

# **Hospital-Based Surveillance for Neonatal Abstinence Syndrome in Tennessee, 2013**

Tennessee Department of Health  
Division of Family Health and  
Wellness



# Please Note:

- Readers should interpret all findings with caution. This report contains data obtained through a hospital surveillance system. In order to obtain the most complete picture of the burden of Neonatal Abstinence Syndrome in Tennessee, readers should also consider other sources of data on the incidence of NAS, including hospital discharge data and payment data (e.g. Medicaid claims data).
- Please be advised that in some cases (particularly in looking at data at the regional level), the counts are small and so we encourage caution in comparing differences across regions.
- If you have questions about particular data points or need assistance in interpreting the data, please contact Angela M. Miller, PhD, MSPH
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# Introduction

- Neonatal Abstinence Syndrome (NAS) is a condition in which an infant undergoes withdrawal from a substance to which he or she was exposed in utero.
- The most common substances causing NAS are the opiate class of drugs (ex. morphine, heroin).
- NAS can occur when a pregnant women takes:
  - A prescription medication prescribed to her
  - An illicit medication
  - A prescription medication written for someone else but diverted to her

# Introduction

- Over the last decade, the incidence of NAS in Tennessee has increased by 15-fold, far exceeding the national increase (3-fold over the same time period)<sup>1</sup>.
- A subcabinet working group focused on NAS was convened in 2012, consisting of Commissioner-level representation from the Departments of Health, Children's Services, Mental Health and Substance Abuse Services, Safety and Human Services as well as the Bureau of Health Care Finance and Administration (Medicaid) and the Children's Cabinet . The group is focused on policy and program strategies to reduce NAS (largely through primary prevention).

<sup>1</sup>Patrick S, JAMA 307(18), 2012

# Introduction

- Previous data on the incidence of NAS was obtained through analysis of hospital discharge data or Medicaid claim data, both of which are associated with significant time lags.
- More timely data was needed to appropriately drive policy and programmatic changes.
- The Tennessee Department of Health made Neonatal Abstinence Syndrome (NAS) a reportable condition on January 1, 2013. Providers who diagnose NAS are required to report to the Department through an online portal within 30 days of diagnosis.

# Introduction

- Providers were instructed that the following elements are generally involved in making the diagnosis of NAS:
  - History of exposure (maternal screening/history)
  - Evidence of exposure (maternal or infant screening)
  - Evidence of disease (infant with clinical signs of NAS)
- Cases were included in the Department's official count if the last criterion (evidence of disease) was reported.
- Cases were not excluded if the first two criteria were left blank, as current screening techniques are not imperfect and NAS is a clinical diagnosis.

# Table of Contents

- Case Report Data
  - Number of cases reported, cases reported by sex, cases reported by month
- Infant Exposure Data
  - Maternal source of exposure, exposure source over time, maternal and infant screening characteristics
- Regional-Level Reporting Data
  - NAS rates by region, exposure source by region

# Case Report Data

Number of Cases Reported  
Reporting Hospital Characteristics

Cases by Infant Sex

Number and Rate of Cases by Birth Month

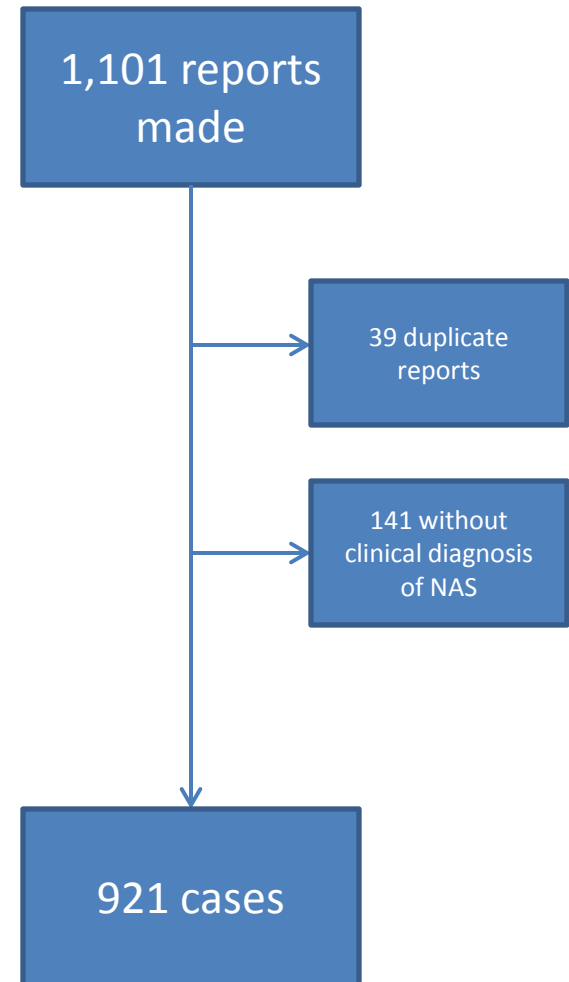


# Highlights—2013 Case Report Data

- Providers submitted **1101 reports** to the NAS reporting portal
  - Only 3.5% of cases (N=39) represented duplicates
  - 12.8% of reported cases (N=141) were for infants without clinical signs of NAS and thus were excluded from the total NAS count
- The vast **majority of cases (84.2%) were reported by birth hospitals**. Few cases were reported by outpatient facilities or at readmission.
  - The median reporting time from hospitals was 8 days after birth.
- **More male infants with NAS** were reported. This is consistent with reports in the literature of discrepancies among NAS by sex<sup>2</sup>.
- The **rate of NAS cases** reported by month (per 1,000 live births) **did not change significantly** throughout the year.

# Cases Reported

- 1101 reports made to portal
  - 39 Duplicate reports, excluded
  - 141 Without clinical diagnosis of NAS, excluded
- 921 cases born in 2013 included in report
- Included cases were from 51 unique reporting hospitals



