



Neonatal Abstinence Syndrome Surveillance Pilot Project 2015 Vermont Results

August 1, 2019

Acknowledgement

The **Neonatal Abstinence Syndrome State Surveillance Project** was funded under a grant to the March of Dimes Foundation from the Centers for Disease Control, National Center for Birth Defects and Developmental Disabilities and the Office for State, Tribal, Local and Territorial Support.

Previous CDC NAS Report

- MMWR published in August 2016:
 - <https://www.cdc.gov/mmwr/volumes/65/wr/mm6531a2.htm>
- Based on ICD-9-CM diagnosis codes from discharge data from 28 states
- Overall, neonatal abstinence syndrome (NAS) rate increased 300% from 1999 through 2013, from 1.5 to 6.0 per 1,000 live births
- Vermont had 2nd highest rate among 28 states (33.3 per 1,000 live births in 2013).

Understanding Vermont's NAS Rate

Vermont's high rate prompted the question “Why are so many cases coded as NAS in Vermont?”

- Does knowledge of mothers' enrollment in Medication-Assist Treatment (MAT) programs, or other licit or/and illicit substance use, impact hospitals' coding of the infant as having NAS?
- Is the coding of NAS based on the infant's symptoms?

Grant Opportunity

“Building on Existing Infrastructure of Population-based Birth Defects Surveillance Systems to Estimate the Incidence of Neonatal Abstinence Syndrome”

Eligibility for NAS Grant

- State has an established birth defects system
- State has documented NAS incidence rate greater than national rate

- Vermont was funded along with Illinois and New Mexico
- Results published in February 2019 MMWR:
 - <https://www.cdc.gov/mmwr/volumes/68/wr/mm6807a3.htm>

Purpose of the Study

- Compare NAS incidence rate found in this study to previous findings
- Determine the positive predictive value (PPV*) of the ICD-9-CM/ICD-10-CM diagnosis codes used in publications to estimate NAS rates
 - ***PPV** = percent of cases coded as NAS that meet the NAS definition after review
- Describe the demographics, medical history, and health services utilized by the mothers and infants

Applying Birth Defects Methodology

- Use various data sources to identify provisional cases
- Follow up with detailed review of medical records for all provisional cases
- Confirmation of cases that meet a standard definition
- Parameters for the NAS study:
 - Births in 2015
 - Infants are VT residents and born in VT
 - Standard definition of NAS

Standard NAS Definition

1. Presence of clinical signs consistent with NAS (i.e., a documented NAS score >8 [on a scale of 0 –37]), not explained by another cause, or a documented infant diagnosis of NAS with pharmacologic treatment, and
2. Documented history of maternal prescription or illicit drug use* during pregnancy associated with NAS, or laboratory confirmation of recent maternal drug use, or fetal exposure to such drugs, and
3. Severity of illness that resulted in a prolonged (>2 days) neonatal hospitalization.

* Prescription drugs include opioid analgesics and Medication-assisted treatment (MAT) prescribed by a health provider, while illicit drugs include illegal, MAT, or analgesic drugs used without a prescription or supervision from a health provider.

Data Sources for Case Finding in Vermont

Hospital discharge

- Infant diagnosis
- Mother diagnosis

Medicaid claims

- Infant diagnosis
- Mother diagnosis
- Hub and Spoke
 - Medication-assisted treatment (MAT) program
- Pharmacy prescriptions

Vermont Health Care Uniform Reporting and Evaluation System (VHCURES*)

- Infant diagnosis
- Mother diagnosis
- Mother pharmacy claims

* The Green Mountain Care Board's all-payer claims database

Diagnosis & Treatment Codes

Infant NAS codes:

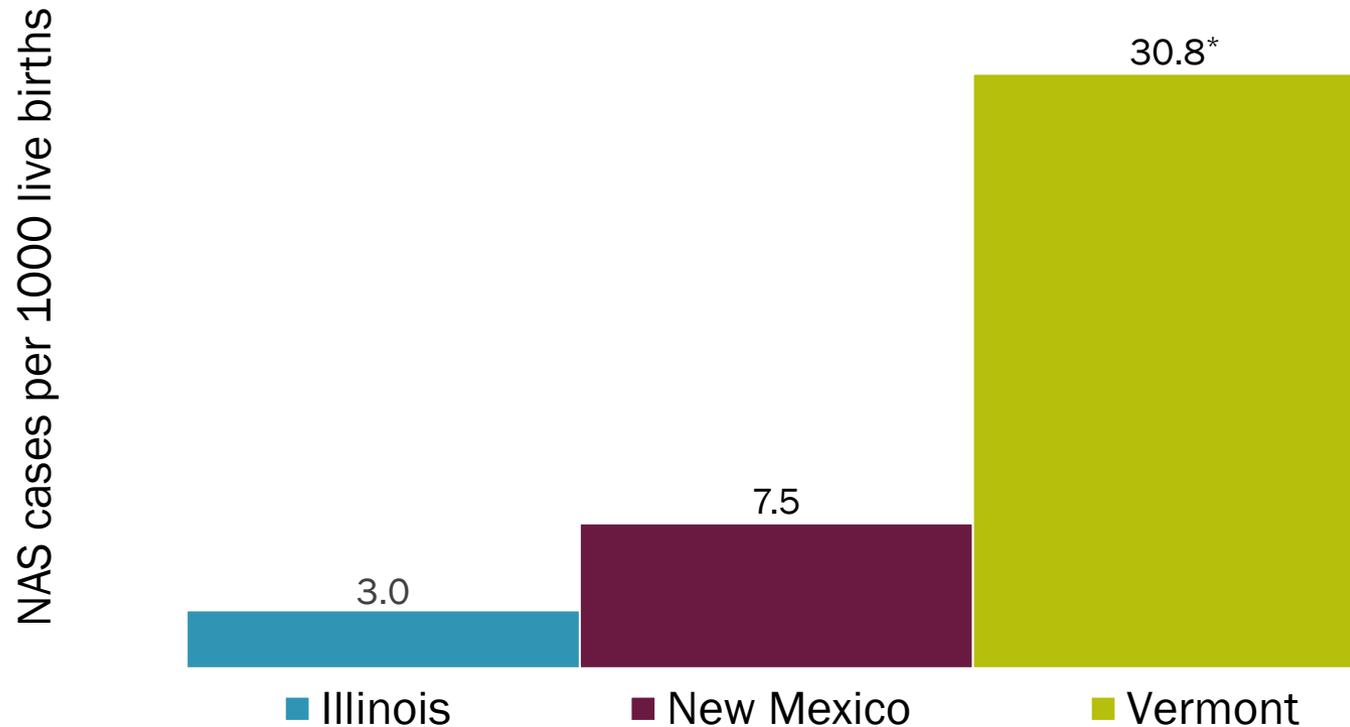
- ICD-9-CM (779.5): drug withdrawal syndrome in a newborn
- ICD-10-CM (P96.1): drug withdrawal, infant of dependent mother

Other infant codes that indicate substance exposure:

- ICD-9-CM (760.72): noxious influences affecting fetus or newborn via placenta or breast milk, narcotics
- ICD-10-CM (P04.49): newborn affected by maternal use of other drugs of addiction

Additional diagnosis codes for mothers who have substance use disorder and/or are receiving medication-assisted treatment.

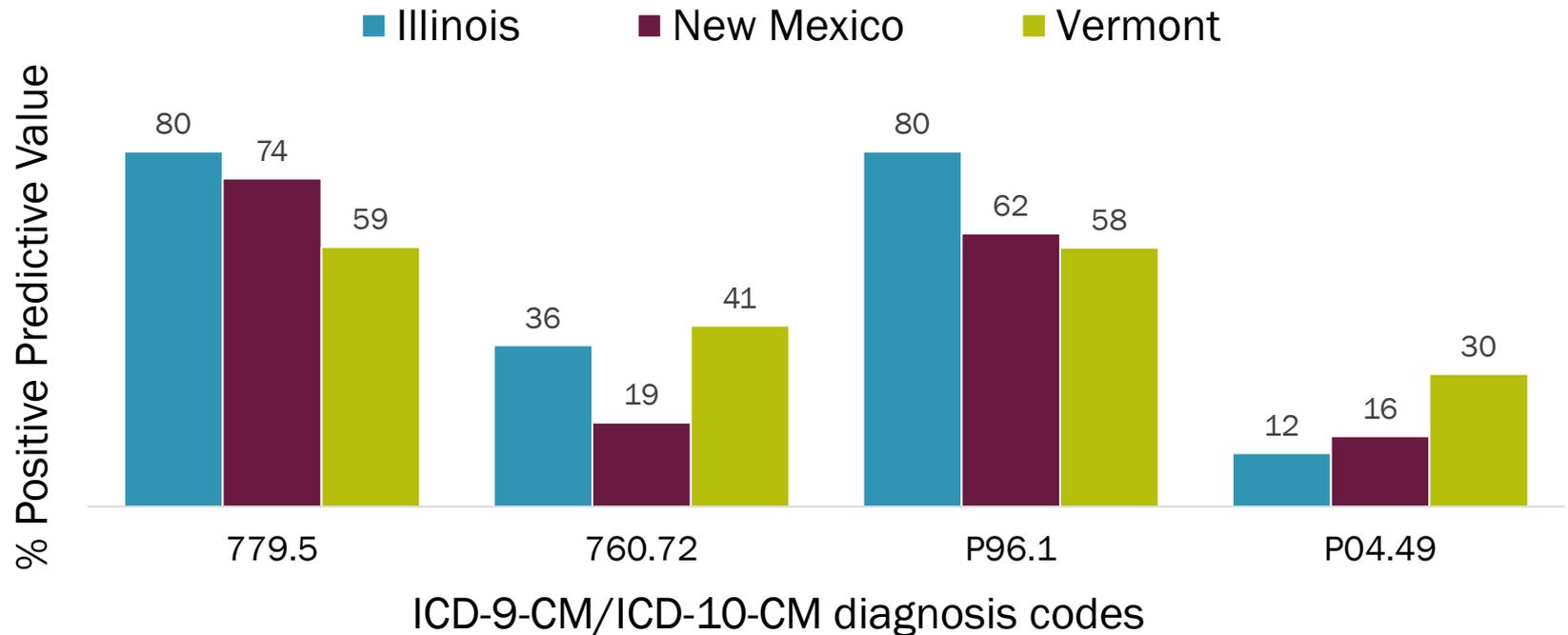
State Incidence Rates for Confirmed Cases



* 160 infants born to residents in Vermont in 2015 were confirmed as NAS cases.

