NAS

NEONATAL ABSTINENCE SYNDROME

Annual Surveillance Report – 2017

Georgia Department of Public Health
Division of Health Promotion

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KEY FINDINGS

Reporting **expanded to 52** Georgia birthing facilities.

1,053 suspected cases were reported, with **762** determined to **meet the case definition of Neonatal Abstinence Syndrome (NAS)**.

Among the 762 cases, **59% were reported to have the signs/symptoms consistent with NAS** (with or without positive toxicology screening results), while **41% had positive toxicology only**.

Infants born to mothers who were **15–29 years of age**, **especially 25–29 (7.0 per 1,000 live births)**, and Non-Hispanic Whites (8.6 per 1,000 live births) had the highest rates of NAS.

Small metropolitan, **micropolitan**, and **non-core counties** had **higher NAS rates than large and medium metropolitan counties** (17.5–19.8 vs. 9.9–13.0 per 1,000 live births, respectively).

Hospital charges and length of stay **increased substantially for infants with NAS** compared with non-NAS newborns in the nursery. Charges and length of stay differed by $12,500 and nine days, respectively, for infants with NAS.

Toxicology results **are currently underreported**, which impacts the ability to inform intervention and prevention efforts.

SUMMARY

Key Recommendations

Standardize protocols: Train hospital staff on standardized protocol for the identification, assessment, and management of NAS, such as education in Regional Perinatal Centers.

a. Utilize existing NAS-specific toolkits and implement evidence-based quality improvement on existing services such as Georgia Perinatal Quality Collaborative (GaPQC).

Promote primary prevention opportunities, such as responsible prescribing practices, reproductive planning, and access to contraception for women who do not intend to become pregnant.

a. Utilize existing toolkits (e.g., Centers for Disease Control and Prevention Guideline for Prescribing Opioids for Chronic Pain, 2016).

Promote existing services and advocate for increased support for women with substance use disorder.

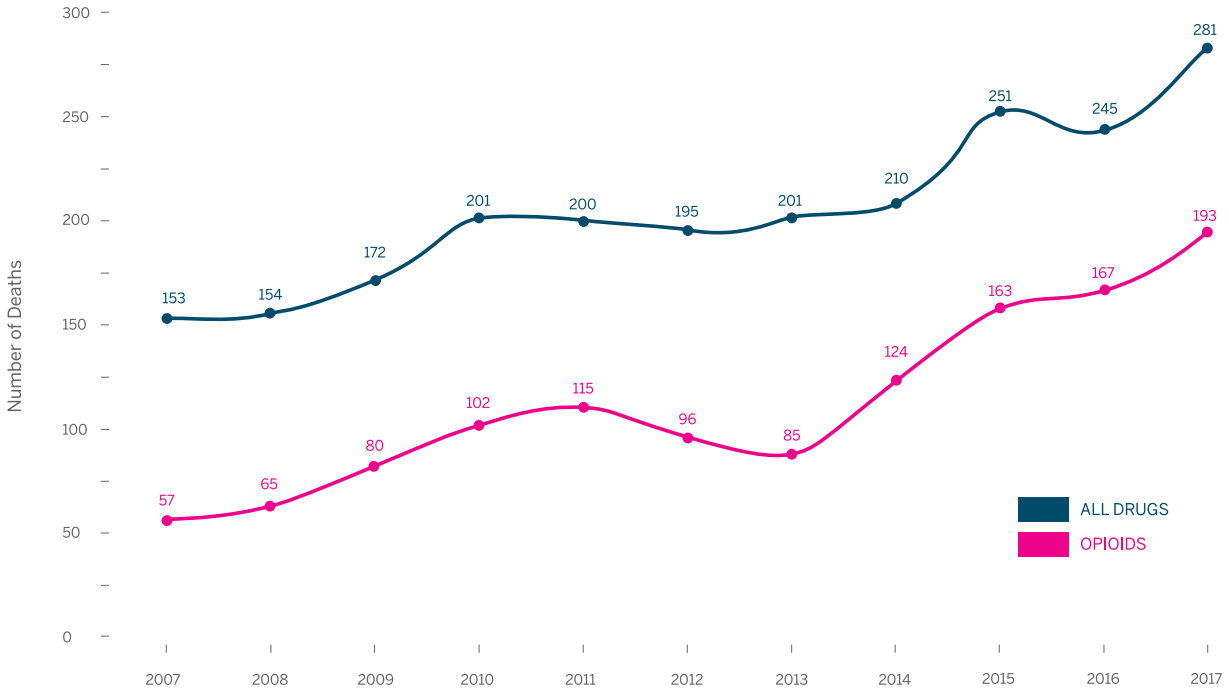
Improve case identification and reporting: Increase awareness of NAS reporting requirements and continue outreach to birthing facilities to encourage participation in reporting suspected cases of NAS. Leverage resources to remove barriers that may keep hospitals from reporting:

a. Enhance passive case identification capacity through integration with other data sources (e.g., Vital Records data).
b. Advocate for resources to receive and review medical records.
c. Expand toxicology screening reporting to include negative results.

INTRODUCTION

Substance abuse presents a significant threat to the health of women and young children in Georgia. From 2007 to 2017, the number of deaths due to drug overdoses nearly doubled among Georgia women of childbearing age (Figure 1). During that same timeframe, the number of opioid-specific overdose deaths more than tripled.

FIGURE 1. **ALL DRUG + OPIOID OVERDOSE DEATHS, FEMALES, 15-44 YEARS OF AGE**, GEORGIA, 2007-2017



SOURCE: Georgia Death Certificates (2007–2017). Georgia Department of Public Health, Office of Health Indicators for Planning and Office of Vital Records. Data pulled October 18, 2018.

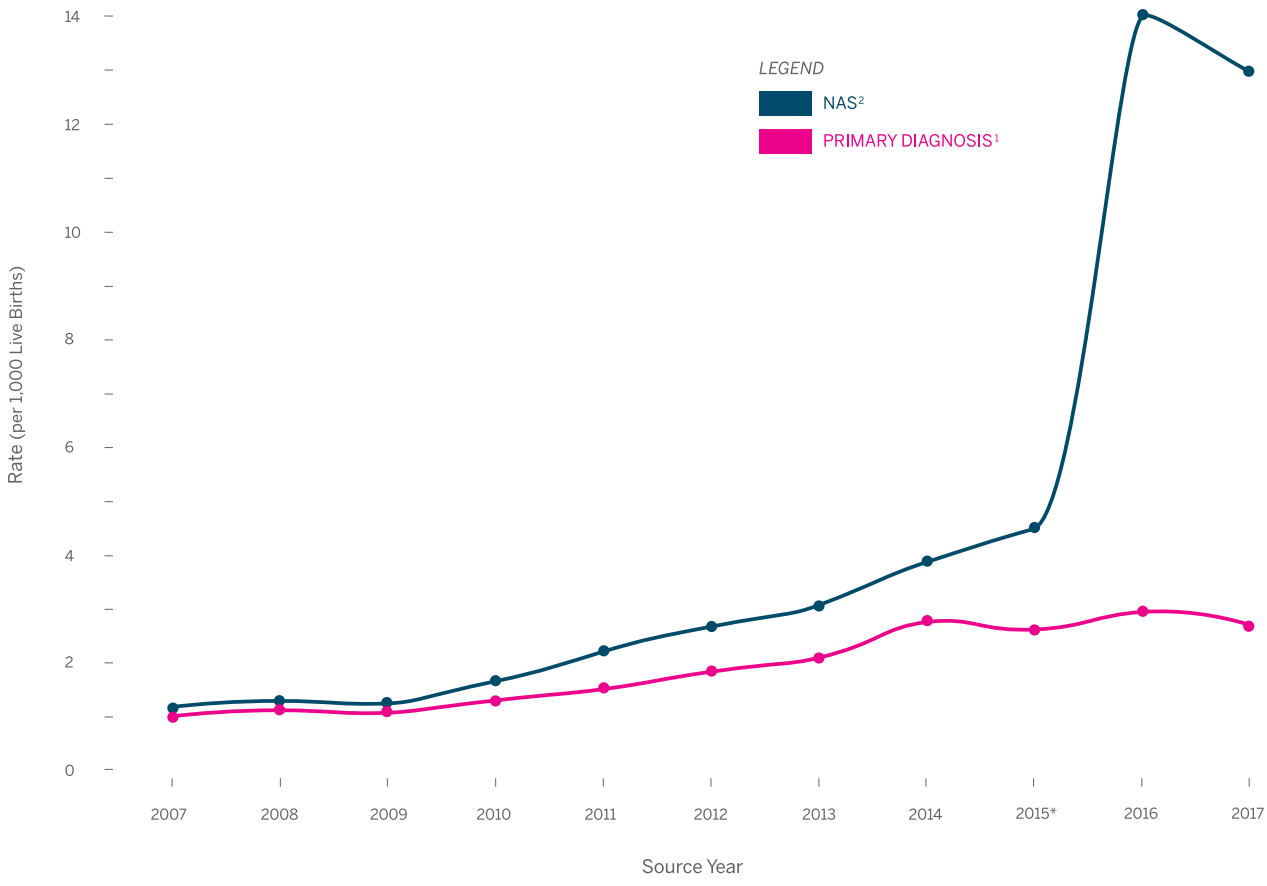
In the most recent national estimates, 8.5% of pregnant women reported using at least one illicit substance during the past month. About 1.4% of pregnant women reported using either heroin or misusing an opioid pain reliever during the past month (Center for Behavioral Health Statistics and Quality, 2018).