# Reporting Hospital Characteristics

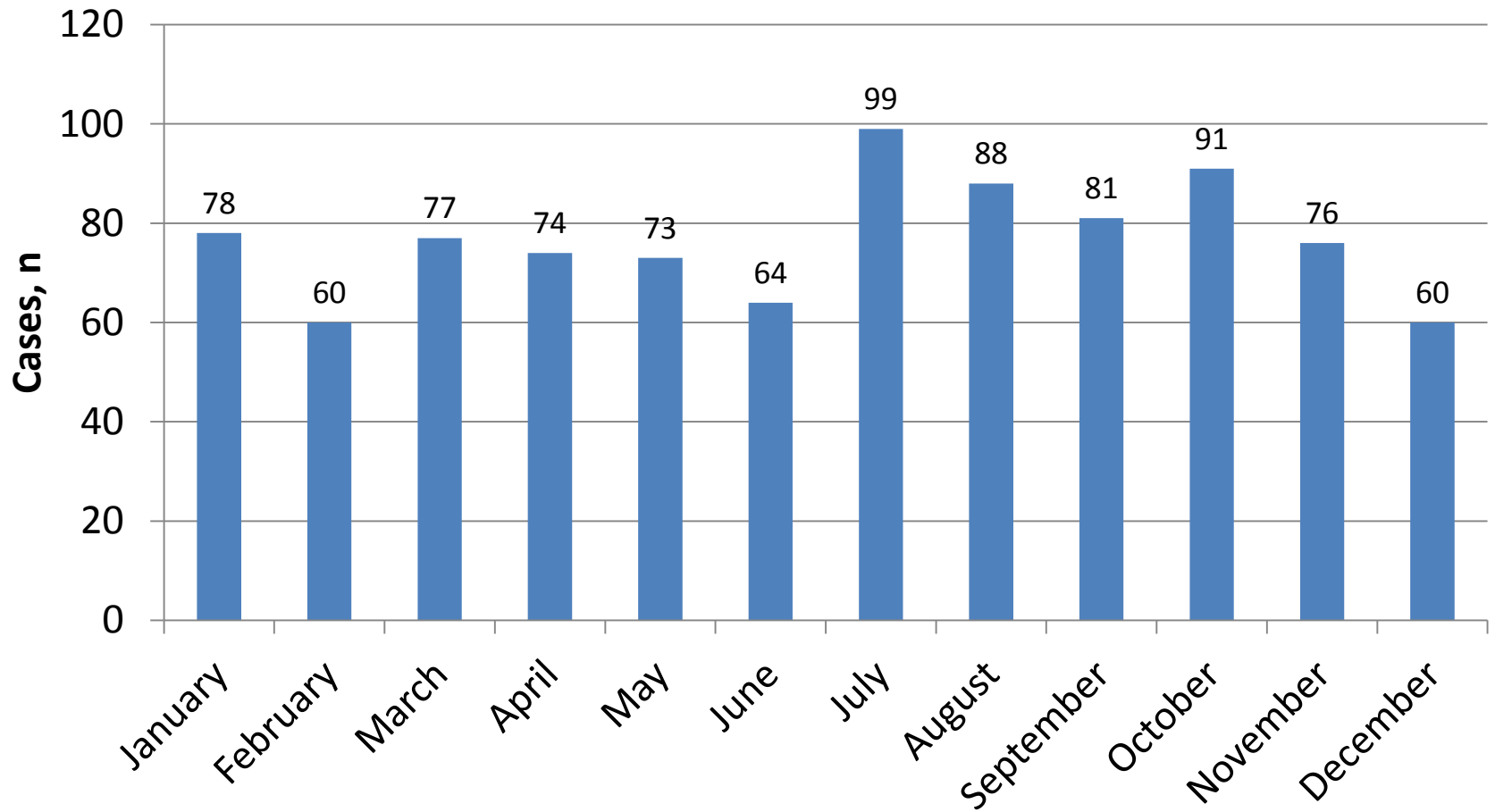
		N	%
Hospital Type	Birth	775	84.2
	Transfer	142	15.4
	Outpatient	2	0.2
	Readmission	2	0.2

Average time from birth to reporting was 23.1 ( $\pm 34.5$ ) days, with a range of 1 to 264 days. The median reporting time was 8.0 days.

# Cases by Infant Sex

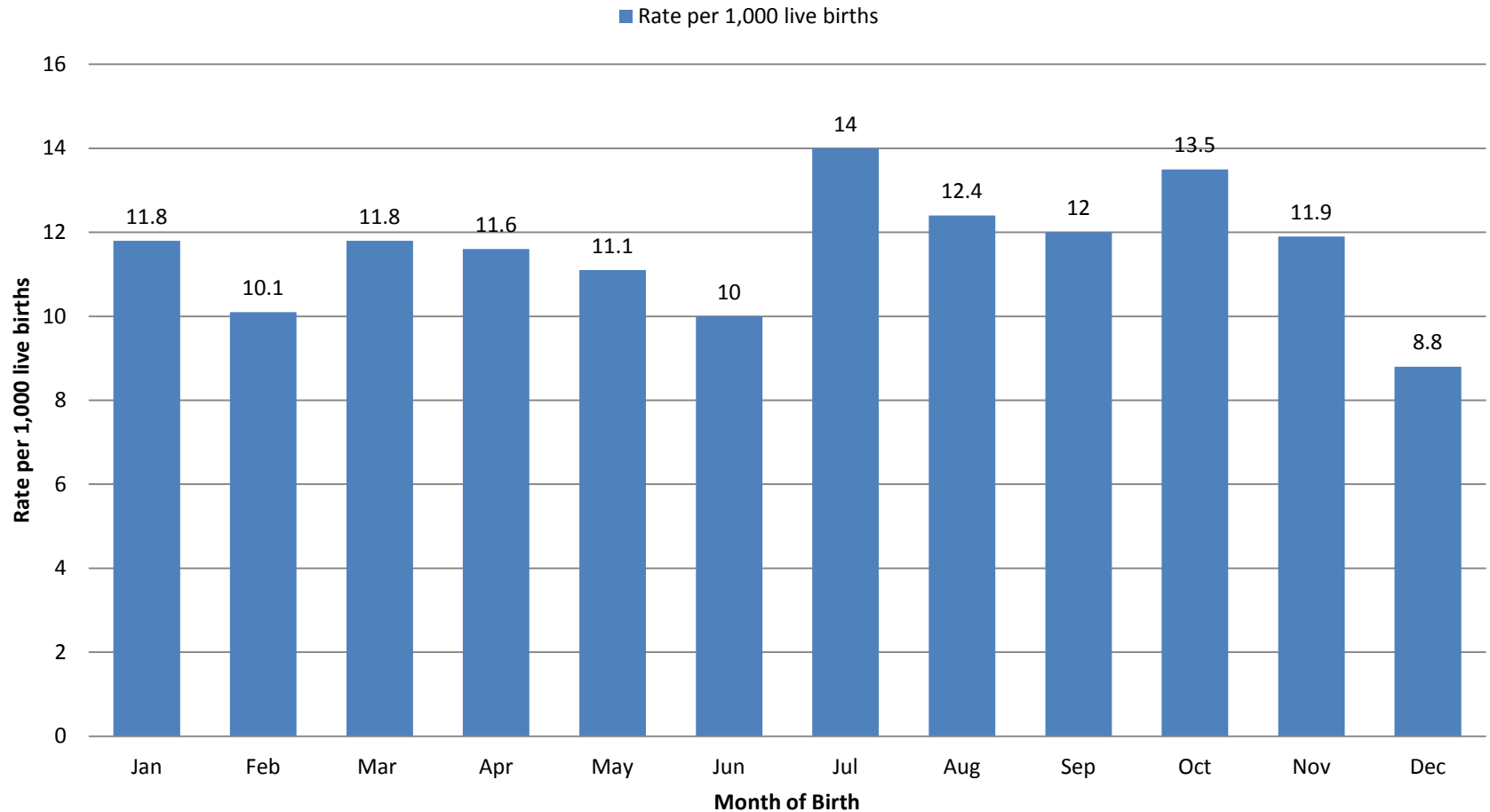
Sex	N	%	P-value
Male	535	58.0	<.0001
Female	386	41.9	

# Cases by Month of Birth



# Case Rate by Month of Birth

## NAS Cases per 1,000 live births



\*The change in monthly rate was not statistically significant.

