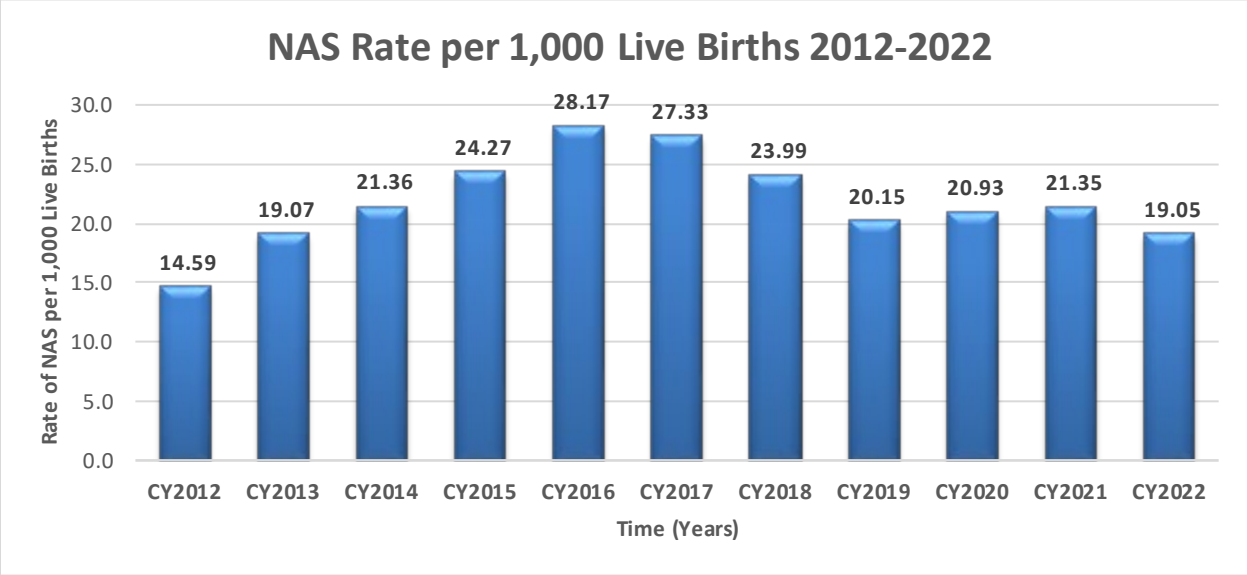
Neonatal Abstinence Syndrome (NAS) among TennCare Enrollees: 2022 data

Neonatal abstinence syndrome (NAS) is a withdrawal syndrome experienced shortly after birth by newborn infants who were exposed to certain substances, most often opioids, in utero and developed dependence. The infant is exposed in the womb before birth when a mother uses substances such as prescription medications or illicit drugs during pregnancy. After birth, the newborn infant exhibits signs and symptoms of withdrawal when the infant is no longer exposed to or receiving these substances. Infants with NAS stay in the hospital longer than other babies to treat these symptoms.

This report documents the occurrence of neonatal abstinence syndrome among TennCare enrollees in 2022. Cases of neonatal abstinence syndrome were identified based on the presence of ICD10 diagnosis codes P96.1[1] and P96.2[1] transmitted to TennCare from medical providers billing for services provided to infants during the first year of life. This report included infants born between January 1 and December 31, 2022; where other years are provided for comparison purposes, those cohorts were born during the specified calendar year. TennCare eligibility status was determined using TennCare's Interchange system. Cases were identified from infants that were eligible at time of birth or enrolled in TennCare during their first year of life. Live births, used as the denominator, were determined based on a linkage of vital statistics records and TennCare eligibility records.

Figure 1: Incidence of Neonatal Abstinence Syndrome among TennCare Enrollees



As Figure 1 illustrates, there was an increase in the incidence rates of NAS per 1,000 live births among TennCare recipients from CY2012 to CY2016. However, the number of TennCare NAS births decreased by nearly 10% from CY2016 to CY2022, from an incidence rate of 28.17 per 1,000 live births among TennCare recipients to 19.05, respectively.