Newborns may be impacted by maternal use of licit and illicit substances. **Neonatal abstinence syndrome (NAS) is a set of clinical withdrawal signs and symptoms present in a newborn infant who was exposed to illegal or prescription drugs while in the mother's womb.** Nationally, the incidence of NAS tripled from 2000 (1.2 per 1,000 live births) to 2009 (3.4 per 1,000 live births) (Patrick et al., 2012)

INTRODUCTION (CON'T)

In Georgia, the incidence of infants who experienced withdrawal signs/symptoms and/or were affected by maternal substance abuse increased from about 1 case per 1,000 live hospital births in 2007 to nearly 13 cases per 1,000 live hospital births in 2017 (Figure 2). The incidence among infants with withdrawal signs/symptoms alone was five times greater in 2017 than 2007. This increase was similar to the findings of a 28-state study that demonstrated NAS rose from 1.5 to 6.0 per 1,000 hospital births during 1999 to 2013 (Ko et al., 2016). See Appendix 1 for more information on the NAS case identification process in the hospital discharge data.

FIGURE 2. **RATE OF NAS CASES PER 1,000 LIVE HOSPITAL BIRTHS BY YEAR**, GEORGIA, 2007-2017



* By October 1, 2015, all hospitals in the U.S. were required to switch from ICD-9-CM to ICD-10-CM codes.
[1] Primary Diagnosis Rate only includes NAS cases identified using one of two ICD codes indicating infants exhibited physical signs/symptoms of withdrawal.
[2] NAS Rate includes all NAS cases identified using at least one of four ICD codes.

DATA SOURCE: Georgia Hospital Discharge Data (2007–2017). Georgia Department of Public Health, Office of Health Indicators for Planning. Data pulled October 25, 2018.

INTRODUCTION (CON'T)

The Georgia Department of Public Health (DPH) made NAS a notifiable condition January 1, 2016. Healthcare providers reported NAS cases through the State Electronic Notifiable Disease Surveillance System (SendSS). As part of NAS surveillance, the NAS reporting form in SendSS collects data to:

1. Assess the incidence of NAS in Georgia and monitor trends over time.
2. Identify opportunities for timely intervention and education.
3. Better characterize risk factors for NAS in Georgia.
4. Assess capacity to address maternal addiction and provide multidisciplinary care for the child and family affected by substance abuse.

This annual report, in accordance with Georgia Code Section 31-12-2, details the most recent NAS findings and recommendations on how to reduce the number of infants born with NAS in Georgia.

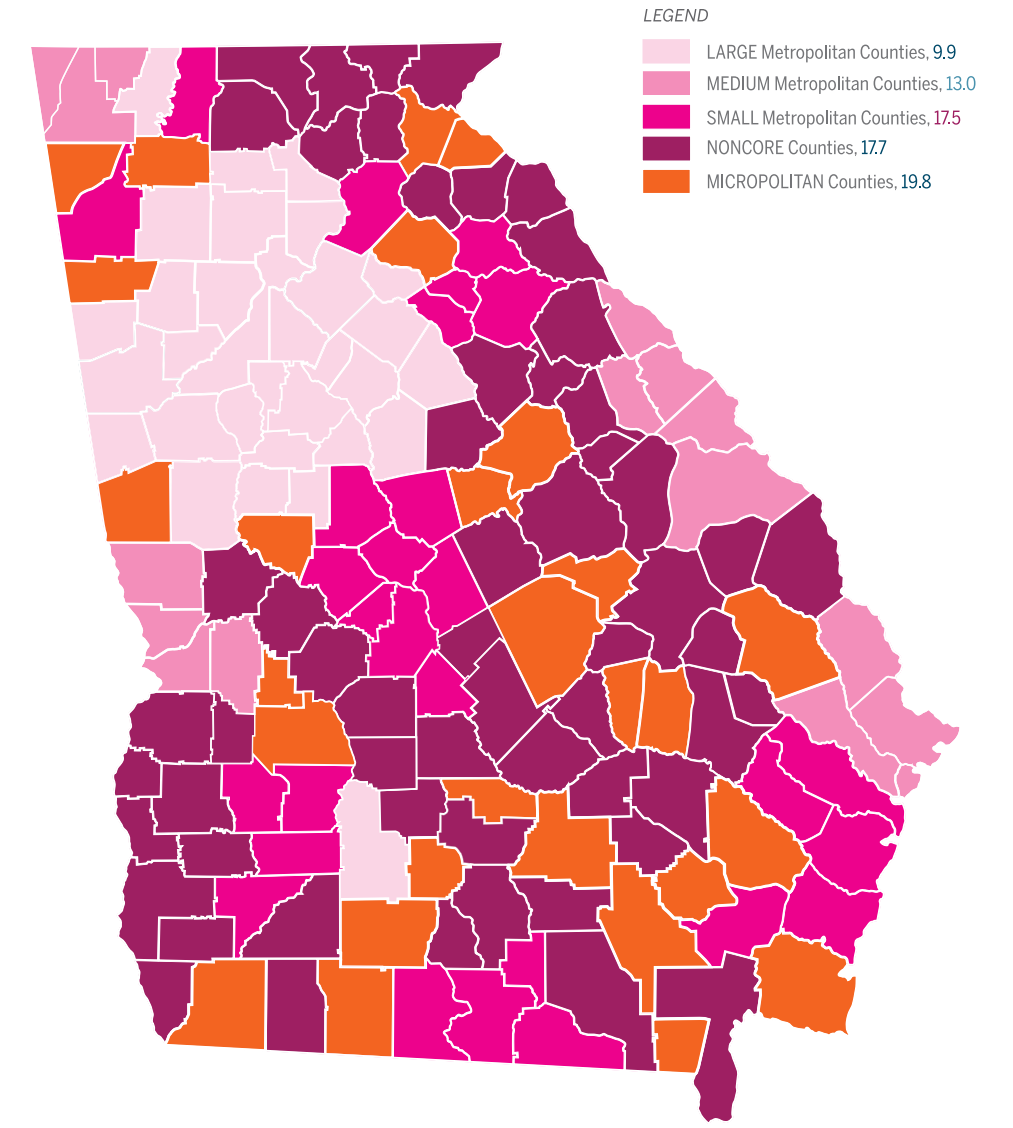
Two data sources were used in this surveillance report. The distribution of NAS cases across the state, average lengths of hospital stay after birth, and average hospital charges were derived from hospital discharge data (HDD) maintained by DPH Office of Health Indicators for Planning (OHIP). Maternal demographic factors, occurrence of clinical signs/symptoms of NAS, substance exposure confirmed by infant toxicology screening results, and the use of medications to treat infants with NAS were summarized from case data collected through the NAS reporting form in SendSS.