# Infant Exposure Data

Maternal Source of Exposure

Exposure Source Over Time

Maternal and Infant Screening Data

# Highlights—2013 Infant Exposure Data

- In **41.7% of cases**, the exposure was reported as **only drugs prescribed to the mother**
  - In an additional 21.6%, the mother was reported to have taken at least one substance prescribed by a health care provider
  - In total, **63.3% of mothers were taking at least one substance prescribed by a health care provider**
- Among mothers taking only drugs prescribed to them, **71.6% were under supervised replacement therapy (such as methadone or buprenorphine)**
- In **62.8% of cases**, there was **both a maternal history of substance use and a positive screen** for NAS causing substances (either maternal or neonatal)



# Source of Exposure

Source	No. of cases*	Percent (%)
Supervised replacement therapy	427	46.4
Supervised pain therapy	175	19.0
Therapy for psychiatric or neurological condition	68	7.4
Prescription substance without a prescription	370	40.2
Non-prescription substance	252	27.4
No known exposure but clinical signs consistent with NAS	13	1.4
No response	19	2.1

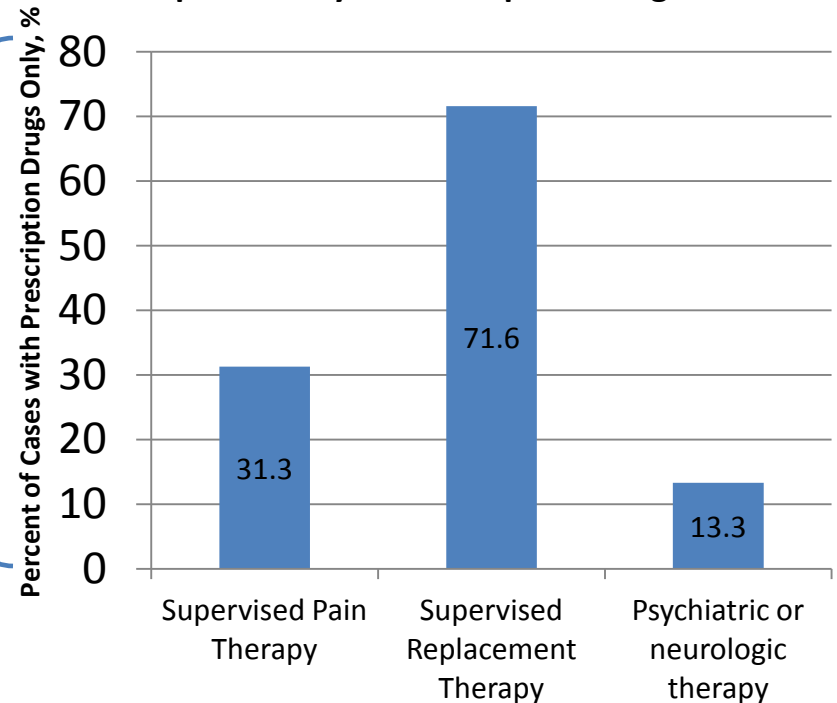
*\*Multiple maternal substances may be reported; therefore the total number of cases in this table may not match the total number of cases reported.*

# Source of Exposure

## Mutually Exclusive Sources of Exposure

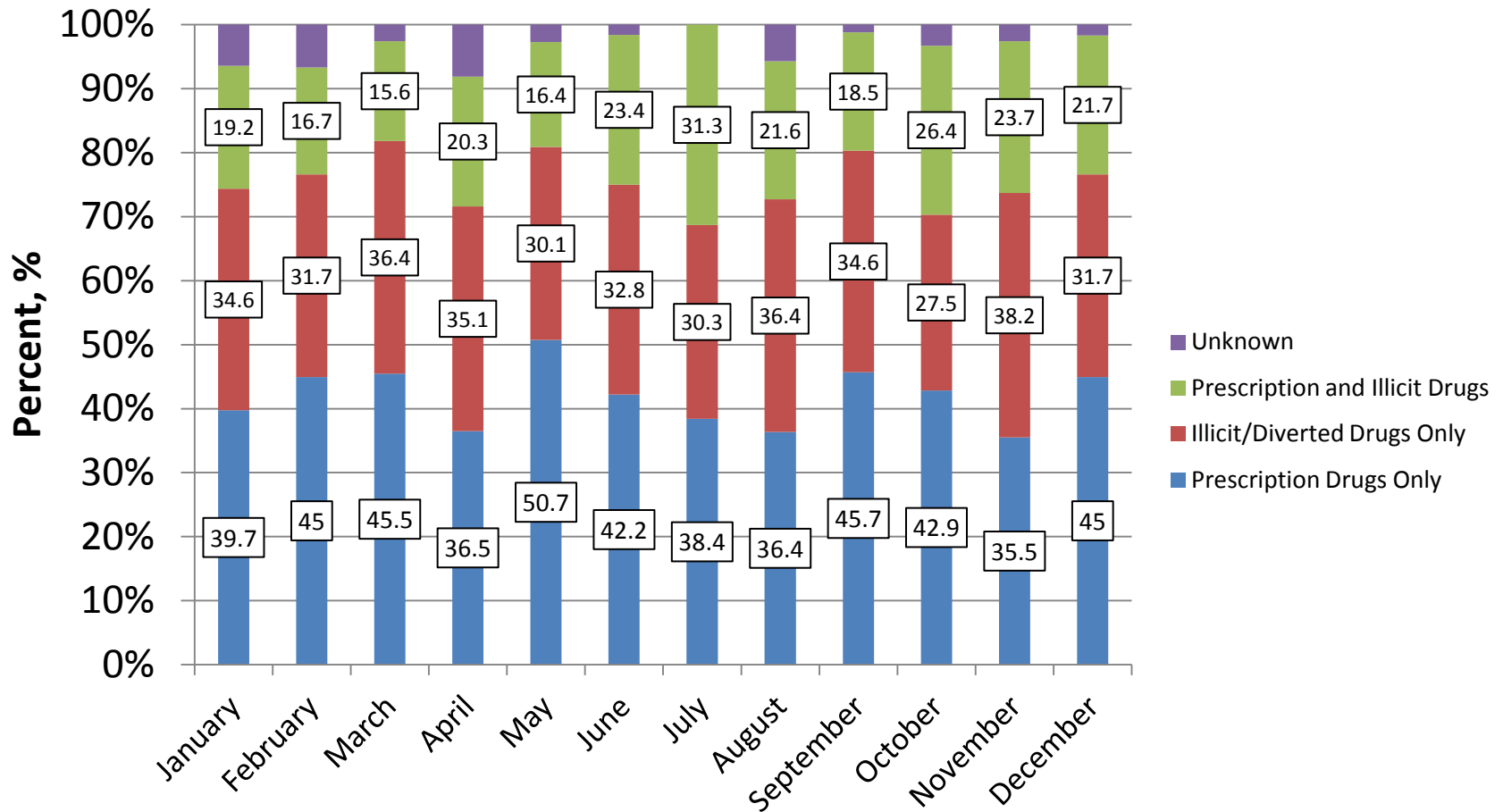
Source	Cases	Percent, %
Prescription Drugs Only	384	41.7
Illicit/Diverted Drugs Only	305	33.2
Prescription and Illicit Drugs	199	21.6
Unknown	32	3.5