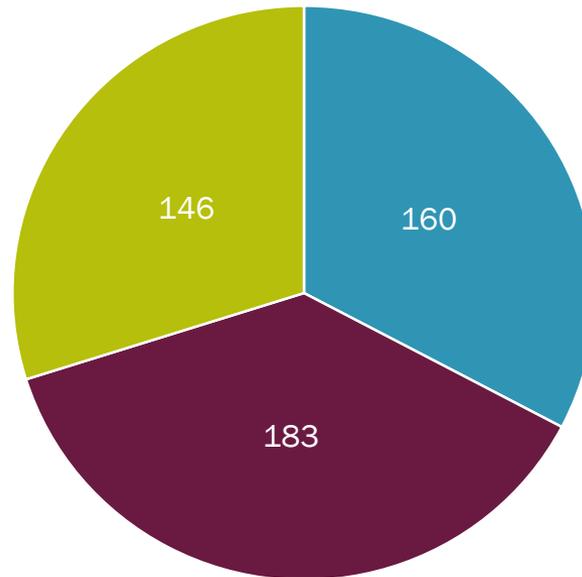
Positive Predictive Values by State

PPV of NAS diagnosis codes by state and infant diagnosis code (Lind et al., MMWR, 2019)



Compared to Illinois and New Mexico, Vermont had a lower percent of infants with primary codes 779.5 or P96.1 (drug withdrawal) who met the NAS definition and a higher percent with secondary codes 760.72 or P04.49 (newborn affected) who met the NAS definition.

Outcome of Vermont case finding



N = 489 provisional cases abstracted*

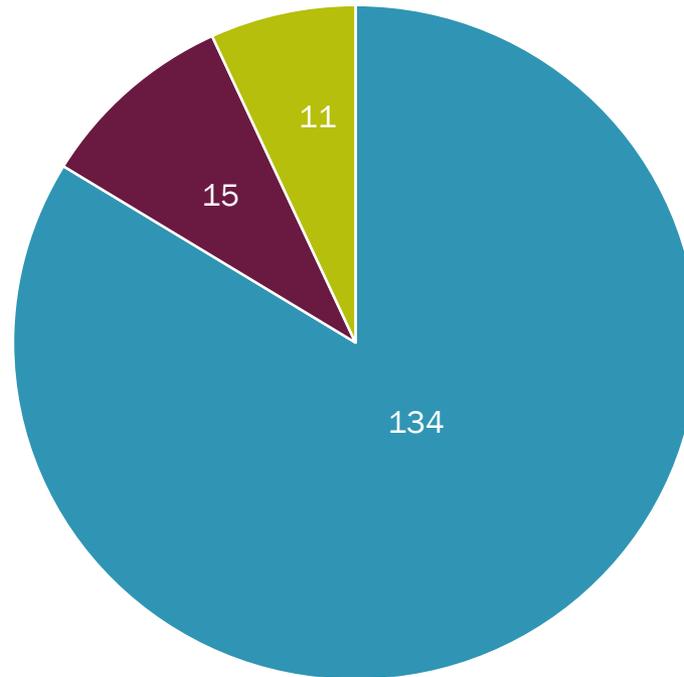
■ Confirmed cases ■ Exposed but not confirmed ■ Not exposed

*Additionally, there were 69 cases of Vermont residents born in out of state hospitals with a code used for case finding. These cases were not included in the 489 provisional cases due to lack of access to medical records.

Outcome of Vermont Case Finding

- **343** of **5,197** infants born to residents in Vermont in 2015 were exposed to illicit or/and prescribed drugs in utero.
- This number translates into a rate of 66.0 per 1,000 live births, which is **6.6%** of births.

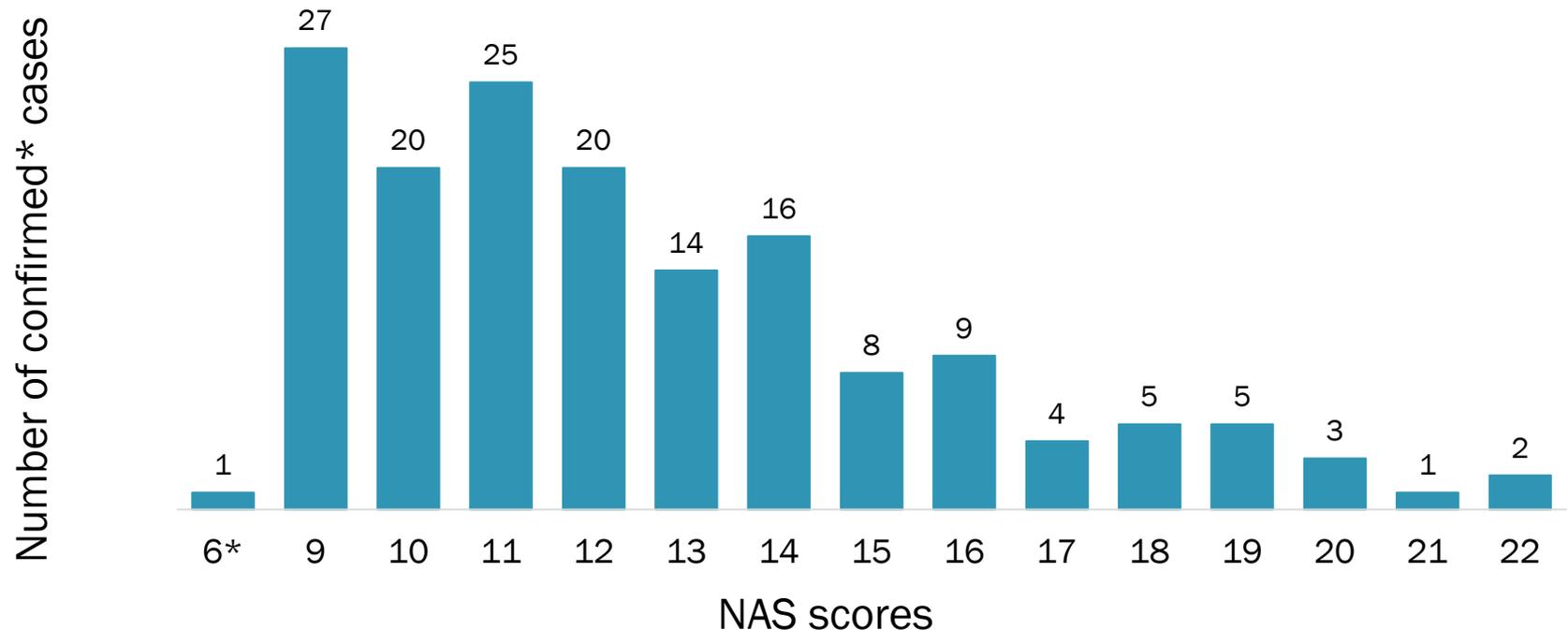
Vermont Confirmed NAS Cases



N = 160 cases

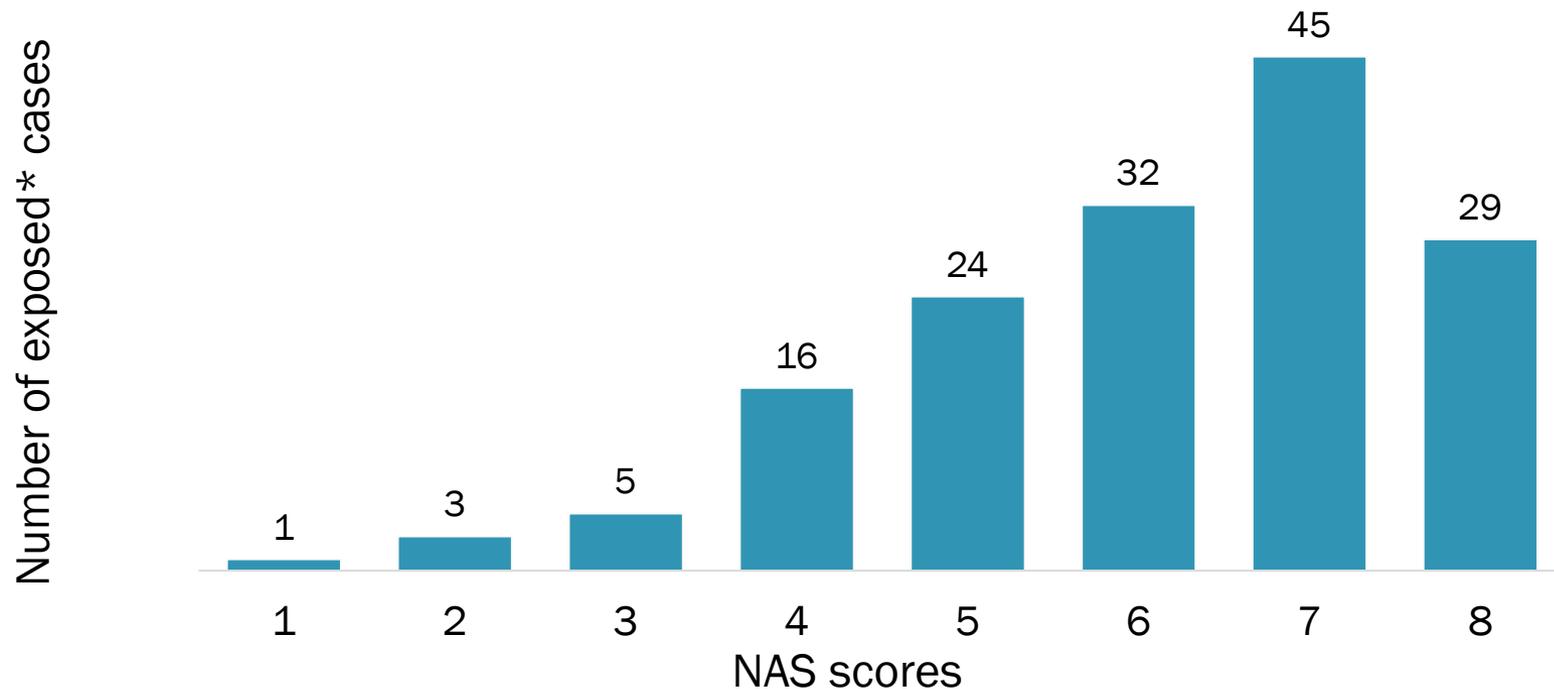
■ Infant NAS codes ■ Other infant codes only ■ Mother codes only