NAS DISTRIBUTION RATES IN GEORGIA

NAS Rates by Urban-Rural Status[1]

Non-metropolitan counties had higher rates of NAS compared to the larger, metropolitan counties (Map 1). The rate of NAS among micropolitan counties (19.8 per 1,000 live births) was double that of the large metropolitan counties (9.9 per 1,000 live births). NAS rates among small metropolitan, noncore, and micropolitan counties ranged from 17.5 to 19.8 per 1,000 live births.

MAP 1. **URBAN-RURAL STATUS RATE PER 1,000 LIVE BIRTHS, HOSPITAL DISCHARGE DATA,** *GEORGIA, 2017*

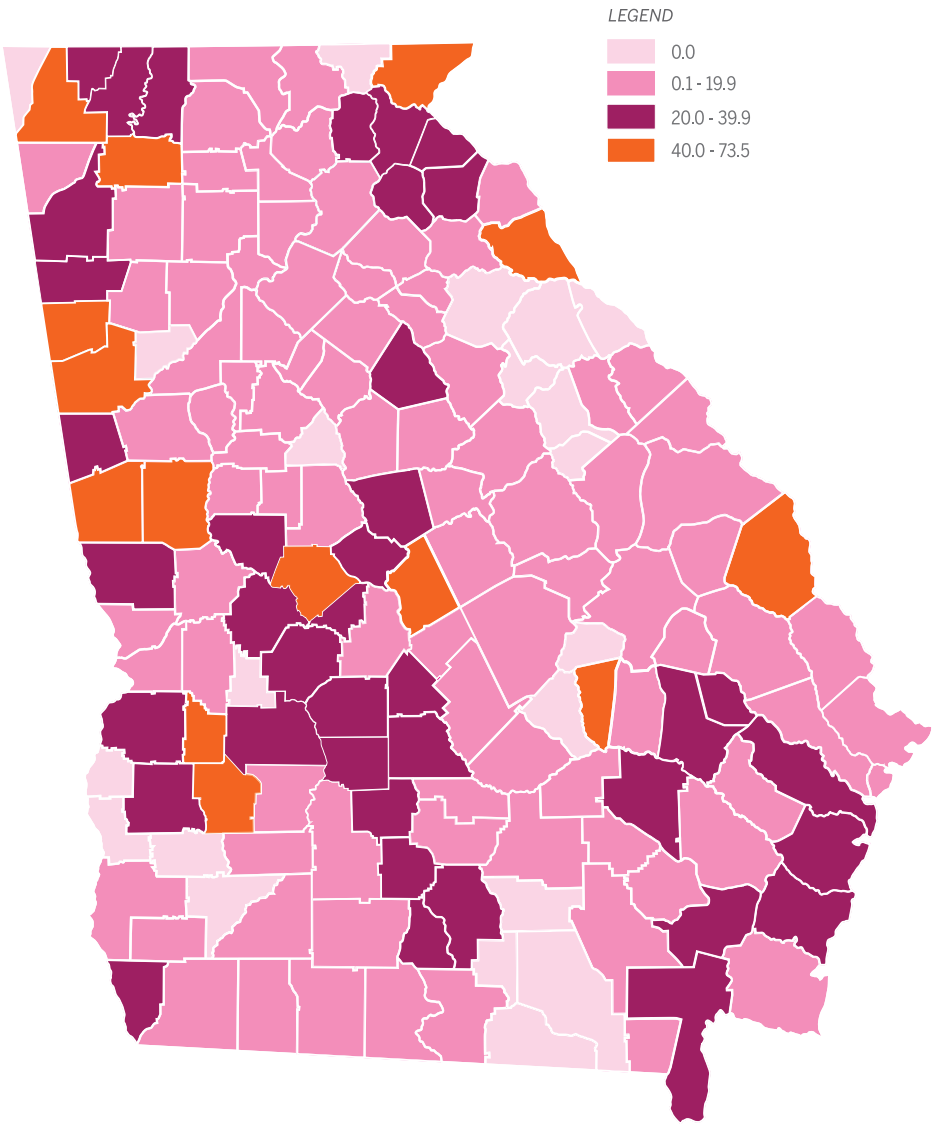


SOURCE: Georgia Hospital Discharge Data (2007–2017), Georgia Department of Public Health, Office of Health Indicators for Planning. Data pulled October 25, 2018.
[1] Urban-Rural Status established using the 2013 National Center for Health Statistics (NCHS) classification scheme for counties (NCHS, 2014)

NAS Rates by Maternal County of Residence

The rates of NAS by county ranged from 0 to 73.5 cases per 1,000 live births (Map 2). In 20 counties there were no identified cases of NAS and each county had fewer than 250 live births in 2017. Thirteen counties had rates of 40 or more cases per 1,000 live births. Haralson County had the highest rate of NAS (73.5 cases per 1,000 live births). Appendix 4 contains the frequency, rate, and urban-rural status by county.

MAP 2. **COUNTY-SPECIFIC RATES OF NAS PER 1,000 LIVE BIRTHS, HOSPITAL DISCHARGE DATA,** *GEORGIA, 2017*



SOURCE:Georgia Hospital Discharge Data (2007–2017). Georgia Department of Public Health, Office of Health Indicators for Planning. Data pulled October 25, 2018.

HOSPITAL CHARGES

In 2017, hospital charges were nearly $12,500 more for infants exhibiting substance withdrawal symptoms in the nursery ($16,224) than infants with no indication of effects of addictive substances ($3,762)[2]. Infants who were affected only by maternal use of substances of addiction[3] had about $1,500 more in hospital charges than infants with no indication of effects of addictive substances.

Table 1A. **Total charges among Nursery Infants by NAS Status,** Georgia, 2017

Total Charges (USD)	NAS Infants[4] Mean (95% CI)	Non-NAS Infants Mean (95% CI)
NURSERY	$7,236.22 ($6,639.06, $7,833.39)	$3,762.96 ($3,737.31, $3,788.62)

Table 1B. **Total charges among Nursery Infants with NAS by ICD-10-CM Code,** Georgia, 2017 [1]

Total Charges (USD)	Infants Experiencing Withdrawal[2] Mean (95% CI)	Infants Exposed[3] Mean (95% CI)
NURSERY	$16,224.68 ($13,521.95, $18,927.42)	$5,269.34 ($4,973.36, $5,565.32)

[1] Columns are mutually exclusive.
[2] Infants experiencing withdrawal were identified with ICD-10-CM code P96.1.
[3] Infants exposed were identified with ICD-10-CM code PO4.4
[4] NAS infants are either of the two ICD-10-CM codes (P96.1 or PO4.4).

LENGTH OF STAY

Among newborns in the nursery, those with substance withdrawal symptoms spent nearly nine more days in the hospital upon delivery than infants with no indication of effects of addictive substances (11.2 and 2.6 days, respectively). Infants affected only by maternal use of substances of addiction had an average length of stay half a day longer than infants with no indication of effects of addictive substances (3.0 and 2.6 days, respectively).