Class of Prescription Drug\* Among Cases Exposed Only to Prescription Drugs\*



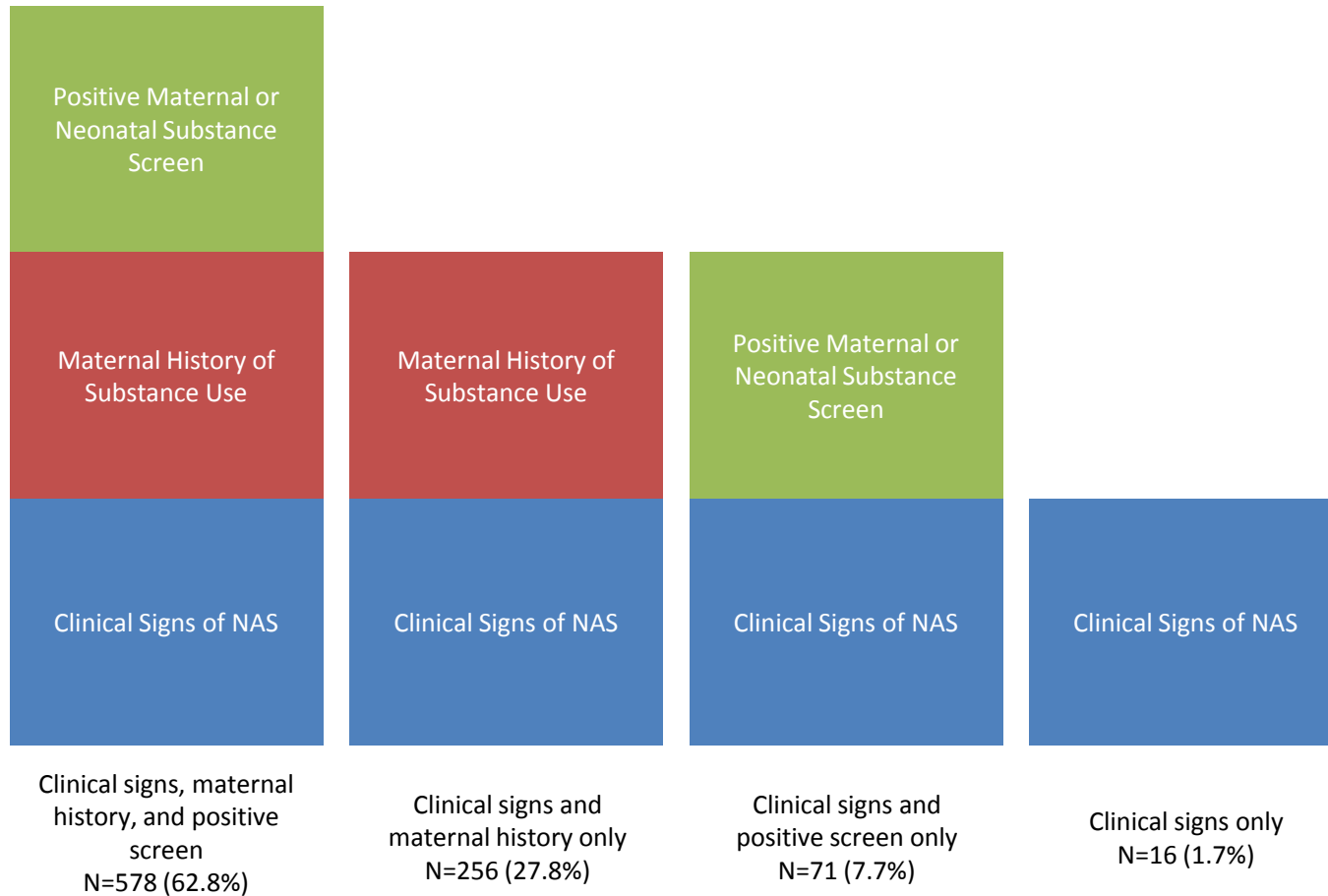
\*Percentages may not equal 100% as women may be exposed to drugs from more than one class

