate, adequate, and adequate plus). Most of the mothers who had babies diagnosed with NAS were insured through TennCare **(Figure 5)** with an average age of 29.8 **(Figure 6).** It is important to note that 69.2% of mothers who had a baby diagnosed with NAS reported smoking during pregnancy, which is 6 times higher than the reported smoking rate among mothers who had a live born infant without NAS. Smoking during pregnancy can affect the onset, severity, or duration of the withdrawal signs and increases the risk of multiple medical problems, including preterm birth and low birth weight. The prevalence of NAS based on maternal race/ethnicity is also highlighted below; infants born to Non-Hispanic White women had the highest prevalence per 10,000 live births (**Figure 7).**

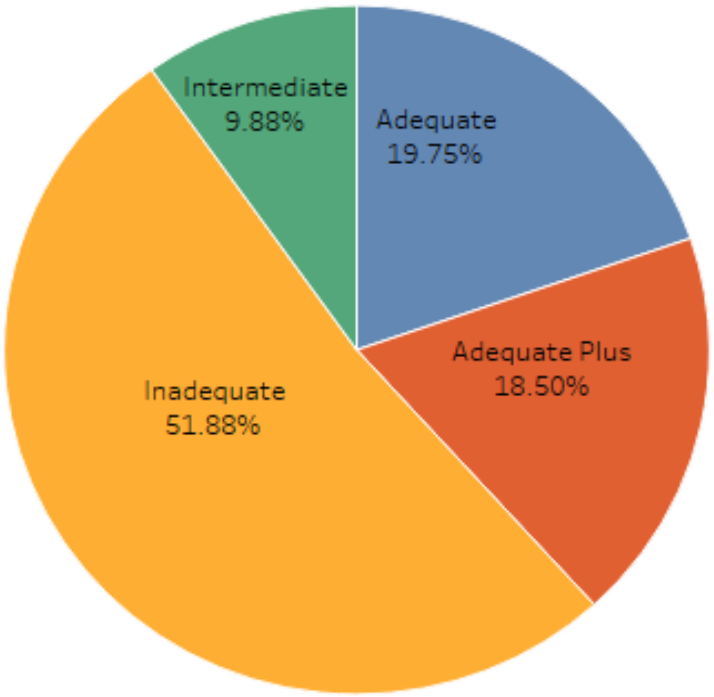



**Figure 4: Percent of Prenatal Care Level among Women with Infants Diagnosed with NAS. 2021**

**Prevalence of NAS by Insurance Coverage**

**(per 10,000 live births)**

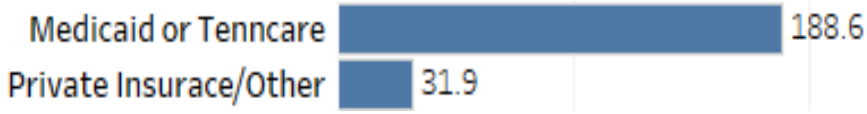



**Figure 5: Insurance Coverage as a percentage of Live Births, 2021**

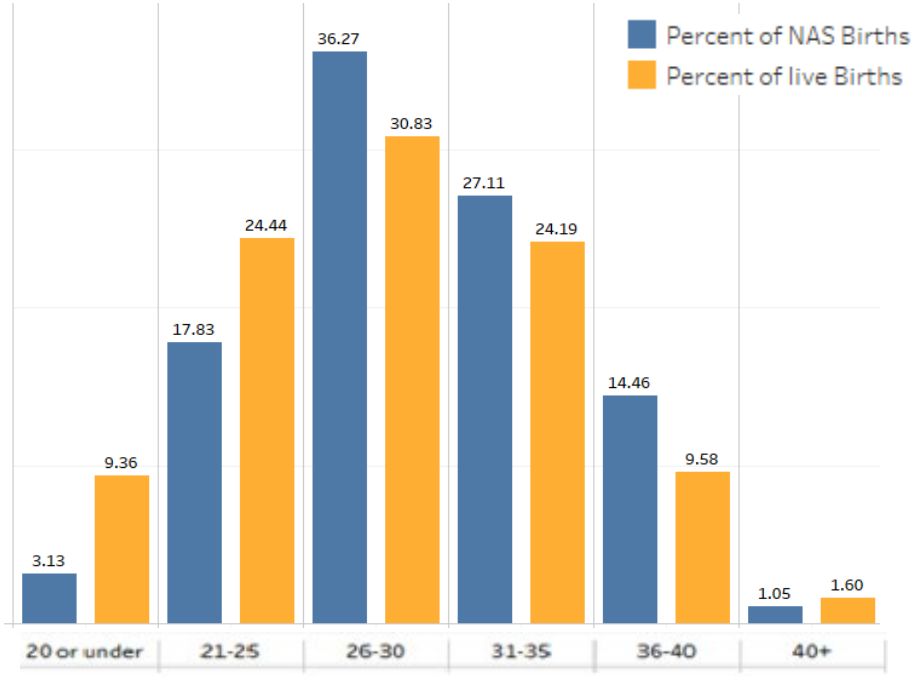



**Figure 6: Percent of NAS Cases by Maternal Age, 2021**

**Prevalence of NAS by Maternal Race/Ethnicity**

**(Per 10,000 live births)**

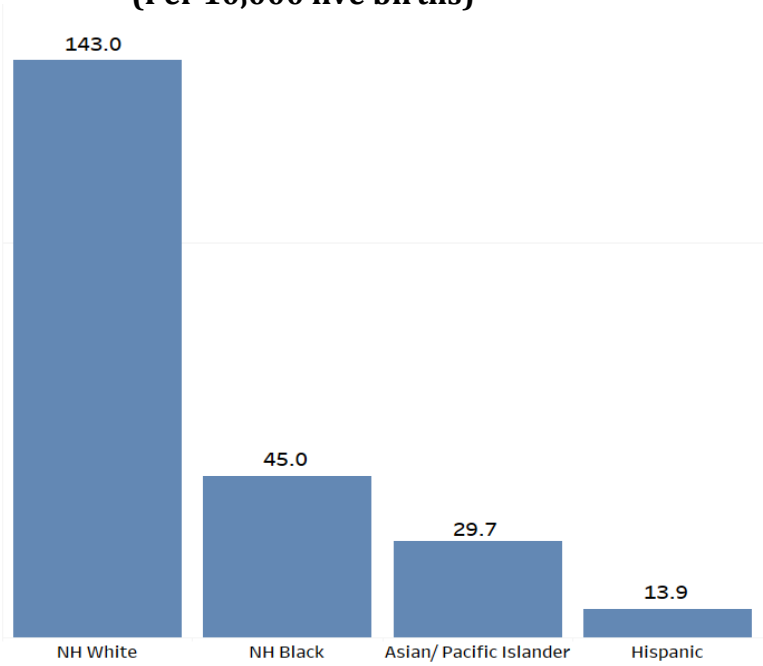



**Figure 7: Maternal Race/Ethnicity as a percent of live births, 2021**

# Source of Exposure for NAS Infants

**Highlights: Source of Exposure**

In 2021:

- 59.4% of infants diagnosed with NAS were exposed to Medication Assisted Treatment (MAT) for treatment of substance use disorder.
- 68.0% of infants diagnosed with NAS were exposed to at least one legally prescribed medication.
- 86.8% of NAS infants with exposure to only prescription drugs were exposed to MAT.