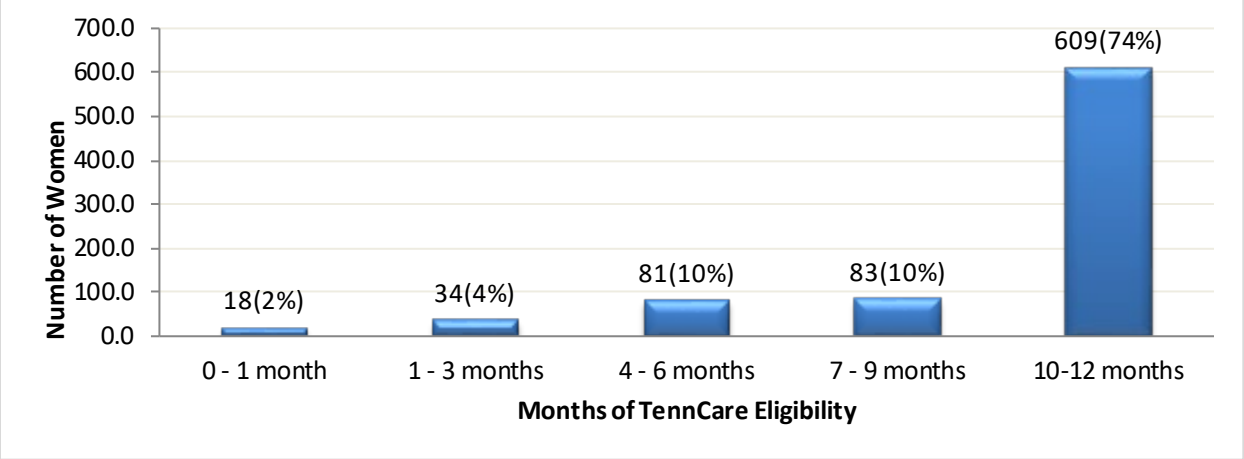
[1] Definition: Drug withdrawal syndrome in a newborn, excluding fetal alcohol syndrome.

Table 1: NAS Mother's TennCare Status at Time of Delivery

YEAR	TennCare Newborns treated for NAS during year	Mothers on TennCare at birth	Percent of NAS Infants	Mothers not on TennCare at birth	Percent of NAS Infants
CY 2008	264	229	87%	35	13%
CY 2009	444	335	75%	109	25%
CY 2010	512	424	83%	88	17%
CY 2011	528	483	91%	45	9%
CY 2012	736	613	83%	123	17%
CY 2013	943	823	87%	120	13%
CY 2014	1,101	1,017	92%	84	8%
CY 2015	1,197	1,098	92%	99	8%
CY 2016	1,357	1,261	93%	96	7%
CY 2017	1,363	1,254	92%	109	8%
CY 2018	1,181	1,093	93%	88	7%
CY 2019	992	922	93%	70	7%
CY 2020	957	890	93%	67	7%
CY 2021	989	919	93%	70	7%
CY 2022	891	825	93%	66	7%

Table 1 presents information regarding the TennCare status of mothers of TennCare NAS infants at the time of birth. In 2022, 93% of TennCare NAS infants were born to mothers who were eligible in TennCare at the time of delivery, while the remaining 7% of NAS infants were born to mothers who were not TennCare-eligible at the time of delivery. This ratio has remained steady since 2014.