# Exposure Source Over Time

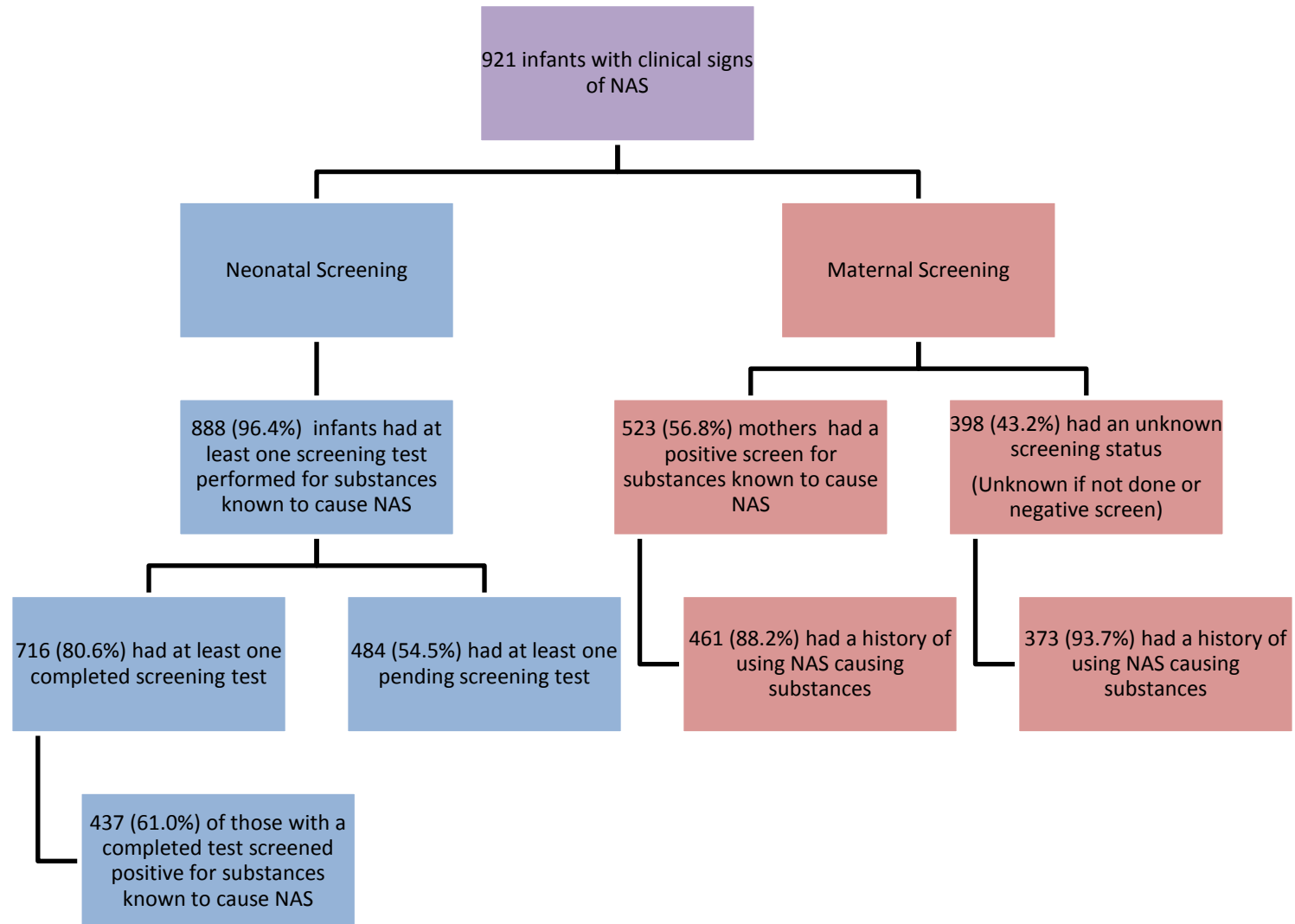


\*The change in exposure source over time was not statistically significant.

# Elements of Case Reporting



# Hospital Screening Patterns



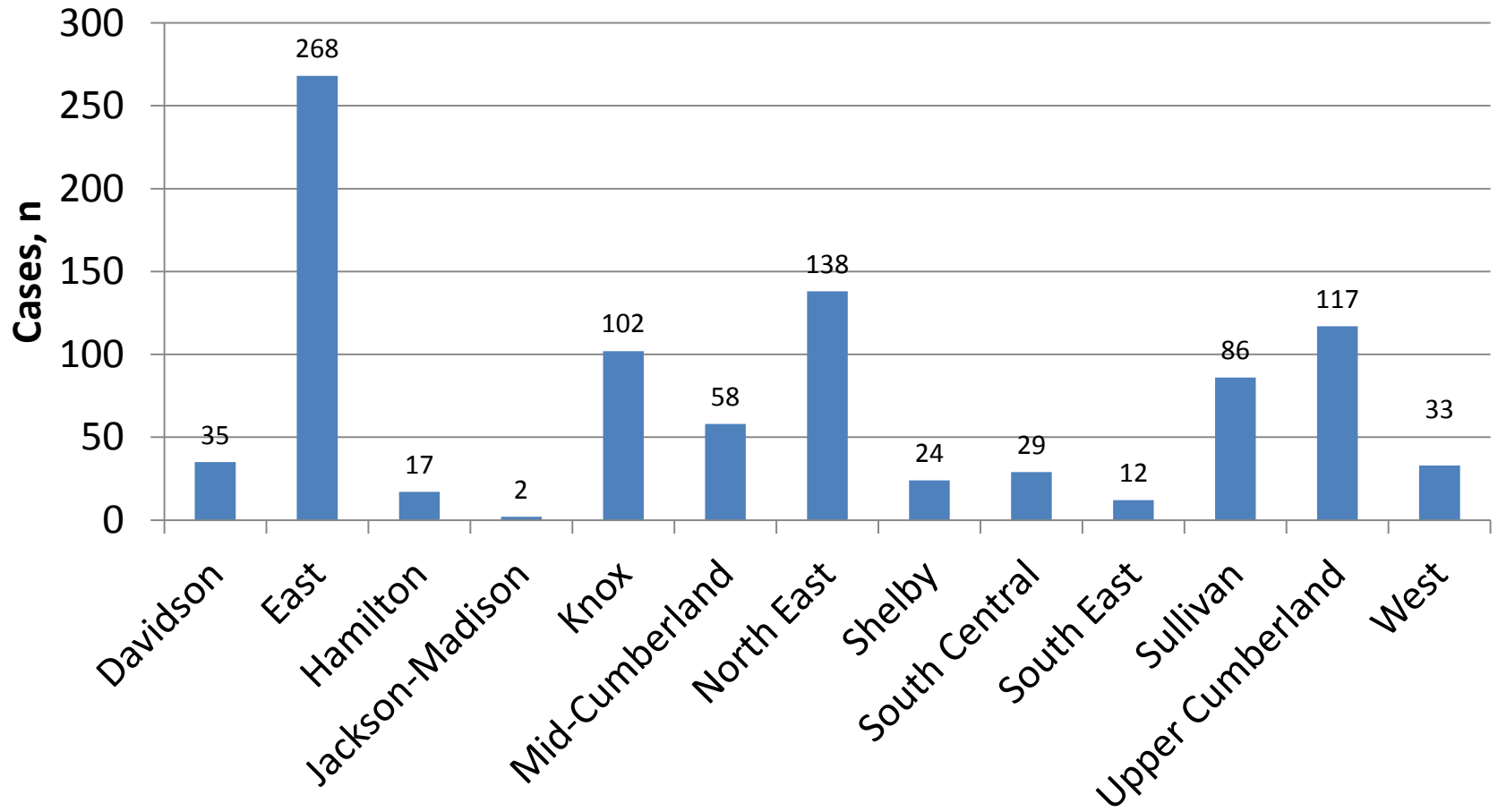
# Regional Data

NAS Incidence by Region  
Distribution of Cases by Region  
Region-Specific Rate by Month  
Exposure Source by Region  
Leading Sources of Exposure by Region

