Kentucky Department for Public Health

Neonatal Abstinence Syndrome

2022 Report

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Kentucky Public Health

Prevent. Promote. Protect.

Revised: July 2023

Neonatal Abstinence Syndrome Reporting Registry – Annual Report 2022

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The Neonatal Abstinence Syndrome (NAS) in Kentucky Annual Report is prepared by the Division of Maternal and Child Health, within the Kentucky Department for Public Health, under Commissioner Dr. Steven Stack. KRS 211.678 calls for an annual report of aggregated data; this report includes calendar year 2021 births. This report was made possible by the many individuals who contributed their time and efforts toward preventing NAS.

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Executive Summary

The Kentucky Public Health Neonatal Abstinence Syndrome (NAS) Reporting Registry received a slight increase in reports of Neonatal Abstinence Syndrome (NAS) in 2021 than in 2020. In 2021, there were 1,087 cases of babies with signs and symptoms of NAS versus 993 cases reported in 2020; this accounts for 21.6 NAS cases per every 1,000 live births among Kentucky residents. Rates are highest in the Appalachian region, reaching as high as 84.2 cases per 1,000 live births, or more than ten times the most recent national estimate (HCUP Fast Stats, 2020). Mothers of infants with NAS tend to have less education, be unmarried, and have more children, which may suggest lower socioeconomic status, a lack of social support, or reduced access to services.

The most frequent opioids reported were buprenorphine (38%), heroin (17%), and fentanyl (13%). Other commonly used substances are amphetamines, including methamphetamine (56%) and cannabinoids (32%). All other substances were used by less than 12% of women in the registry. Approximately 63% of cases were exposed to more than one type of substance during pregnancy; for these cases, the average exposure was to two substances.

Prenatal care is critical for these women to address substance abuse and other co-occurring problems, such as hepatitis C, which was reported in about 32% of this population. Compared to women whose infants do not have NAS, mothers of infants with NAS are more likely to utilize Women, Infants, and Children (WIC) services during pregnancy but much less likely to receive adequate prenatal care. Adequate prenatal care refers to care beginning in the first four months of pregnancy with the appropriate number of visits for the infant's gestational age. Inadequate health insurance may explain part of this disparity, as mothers in the registry were less likely to have insurance of any type to pay for their delivery. Prenatal care may also promote Medication for Opioid Use Disorder (MOUD). About 47% of the women in the registry were estimated to be enrolled in MOUD. Sixty-three percent of those women were using other drugs not compliant with their treatment; only 37% were compliant with their program.

Infants with NAS are almost twice as likely to have a low birth weight and almost three times as likely to be admitted to a neonatal intensive care unit. Tobacco use co-occurs with substance use at high rates, which could further affect the health and development of these infants. Infants with NAS had longer delivery hospitalizations: 12.8 days as compared to 3.9 days for infants without NAS. Infants who received pharmacological treatment (42%) had average stays of 19.5 days. Among this group, 28% were treated with clonidine either as a single drug or as an adjunct therapy.

About 83% of infants with NAS were referred to the Department for Community Based Services, and 51% of those cases were accepted for investigation. Data from other Kentucky programs indicates that NAS is a risk factor for fatal or near-fatal child abuse including abusive head trauma and Sudden Unexpected Infant Death.

In addressing NAS and the issues of families affected by substance use, the Kentucky Department for Public Health recommends to:

1. Continue to promote periconceptional and prenatal care;
2. Promote enrollment in MOUD programs;
3. Implement a plan of safe care that includes educating parents and medical/childcare providers on safe sleep, abusive head trauma, child abuse and neglect;
4. Promote enrollment in services such as WIC and home visiting; and

5. Improve access to long-acting reversible contraception.

Background

The Opioid Epidemic

Opioids are a class of narcotics that bind to receptors in the brain to produce pain relief, anesthesia, or euphoria (Hughes et al., 2016). After prolonged use, increasing doses are needed to produce an effect (tolerance), which can lead to drug overdoses (ACOG, "Opioid," 2017); these overdoses may result in kidney failure, heart problems, nerve damage, anoxic brain injuries, and death (Zibbel, Howard, Clarke, Ferrell, & Karon, 2019).

The Appalachian region has some of the highest opioid prescription rates in the United States (US) (CDC, "US County Opioid Dispensing Rates," 2020). Between 1999 and 2015, overdose fatalities quadrupled in the US (O'Donnell, Gladden, & Seth, 2017), driven by synthetic opioids and other illicit substances. During the early months of the COVID-19 pandemic, reports of hospitalization, emergency medical services, and deaths due to opioid overdoses increased greatly in various areas of the US, including Kentucky (Rodda, West, & LeSaint, 2020; Slavova, Rock, Bush, Quesinberry, & Walsh, 2020).