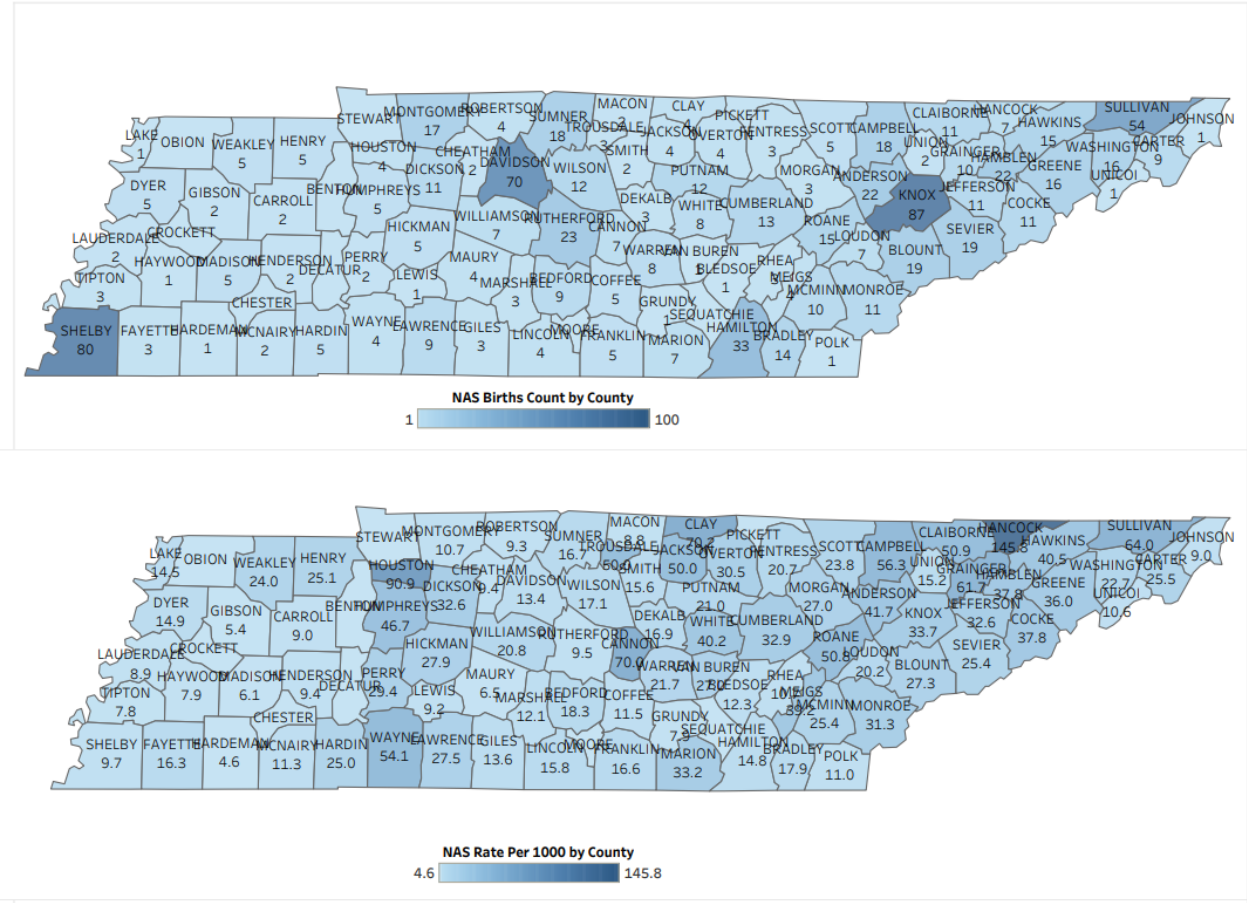
Figure 2: Eligibility Span for TennCare NAS Mothers through Pregnancy Period



For each woman with a TennCare child diagnosed with NAS in CY2022, the length of TennCare eligibility for the mother prior to the child's birth was determined (Figure 2). A total of 18 mothers only had

TennCare coverage within a month prior to the child's birth. Approximately 84% of women with NAS children had TennCare eligibility for 7 months or more prior to the child's delivery.

Map 1: Incidence of NAS among TennCare Recipients by County



In order to visualize the relative incidence of NAS by county, counts (top map) and rates (bottom map) were plotted on a map of the state of Tennessee (Map 1). To calculate county level rates, the county of residence of the infant was based on the address of the mother at the time of delivery. The total number of Medicaid live births was used as the denominator. The degree of regional variation is significant, as the second map illustrates counties in east Tennessee tend to have higher NAS rates per 1,000 births. In 2022, Hancock County had the highest incidence of NAS births with 146 NAS births per 1,000 live births. The county with the highest total number of NAS births was Knox County with 87 NAS infants in CY2022. NAS births follow a similar geographic pattern as emergency department visits for prescription drug related overdoses, in which rates are considerably higher in east and middle Tennessee.