## *Source of Exposure*

The NAS Surveillance System collects nine categories of substances to which an infant was exposed (**Figure 8**). Individual cases could have been exposed to multiple substances; therefore, percentages may sum to greater than 100%. Consistent with previous years' data, most infants were exposed to medications used to treat substance use disorders (medication assisted treatment, MAT; 59.4%). In 2021, 16.0% (n=117) of infants were exposed to diverted prescription opioid medications. This was a decrease from the prior year in which 23.5% (N=195) of infants were exposed to diverted prescription opioid medications.

When categorized into mutually exclusive categories of exposure **(Table 1)**, 68.0% of NAS infants were exposed to at least one prescription medication, an increase from 65.0% in 2020. Forty-two percent of cases were exposed to prescription medications only, and 20.7% were exposed to a mix of prescription and illicit or diverted drugs (**Figure 9**). Another 30.2% were exposed only to illicit or diverted drugs. The remainder (8.2%) had no known exposure, or exposure information was not reported. This was a significant increase from prior years in which the percentage of unknown exposures ranged from 0.3-3.4%. Overall, the proportion of NAS cases exposed to drugs involving only a prescription drug continued to decrease while those involving illicit drugs, or a combination of illicit drugs and prescription drug continued to increase or stay consistent with prior years.

From 2013 to 2016, there was an overall upward trend in the percentage of NAS cases exposed only to prescription medications, reaching the highest percentage in 2016. Thereafter, the trend changed course and has continued to show slight but steady decrease over the years with a 4.4-point decrease from 46.1% in 2020 to 41.7% in 2021

(**Figure 9**). The proportion of cases exposed to illicit drugs or diverted medications also saw a slight decrease (30.2% of cases in 2021 compared to 31.7% in 2020). There was a slight increase in the proportion of cases exposed to a mix of illicit and prescription medications from 2020 to 2021.

Of those infants with exposure only to prescription medications **(Figure 10)**, most (87.5%) were exposed to medication assisted treatment (**Figure 10**). In addition to MAT, 8.9% of prescription-only exposures were to legal non-opioid medications, and 4.4% were exposed to legal opioid medications (**Figure 10**). Since 2016, there has been a steady increase in the proportions of cases exposed to other non-prescription substance with 29.6% reported in 2021 compared to 25.2% in 2020.

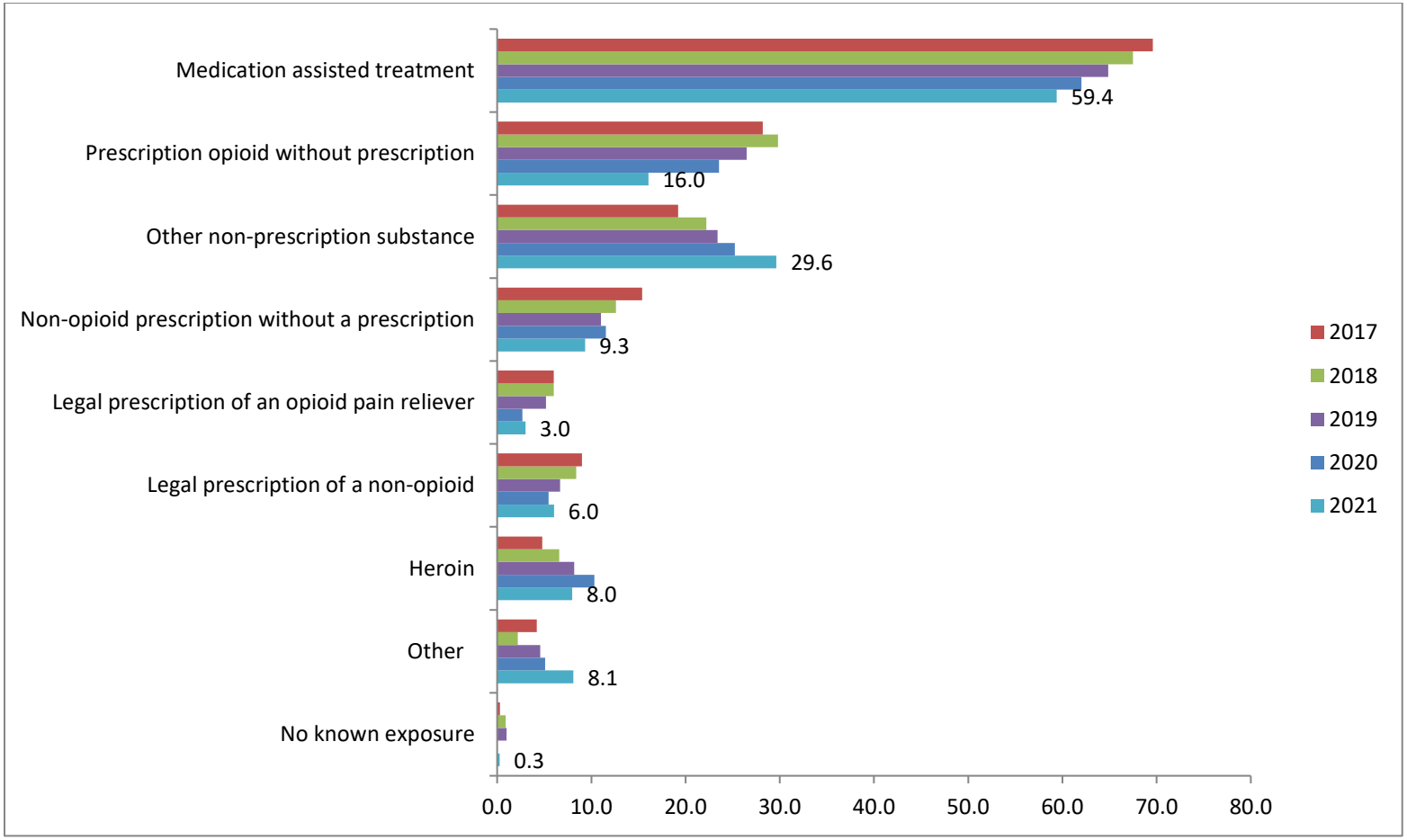



**Figure 8: Non-mutually Exclusive Sources of Exposure for NAS Cases, 2017-2021.**

**Table 1: Derivation of Mutually Exclusive Categories of Exposure from Individual Exposures**

| **Prescription Medications Only** | **Illicit Drugs or Diverted Medications Only** | **Combination of Prescription Medications and Illicit Drugs/ Diverted Medications** | **Unknown** |
|---|---|---|---|
| Exposure to one or more of the following ***ONLY***:<br><br>• Medication Assisted Treatment (MAT)<br><br>• Legal prescription of an opioid pain reliever<br><br>• Legal prescription of a non-opioid medication | Exposure to one or more of the following ***ONLY***:<br><br>• Prescription opioid medication obtained without a prescription<br><br>• Non-opioid prescription medication obtained without a prescription<br><br>• Heroin<br><br>• Other Illicit drug | At least one medication from "Prescription Medications Only"<br><br>***AND***<br><br>At least one substance from "Illicit Drugs or Diverted Medications Only" | "No known source of exposure but clinical signs consistent with NAS" was selected at time of report<br><br>***OR***<br><br>No exposure options were selected at time of report |