Impact on Maternal and Child Health

Infants with prenatal substance exposure, including opioid exposure, may experience effects upon its discontinuation, also known as Neonatal Abstinence Syndrome (NAS) (Kocherlakota, 2014). Many over-the-counter or prescription medications can cause NAS (Hudak & Tan, 2012), so the diagnosis does not inherently indicate illicit activity by the mother. NAS presents similarly to withdrawal in adults, including restlessness, tremors, seizure, vomiting, fever, sweating, and apnea (Hudak & Tan, 2012), although symptoms may vary in presentation, duration, and severity. Because symptoms are non-specific, toxicology screenings and maternal history are important in establishing in utero exposure. As a first-line intervention, NAS is treated by comfort care (non-pharmacological intervention), such as swaddling, rocking, and reducing environmental stimuli (Kocherlakota, 2014), but pharmacological intervention is used in severe cases (MacMillan, 2019). Treatment may take place in a Neonatal Intensive Care Unit (NICU) or other special care unit (MacMillan, 2019). Substance use not only affects infant health but also contributes to the increasing rate of maternal mortality; in 2018, 52% of Kentucky maternal mortality cases were linked to substance use disorder (CHFS, 2021).

Between 1999 and 2014 in Kentucky, the rate of opioid use disorder (OUD) increased 48-fold to 19 cases per every 1,000 deliveries (Haight, Ko, Tong, Bohm, & Callaghan, 2018). However, women with OUD make up only a fraction of the estimated one in fifteen who take opioids during pregnancy (Ko et al., 2020).

Methodology and Limitations

In 2013, Kentucky Revised Statute (KRS) 211.676 established NAS as a reportable disease. Mandatory statewide reporting to the Public Health NAS Reporting Registry (from here on, "the NAS Registry") began on July 15, 2014. The NAS Registry collects information from Kentucky hospitals on resident children with NAS and a history of prenatal substance exposure. Case reporting is not tied to the International Classification of Disease codes.

Unless otherwise stated, all figures and tables show preliminary unduplicated symptomatic case counts. Any category with less than five (<5) cases is suppressed, and categories with five-nineteen cases should be interpreted with caution as rare outcomes may lead to unstable estimates.

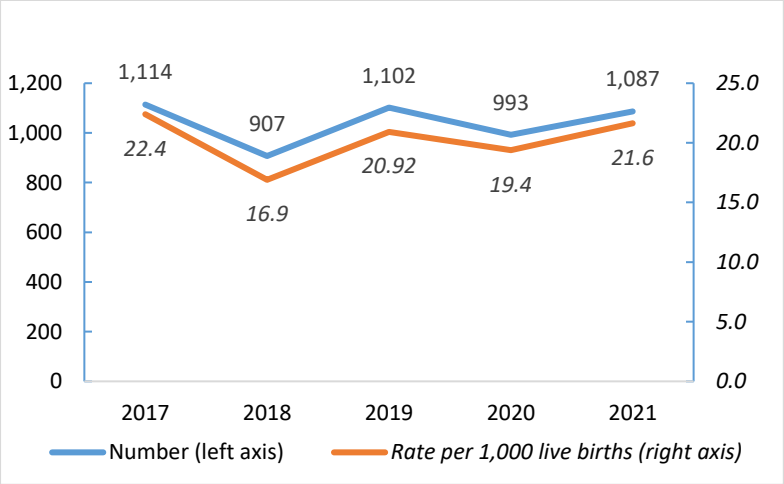
The NAS Registry is a passive surveillance system that poses challenges with data accuracy. Reporting practices of different hospitals or individual hospital employees vary, leading to data inconsistencies that affect the data report as a whole. For birth year 2021, 39 Kentucky hospitals reported to the NAS Registry with an average submission time of 120 days after discharge; delayed reporting can negatively affect data quality. The data system does not differentiate the details of timing and intent of substance use, which affects data on polysubstance use and Medication for Opioid Use Disorder (MOUD). Finally, out of state hospitals do not report to the NAS Registry, which could result in underreporting near state borders.