Table 2A. **Length of Stay among Nursery Infants by NAS Status,** Georgia 2017

Length of Stay (DAYS)	NAS Infants[4] Mean (95% CI)	Non-NAS Infants Mean (95% CI)
NURSERY	4.47 (4.06, 4.87)	2.55 (2.54, 2.57)

Table 2B. **Length of Stay among Nursery Infants with NAS by ICD-10-CM Code,** Georgia 2017[1]

Length of Stay (DAYS)	Infants Experiencing Withdrawal[2] Mean (95% CI)	Infants Exposed[3] Mean (95% CI)
NURSERY	11.17 (9.30, 13.04)	3.03 (2.86, 3.21)

[1] Columns are mutually exclusive.
[2] Infants experiencing withdrawal were identified with ICD-10-CM code P96.1.
[3] Infants exposed were identified with ICD-10-CM code PO4.4
[4] NAS infants are either of the two ICD-10-CM codes (P96.1 or PO4.4).

CONFIRMED CASE SUMMARY

All data described in the remainder of this report were collected through the SendSS NAS reporting form. **A confirmed case was defined as an infant reported with either a positive toxicology screen or clinical signs/symptoms compatible with NAS**. Positive maternal toxicology screens were not used for case confirmation. In 2017, Georgia had 762 confirmed cases of NAS. Of these, clinical signs were present in 59% (Figure 3). The remaining confirmed cases (41%) had at least one positive toxicology screen.

FIGURE 3. **CONFIRMED NAS CASES BY CONFIRMATION METHOD**, GEORGIA, 2007-2017 (N=762)

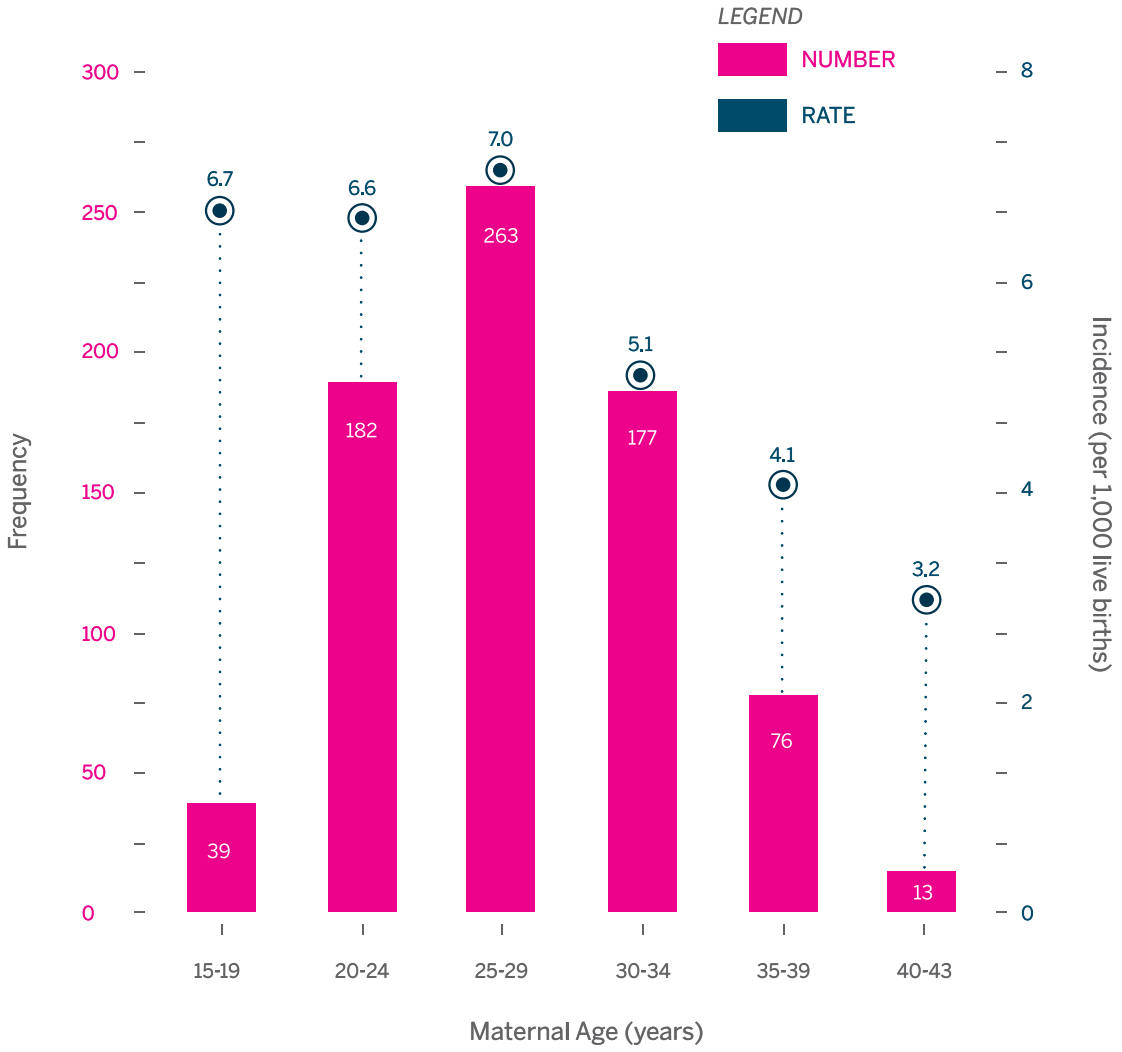
SOURCE: State Electronic Notifiable Disease Surveillance System NAS reporting form (2017). Georgia Department of Public Health. Data pulled September 5, 2018.

See Appendix 2 for a description of Georgia's case confirmation process. Tables listing the substances and signs/symptoms captured by the SendSS-based NAS reporting form can be found in Appendix 3.

MATERNAL AGE

Infants born to mothers 25-29 years of age had the highest incidence of NAS (Figure 4). Over one in three infants with NAS were born to mothers 25–29 years of age. Overall, the incidence of NAS was highest for infants born to mothers 15-29 years of age (6.6-7.0 cases per 1,000 live births).

FIGURE 4. **CONFIRMED NAS CASES + INCIDENCE BY MATERNAL AGE**, GEORGIA, 2017 (N=750*)