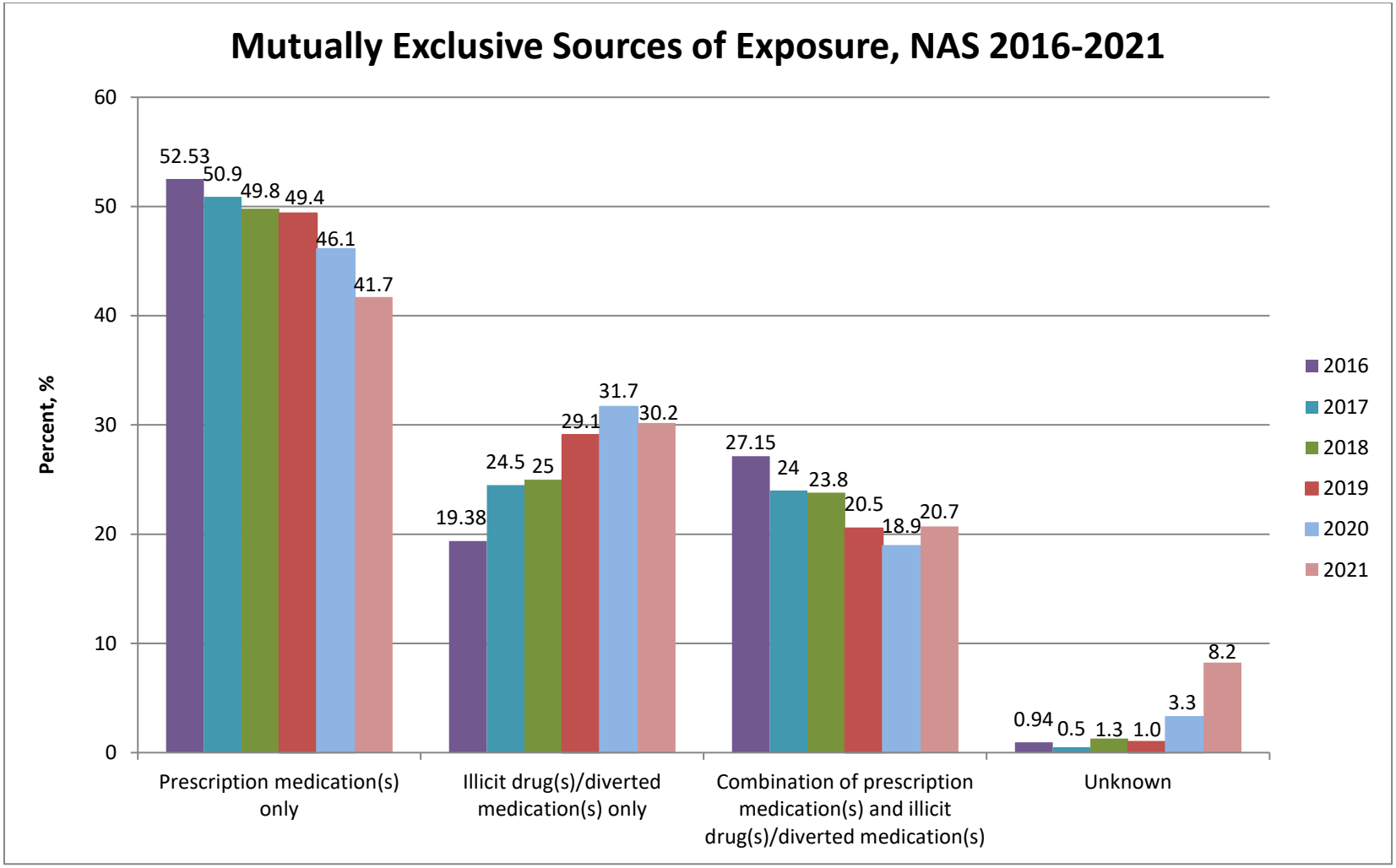



**Figure 9: Mutually Exclusive Sources of Exposure for Neonatal Abstinence Syndrome Cases, Tennessee 2016-2021.**

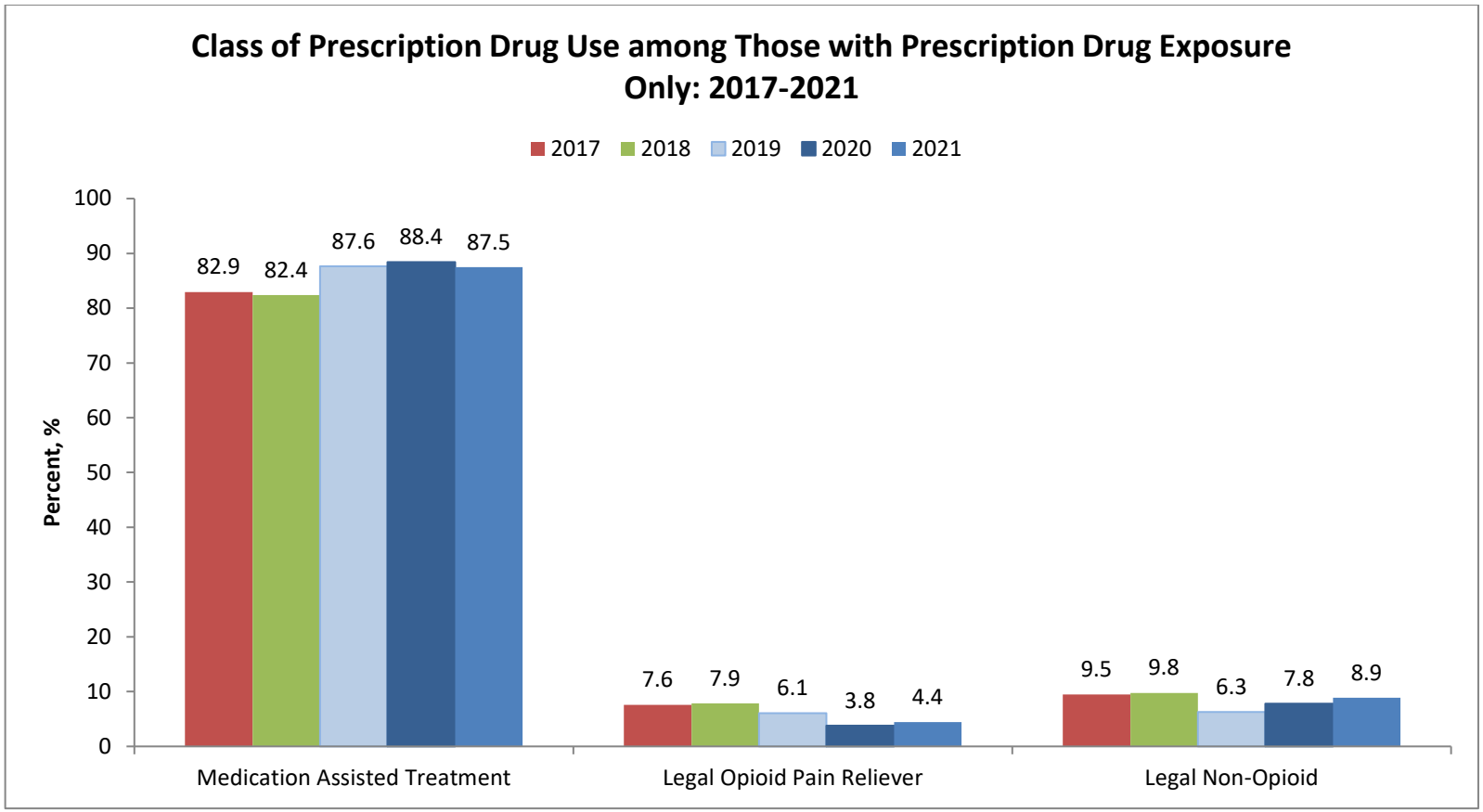



**Figure 10: Class of Prescription Drug Use Among Those with Prescription Medication Exposure Only, 2017-2021.**

# Regional Data

**Highlights: Regional Trends for NAS**

In 2021:

- Overall, rates of cases of NAS increased when moving from West to East across Tennessee.
- The eastern part of the state continues to see the highest case rate of NAS, but compared to prior years, patterns of exposure source were more sporadic across the state
- The use of legally obtained non-opioid medication increased statewide to 7.3% of cases compared to 3.9% in 2020.