Data and Results

Kentucky Incidence

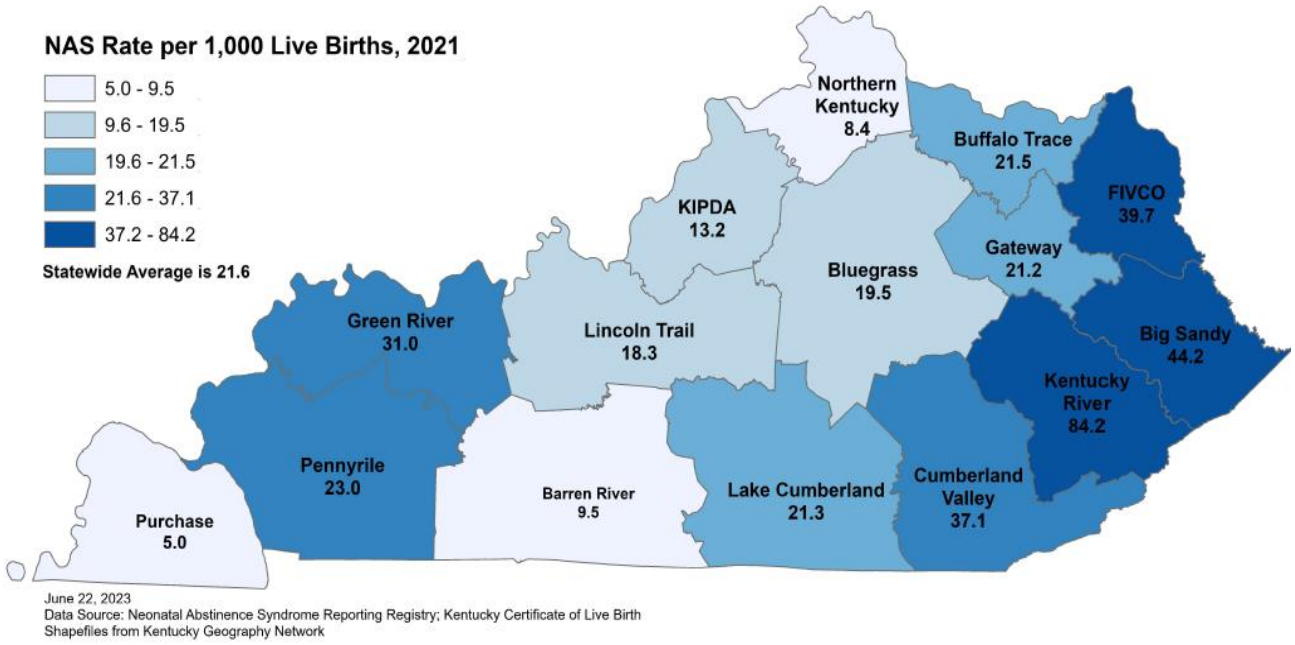
Kentucky's NAS rate remains far above the national average, with some areas reaching more than ten times the most recent national estimate (HCUP Fast Stats, 2020). Data from the NAS Registry shows 1,087 unduplicated cases in 2021, which is an increase from 2020 (Figure 1).

Figure 1. Kentucky Resident NAS Cases, 2017-2021



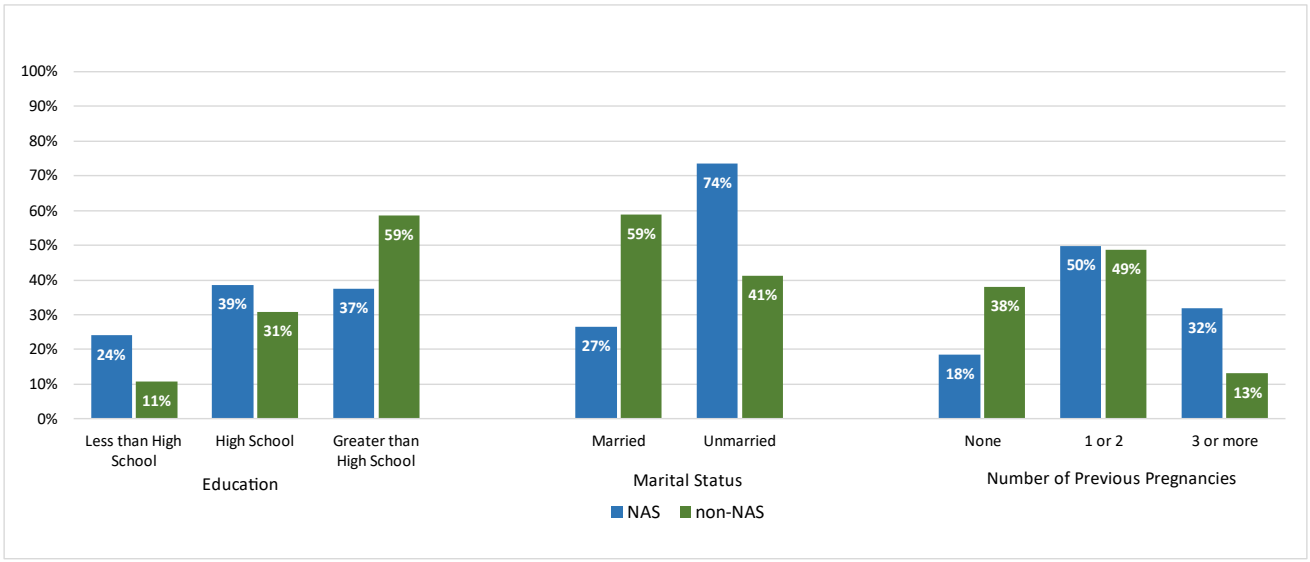
There are large discrepancies within Area Development Districts (ADDs) across Kentucky with rates ranging from 4.9 to 84.2 cases per 1,000 live births (Figure 2). In Kentucky, the rate of NAS in rural counties is nearly twice the rate in urban counties, with the highest rates in Appalachia.