Figure 3: Demographic Characteristics of NAS Mothers

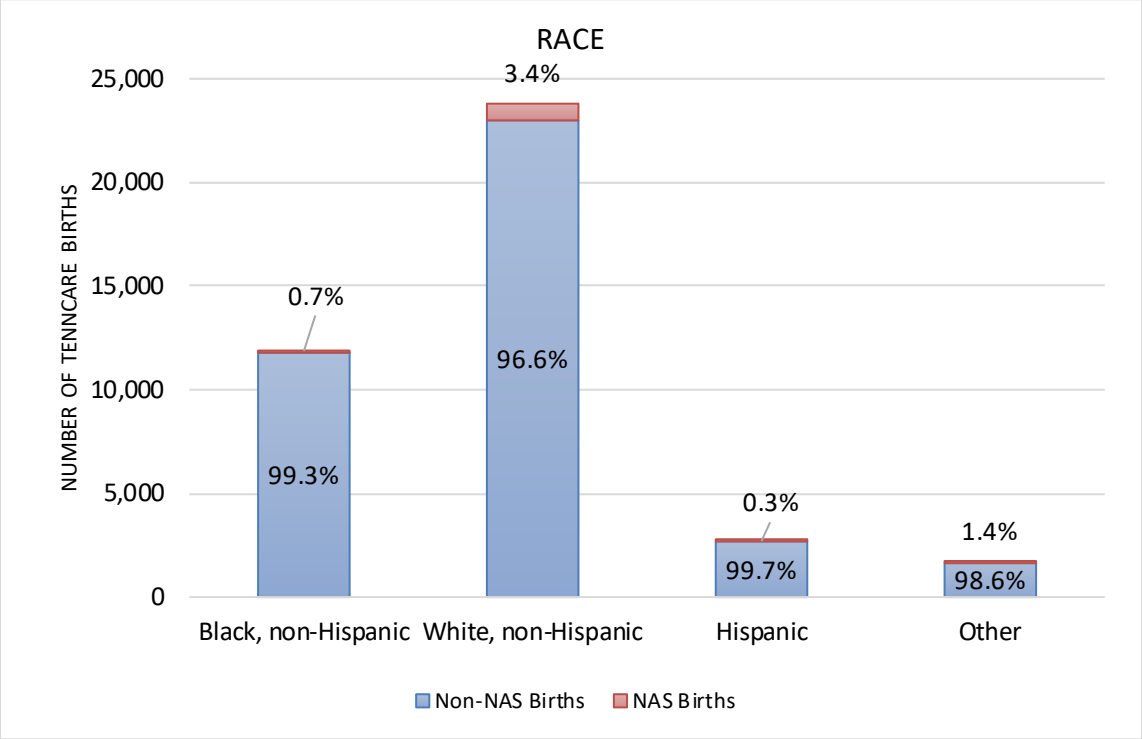


Figure 3A

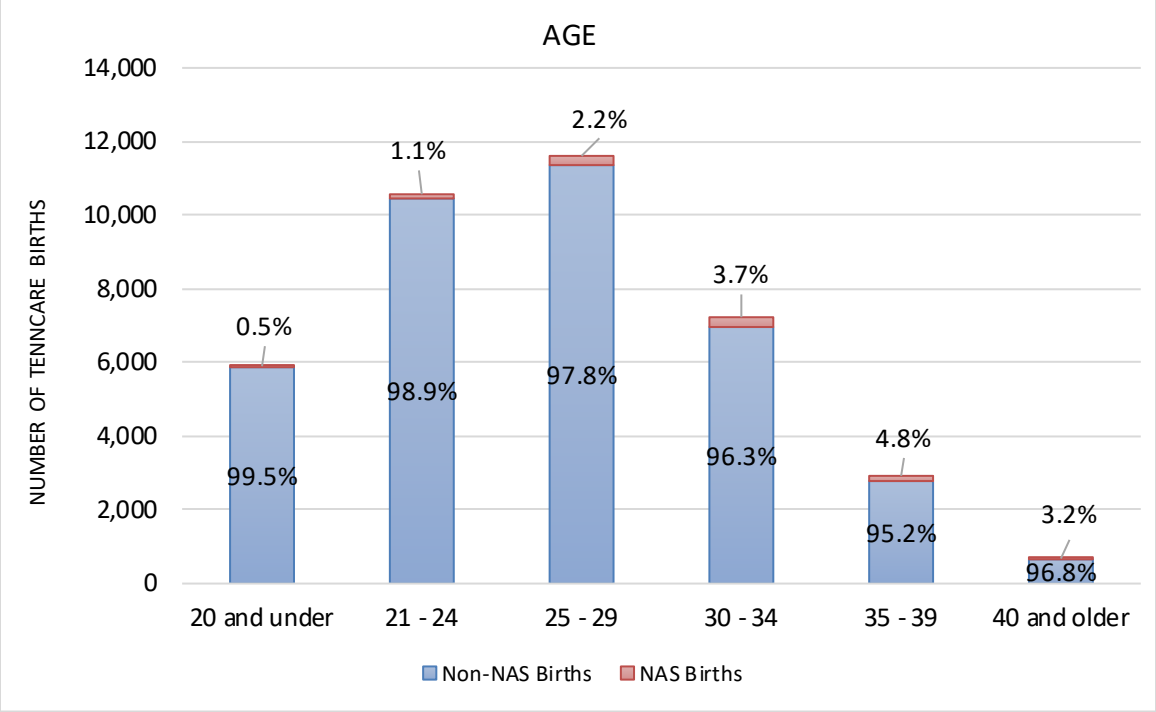


Figure 3B

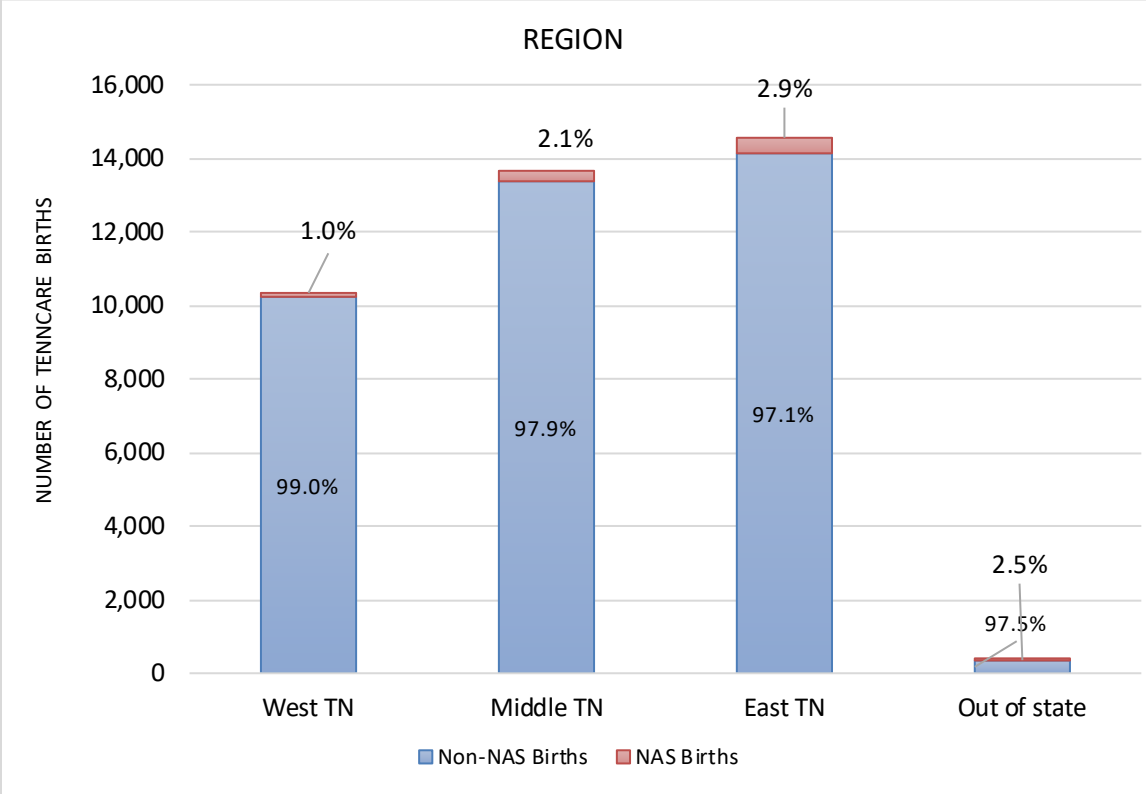


Figure 3C

Figures 3A, 3B, and 3C display basic demographic characteristics of NAS mothers who had TennCare eligibility in CY2022. White Non-Hispanic mothers have the highest NAS rate (2.9%) among all races (see Figure 3A). As displayed in Figure 3B, while women in the 25–29-year-old age category have delivered more NAS babies than any other age group, women in the 35–39-year-old age category have the highest rate of NAS deliveries. Generally, the risk of a baby being delivered with neonatal abstinence syndrome increases with the age of the mother. Figure 3C shows the delivery rate of NAS mothers in East Tennessee is 2.9%, which is higher than Middle (2.1%) and West Tennessee (1.0%).