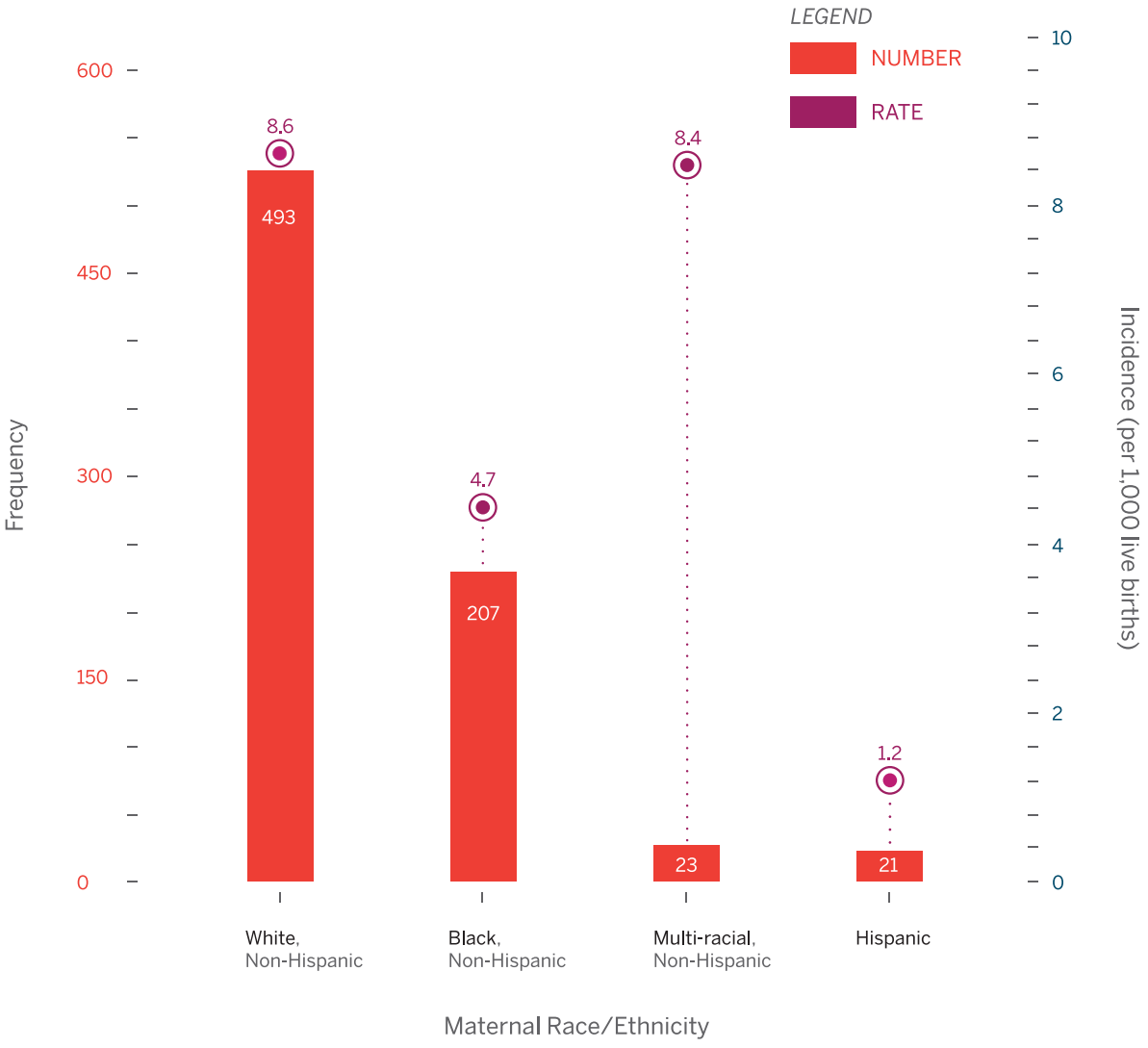


*Maternal age was not available for all confirmed cases.
SOURCE: State Electronic Notifiable Disease Surveillance System NAS reporting form (2017). Georgia Department of Public Health. Data pulled September 5, 2018.

MATERNAL RACE/ETHNICITY

Nearly two-thirds of confirmed NAS cases had Non-Hispanic white mothers (Figure 5). Infants with Non-Hispanic White mothers had nearly twice the incidence of NAS as infants with Non-Hispanic Black mothers.

FIGURE 5. **CONFIRMED NAS CASES + INCIDENCE BY MATERNAL RACE / ETHNICITY**, GEORGIA, 2017 (N=744*)

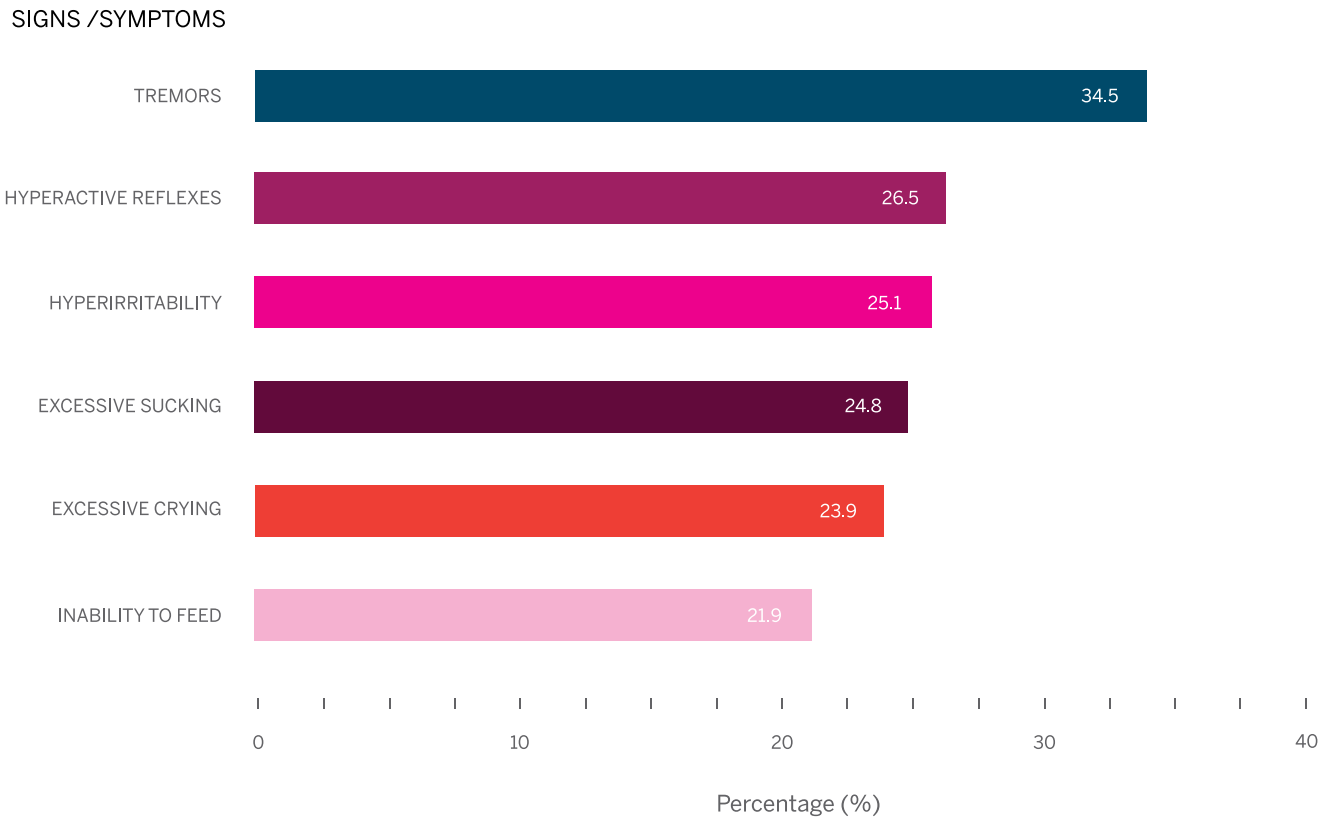


*Maternal race/ethnicity was not available for all confirmed cases.
SOURCE: State Electronic Notifiable Disease Surveillance System NAS reporting form (2017). Georgia Department of Public Health. Data pulled September 5, 2018.

WITHDRAWAL SIGNS/SYMPTOMS

Among confirmed cases, **451 infants (59%) were reported to have clinical signs/symptoms consistent with substance withdrawal**; of these, about half were male (data not shown). **Tremors (34.5%) were the most frequently reported sign/symptom** (Figure 6). About a quarter of confirmed NAS cases were reported with hyperactive reflexes (26.5%), hyperirritability (25.1%), and excessive sucking (24.8%). **Among confirmed NAS cases with any signs/symptoms, over 80% had multiple signs/symptoms reported** (data not shown).

FIGURE 6. **DISTRIBUTION OF REPORTED NAS SIGNS/SYMPTOMS***, GEORGIA, 2017 (N=762)



*Only signs/symptoms reported in >20% of confirmed cases are displayed. Cases may be included in more than one category, as multiple signs/symptoms could be reported per case.

SOURCE: State Electronic Notifiable Disease Surveillance System NAS reporting form (2017). Georgia Department of Public Health. Data pulled September 5, 2018.