Figure 2. NAS Rate by ADD of Residence, 2021



Mothers of infants with NAS (compared to mothers of infants without NAS) tended to have less education, be unmarried, and have more children (Figure 3). Those factors may indicate lower socioeconomic status, less social support, lack of access to family planning services, or limited health literacy. Identifying demographic patterns and addressing social determinants of health are important steps in developing prevention strategies.

Figure 3. Education, Marital Status, and Pregnancies of Mothers by NAS Status of Child, 2021



Frequent Substances Used

Table 1 includes any substances reported in less than five cases in the NAS Registry (excluding tobacco and alcohol) by category, ranked from most to least commonly reported. This table includes any indication of exposure (maternal history, positive maternal toxicology, and/or positive infant toxicology). Opioids continue to be an issue for Kentucky with 80% of NAS cases reporting opioid use.

Table 1. Frequency of All Substance Groups in the Public Health NAS Reporting Registry, 2021

Frequency of Opioids in the Public Health NAS Reporting Registry	
Any of the below opioids	*79.94%*
Buprenorphine	38.08%
Heroin	17.57%
Fentanyl	13.43%
Methadone	9.01%
Oxycodone	7.17%
Hydrocodone	3.58%
Tramadol	1.28%
Naltrexone	0.09%
Unspecified Opioids	25.75%

Frequency of Other Substances in the Public Health NAS Reporting Registry	
Amphetamines	56.30%
Cannabinoid	32.65%
Benzodiazepines	11.49%
Gabapentin	6.71%
Cocaine	6.53%
SSRI/antagonist	2.66%
Barbiturates	1.19%
Tricyclics	0.73%

Note: Numbers will not add to 100% as more than one substance can be reported per case and not all substances are shown in the table above. The category Amphetamines includes any indication of use of methamphetamine and/or amphetamines. The category SSRI/antagonist includes any indication of use of SSRIs and/or SARIs.

The most commonly reported substance was amphetamines, including methamphetamine, which were reported in over half of all NAS cases. The use of these substances has increased in recent years, from 23.07% in 2017 to 56.30% in 2021.

The most common opioid in the NAS Registry is buprenorphine, a partial opioid agonist with a low potential for abuse, which is used to reduce withdrawal and cravings (SAMHSA, 2016). While it can be associated with NAS, its use as part of supervised MOUD is preferable to untreated OUD during pregnancy. Increased access to MOUD may explain why buprenorphine is among the most common substances in the NAS Registry.

More than one-quarter of the cases in the NAS Registry were exposed to cannabinoids. The American College of Obstetricians and Gynecologists (ACOG) discourages marijuana use during pregnancy due to a lack of studies on its safety (ACOG, “Marijuana,” 2017).

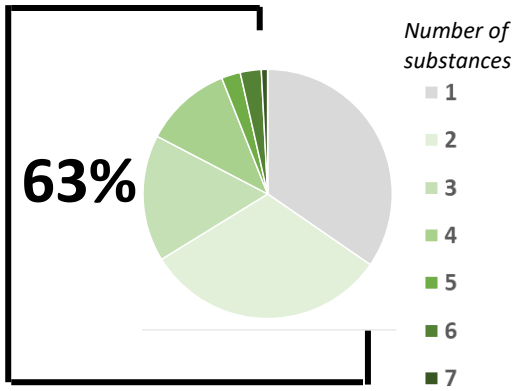
Fentanyl use continues to rise, from 3.86% in 2018 to 13.43% in 2021.