Table 2: Percentage of Infants in DCS Custody within One Year of Birth

Metric	All Infants	NAS Infants
Total Number of Infants	49,454	897
Number of Infants in DCS Custody	508	238
Percent of Infants in DCS Custody	1.0%	26.5%

Using TennCare eligibility records, it was determined that 238 of the 897 infants diagnosed with NAS in CY2022 (26.5%) were placed in Department of Children's Services (DCS) custody within one year of their birth. Among all TennCare infants born in CY2022, 1.0% were placed in DCS within one year of birth

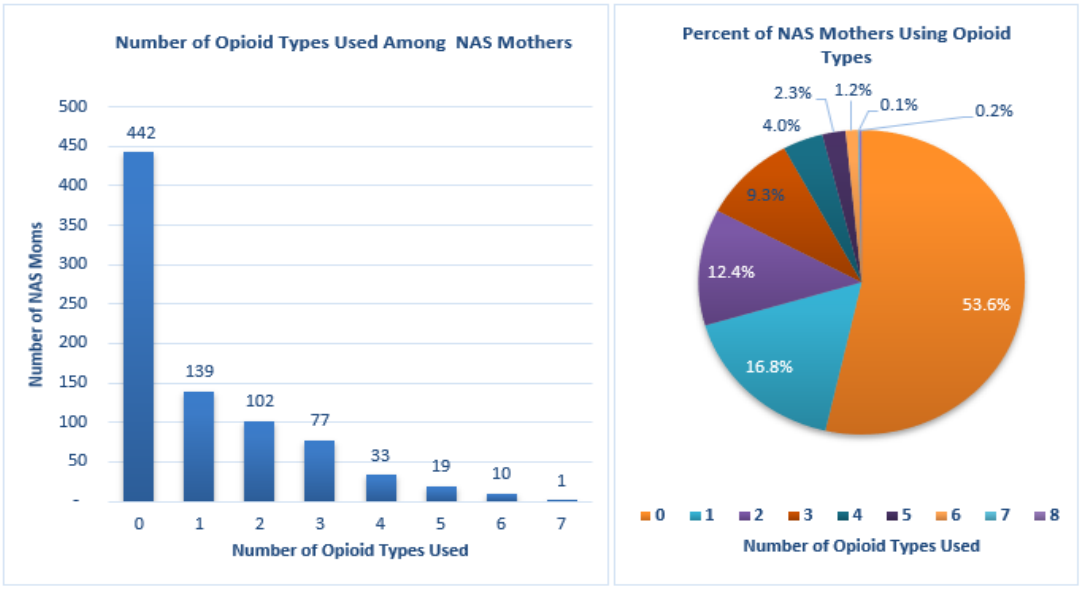
(Table 2). Infants born with NAS are about 25.8 times more likely to be in DCS custody during their first year of life compared to other TennCare infants.

Table 3: Impact of NAS on Infant Health Care Expenditures[2]

Metric	All TennCare paid live births	All TennCare normal birth weight births	All TennCare live low birth weight births	NAS Infants
Number of Births	46,773	41,684	5,089	899
Total Cost for Infants in First Year of Life	$542,838,698	$289,220,949	$253,617,749	$48,281,885
Average Cost per Child	$11,606	$6,938	$49,836	$53,706
Average length of Stay	5.1	3.2	20.6	29.3

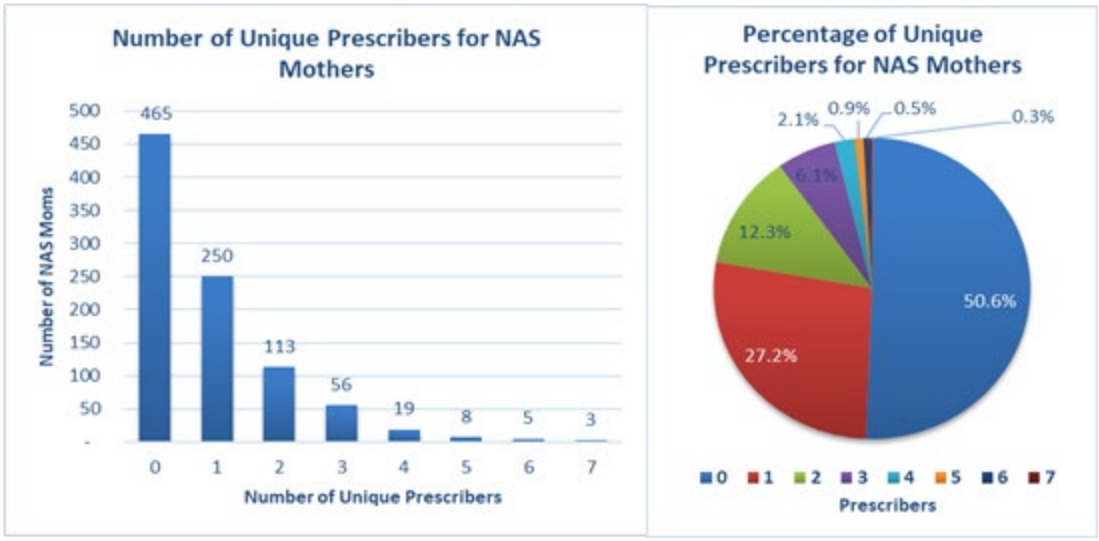
To determine the financial impact of NAS relative to all births, TennCare's Interchange System was used to quantify expenditures for live born infants in the first year of life (Table 3). In CY2022, the average cost of care for an NAS infant in the first year of life is more than 1.1 times higher than the average cost of care for normal birth weight infants and more than 7.7 times higher than the average cost of care for low-birth-weight infants.