Highest NAS Score for Confirmed Cases



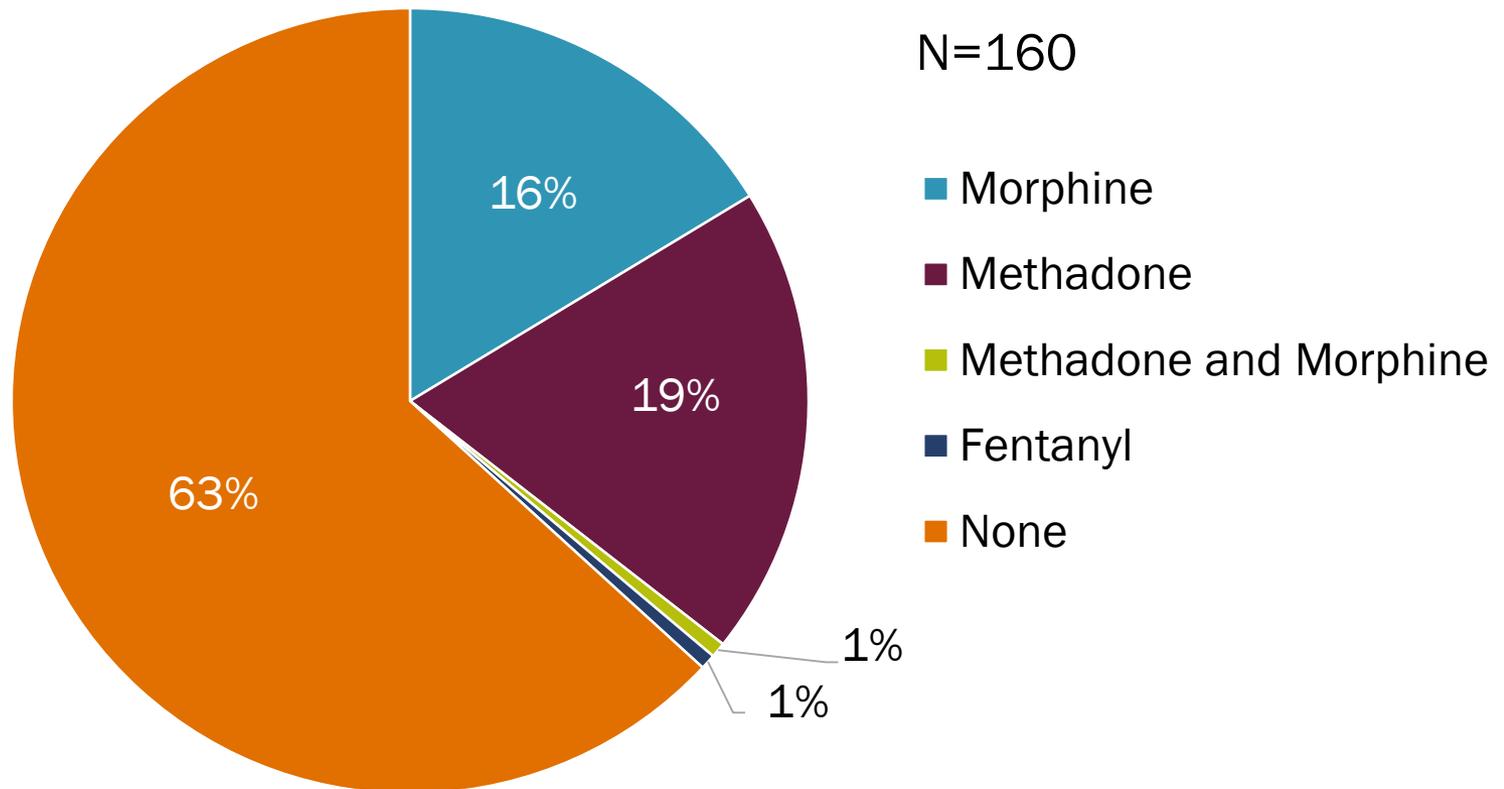
* One case with highest NAS score of 6 was confirmed based on diagnosis of NAS, treatment with morphine, and mother's use of opioids. Clinical notes indicated that treatment was started to prevent increased symptoms.

Highest NAS Score for Exposed Cases

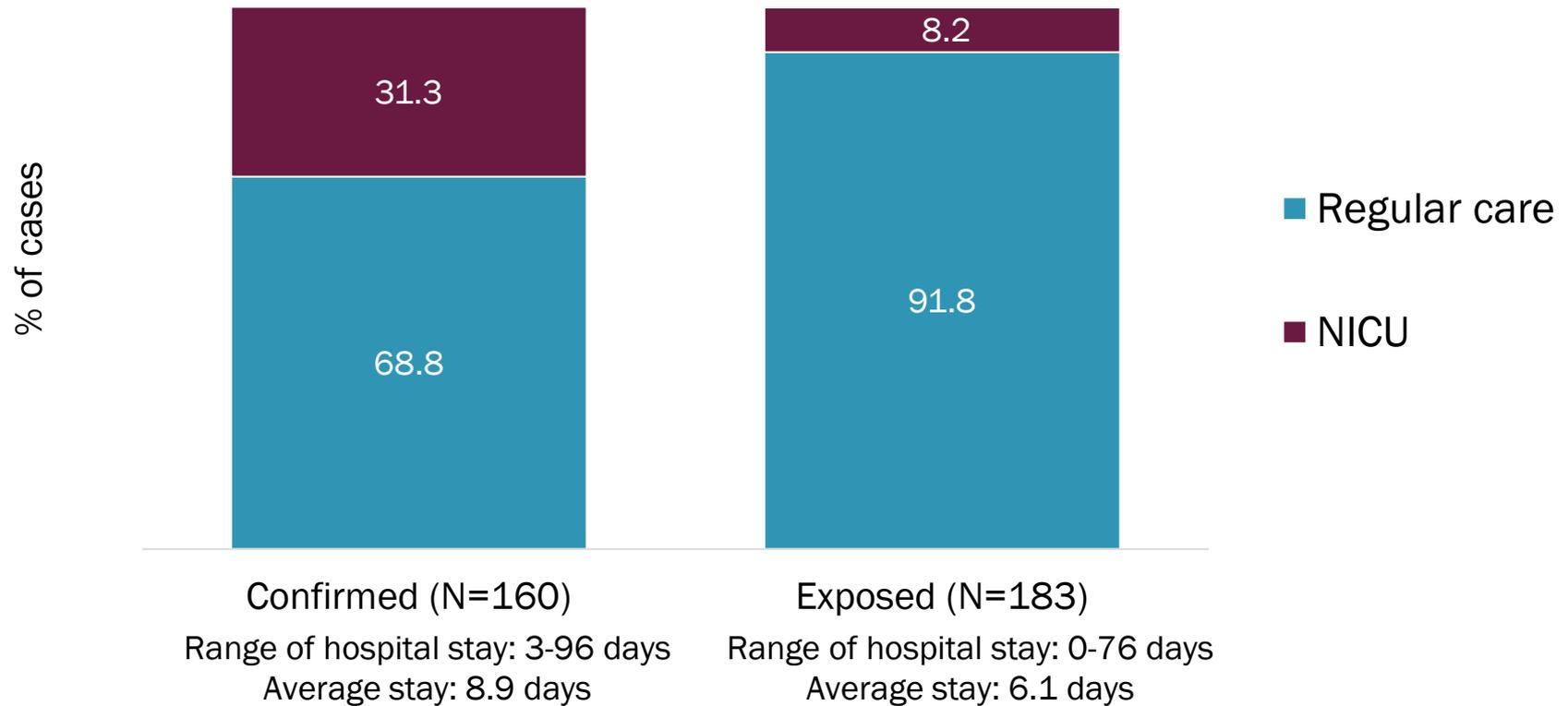


*Medical records of 28 exposed cases (i.e. infants exposed to substances, that did not meet the definition) did not include NAS scores