About 63% of cases had polysubstance use, which in this report means using substances from more than one type or category (see Table 1), excluding tobacco and alcohol. About 28% of women used two types of substances, and about 34% used three or more types of substances; on average, cases with polysubstance use had exposures to three types of substances. Polysubstance use may contribute to prolonged or more severe NAS symptoms, as

cocaine, benzodiazepines (Hudak & Tan, 2012), and antidepressants (Kaltenbach et al., 2012) can be associated with worsened NAS symptoms when combined with opiates.

Approximately 47% of the women had a prescription for medications to treat addiction, indicating enrollment in MOUD. Prescriptions for pain treatment and psychiatric treatment were much less common (<10% of women for each), which aligns with the low reported frequencies of those medications.

Figure 4. Frequency of Polysubstance Use, 2021



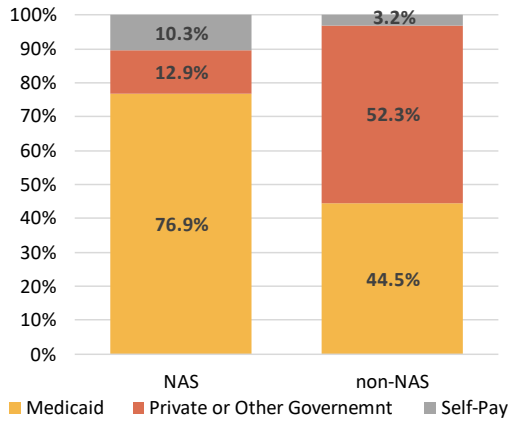
Prenatal Care

The prenatal period presents a unique window of opportunity for women to make many changes in their health and lifestyle, including the management of OUD (ACOG, "Opioid," 2017). Over half of the mothers in the NAS Registry received at least adequate prenatal care using the Kotelchuck index, compared to three out of four mothers who did not have infants with NAS.

As part of prenatal care, ACOG recommends that women with OUD are screened for infections including hepatitis C virus (HCV) (ACOG, "Opioid," 2017). Among women who are hepatitis C positive, perinatal transmission occurs in 5 to 6% of pregnancies (Corcorran, 2021), and injection drug use is one factor that makes transmission more likely. The HCV rate among mothers whose children did not have NAS was 1.6%, compared to 31.7% among those whose children had NAS. These concerns led to the passage of Senate Bill 250 in April 2018, which added universal screening of pregnant women for hepatitis C to KRS 214.160.

Disparities in insurance coverage, shown in Figure 5, give one possible explanation for disparities in prenatal care utilization. Deliveries of infants with NAS were three times more likely to be paid out of pocket than deliveries of infants without NAS (10.3% versus 3.2%), and these mothers may lack insurance to cover prenatal care. With three-quarters of babies with NAS having Medicaid, Medicaid organizations have the ability to reach this population and work with them to promote prenatal, postpartum, and pediatric care.

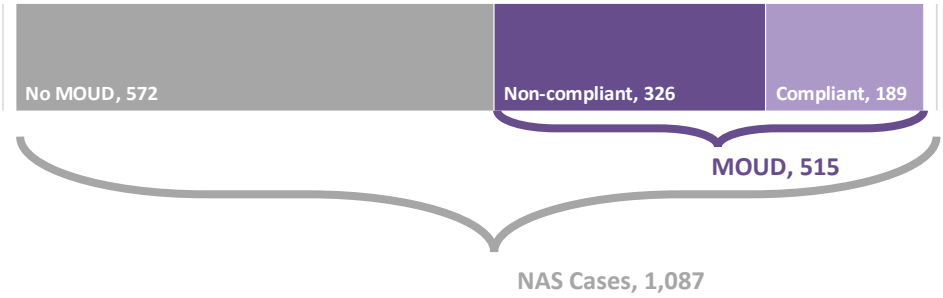
Figure 5. Insurance Type at Time of Delivery, by NAS Status, Kentucky Residents, 2021



In addition to prenatal care, there are other opportunities for preventive services. Just under half of the mothers whose infants had NAS received services through the Women, Infants, and Children program (WIC) during pregnancy, which can promote nutrition for an infant who is at risk of feeding difficulties, provide assistance with breastfeeding, and refer mothers to additional services. Another opportunity for prevention is MOUD, which uses counseling and mental health therapy approaches in addition to medications such as buprenorphine, methadone, or naltrexone. In this report, MOUD means having a valid prescription for replacement therapy. The NAS Registry does not collect compliance with MOUD, so for the purposes of this report, non-compliance is defined as reported prenatal exposure to meth/amphetamines, barbiturates, cannabinoids, cocaine, heroin, or any other opioid. In

the 2021 cohort, about half of the mothers were in MOUD, but less than half of those were compliant (Figure 6). The low compliance rate among mothers in MOUD parallels the high frequency of polysubstance use in the NAS Registry.