## *Incidence of Reported Cases by Region*

As in previous years, NAS Surveillance System data (hospital reporting data) was used to analyze the rates of NAS cases by health region. Rates of NAS cases were lowest in West Tennessee and increased in an easterly fashion during the time period 2017-2021 (**Figure 11**). **Figure 12** shows the annual NAS case rate by region from 2017-2021. From 2020 to 2021, Shelby and Knox Counties showed a statistically significant overall decrease in the rate of cases of NAS ($p < 0.05$). However, Upper Cumberland, West and East Regions all had statistically significant ($p<0.05$) increases in the number and rate of cases of NAS in 2021 compared to 2020.

In 2021, there was an increase in the number of counties (from 22 to 25) that did not report any cases of NAS. Data were suppressed for 48 counties because of the small number of cases in each county that could lead to concerns about privacy or statistical validity. From 2017-2021 **(Figure 13 - Figure 17**), rates of cases of NAS in the western portion of the state have continued to decrease or remain low (lighter shades or suppressed on the maps). Similarly, many counties in the West and South Central Regions were suppressed. In the eastern part of Tennessee, the rate of cases of NAS remained high.

## *Exposure Source by Region*

Geographic variation in the substance causing NAS was noted (**Figures 18**). The following regions had the highest proportions of cases with prescription medication(s) identified as the source of exposure: Hamilton Region with 72.7% of cases, Jackson-Madison with 100% of cases, and Mid-Cumberland with 64.9% of cases. This was different then prior years where the higher proportions were seen mainly in the eastern part of the state. In contrast,

prescription medication(s) was identified as the source of exposure in 23.0% of cases in Shelby County and 25.8% of cases in Davidson. Differences in exposure to illicit drug(s)/diverted medication(s) only (52.7% of cases in Shelby County, 48.4% of cases in Davidson County, and 44.6% in Sullivan County) were also noted in 2021, while in prior years the West part of the state saw the highest portions of cases. In addition, the proportion of cases exposed to a combination of prescription and illicit or diverted drugs increased in the Northeast Region (34.1% of cases in 2021 compared to 14.4% in 2020) and in the Southeast Region (25.0% of cases in 2021 compared to 10.0% in 2020. Exposure to medication assisted treatment (MAT) also varied geographically, ranging from 25.7% in Shelby County to 74.4% in the East Health Region (**Figure 19**).

In 2021, the use of legally obtained medications as the source of exposure was more common statewide and increased from 2020 (with an average of 3.1%, range of 0-9.5%, for opioid medications and an average of 7.3%, range of 0-50.0%, for non-opioid medications) (**Figure 20**). Similar to prior years, exposure to diverted opioid medications was more common than diverted non-opioid medications. The highest proportion of cases of NAS exposed to diverted opioids was observed in Shelby and Davidson counties and the Mid-Cumberland, West, and South-Central Regions (**Figure 21**). Exposure of NAS cases to heroin remained less than 8.0% of cases of NAS (n=58) and varied across the state. In 2021, Davidson County saw an increase in the number of NAS cases exposed to heroin with 32.3% **(Figure 22)**, compared to 22.7% in 2019. However, there was a decrease in the number of NAS cases exposed to heroin in Shelby County, from 18.5% in 2020 to 6.8% in 2021, and in Hamilton County, from 20.0% in 2020 to 9.1% in 2021**.**