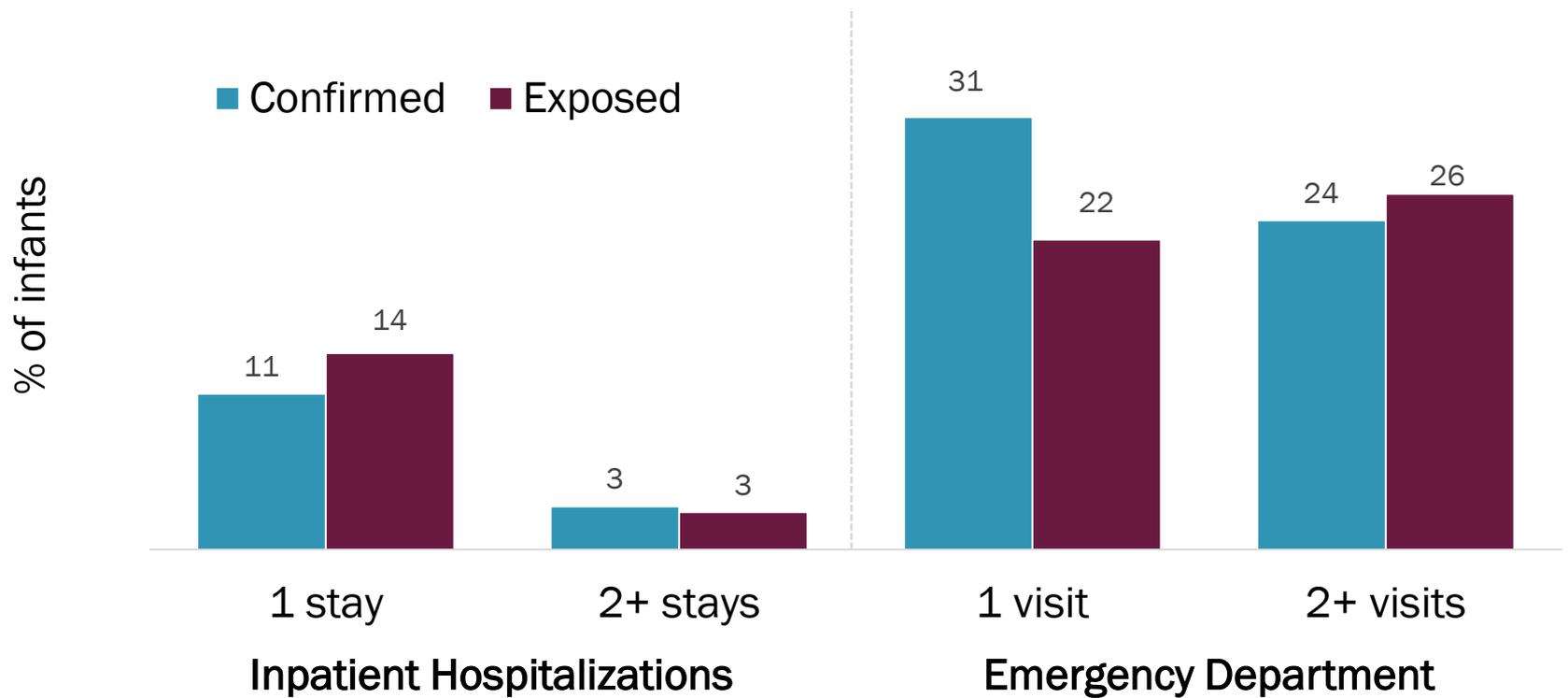
Pharmacological Treatment of Confirmed Cases During Neonatal Care



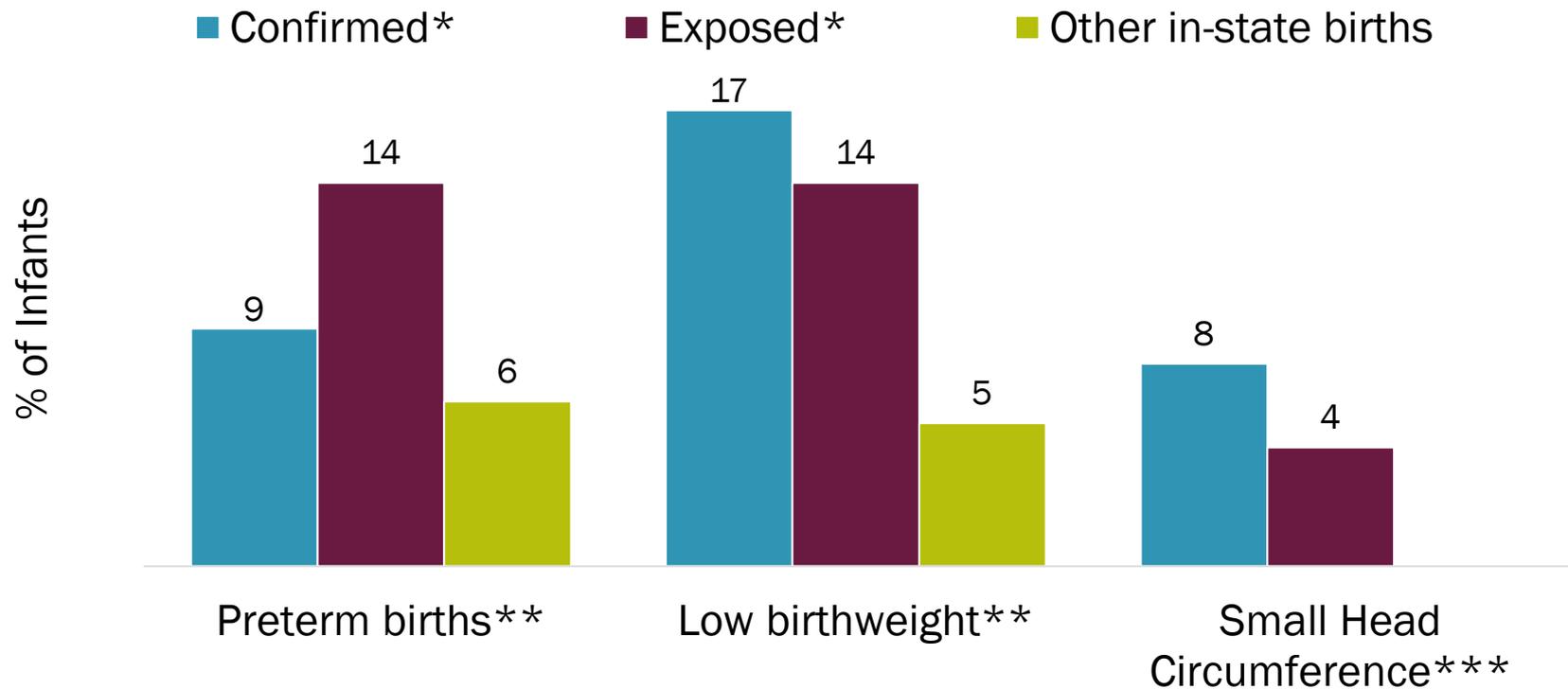
Neonatal Hospital Type and Length of Stay of Confirmed and Exposed Cases



Inpatient and ED Visits of Confirmed and Exposed Cases During the First Year After Birth



Birth Outcomes for Vermont Confirmed Cases, Exposed Cases, and Other In-State Births

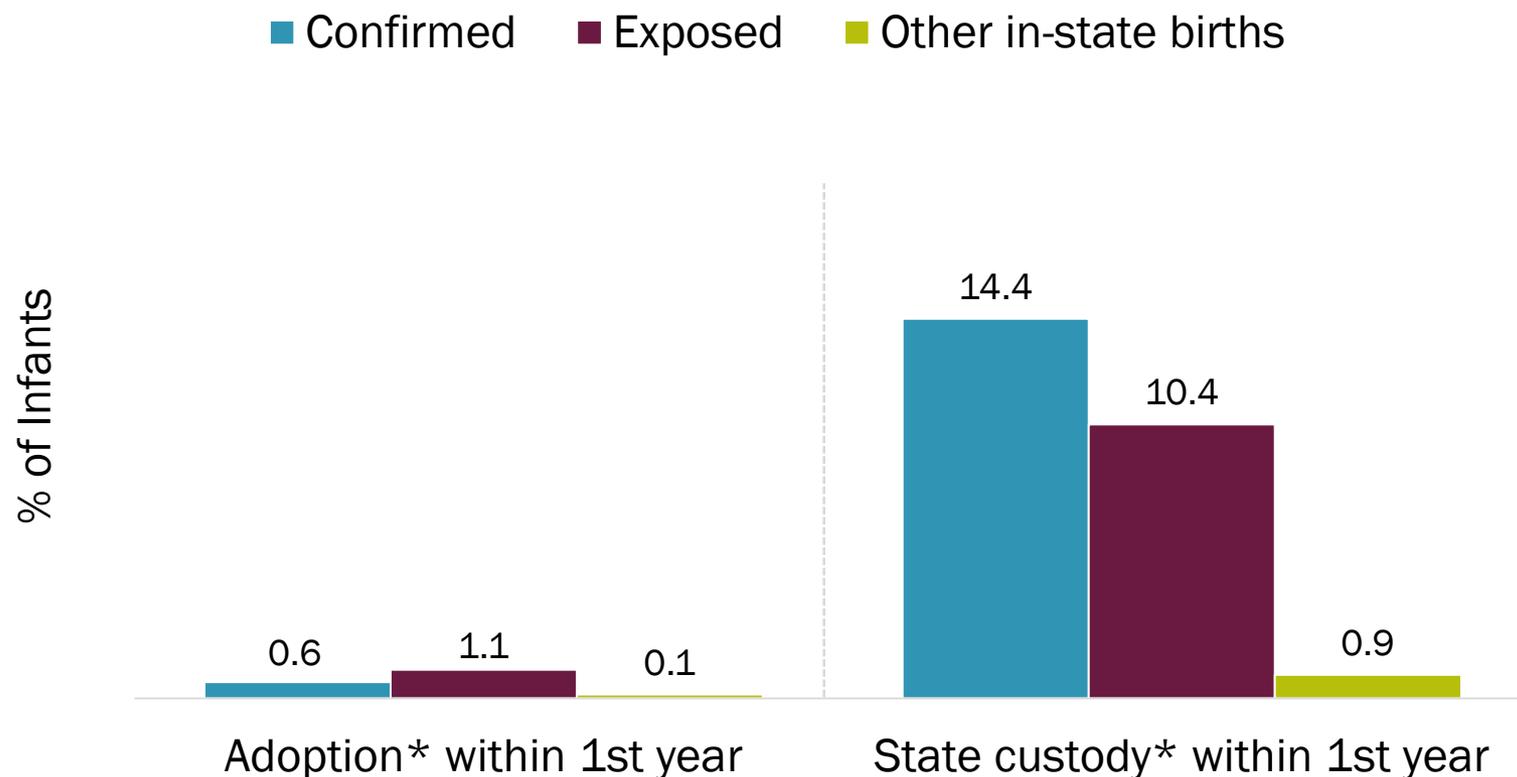


* These outcomes could be associated with use of other substances such as tobacco.