Figure 6. Number of Cases in NAS Registry, by MOUD Participation and Compliance, 2021

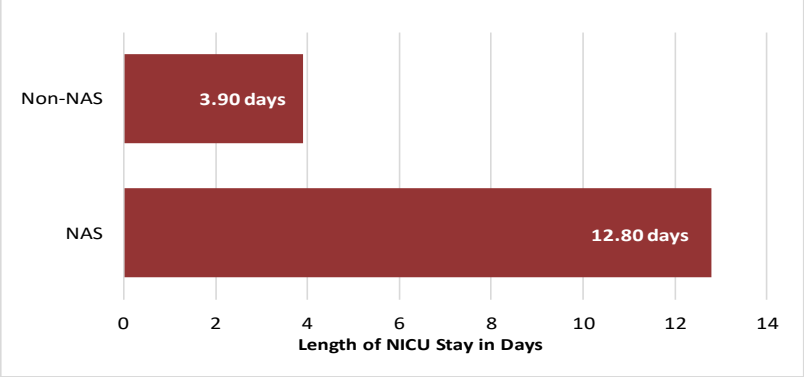


Newborn Outcomes

In the wake of the opioid epidemic, prenatal tobacco exposure is often overlooked although it is associated with adverse pregnancy outcomes and withdrawal-like symptoms in infants (Hudak & Tan, 2012). Kentucky Office of Vital Statistics data show smoking during pregnancy is more than five times more common among women whose babies have NAS (62% compared to 11%). Data collected in the NAS Registry is even higher with 72% of women reporting tobacco use.

Compared to infants without NAS, infants with NAS are nearly twice as likely to be low birth weight (LBW), defined as less than 2,500 grams. Infants with NAS can have difficulties feeding and gaining weight (Hudak & Tan, 2012), further increasing the health risks and challenges associated with preterm and LBW. These conditions are associated with medical complications that result in a longer duration of hospitalization. In 2021, about 11.5% of newborns without NAS had NICU stays, compared to 31.8% of newborns with NAS, and there is a national trend of NICUs dedicating increasing resources to NAS (Tolia et al., 2015). Infants with NAS also have a much longer length of stay (LOS): 12.80 days versus 3.90 days (Figure 7).

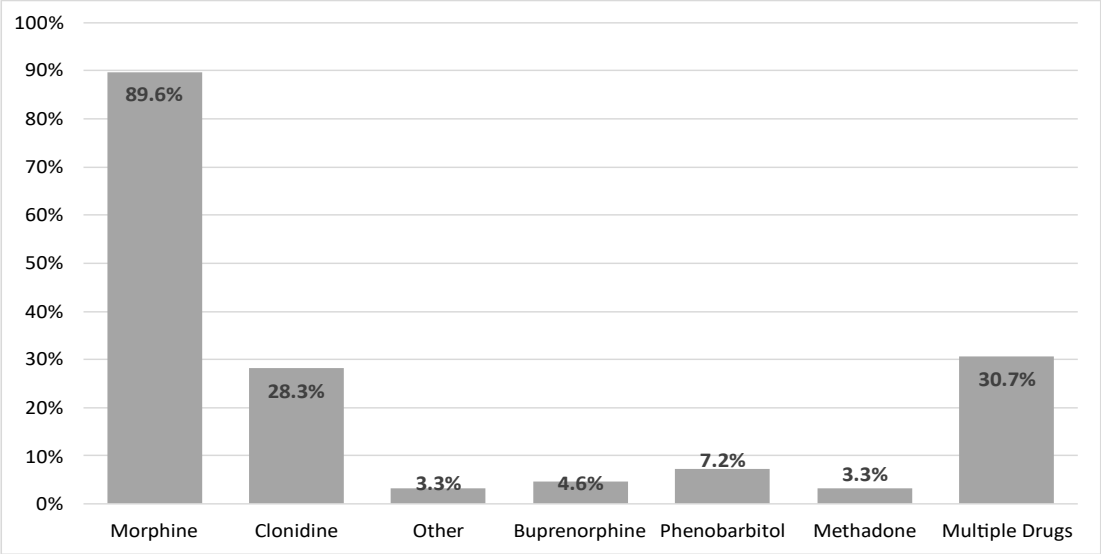
Figure 7. Length of Stay by NAS Status, 2021