# Highlights—2013 Regional Data

- The highest rate of NAS cases (per 1,000 live births) observed in 2013 were in the East and Northeast regions of Tennessee, consistent with historical patterns
  - The **statewide rate was 11.6 cases per 1,000 live births**
  - There was no statistically significant change in rate throughout 2013 (at the state level or by region)
  - **Sullivan County had the highest rate, 54.7 per 1,000 live births, followed by the Northeast region (41.6 per 1,000) and the East Region (34.4 per 1,000)**
  - The **Upper Cumberland Region is ranked a close fourth, with 30.9 cases per 1,000 live births**
- Exposure source varied by region, with **“prescription drugs only”** being the most common source in most regions but **“illicit/diverted drugs only”** being more common in the East, Southeast, and Upper Cumberland regions.

# Annual Incidence, by Region





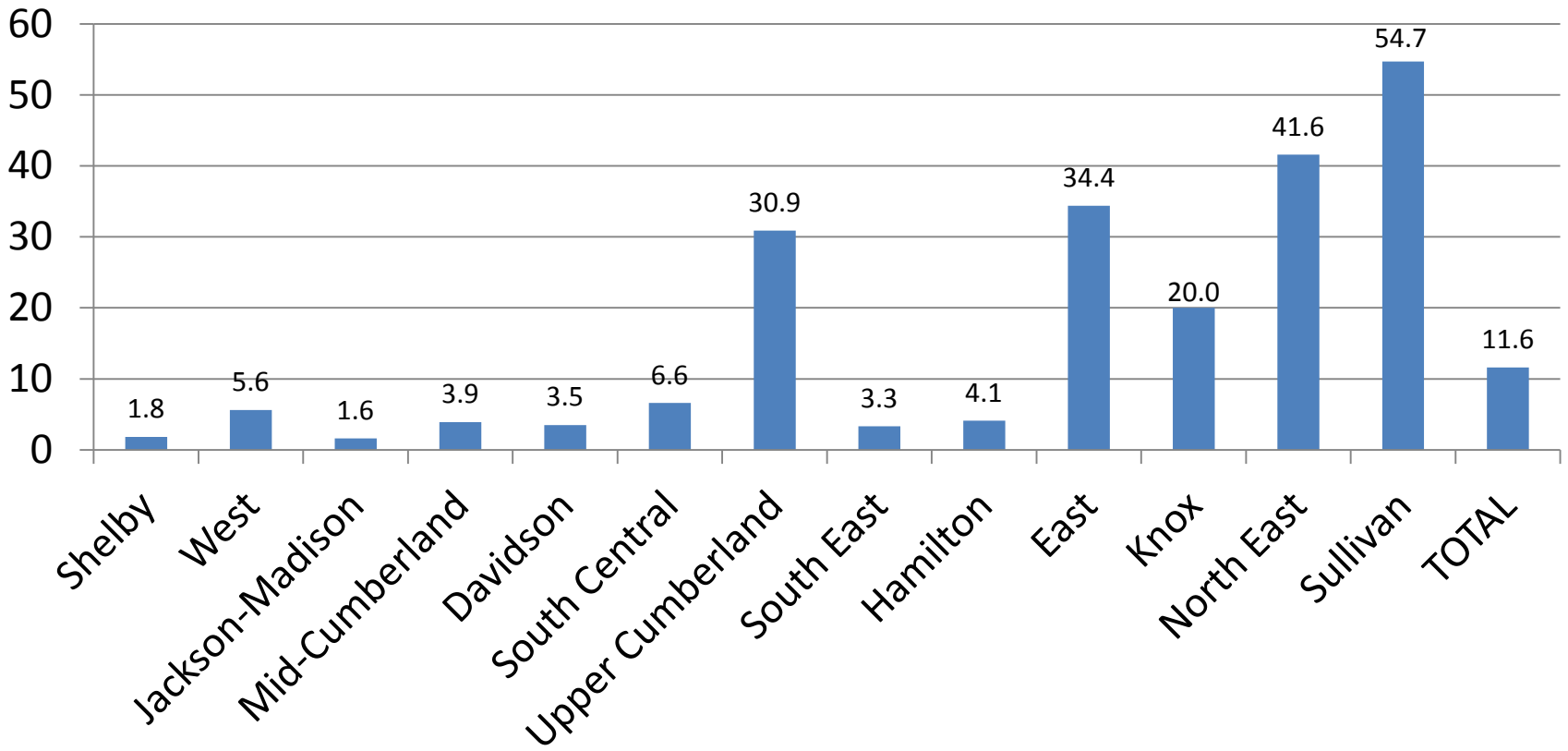
# Annual Incidence and Rate, by Region

Month	NAS Cases	Births*	Rate (per 1,000 births)
Davidson	35	9,889	3.5
East	268	7,795	34.4
Hamilton	17	4,139	4.1
Jackson/Madison	2	1,252	1.6
Knox	102	5,100	20.0
Mid-Cumberland	58	14,748	3.9
Northeast	138	3,321	41.6
Shelby	24	13,647	1.8
South Central	29	4,415	6.6
Southeast	12	3,663	3.3
Sullivan	86	1,571	54.7
Upper Cumberland	117	3,790	30.9
West	33	5,900	5.6
TOTAL	921	79,230	11.6