** Preterm is defined as <37 weeks. Low birthweight is defined as <2500 grams.

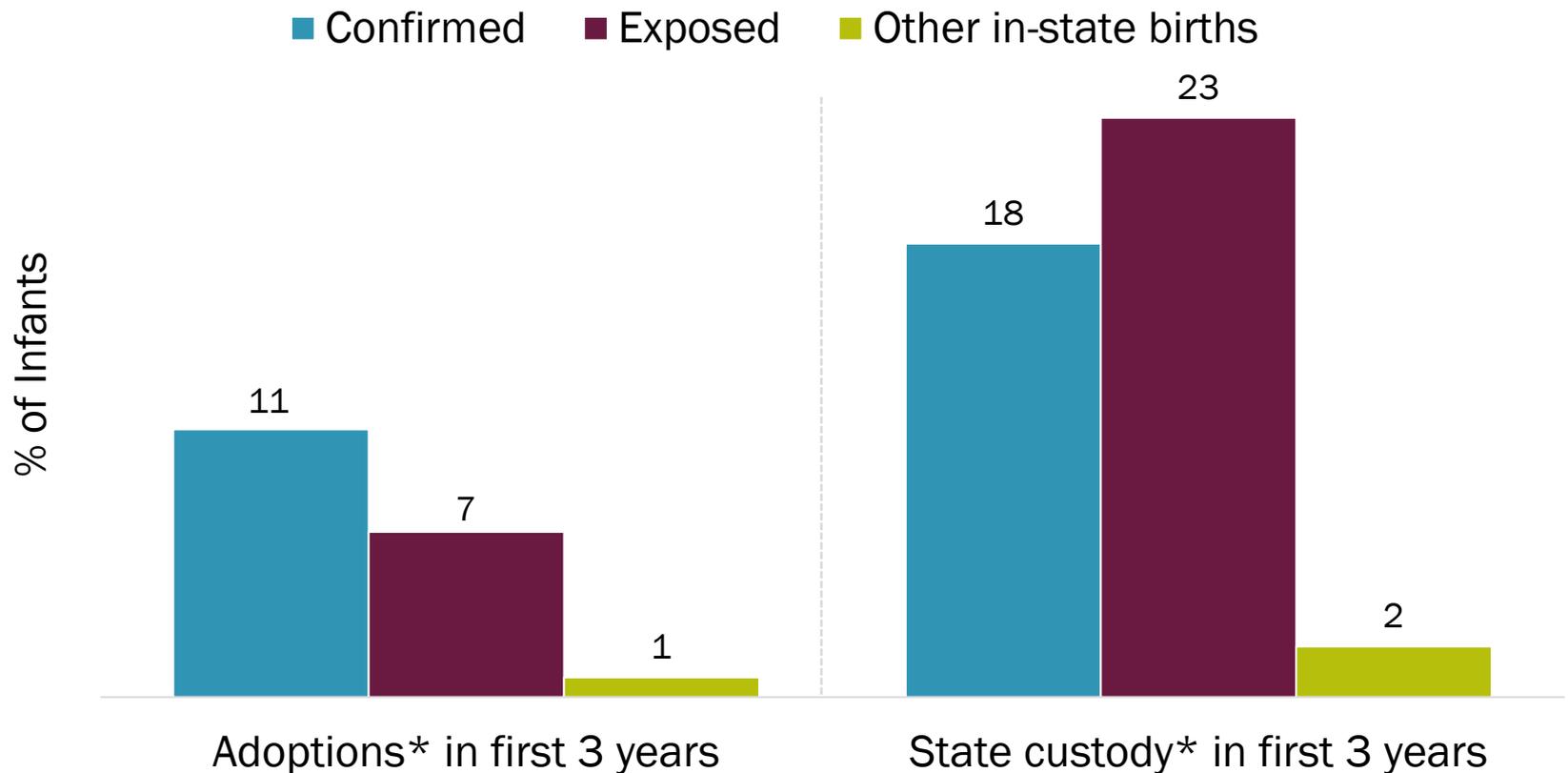
*** Small head circumference < 3rd percentile. Head circumference for other in-state births is not available.

Infant Outcomes in First Year for Vermont Confirmed Cases, Exposed Cases, and Other In-State Births



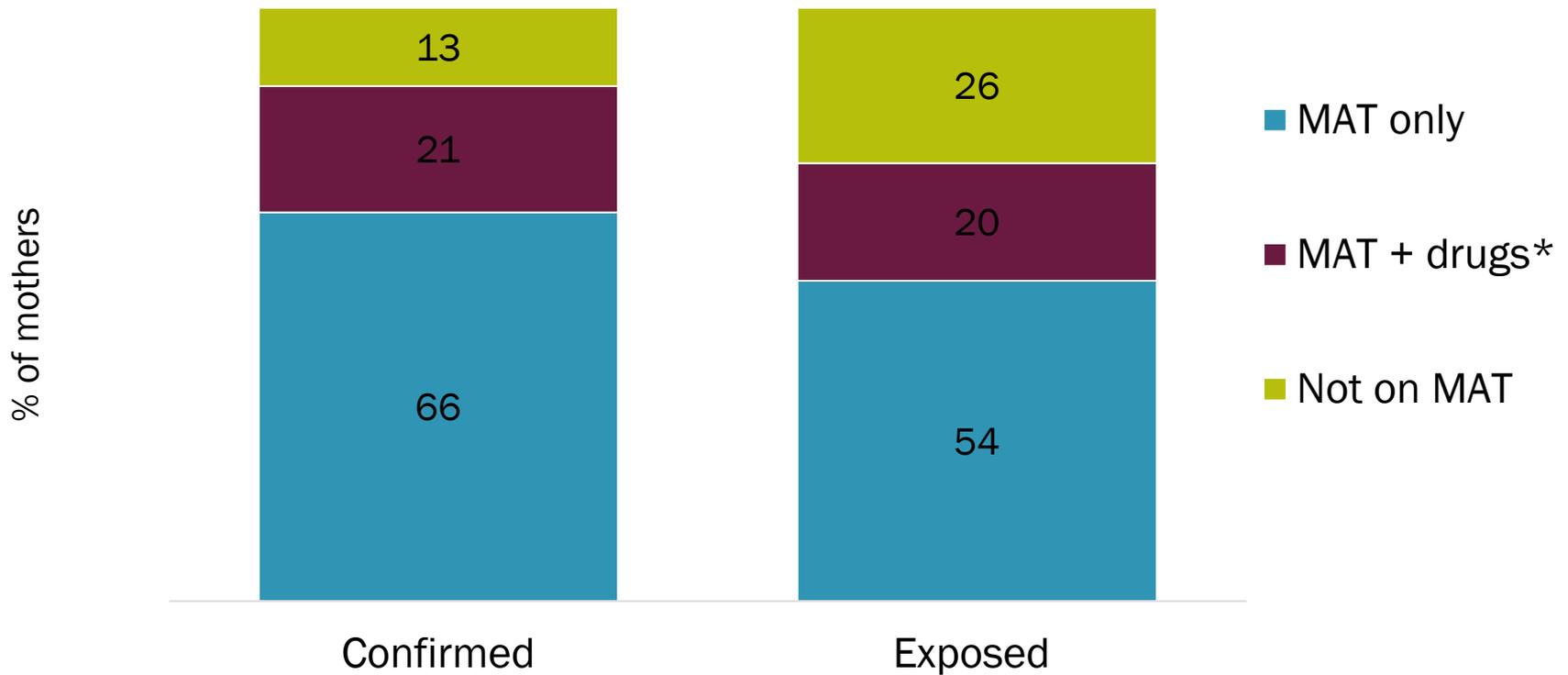
* There are many factors that may result in infants being adopted or placed in state custody. Assessment of other factors was beyond the scope of this study.

Child Outcomes in First 3 Years for Vermont Confirmed Cases, Exposed Cases, and Other In-State Births



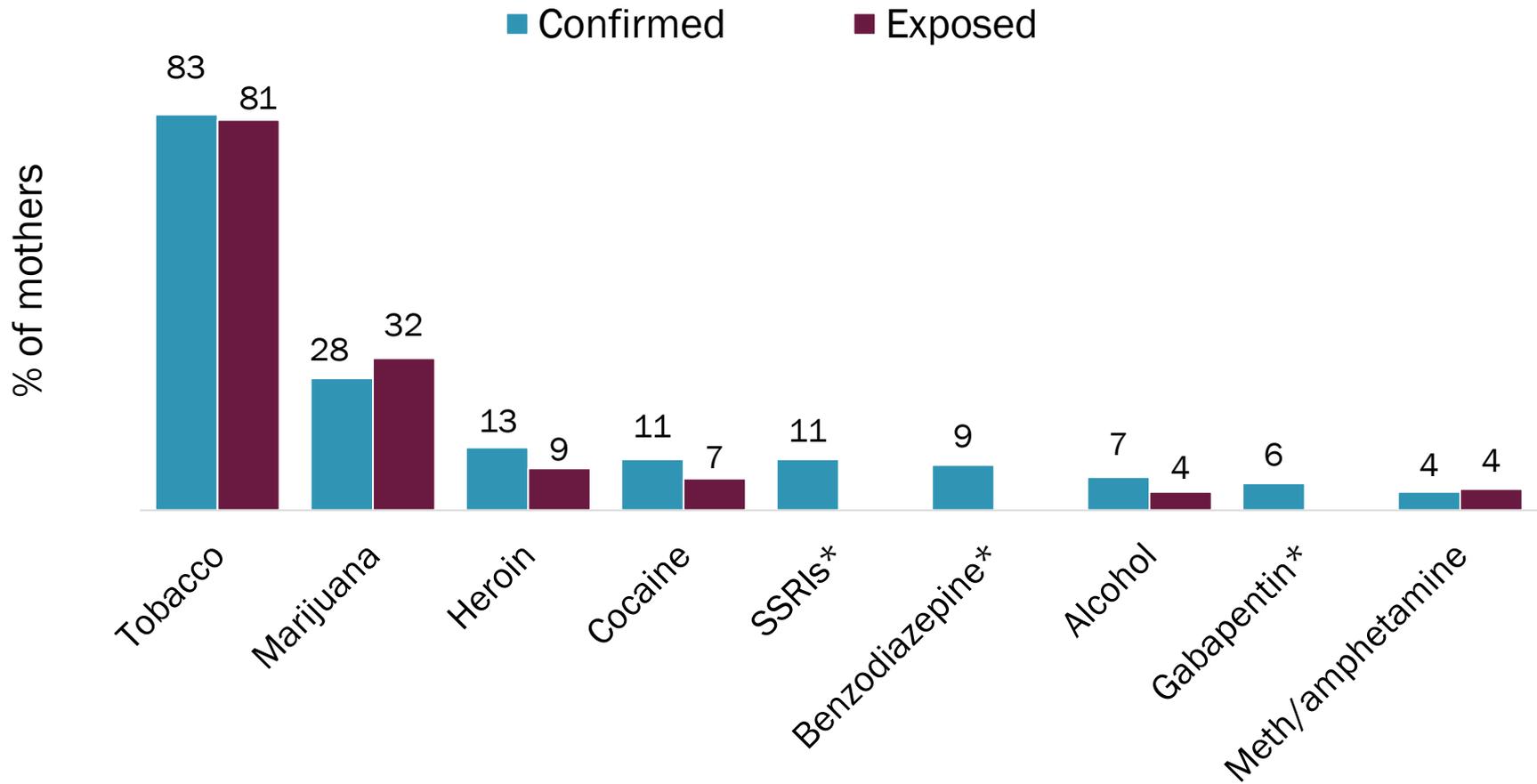
* There are many factors that may result in infants being adopted or placed in state custody. Assessment of other factors was beyond the scope of this study.