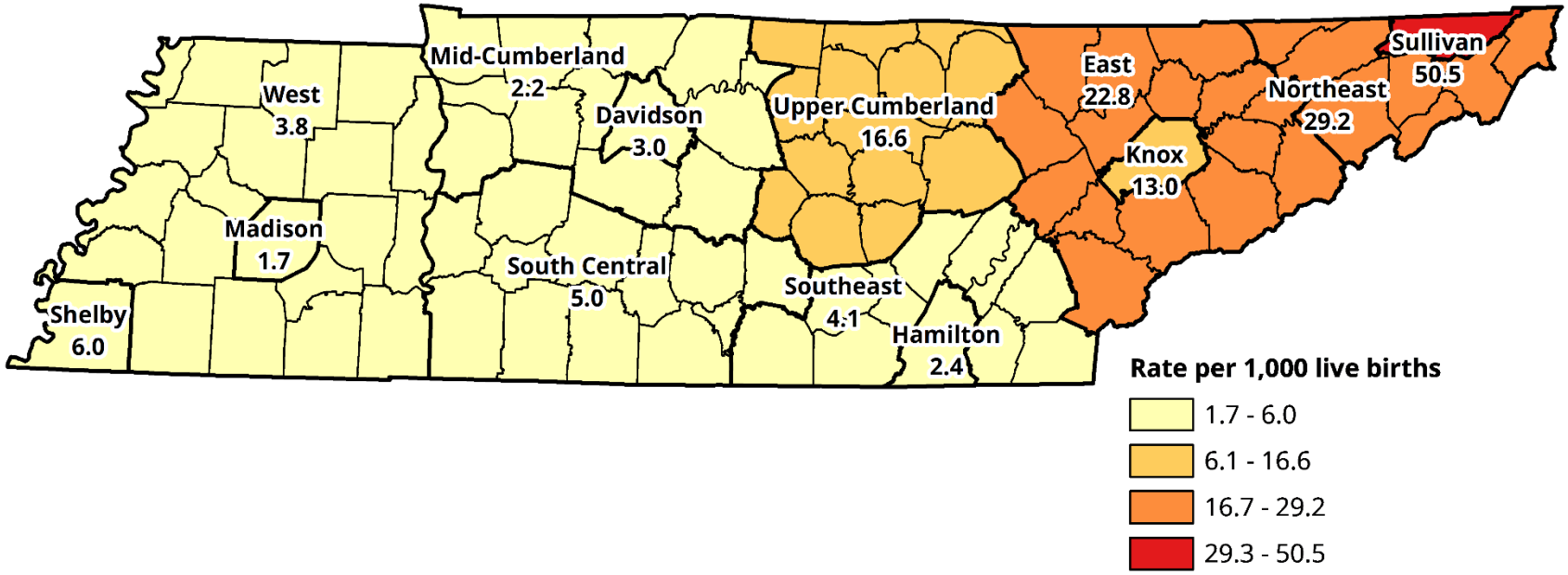



**Figure 11: NAS Rates by TDH Health Region, 2021.**

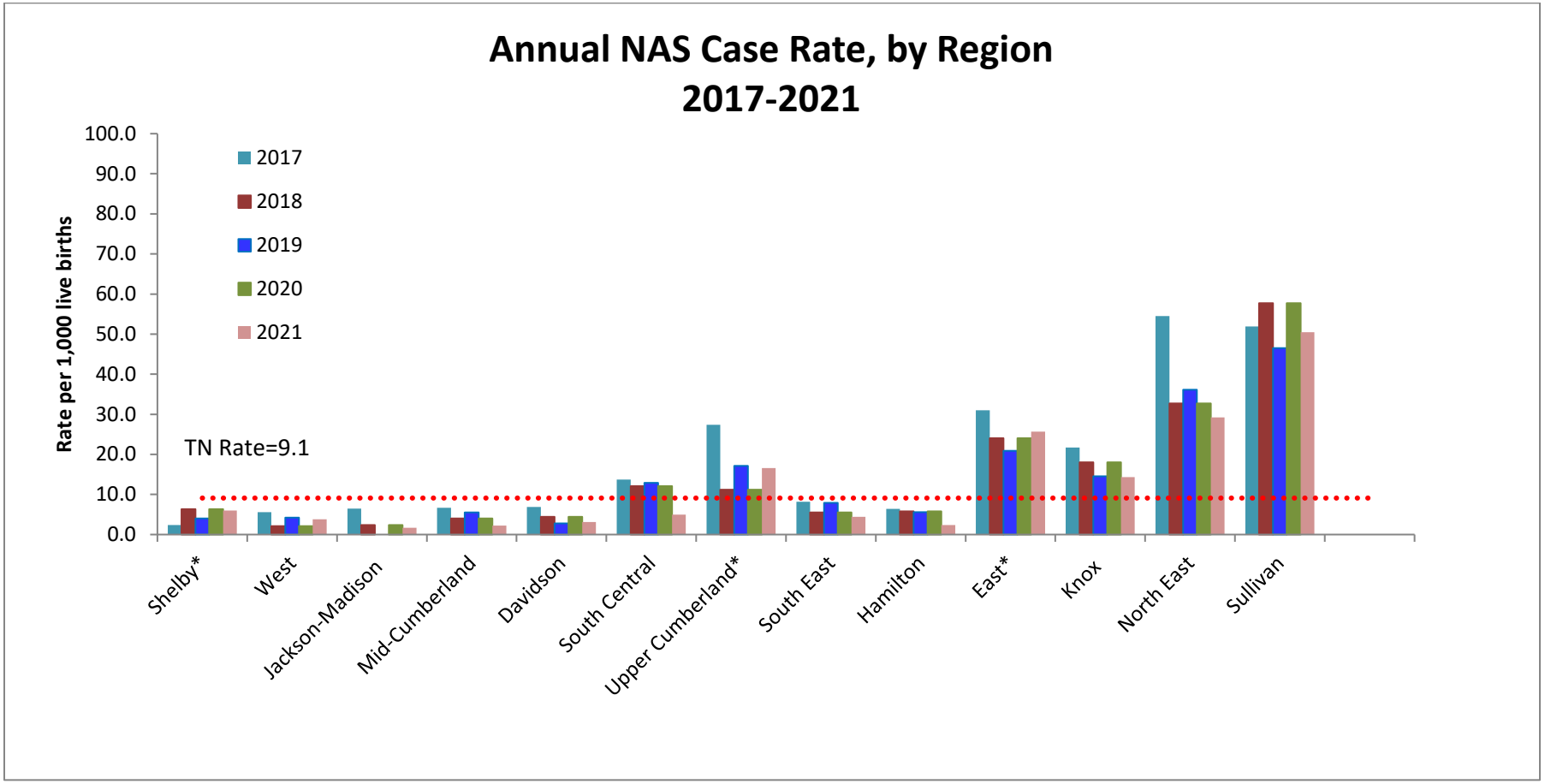



**Figure 12: Rate per 1,000 Live Births of NAS Cases by TDH Health, 2017-2021**

*Regions/counties with statistically significant trends over the years.

Note: Counties with 1-9 cases were suppressed.

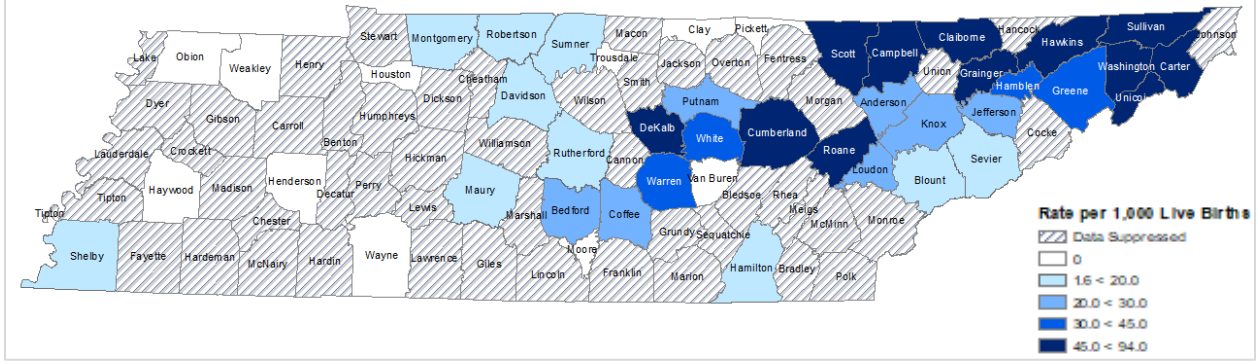



**Figure 13: Rate of NAS Cases by County, 2017**

Note: Counties with 1-9 cases were suppressed.

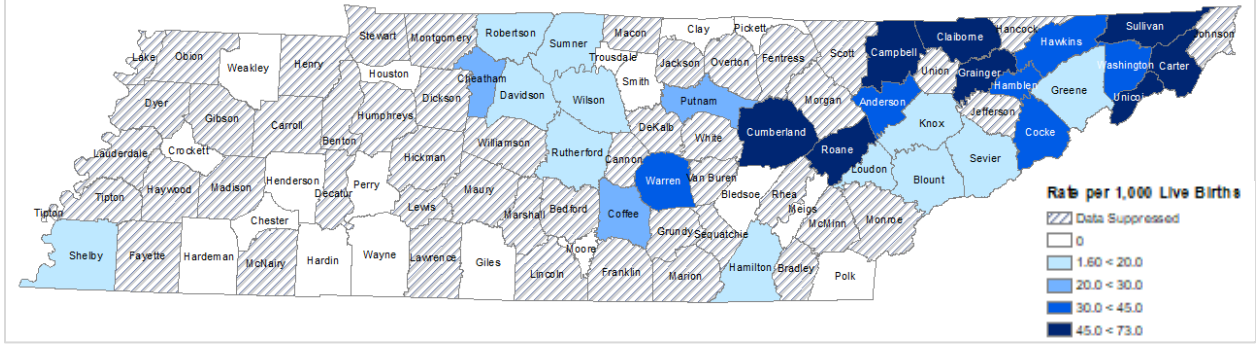



**Figure 14: Rate of NAS Cases by County, 2018**

Note: Counties with 1-9 cases were suppressed.

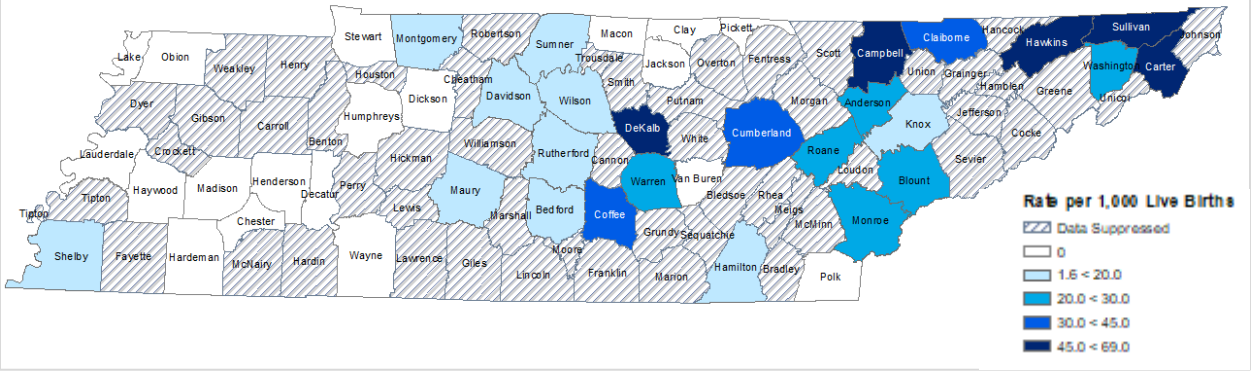



**Figure 15: Rate of NAS Cases by County, 2019**

Note: Counties with 1-9 cases were suppressed.