\*Provisional count of births, 2013

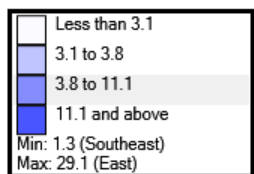
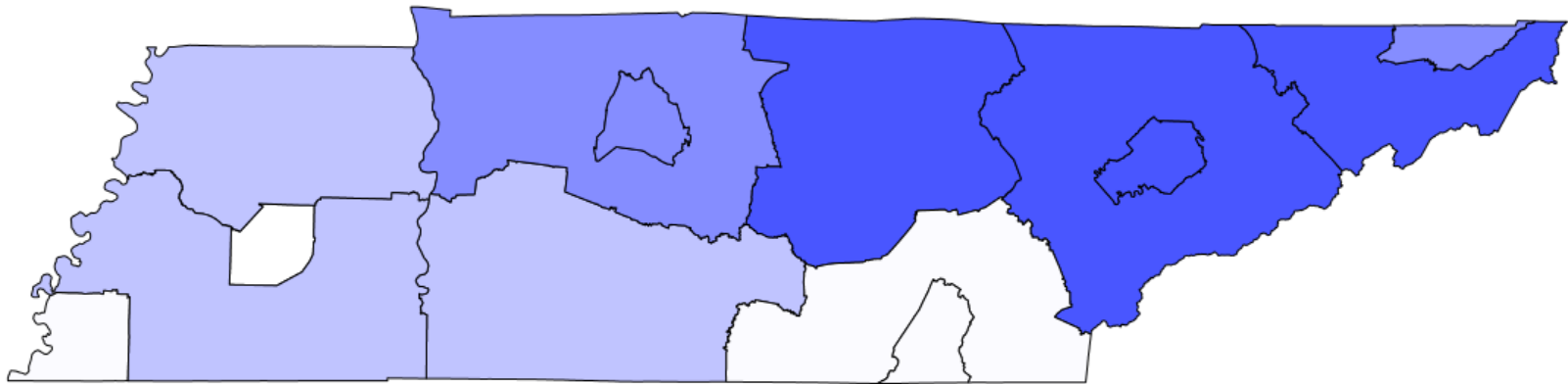
# Annual Rate, by Region