Medication Assisted Treatment (MAT) During Pregnancy of Vermont Mothers of Confirmed and Exposed cases



* Refers to opioids and other substances, licit or illicit, that were not prescribed as part of MAT.

Other Substance Use During Pregnancy by Vermont Mothers of Confirmed and Exposed Cases

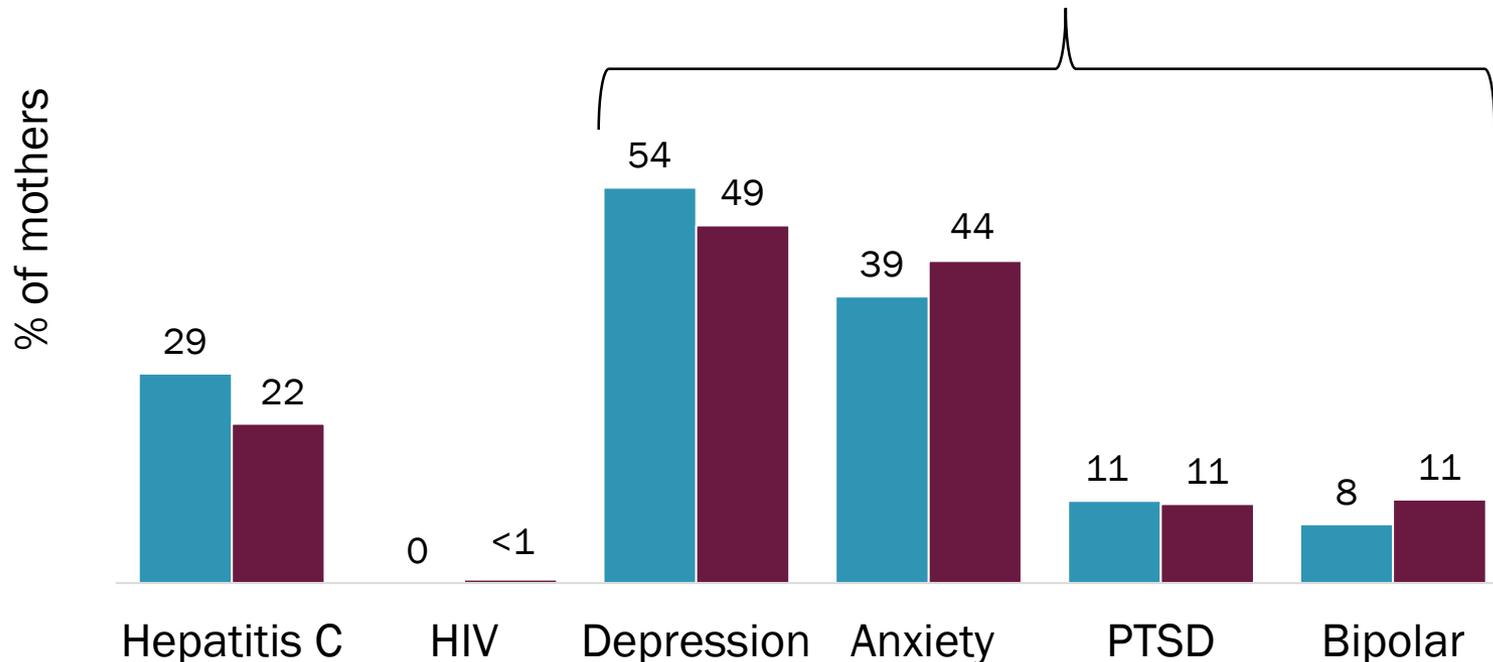


* Information not available for exposed cases

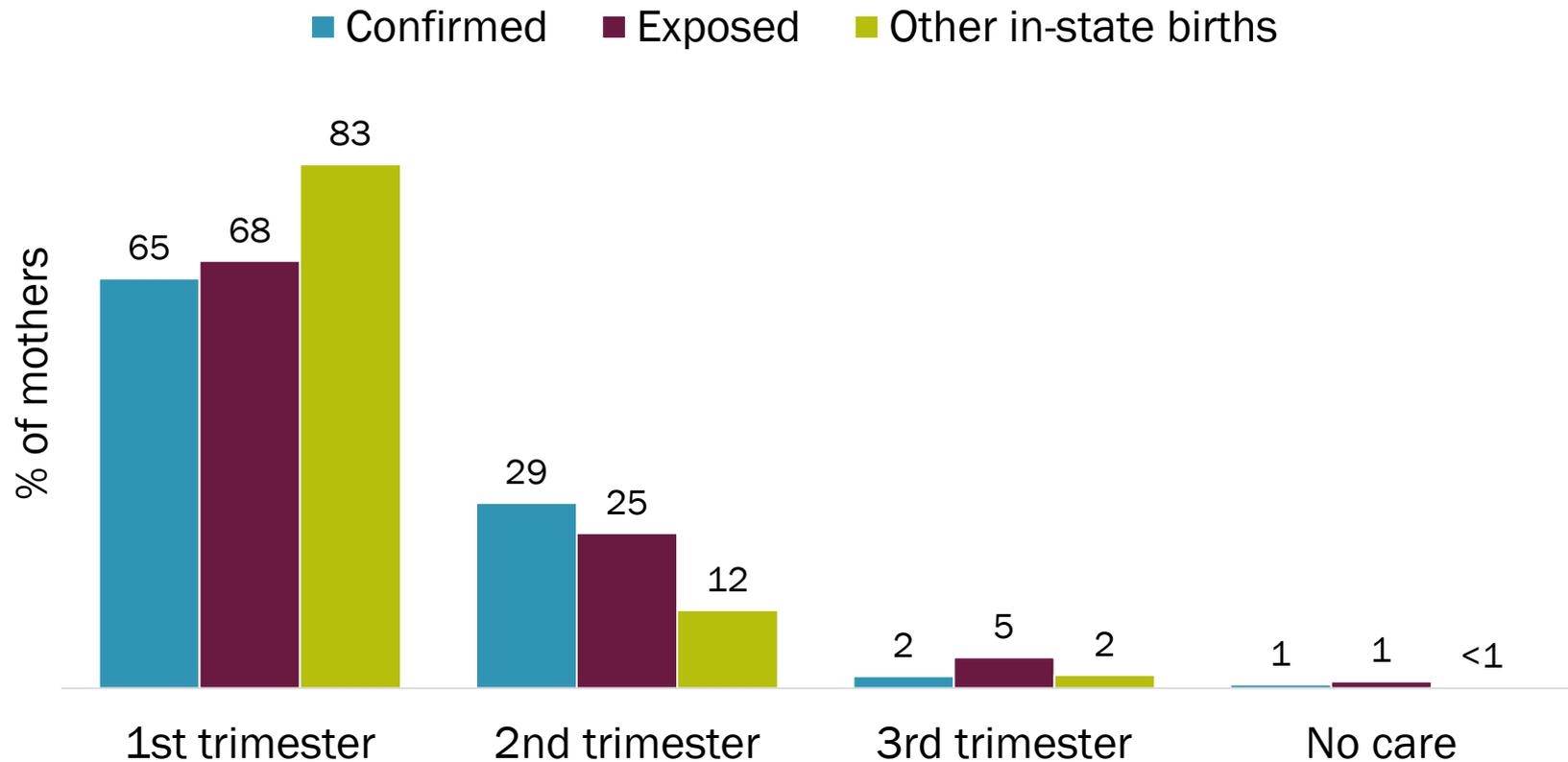
Health and Mental Health Conditions of Vermont Mothers of Confirmed and Exposed Cases