Figure 4: Number and Percentage of Unique Opioid Types for NAS Mothers



[2] Includes all expenditures paid through the first year of life. Totals are subject to change based on updated data.

Figure 5: Number and Percentage of Unique Prescribers for NAS Mothers



All opioid claims up to one year prior to birth for any woman with a NAS infant were evaluated. Buprenorphine and methadone, which are evidence-based treatments and best-practice of care for members with opioid use disorder, are also considered opioids and were included in this analysis. Figures 4 and 5[3] illustrate the numbers of NAS mothers who were using different TennCare-paid opioid prescriptions as well as the number of unique opioid types during the pregnancy period. The overall percentage of mothers who did not have any opioid prescriptions paid for by TennCare was 53.6% (442/825) in CY2022. This value was slightly higher than the number observed in CY2021 of 50.6% (465/910). Of the women who received an opioid prescription paid for by TennCare, over 40% were receiving medications for opioid or substance use disorder. Individuals who receive medications for opioid use disorder and recovery services are more likely to have a full-term birth and less likely to have a low-birth weight baby. These figures do not account for services provided in an institutional setting, such as an inpatient hospital, or other forms of addiction treatment where a separate pharmacy claim does not exist. Overall, these results show continued improvement in reducing opioid utilization and improving access to medications for opioid use disorder and recovery services for opioid use disorder. Both interventions have been integral to reducing the overall number of NAS births for TennCare members.

[3] Any pharmacy claim with a National Drug Code correlation to the following Therapeutic Class Codes (HIC3) was considered an opioid: H3A, H3H, H3J, H3M, H3N, H3R, H3T, H3U, H3W or H3X.

Table 4: Narcotic Analgesic and Contraceptive Use Among All TennCare Women

Demographics (Years)	TennCare Women	Women Prescribed Opioid (>30 days supplied)	Women Using Opioids (Rate per 1,000)	Women Prescribed Monthly Contraceptives and Opioid	% of Women on Opioid and Monthly Contraceptives	Women Prescribed Opioid without Monthly Contraceptives	% of Women on Opioid without Monthly Contraceptives
15 - 20	122,642	123	1	36	29%	87	71%
21 - 24	63,982	459	7	115	25%	344	75%
25 - 29	75,767	1,763	23	359	20%	1,404	80%
30 - 34	81,648	3,244	40	478	15%	2,766	85%
35 - 39	67,073	3,816	57	413	11%	3,403	89%
40 - 44	53,784	3,725	69	247	7%	3,478	93%
Total	464,896	13,130	28	1,648	13%	11,482	87%