INFANT SEX

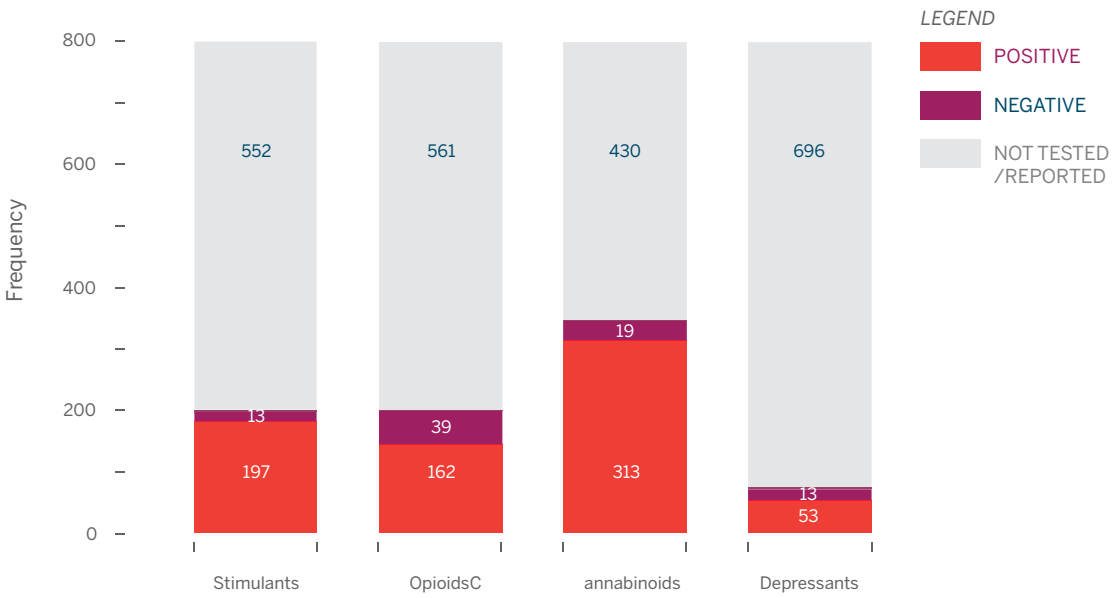
In 2017, **52% of the confirmed NAS cases were male and 48% were female**, yielding a rate of approximately **six cases per 1,000 live births for each sex** (data not shown). This minor variation by sex is contrary to recent research indicating males were disproportionately impacted by NAS (Warren et al., 2015; Miller et al., 2018).

SUBSTANCE EXPOSURE

In recent years, opioid use and abuse, particularly among pregnant women, has gained increased attention. While this is warranted, opioids are not the only addictive substances that can cause NAS. In 2017, 8.5% of pregnant women reported using at least one illicit substance within the past month (Center for Behavioral Health Statistics and Quality, 2018). Marijuana was the substance most commonly reported by pregnant women, with 7% reporting use in the past month.

In Georgia, three out of four confirmed NAS cases had positive toxicology screens for at least one substance (data not shown). Cannabinoids were the most commonly reported substance for which infants were positive (Figure 7). Over one in five confirmed NAS cases had positive toxicology screens for stimulants (n=197) or opioids (n=162). Infant toxicology results were not available for the majority of confirmed cases.

FIGURE 7. **TOXICOLOGY SCREENING RESULTS BY SUBSTANCE CLASS*** **AMONG CONFIRMED CASES**, GEORGIA, 2017 (N=762)

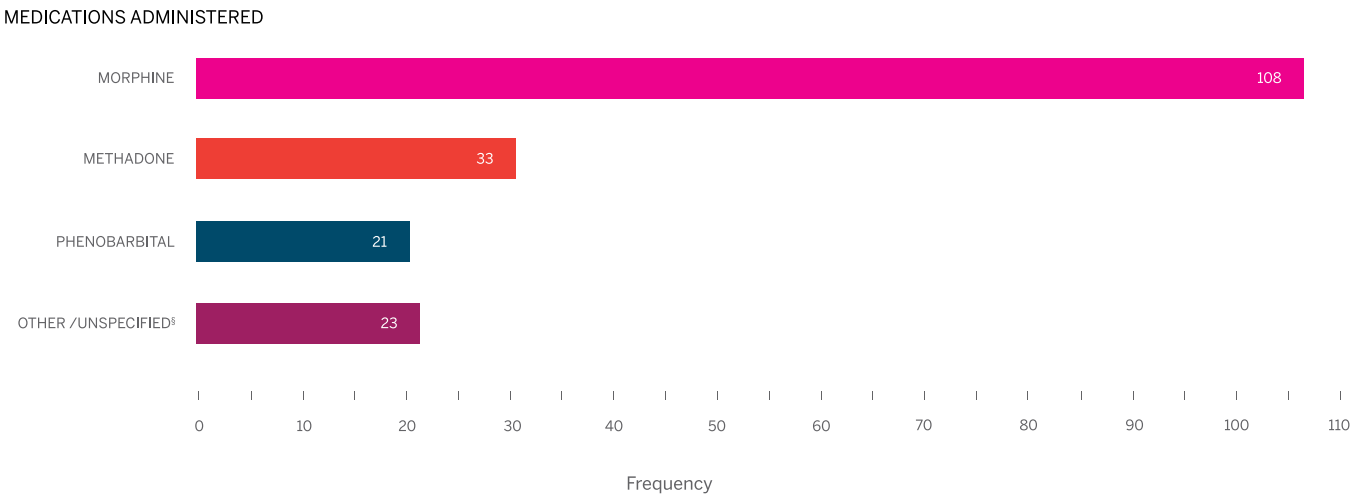


*Classes are not mutually exclusive, as an infant could have a positive toxicology screen for more than one substance/class.
SOURCE: State Electronic Notifiable Disease Surveillance System NAS reporting form (2017). Georgia Department of Public Health. Data pulled September 5, 2018.

MEDICATIONS TO TREAT INFANTS

About one in five confirmed NAS cases received pharmacological intervention (n=161) (data not shown). Among infants reported with signs/symptoms (N=451), about one in three received medication to treat withdrawal (n=159) (data not shown). Morphine was the most frequently reported pharmacological intervention (Figure 8).

FIGURE 8. **MEDICATIONS USED TO TREAT INFANTS WITH CLINICAL SIGNS/SYMPTOMS OF DRUG WITHDRAWAL*, AMONG INFANTS WITH NAS SIGNS/SYMPTOMS**, GEORGIA, 2017 (N=451)



*Categories are not mutually exclusive, as some infants were treated with more than one medication.
§ Other includes benzodiazepines, caffeine, clonidine, fentanyl, Sudafed, and Versed. Other and Unspecified categories were combined due to few reported cases.
SOURCE: State Electronic Notifiable Disease Surveillance System NAS reporting form (2017). Georgia Department of Public Health. Data pulled September 5, 2018.

APPENDIX 1

Hospital Discharge Data and NAS Burden

Hospital discharge data (HDD) from 2007 to 2017 were used to determine the annual, de-duplicated incidence rate of neonatal abstinence syndrome (NAS) in infants born to mothers who were residents of Georgia at the time of delivery.

The numerator consisted of infants younger than one year of age born in Georgia whose hospital discharge records contained at least one of four International Classification of Disease (ICD) codes that indicated an NAS diagnosis. From 2007 through the first three quarters of 2015, NAS cases were identified by ICD-9-CM codes 779.5 (drug withdrawal syndrome in a newborn) and 760.72 (narcotics affecting fetus or newborn via placenta or breast milk). For the last quarter of 2015 through 2017, NAS cases were identified with ICD-10-CM codes P96.1 (neonatal withdrawal symptoms from maternal use of drugs of addiction) and P04.4 (newborn affected by maternal use of drugs of addiction). Iatrogenic cases[4] were ascertained using the methodology described by Patrick et al in "Neonatal Abstinence Syndrome and Associated Health Care Expenditures: United States, 2000–2009" (Patrick et al., 2012); and were excluded from the numerator.