■ Confirmed ■ Exposed

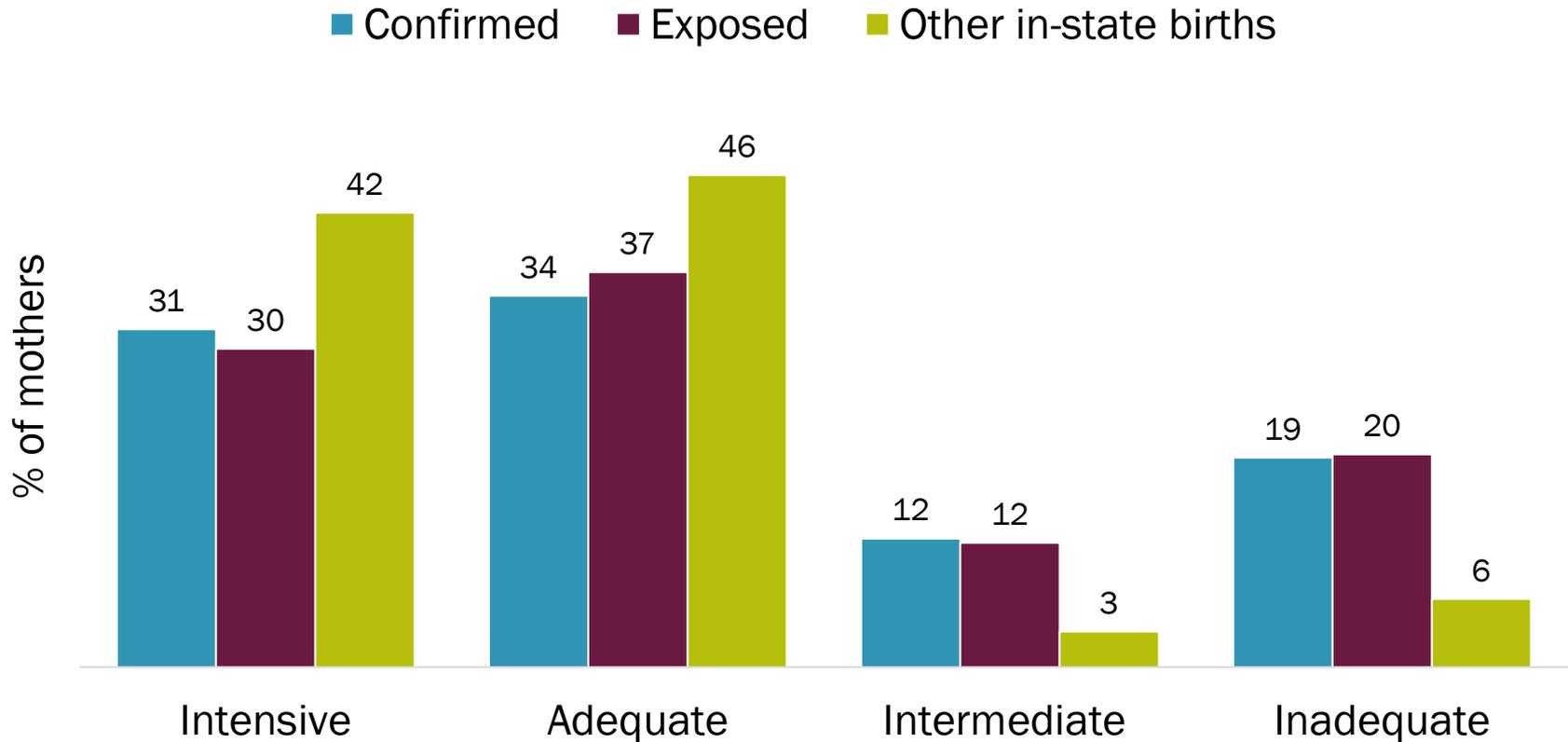
64% of mothers of **confirmed** cases had one or more documented mental health conditions.



Entry Into Prenatal Care of Vermont Mothers of Confirmed Cases, Exposed Cases, and Other In-State Births

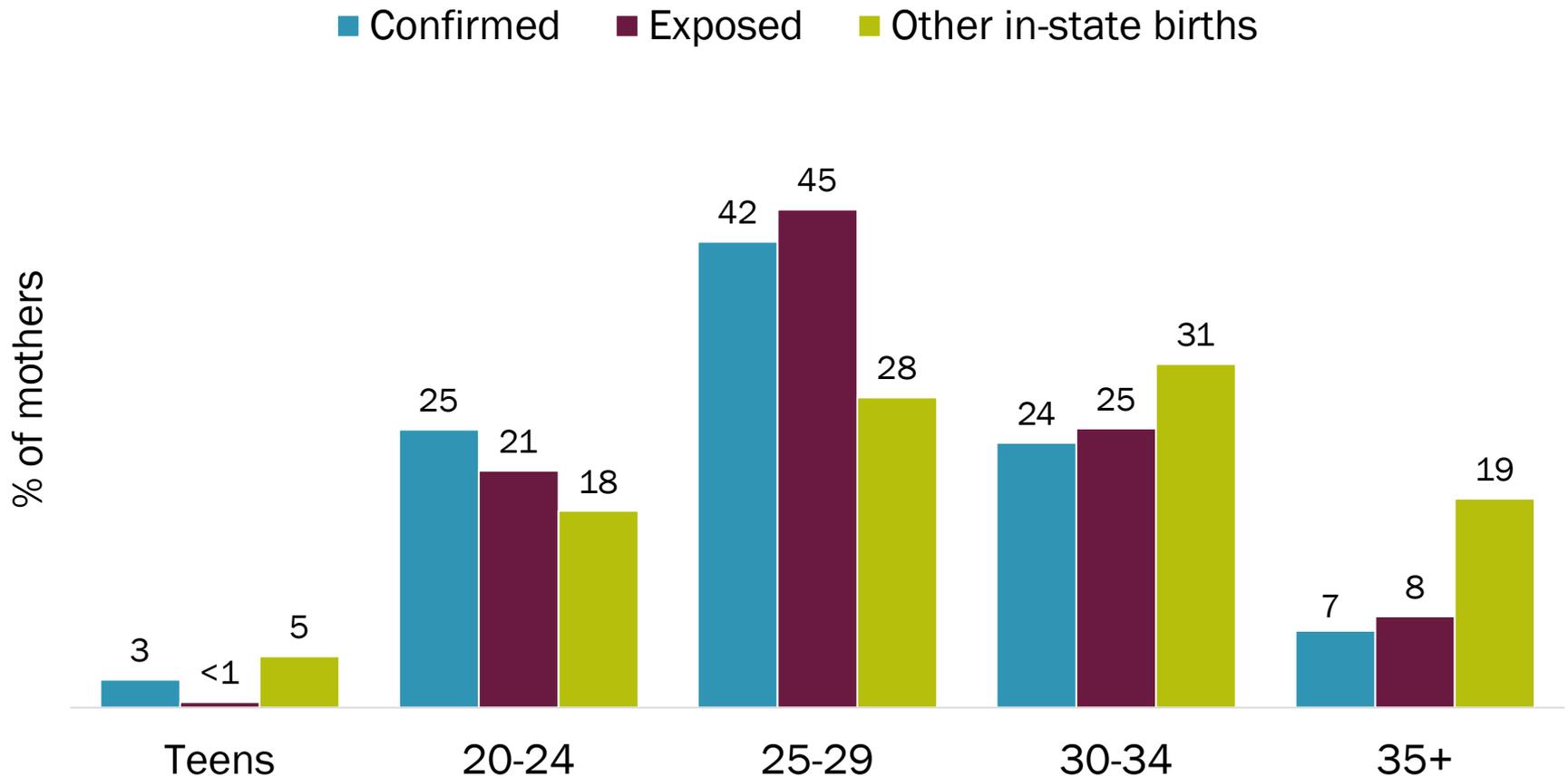


Adequacy* of Prenatal Care of Vermont Mothers of Confirmed Cases, Exposed Cases, and Other In-State Births

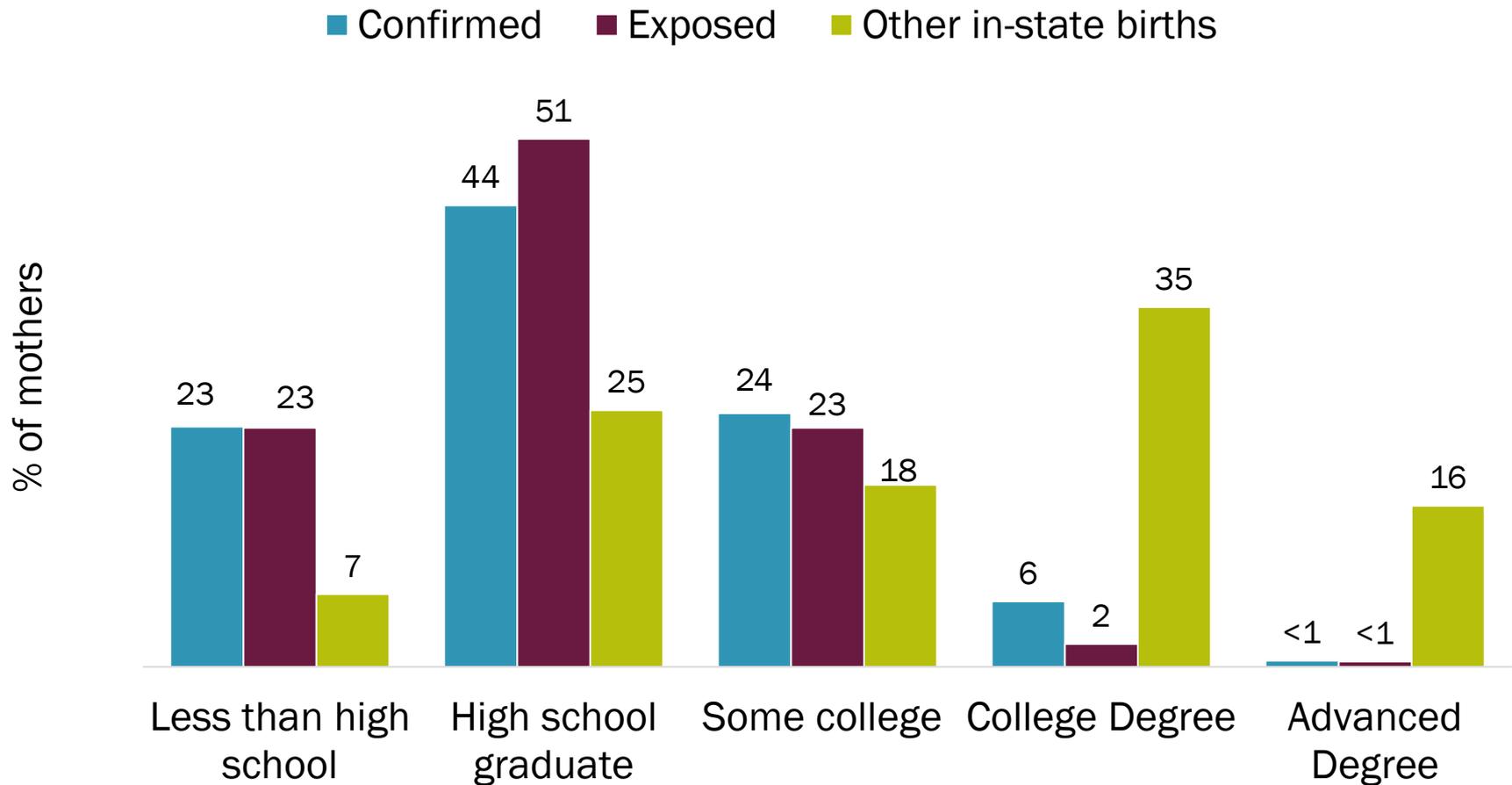


* Adequacy of prenatal care is based on when prenatal care began and the number of prenatal visits.