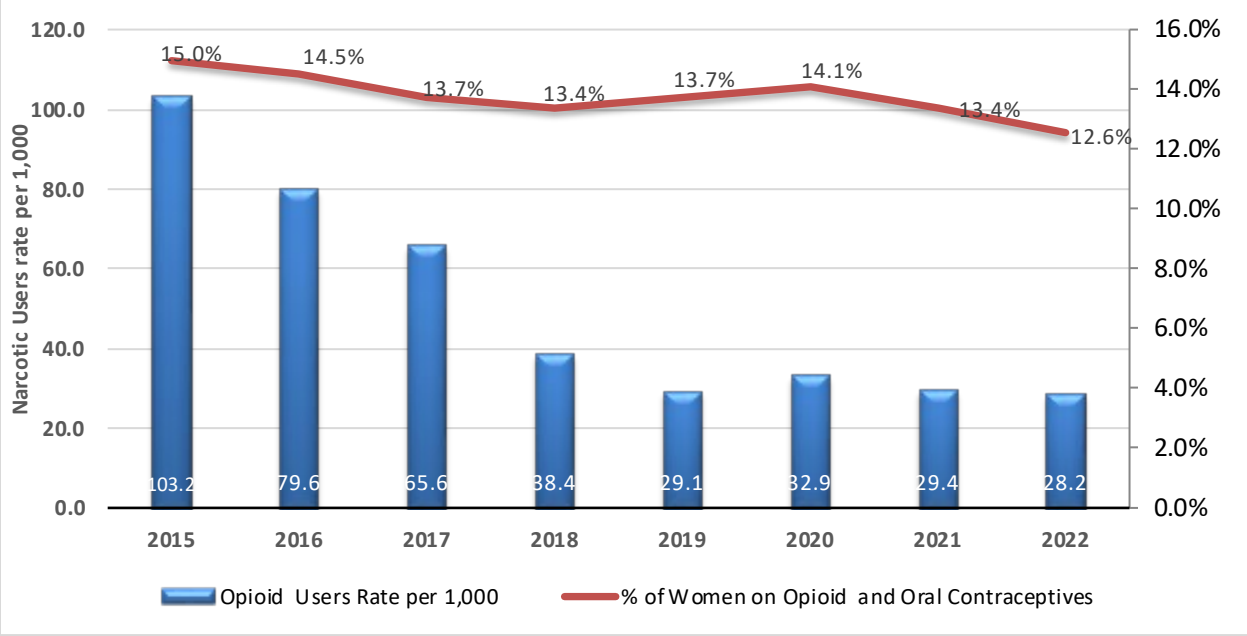
Note: This analysis underestimates use of voluntary long-acting reversible contraceptives (vLARC). Additionally, this metric does not account for individuals with permanent forms of contraception such as tubal ligation or hysterectomy.

The rate of women using prescribed opioids and contraceptive medications in CY2022 is reported in Table 4. The analysis was limited to women of child-bearing age (15–44). The prescription histories of TennCare women of child-bearing age were evaluated for the presence of opioids and contraceptive products[4]. Pharmacy claims were used in this analysis and thus the claims capture prescribed contraceptive options (e.g. oral, injectable, transdermal, hormonal ring). Due to limitations in pharmacy claims, this analysis does not capture all women who may have used a voluntary long-acting reversible contraceptive (vLARC) and those who have permanent sterilization. Thus, this table is an underrepresentation of the full contraceptive options available to and being utilized by TennCare mothers. Women were excluded from the analysis if they had opioid prescriptions totaling less than 30 days in CY2022.

In 2022, the overall rate of prescription opioid utilization among women aged 15-44 was 28 TennCare members using opioids per 1,000 eligible women, a 4% decrease compared to 2021 (see Figure 6). As Table 4 indicates, approximately 13% of women of child-bearing age in 2022 who were prescribed opioids for more than 30 days a year were also prescribed a form of contraceptive. Future analysis will identify opportunities to incorporate these additional forms of contraception (e.g., vLARCs, implants, or other sterilization procedures) to better analyze contraceptive usage among TennCare members using prescription opioids.

[4] Any pharmacy claims with an NDC correlating to any HIC3 codes of G8A, G8B, G8C, G8F, G9B, X1C, G9A was considered a contraceptive.

Figure 6: Opioid and Contraceptives Trends for TennCare Women



Based on the 5-year data regarding the utilization of opioid and contraceptives among TennCare women aged 15 to 44 years old, the rate of opioid users per 1,000 women continuously decreased from 2016-2019, slightly increased in 2020, and has decreased in 2021 and 2022 (see Figure 6). Like Table 4, Figure 6 does not capture all individuals with contraception, particularly vLARC and permanent sterilization. Figure 6 shows a 74% decrease in the rate of opioid use among women aged 15-44 from 2015 to 2019 (103.2 versus 29.1 per 1,000 women, respectively) with a slight increase from 2019 to 2020 (29.1 versus 32.9 per 1,000 women, respectively) and then another decrease in 2021 (29.4 per 1,000 women). In 2022, the rate decreased to 28.2 per 1,000 women. The concurrent prescription of contraceptives with an opioid prescription is 12.6% in 2022 compared to 13.4% in 2021. As discussed, this decrease may suggest that alternative forms of birth control are being used and will be an area for potential future analyses in subsequent NAS reports.