As symptoms do not develop immediately (Kocherlakota, 2014), the American Academy of Pediatrics (AAP) (Hudak & Tan, 2012) and the World Health Organization (2014) both recommend observing infants with NAS in the

hospital for four to seven days post-delivery. One factor contributing to the length of stay is the pharmacological treatment for NAS; infants receiving medication for NAS have a longer LOS than those who receive comfort care only (19.5 days compared to 6.1 days). Overall, 36% of infants with NAS received one or more medications to treat NAS. Nearly ninety percent (89.6%) of treated infants received morphine, which is consistent with research on prescribing practices (Hudak & Tan, 2012). Clonidine was used in about a quarter of cases either as the primary drug or as an adjunct therapy in combination with morphine. All other medications were administered to <10% of infants who received medication. Over one-quarter of infants who received treatment were prescribed more than one medication. When considering pharmacological treatments for NAS, the first concern is that treatment should be both safe and effective. NAS may cause distress or discomfort, but it is ultimately self-limiting, and unnecessary medication may prolong or exacerbate the process (Hudak & Tan, 2012).

Figure 8. Frequency of Medications Administered to Treat NAS, Kentucky Residents, 2021



Breastfeeding may reduce the severity of NAS symptoms (Hudak & Tan 2012; ACOG, "Opioid," 2017). From birth certificate data, mothers of infants with NAS are much less likely to plan to breastfeed than mothers of infants without NAS (36% vs 73%, respectively); according to the NAS Registry, only about 26% actually initiate breastfeeding.

Outcomes Beyond Discharge

As part of the Child Abuse Prevention and Treatment Act (CAPTA), states must have policies to notify child welfare agencies about infants with prenatal substance exposure. As stated in the Kentucky Cabinet for Health and Family Services (CHFS) standard of practice manual, reports may be accepted alleging risk of harm if a "caretaker engages in a pattern of conduct that renders him/her incapable of caring for the immediate and ongoing needs of the child" due to substance misuse (2022). That policy includes the example of infants testing positive or experiencing withdrawal from non-prescribed substances. Therefore, medical providers must document prenatal substance exposure in the medical record. Of all infants in the NAS Registry, 91.6% were referred to DCBS; 52.4% of those were accepted. Of the infants in the 2021 cohort of the NAS Registry, nearly seven out of every ten are discharged to the care of one or both biological parents, and one out of every four are discharged to kinship care, foster care,

or an adoptive parent. Nationwide, in fiscal year 2021, over 73,000 children entering foster care had parental drug abuse as a circumstance of removal from the home (Children's Bureau, 2022).

The Child Fatality and Near Fatality External Review Panel ("the panel") conducts comprehensive, multidisciplinary reviews to discover risk factors and systems issues and recommend prevention measures (2022). During recent reviews, the panel has seen a substantial increase in overdose/ingestion cases. Fifty percent of all cases reviewed by the panel identified substance misuse by a caregiver as a risk factor. Nearly a third of all substance-exposed infants, reviewed by the panel, were exposed to more than three different types of substances in utero. The panel strongly advocates for a more robust plan of safe care for Kentucky. Recommendations from the panel have been incorporated into this report.

Every year, roughly 50,000 US children visit an emergency department because they swallowed something potentially dangerous (AAP, 2023), with some dying from poisoning. Opioids are the most common substance contributing to fatal poisonings among children less than five years old (AAP, 2023). In 2021, there were six child deaths due to accidental poisoning in Kentucky (CHFS, 2022). Unintentional injuries are often the most preventable deaths for children.

Data from Kentucky's Sudden Unexpected Infant Death (SUID) Case Registry shows that in 2016-2021, 33% of cases had a risk factor related to substance use (including NAS and parental/caregiver use). This data could indicate that NAS is a risk factor for SUID. There is no known biological mechanism for that relationship, but caregiving or co-sleeping while impaired endangers infants.

Concluding Statement

NAS is just one facet of the opioid epidemic and cannot be addressed in isolation from larger systemic issues. Although the problem is daunting, prevention is possible. The following recommendations help address the underlying determinants of health to promote better outcomes for families and children.