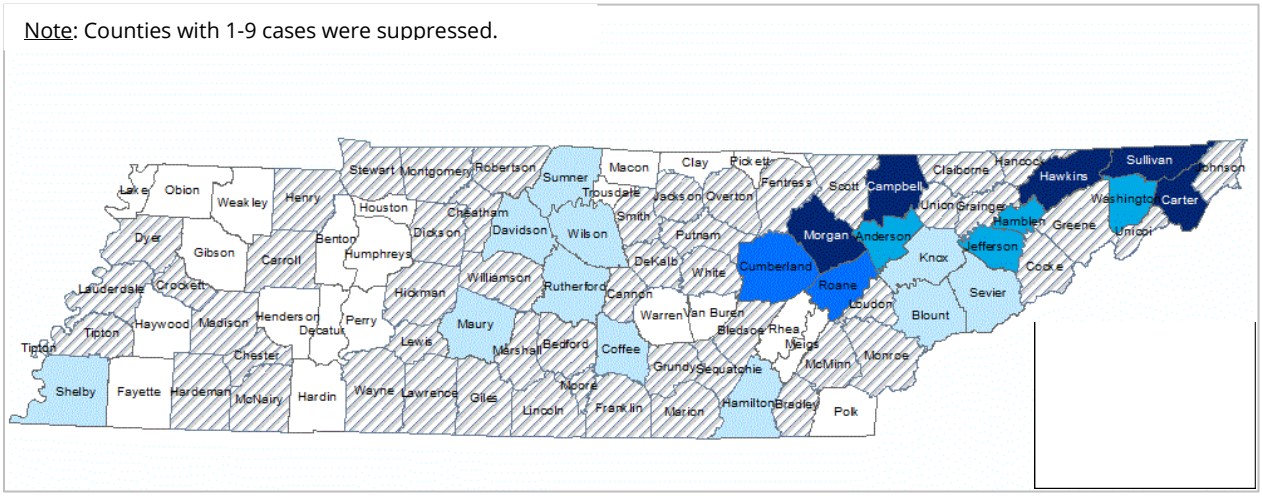


**Figure 16: Rate of NAS Cases by County, 2020**

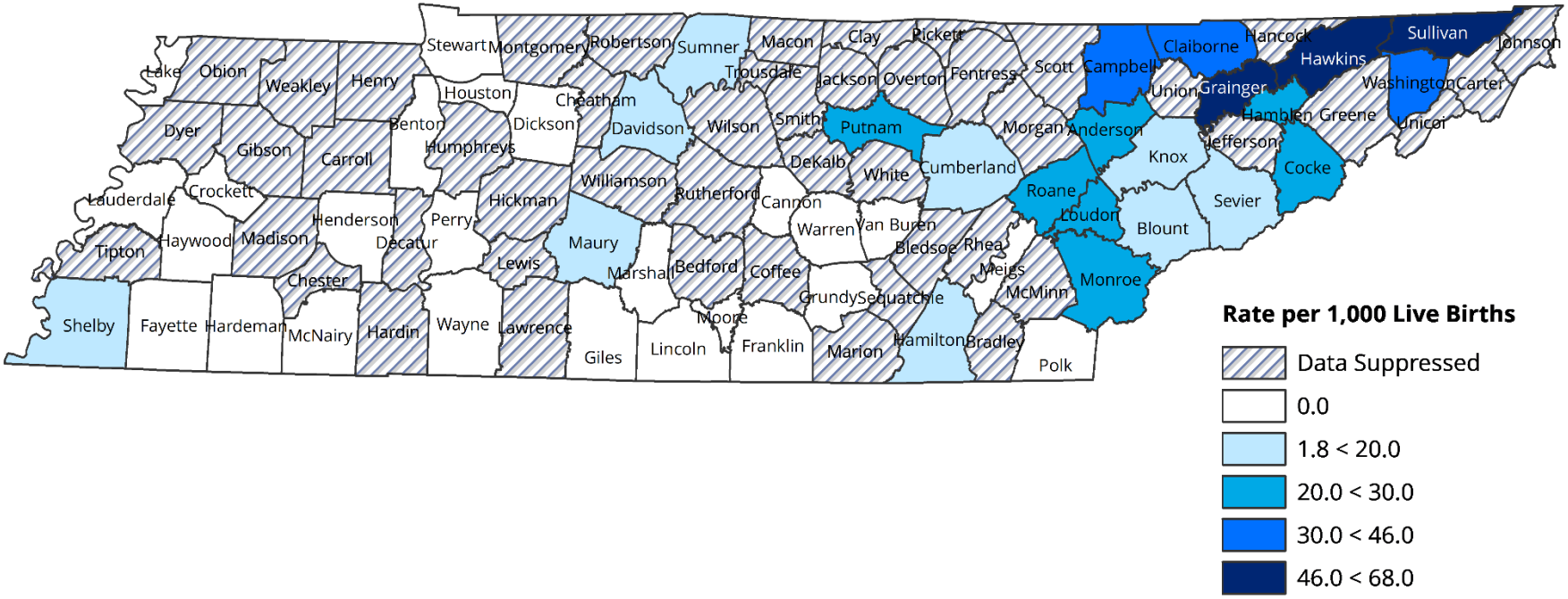



**Figure 17: Rate of NAS Cases by County, 2021**

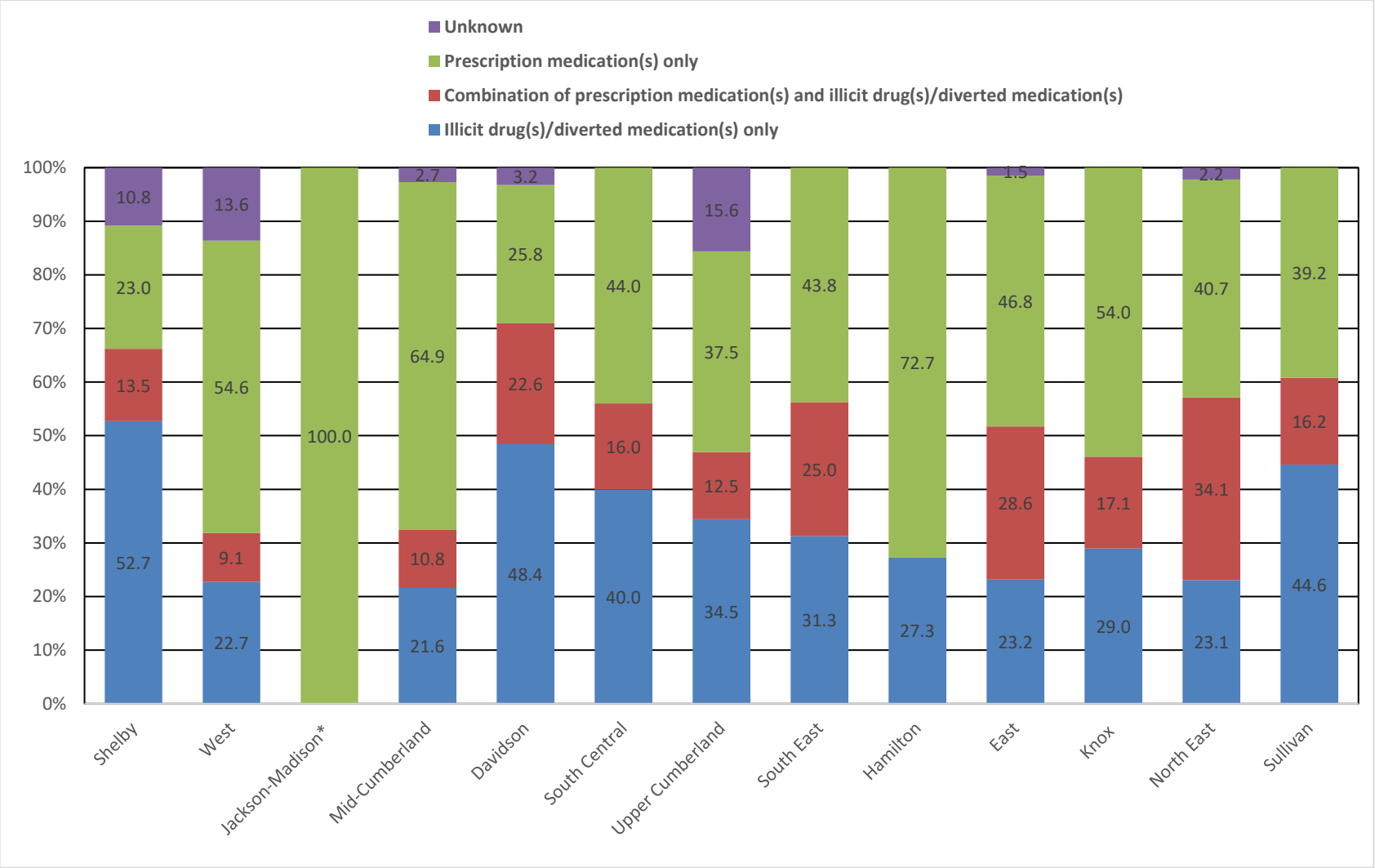



**Figure 18: Distribution of Mutually Exclusive Sources of Exposure by Health Region for Neonatal Abstinence Syndrome Cases, 2021**

* Jackson-Madison had few cases reported. Findings should be interpreted with caution due to small case numbers.