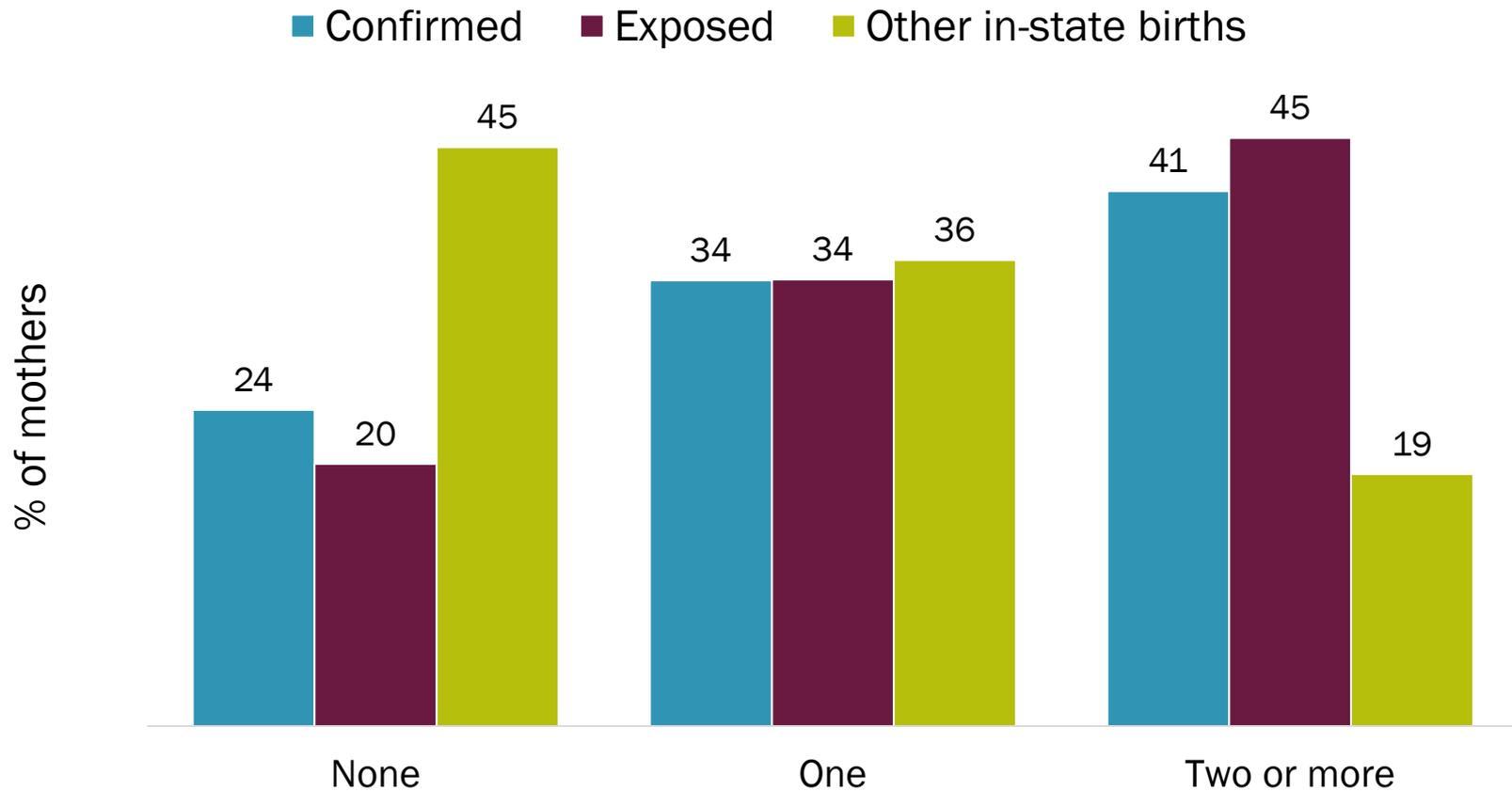
Age of Vermont Mothers of Confirmed Cases, Exposed Cases, and Other In-State Births



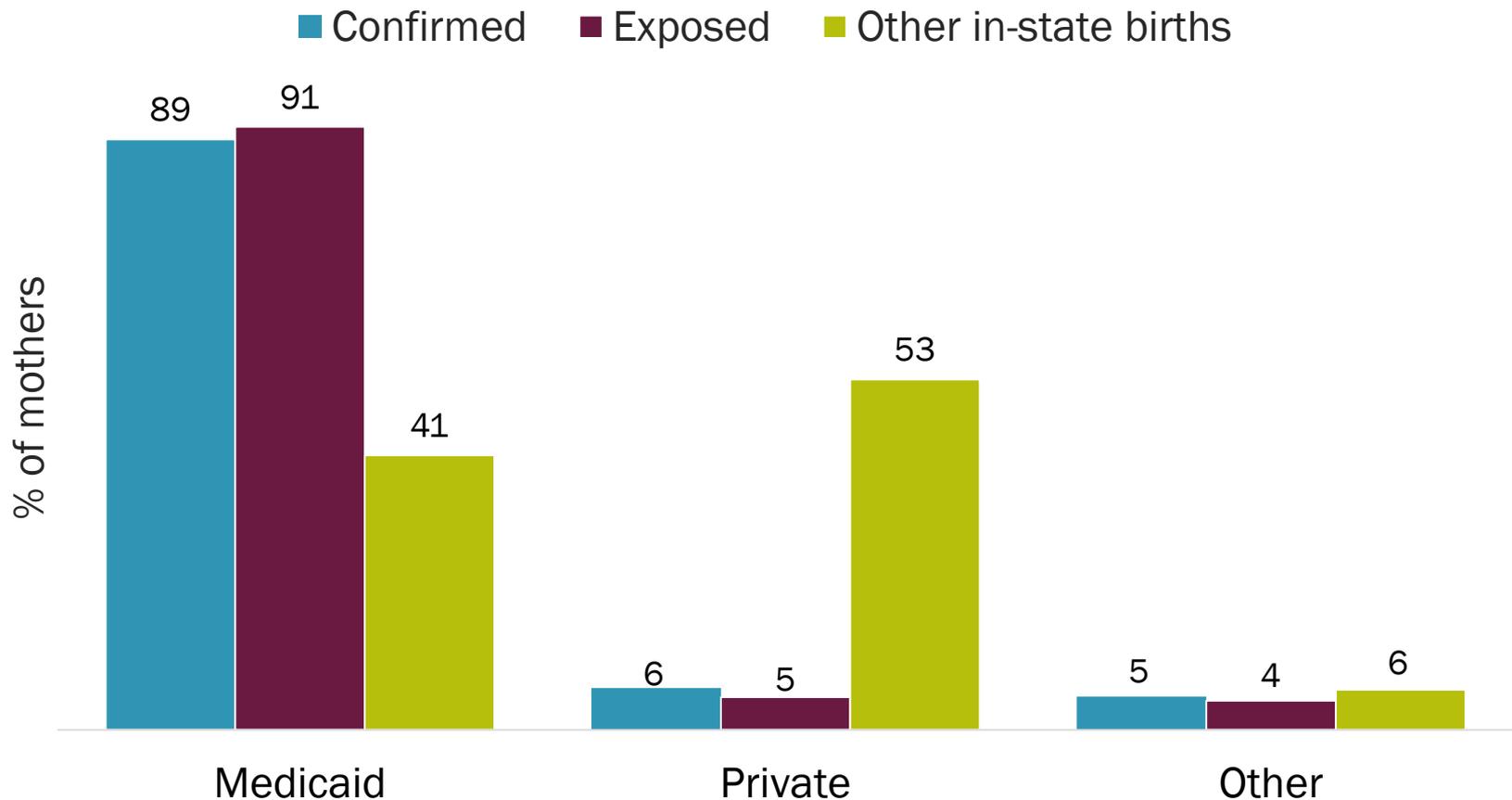
Education of Vermont Mothers of Confirmed Cases, Exposed Cases, and Other In-State Births



Previous Live Births of Vermont Mothers of Confirmed Cases, Exposed Cases, and Other In-State Births



Primary Payer for Confirmed Cases, Exposed Cases and Other In-State Births



Limitations

- 69 Vermont infants with a code used for NAS case finding were born in out-of-state hospitals and could not be included in the study.
- 9 Vermont infants' records indicated drug exposure, but they were transferred to out-of-state hospitals before meeting the NAS definition.
- One infant with drug exposure that died within hours after birth, could not be assessed by this study since the circumstances of the case could not be measured with the definition guidelines.

Limitations

Case finding was based on codes assigned to infants and/or mothers. If an infant or mother did not have any of these codes, they were not included for review as possible NAS cases.

- If providers were unaware that a mother had a substance use disorder, they would not receive a diagnosis used in the study.
- If infants were discharged early, symptoms of NAS would not have been observed.

More Information

For more information about the results and involvement of the Vermont Department of Health in the Neonatal Abstinence Syndrome Surveillance Pilot Project, contact:

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