The denominator consisted of all hospital births among Georgia residents as identified with V and Z ICD codes. During 2007 through the first three quarters of 2015, hospital births were captured with the ICD-9-CM codes V30–V39.01. For the last quarter of 2015 through 2017, the following ICD-10-CM codes were used: Z38.0, Z38.2, Z38.3, Z38.5, Z38.6, and Z38.8.

The incidence rate of NAS was calculated by dividing the number of infants with NAS, as identified by one of the above ICD codes (779.5 or 760.72; P96.1 or P04.4), divided by the total hospital births, as identified by the V or Z ICD codes listed above; and multiplying by 1,000 to determine the number of cases per 1,000 hospital births among Georgia residents. The primary diagnosis rate of NAS is the number of infants with NAS, as identified by either the ICD-9-CM or ICD-10-CM codes, who exhibit withdrawal symptoms only, per 1,000 hospital births among Georgia residents (data not shown). These infants were identified by either ICD-9-CM code 779.5 or ICD-10-CM code P96.1. Because no standardized case definition for NAS has been implemented in the U.S., states have utilized a combination of the primary diagnosis and overall NAS incidence (i.e., using both signs/symptoms and positive toxicology ICD codes) rates to estimate the burden of NAS. The Centers for Disease Control and Prevention (CDC) and the Council for State and Territorial Epidemiologists (CSTE) surveyed states in late 2018 to collect detailed information on local NAS case criteria. This information will be used to develop a standardized NAS case definition in the coming year.

[4] Latrogenic cases refer to infants experiencing withdrawal signs/symptoms related to medical treatment or surgery, not antenatal exposure to maternal substance use.

APPENDIX 2

Case Confirmation Process

Healthcare providers reported suspected NAS cases to the Georgia Department of Public Health (DPH) by filling out an electronic reporting form in the State Electronic Notifiable Disease Surveillance System (SendSS). DPH reviewed the NAS case reports for completeness and accuracy. A reported case was confirmed if the infant met the case definition (Figure A2). To be considered a confirmed NAS case, a newborn must have been reported with clinical signs/symptoms consistent with NAS and/or a positive toxicology screen result. Clinical signs/symptoms included tremors, vomiting, hyperactive reflexes, and hyperirritability (a full list is presented in Appendix 3). Sixteen substances for which toxicology results could be reported were grouped into four classes: opioids, stimulants, cannabinoids, and depressants (see Appendix 3 for more information).

Figure A2.
NAS CASE CONFIRMATION DECISION

In 2017, 1,053 suspected cases of NAS were reported to DPH through SendSS from 52 of the 74 (70%) birthing facilities in Georgia. Three birthing hospitals in Tennessee also reported NAS cases among Georgia resident births in their facilities. Of the 1,053 suspected cases, 762 were confirmed. This was nearly twice the number of reported suspected (N=522) and confirmed NAS cases (N=410) in 2016.

Data from the SendSS NAS reporting form has several limitations. First, despite the addition of NAS to the notifiable condition list in Georgia, cases may have been underreported. Incidence rates based on SendSS data may be an underestimate of the burden of NAS in the Georgia population as a whole and subpopulations therein. Second, data reported may be incomplete. For example, only the more severe signs/symptoms may have been regularly reported. Finally, data collection for toxicology screening may not provide the most effective information for informing prevention efforts. Although fewer than half of all confirmed cases were reported to have had toxicological screening for any substance class (Figure 7, range: 8.7%–43.6%), the vast majority of toxicology screens reported to SendSS were positive (data not shown). The 2017 NAS case reporting form also did not collect information on the specimen type (e.g., urine, meconium, cord blood, etc.). Further, reported maternal substance exposure did not differentiate among licit or illicit use, abuse, or prescription of addictive substances, including whether medication-assisted treatment (MAT) was administered during pregnancy. The NAS case reporting form in SendSS has been revised to capture these data starting January 1, 2018.

APPENDIX 3

Data Collection on the SendSS NAS Reporting Form

On the 2017 SendSS NAS case reporting form, providers could indicate one or more clinical signs/symptoms of NAS using 13 checkboxes (Table 3A). An additional checkbox gave providers the option to report asymptomatic infants. If "Other" was selected, a comment box appeared to collect signs/symptoms not otherwise listed. Reported "Other" symptoms included sleep and respiratory (e.g., apnea, tachypnea) abnormalities, and arrhythmias (e.g., tachycardia, bradycardia).

Table 3A. **CLINICAL SIGNS/SYMPTOMS OF NAS COLLECTED IN SENDSS**

Blotchy skin coloring	Other
Diarrhea	Poor/inability to feed
Excessive crying	Seizures
Excessive sucking	Sweating
Fever/temperature instability	Tremors
Hyperactive reflexes	Vomiting
Hyperirritability	

Like the signs/symptoms selections, the SendSS NAS reporting form had checkboxes for 16 substances (Table 3B). Providers could indicate whether mothers and/or infants (1) received toxicology screening and (2) the toxicology results (e.g., positive or negative) for each substance. Additionally, providers had a free-text option to list substances and toxicology results not otherwise captured by the 16 checkboxes. Four substances classes were created by grouping the 16 individual substances by their mechanisms of action and effects on the body. When "Other Opioids" was indicated, more granular information was not reported. The reporting form did not capture whether buprenorphine was associated with medication-assisted treatment (MAT). Ambien and butalbital (grouped into Depressants) were reported in free-text for infants, and kratom (grouped into Opioids) toxicology screening was reported in free-text for both infants and mothers.

Table 3B. **CLASS CATEGORIES FOR INFANT AND MOTHERS SUBSTANCES COLLECTED IN SENDSS**

Cannabinoids[1]	Depressants	Opioids	Stimulants
Marijuana or THC	Alcohol	Buprenorphine	Amphetamines
	Barbiturates	Heroine	Cocaine
	Benzodiazepines	Oxycodone	Methamphetamine
	Gabapentin (Neurontin)[2]	Tramadol (Ultram)	Tobacco (nicotine)[4]
	Phencyclidine (PCP)	Other opioids	
	SSRI[3]		

[1] SendSS listed one checkbox for cannabinoids: "Marijuana-THC-cannabinoids." [2] Gabapentin (Neurontin) toxicology screening was not reported for any mothers or infants. [3] SSRI: Selective serotonin reuptake inhibitors. SSRI toxicology screening was not reported for any infants. [4] Tobacco (nicotine) toxicology screening was not reported for any infants.

APPENDIX 4

Hospital Discharge Data by County: Frequency, Rate, and Urban-Rural Status

County	Number of Live Births	Number of NAS Cases	Rate of NAS	NCHS Urban-Rural Status
Appling	213	*	**	Noncore
Atkinson	93	0	0.0	Noncore
Bacon	175	*	**	Noncore
Baker	34	0	0.0	Small Metropolitan
Baldwin	358	*	**	Micropolitan
Banks	189	*	**	Noncore
Barrow	886	*	**	Large Metropolitan
Bartow	1238	18	14.5	Large Metropolitan
Ben Hill	194	*	**	Micropolitan
Berrien	185	*	**	Noncore
Bibb	1919	52	27.1	Small Metropolitan
Bleckley	122	*	**	Noncore
Brantley	198	*	**	Small Metropolitan
Brooks	170	*	**	Small Metropolitan
Bryan	433	*	**	Medium Metropolitan
Bulloch	839	10	11.9	Micropolitan
Burke	305	*	**	Medium Metropolitan
Butts	219	0	0.0	Large Metropolitan
Calhoun	45	0	0.0	Noncore
Camden	693	11	15.9	Micropolitan
Candler	132	*	**	Noncore
Carroll	1256	77	61.3	Large Metropolitan
Catoosa	44	*	**	Medium Metropolitan
Charlton	82	*	**	Noncore
Chatham	3430	43	12.5	Medium Metropolitan
Chattahoochee	62	*	**	Medium Metropolitan
Chattooga	246	*	**	Micropolitan
Cherokee	2677	21	7.8	Large Metropolitan
Clarke	1349	17	12.6	Small Metropolitan
Clay	17	0	0.0	Noncore
Clayton	3914	33	8.4	Large Metropolitan
Clinch	82	0	0.0	Noncore
Cobb	8793	74	8.4	Large Metropolitan
Coffee	577	*	**	Micropolitan
Colquitt	496	*	**	Micropolitan

* Counts not displayed for counties with 1–9 NAS cases. ** NAS rates not calculated for counties with 1–9 cases of NAS.