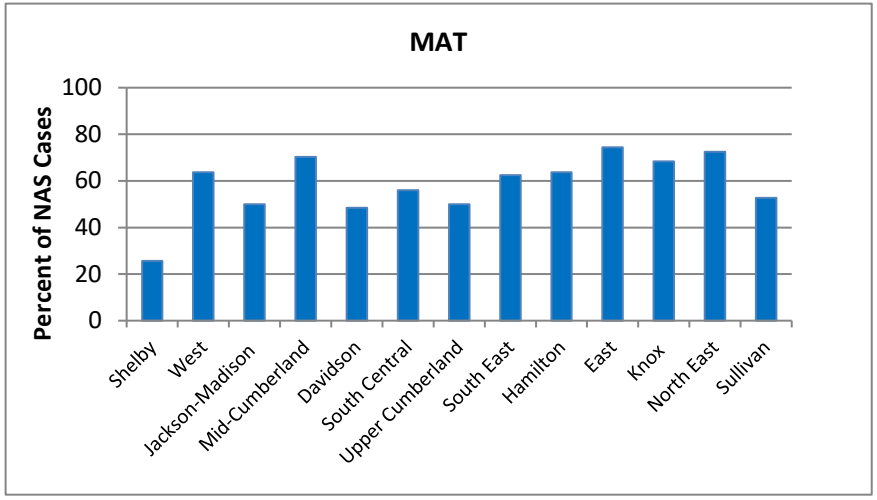



**Figure 19: Prevalence of Exposure to Medication Assisted Treatment among NAS Cases by Region, 2021**

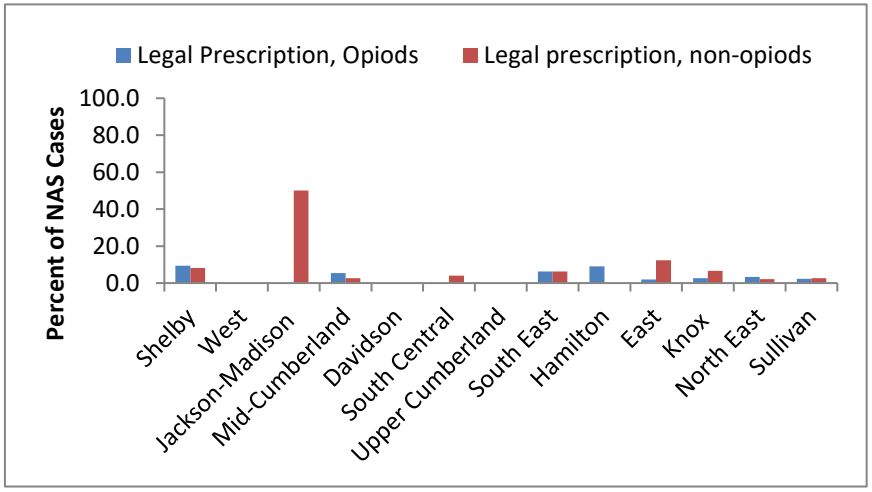



**Figure 20: Prevalence of Exposure to Legally Obtained Prescription Medications among NAS Cases by Region, 2021**

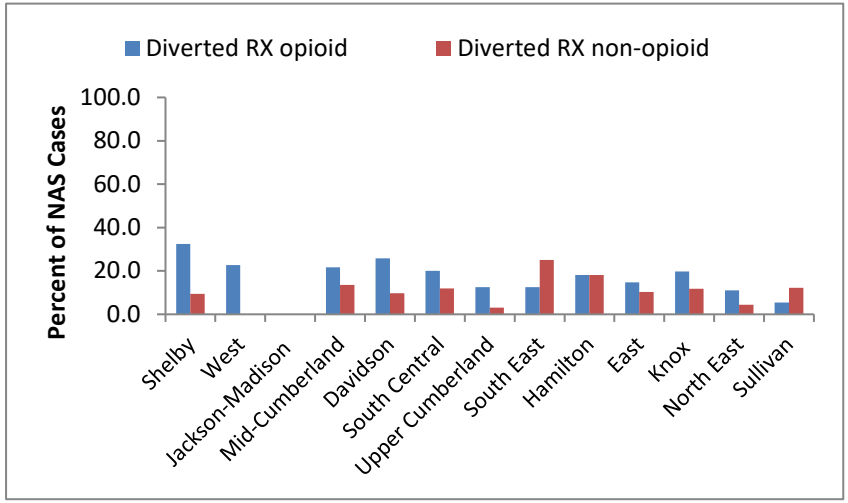



**Figure 21: Prevalence of Exposure to Diverted Prescription Medications among NAS Cases by Region, 2021**

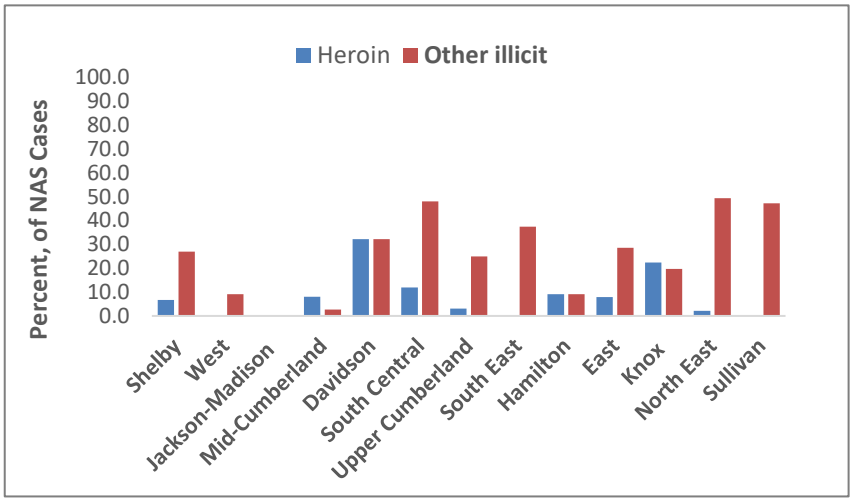



**Figure 22: Prevalence of Exposure to Illicit Drugs among NAS Cases by Region, 2021**

# Conclusion

The TDH NAS Surveillance Program was established in 2013 when NAS first became a reportable condition. The 2013 to 2020 annual reports featured data on NAS cases reported by hospitals. Due to the COVID-19 pandemic and its effect on hospital reporting, data from new sources (hospital discharge data and birth statistical data) were analyzed and incorporated into this year's report. The inclusion of additional data sources provides a more comprehensive picture of NAS in Tennessee.

NAS prevalence can be examined through two data sources – hospital reporting data and hospital discharge data. The number and rate of NAS cases reported to TDH increased each year from 2013 to 2017 until a decrease was observed in 2018 and again in 2019. In 2020 there was a small increase in the number of reported NAS cases, followed by another decrease in 2021. Geographic variability continues to be observed among reported cases, and the eastern part of the state continues to see the highest rate of reported cases.

Analysis of hospital discharge data (using the ICD-10 diagnostic code most often used in NAS cases, P96.1) showed higher numbers and rates of NAS cases. The number and rate of NAS cases decreased from 2018 to 2020; however, there was a slight increase in NAS in 2021.

As in previous reports, the source of exposure for NAS continues to be analyzed. Since 2013, there has been a shift in the exposure sources associated with NAS, with more mothers of NAS infants taking medications prescribed by a provider. The high proportion of cases of NAS involving medication assisted treatment, or MAT, suggest that women with a history of substance use disorder are receiving treatment during pregnancy. Notably, there was a slight decrease in the percent of infants exposed to MAT from 62.0% in 2020 to 59.4% in 2021. In addition, geographic differences in the source of exposure that was previously seen across the state became less obvious in recent years. Most of the regions reported having over 50% of infants exposed to MAT, and West and Upper Cumberland Regions saw a steady increase in MAT in recent years. Illicit drugs or diverted medications as the source of exposure decreased slightly statewide, from 31.7% in 2020 to 30.2% in 2021.

New analyses included in this year's report highlight the intersection of social determinants of health and NAS. In 2021, 51% of mothers who had a baby diagnosed with NAS received inadequate prenatal care, and among these mothers, 147 received no prenatal care. Most of the mothers with infants with NAS were insured through TennCare. It is also interesting to note that 69% of mothers who had a baby diagnosed with NAS reported smoking during pregnancy, which is 6 times higher than the average rate of smoking during pregnancy in Tennessee.

The patterns of exposure (with nearly 65% of cases being exposed to at least one substance prescribed by a healthcare provider) highlight opportunities for primary prevention. Healthcare providers should be encouraged to explore non-opioid treatment modalities in women of childbearing age and should promote client-centered pregnancy planning. Finally, this report highlights opportunities to address health disparities among women with infants with NAS.

## *Success Stories and Next Steps*

Tennessee has made significant progress in addressing the opioid epidemic through key legislation, partnership with stakeholders, and collaboration and coordination among state agencies. Policy changes aimed at prescribing practices, such as the expansion of a controlled substance monitoring database, development of opioid prescribing guidelines, increased access to drug disposal outlets, and regulation of pain management guidelines, have resulted in decreased opioid prescribing and dispensing. The increase in availability of naloxone and similar policies encourage people to seek medical assistance for drug overdose and help mitigate the risks associated with substance use. Tennessee has also increased funding and expanded access for substance use treatment, including substance use treatment for pregnant women. FindHelpNowTN.org, is an online platform designed to help people with substance use disorders find providers based on factors such the type of treatment, insurance, and location in near real-time.