Recommendations for Prevention

Promote optimal periconceptional health and prenatal care. Optimal periconceptional status promotes healthy pregnancy. Prenatal care ensures monitoring for any medical or fetal complication and screening for substance use disorder and co-morbidities so that referral can be made for treatment and counseling. Additionally, the Kentucky Department for Public Health (KDPH) recommends as a standard of care that providers access the Kentucky all schedule prescription electronic report (KASPER) during the first prenatal visit. Women with HCV should have ribonucleic acid (RNA) testing performed at nine to twelve months postpartum to assess for the possibility of spontaneous HCV clearance. KDPH also suggests providers institute a postpartum follow-up within seven to ten days of delivery, especially for high-risk deliveries and for women with SUD before the standard six weeks postpartum visit.

Referral and enrollment in MOUD programs. In the NAS Registry, over half of the women report having a prescription for replacement therapy. MOUD programs, especially those that incorporate comprehensive services to address the complex needs of the mother and family, can be very successful in addressing OUD. To support recovery, MOUD should be more accessible for both pregnant and postpartum women. Furthermore, all MOUD providers need training in family-oriented protocols for counseling and behavioral therapy, which are crucial to the success of treatment programs. Regulatory authorities should require MOUD providers to participate in collaborative and holistic services directed to pregnant women, or mothers and their infants. Findhelpnowky.org is a tool providers can use to refer patients for MOUD treatment.

Implement a plan of safe care. Every infant, including those prenatally exposed to drugs or alcohol, should leave the hospital with an appropriate plan of safe care. A plan of safe care should address coordinated and integrated services needed for the impacted child, parent(s), and caregivers. KDPH promotes the plan of safe care through various programs and education provided at local health departments, different agencies, including community mental health centers, and through conferences at regional and statewide levels. Interagency collaboration among the Department for Behavioral Health, Developmental and Intellectual Disabilities, Department for Community Based Services, and KDPH should ensure that plans of safe care are implemented for infants with NAS or any substance exposure.

Education for parents on abusive head trauma and safe sleep. Birthing hospitals should provide in-person, evidence-informed education regarding safe sleep and abusive head trauma prevention to parents, both antepartum and postpartum. Continuing this as universal practice will ensure that all parents of infants with NAS or prenatal substance exposure are reached. To that end, the Kentucky Hospital Association supports this practice. The KDPH continues to promote the **ABCD** of safe sleep practice (Babies sleep **Alone** on their **Back,** in a **Crib,** and are attended to without **Danger** by a caretaker who is impaired, tired, or distracted).

Implement the practice of modeling safe sleep among healthcare and childcare providers. Infants with NAS have an increased risk of SUID, which may be reduced through safe sleep practices. Healthcare and childcare providers are uniquely positioned to encourage these practices through modeling and should do so universally.

Increase enrollment in services, such as WIC and HANDS. Programs that serve mothers and families prenatally and throughout early childhood have unique opportunities for engagement. These programs should incorporate substance abuse education into curricula on healthy pregnancies, in addition to making referrals to counseling or treatment, and community resources, and monitor the parent's and child's well-being.

Improve access to long-acting reversible contraception (LARC). Only 18% of infants with NAS were the first live birth to that mother, compared to 42% of infants without NAS. This demographic trend has been consistent across the past few years, with the additional context that nearly 90% of pregnancies among this population are unintended (Heil et al., 2010). Women of reproductive age who use opioids for any purpose need effective pre-conception counseling and access to family planning. Kentucky Medicaid covers LARCs, and other insurers and providers should work to make LARCs accessible to all interested mothers during the intrapartum period.

Promote breastfeeding for infants with NAS. Breastfeeding may reduce the severity of NAS symptoms (Hudak & Tan 2012; ACOG, "Opioid," 2017), although mothers of infants with NAS are much less likely to initiate breastfeeding. ACOG also recommends breastfeeding for mothers with HCV infections; breastfeeding is safe for mothers with HCV infections if they do not have damaged, cracked, or bleeding nipples (Corcorran, 2021).

Promote the American Academy of Pediatrics (AAP) well-child visit schedule. Well-child visits have a multitude of benefits, including prevention of adverse health outcomes, tracking of growth and development, and allowing parents to raise concerns to their child's pediatrician. As part of this schedule, ACOG recommends that all children born to women with HCV infection receive HCV testing at 18 months of age with follow-up at age three for positive tests (Corcorran, 2021).

Education for parents on medication safety. The AAP suggests educating parents on methods for keeping medications out of the hands of children; some of these methods include storing all medications in a high area out of a child's sight/reach, keeping medicines in their original containers with child-safety caps, promoting the use of lock boxes for extra safety, and dispose of unused medications, especially opioids, at pharmacies, doctors' offices, and other drug "take back" programs. It is also suggested that clinicians continue to track the source of patient prescriptions and the efficacy of the dosage prescribed.

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