APPENDIX 4 (CON'T)

County	Number of Live Births	Number of NAS Cases	Rate of NAS	NCHS Urban-Rural Status
Columbia	1656	*	**	Medium Metropolitan
Cook	188	0	0.0	Noncore
Coweta	1364	10	7.3	Large Metropolitan
Crawford	121	*	**	Small Metropolitan
Crisp	257	*	**	Micropolitan
Dade	0	0	0.0	Medium Metropolitan
Dawson	217	*	**	Large Metropolitan
Decatur	355	18	**	Micropolitan
DeKalb	10594	74	7.0	Large Metropolitan
Dodge	201	*	**	Noncore
Dooly	63	52	**	Noncore
Dougherty	1179	13	11.0	Small Metropolitan
Douglas	1637	19	11.6	Large Metropolitan
Early	129	*	**	Noncore
Echols	51	0	0.0	Small Metropolitan
Effingham	733	*	**	Medium Metropolitan
Elbert	198	*	**	Noncore
Emanuel	289	*	**	Noncore
Evans	131	*	**	Noncore
Fannin	183	*	**	Noncore
Fayette	694	*	**	Large Metropolitan
Floyd	1188	28	23.6	Small Metropolitan
Forsyth	2357	13	5.3	Large Metropolitan
Franklin	271	*	**	Noncore
Fulton	11578	143	12.4	Large Metropolitan
Gilmer	278	*	**	Noncore
Glascock	22	0	0.0	Noncore
Glynn	891	18	20.2	Small Metropolitan
Gordon	560	24	42.9	Micropolitan
Grady	286	*	**	Noncore
Greene	161	*	**	Noncore
Gwinnett	11478	55	4.8	Large Metropolitan
Habersham	477	14	29.4	Micropolitan
Hall	2063	26	12.6	Small Metropolitan
Hancock	51	*	**	Micropolitan
Haralson	313	23	73.5	Large Metropolitan
Harris	290	*	**	Medium Metropolitan
Hart	210	*	**	Noncore
Heard	109	*	**	Large Metropolitan

County	Number of Live Births	Number of NAS Cases	Rate of NAS	NCHS Urban-Rural Status
Henry	2090	12	5.7	Large Metropolitan
Houston	1856	37	19.9	Small Metropolitan
Irwin	87	*	**	Noncore
Jackson	787	*	**	Micropolitan
Jasper	144	*	**	Large Metropolitan
Jeff Davis	197	*	**	Noncore
Jefferson	192	*	**	Noncore
Jenkins	87	*	**	Noncore
Johnson	106	*	**	Micropolitan
Jones	245	*	**	Small Metropolitan
Lamar	170	*	**	Large Metropolitan
Lanier	124	0	0.0	Small Metropolitan
Laurens	609	11	18.1	Micropolitan
Lee	315	*	**	Small Metropolitan
Liberty	616	14	22.7	Small Metropolitan
Lincoln	80	0	0.0	Medium Metropolitan
Long	192	*	**	Small Metropolitan
Lowndes	1458	12	8.2	Small Metropolitan
Lumpkin	248	*	**	Noncore
Macon	116	*	**	Noncore
Madison	317	*	**	Small Metropolitan
Marion	84	*	**	Medium Metropolitan
McDuffie	267	*	**	Medium Metropolitan
McIntosh	126	*	**	Small Metropolitan
Meriwether	214	10	46.7	Large Metropolitan
Miller	66	*	**	Noncore
Mitchell	261	*	**	Noncore
Monroe	231	*	**	Small Metropolitan
Montgomery	94	*	**	Micropolitan
Morgan	210	*	**	Large Metropolitan
Murray	462	11	23.8	Small Metropolitan
Muscogee	2371	51	21.5	Medium Metropolitan
Newton	1271	*	**	Large Metropolitan
Oconee	372	*	**	Small Metropolitan
Oglethorpe	169	0	0.0	Small Metropolitan
Paulding	1788	27	15.1	Large Metropolitan
Peach	285	*	**	Small Metropolitan
Pickens	301	*	**	Large Metropolitan
Pierce	223	*	**	Micropolitan

* Counts not displayed for counties with 1–9 NAS cases. ** NAS rates not calculated for counties with 1–9 cases of NAS.

APPENDIX 4 (CON'T)

County	Number of Live Births	Number of NAS Cases	Rate of NAS	NCHS Urban-Rural Status
Pike	162	*	**	Large Metropolitan
Polk	536	13	24.3	Micropolitan
Pulaski	71	*	**	Small Metropolitan
Putnam	183	*	**	Noncore
Quitman	19	0	0.0	Noncore
Rabun	126	*	**	Noncore
Randolph	85	*	**	Noncore
Richmond	2782	38	13.7	Medium Metropolitan
Rockdale	934	10	10.7	Large Metropolitan
Schley	48	0	0.0	Micropolitan
Screven	190	*	**	Noncore
Seminole	94	*	**	Noncore
Spalding	786	*	**	Large Metropolitan
Stephens	254	*	**	Micropolitan
Stewart	36	*	**	Noncore
Sumter	385	*	**	Micropolitan
Talbot	59	*	**	Noncore
Taliaferro	12	0	0.0	Noncore
Tattnall	230	*	**	Noncore
Taylor	86	*	**	Noncore
Telfair	139	*	**	Noncore
Terrell	93	*	**	Small Metropolitan
Thomas	487	*	**	Micropolitan
Tift	526	13	24.7	Micropolitan
Toombs	339	*	**	Micropolitan
Towns	71	0	0.0	Noncore
Treutlen	82	0	0.0	Noncore
Troup	664	44	66.3	Micropolitan
Turner	92	*	**	Noncore
Twiggs	67	*	**	Small Metropolitan
Union	148	*	**	Noncore
Upson	313	*	**	Micropolitan
Walker	35	*	**	Medium Metropolitan
Walton	1010	*	**	Large Metropolitan
Ware	452	*	**	Micropolitan
Warren	65	0	0.0	Noncore
Washington	198	*	**	Noncore
Wayne	331	*	**	Micropolitan
Webster	24	*	**	Noncore

County	Number of Live Births	Number of NAS Cases	Rate of NAS	NCHS Urban-Rural Status
Wheeler	68	0	0.0	Noncore
White	233	*	**	Noncore
Whitfield	1172	24	20.5	Large Metropolitan
Wilcox	62	*	**	Noncore
Wilkes	91	0	0.0	Noncore
Wilkinson	93	*	**	Noncore
Worth	235	*	**	Large Metropolitan

* Counts not displayed for counties with 1–9 NAS cases. ** NAS rates not calculated for counties with 1–9 cases of NAS.

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Georgia Department of Public Health

Information and contacts regarding NAS and other reportable diseases/conditions can be found at:

dph.georgia.gov/NAS *or*
dph.georgia.gov/disease-reporting

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