In addition to increased access to treatment, collaboration with partners has also resulted in higher quality of care for pregnant women with substance use disorders and their infants. TDH led the state's involvement in a multi-state, multi-year OMNI (Opioid Use Disorder, Maternal Outcome, Neonatal Abstinence Syndrome Initiative) project. Partners included the Tennessee Department of Children's Services, TennCare, the Tennessee Department of Mental Health and Substance Abuse Services, the Tennessee Initiative for

Perinatal Quality Care (TIPQC), and safety net clinics. The primary focus of the state's workgroup was the development of a opioid use disorder (OUD)/NAS patient safety bundle, which is comprehensive prenatal and postnatal guidance.

The NAS Surveillance Program has focused on expanding its surveillance capacity, improving care coordination efforts, and strengthening collaboration with partners, such as the TDH Overdose Response Coordination Office. In 2020 the program was selected to participate in the Council of State and Territorial Epidemiologist's (CSTE) NAS standardized case definition implementation project, which has resulted in expanded surveillance capacity. The program will continue to focus on improving data quality and completeness by providing technical assistance to reporting hospitals and incorporating new data sources. The NAS Surveillance Program also launched a case management system, which improves the process of referring infants and families to services, such as the Tennessee Early Intervention System (TEIS) and the care coordination program CHANT. Finally, the NAS surveillance Program looks forward to continued collaboration with partners to guide the future of NAS prevention efforts, surveillance, and care coordination for infants.

## *Recommendations for Partners and Policy Makers*

Findings from this year's report highlight the ongoing need for public health approaches to address substance use in pregnancy and substance exposure among infants:

### Pre-Pregnancy

1) Expand programs and initiatives to prevent substance use disorders among women of childbearing age (e.g., improved prescribing practices).
2) Improve access to programs and primary care aimed to optimize preconception health.
3) Improve access to client-centered family planning. Client-centered care is respectful of and responsive to individual client preferences, needs, and values.

### Prenatal

1) Screen for substance use in pregnancy using a validated screening tool (e.g., NIDA Quick Screen or 4 Ps).
2) Improve access to treatment for substance use disorders and other mental health conditions.

3) Reduce the stigma associated with substance use disorders and other mental health conditions.
4) Connect pregnant women to services and programs such as Evidence-Based Home Visiting, Tennessee Tobacco QuitLine, and BABY & ME – Tobacco Free Program™.
5) Identify and address health disparities in substance use disorders.

### Neonatal

1) Improve the surveillance of NAS and infants with prenatal substance exposure.
2) Improve the standardization of care for infants with prenatal substance exposure.
3) Identify and address health disparities in NAS and prenatal substance exposure.
4) Connect infants and families to care coordination and support services, such as Evidence-Based Home Visiting, TEIS, and CHANT.

### Childhood

1) Support research on the long-term risks of prenatal substance exposure.
2) Connect children and families to support services, such as TEIS, and programs, such as Head Start and Early Head Start.

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# Technical Notes

1. At publication of the 2020 Neonatal Abstinence Syndrome Surveillance Annual Report, 824 cases with a birth year of 2020 had been reported. After publication of the 2020 report, an additional 11 cases were reported and are included here.

2. All rates for 2021 were calculated using the 2021 Birth Statistical File as the denominator.

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