Rate per 1,000 births



# Distribution of NAS Cases by Region, 2013

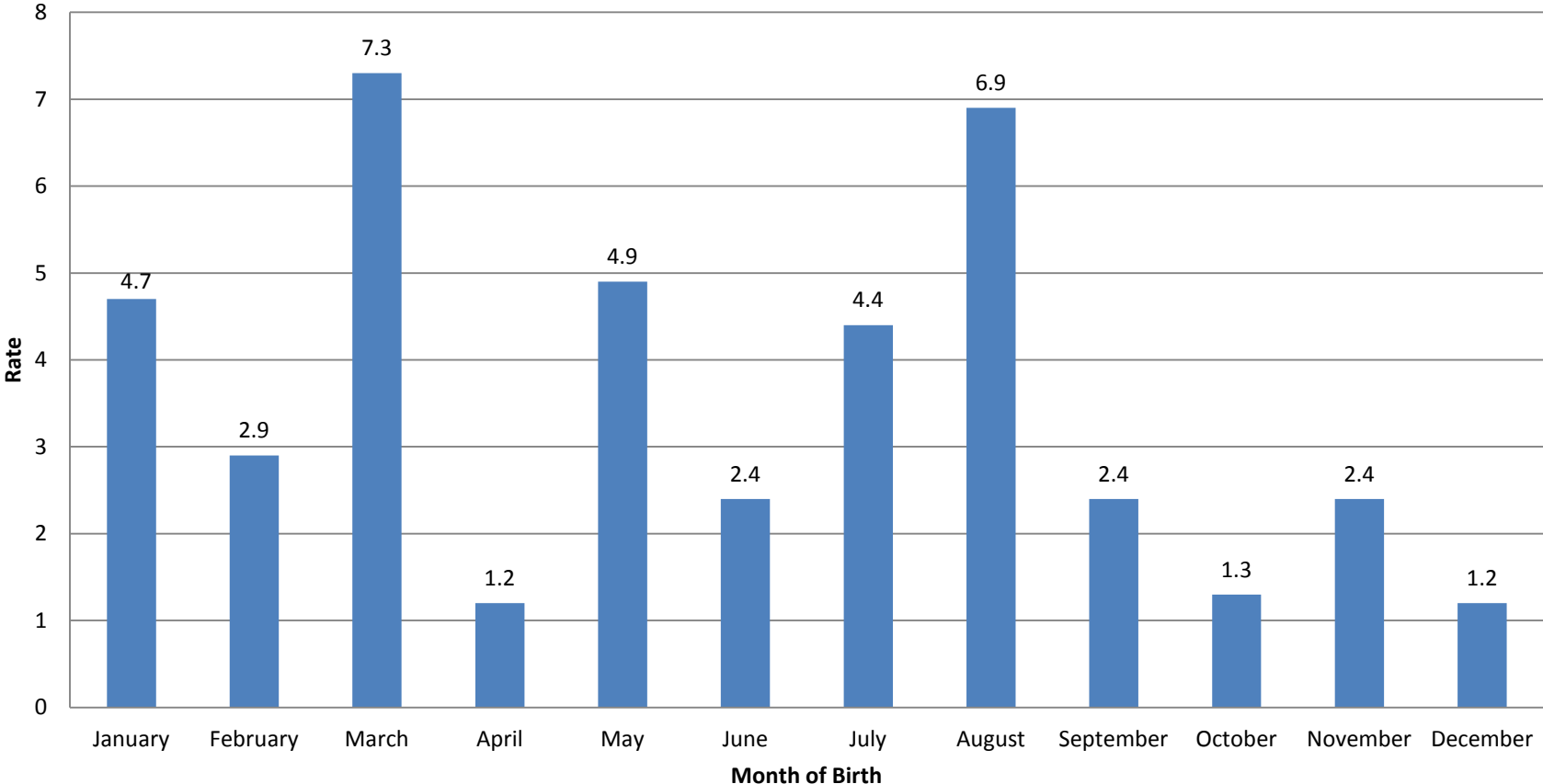
*As Percent of Total*



# Rate by Month, Davidson

## Davidson County

■ Rate per 1,000 live births

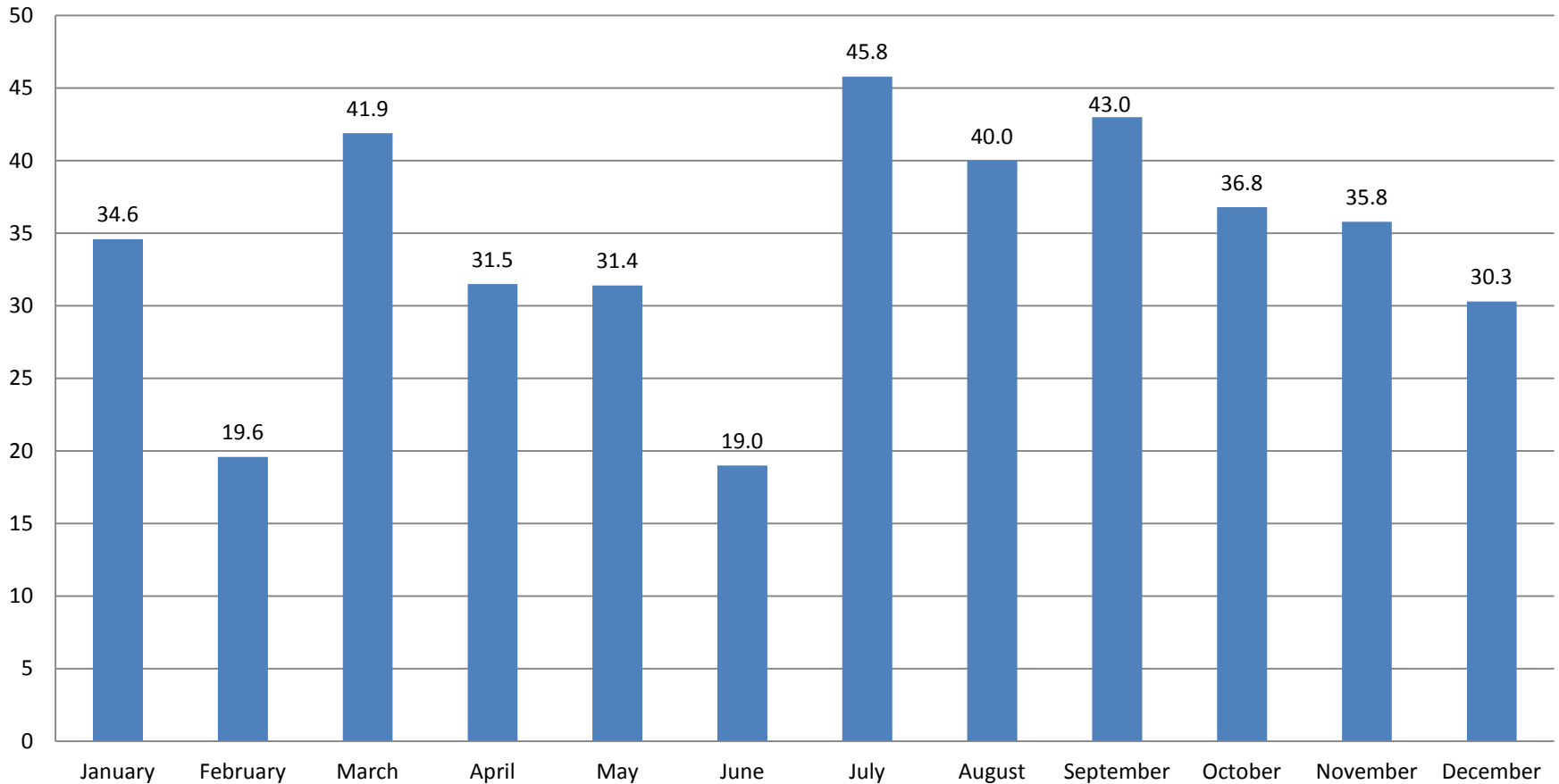


\*The change in monthly rate was not statistically significant for any region.

# Rate by Month, East

## East Region

■ Rate per 1,000 live births

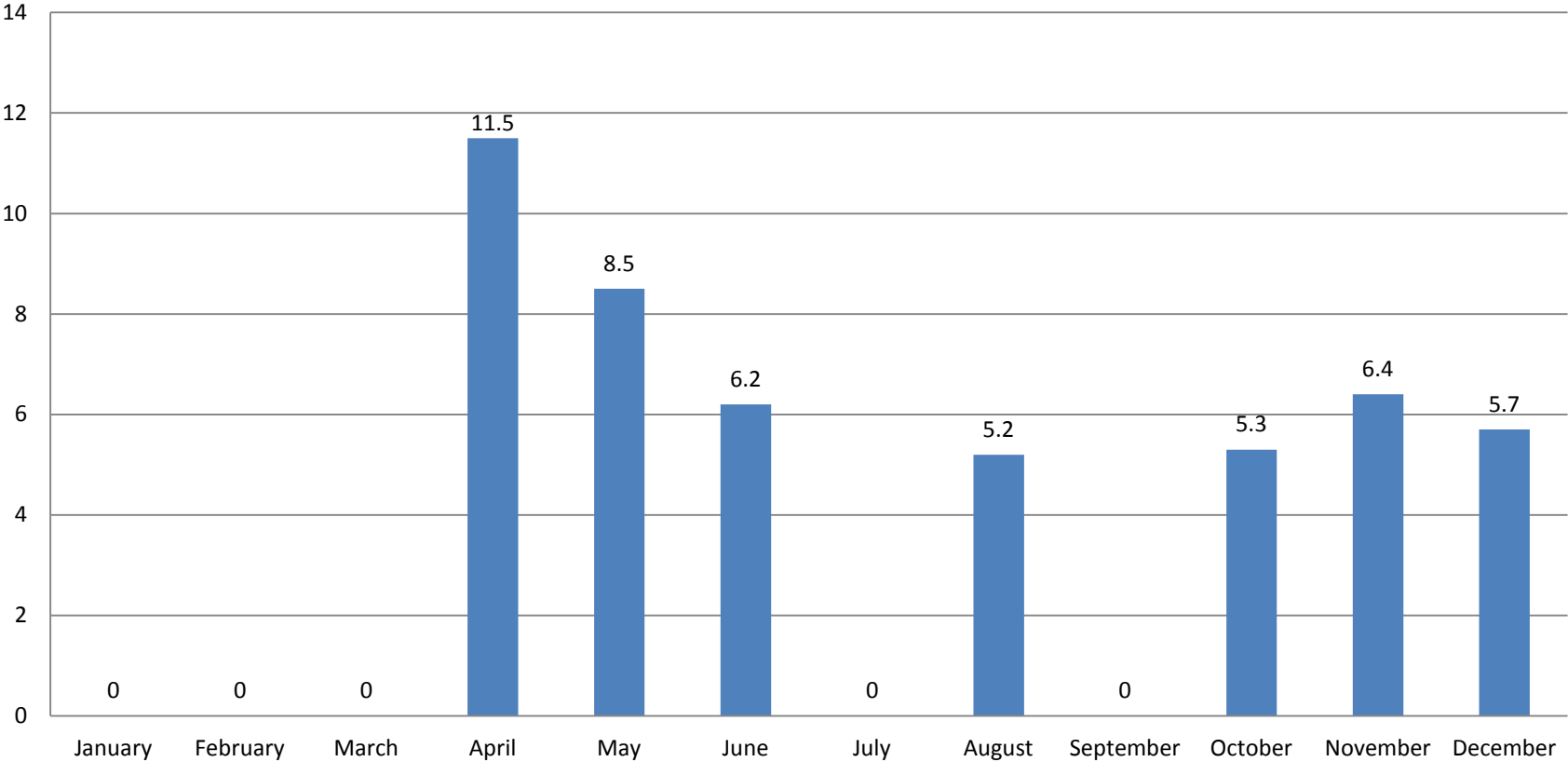


\*The change in monthly rate was not statistically significant for any region.

# Rate by Month, Hamilton

## Hamilton County

■ Rate per 1,000 live births

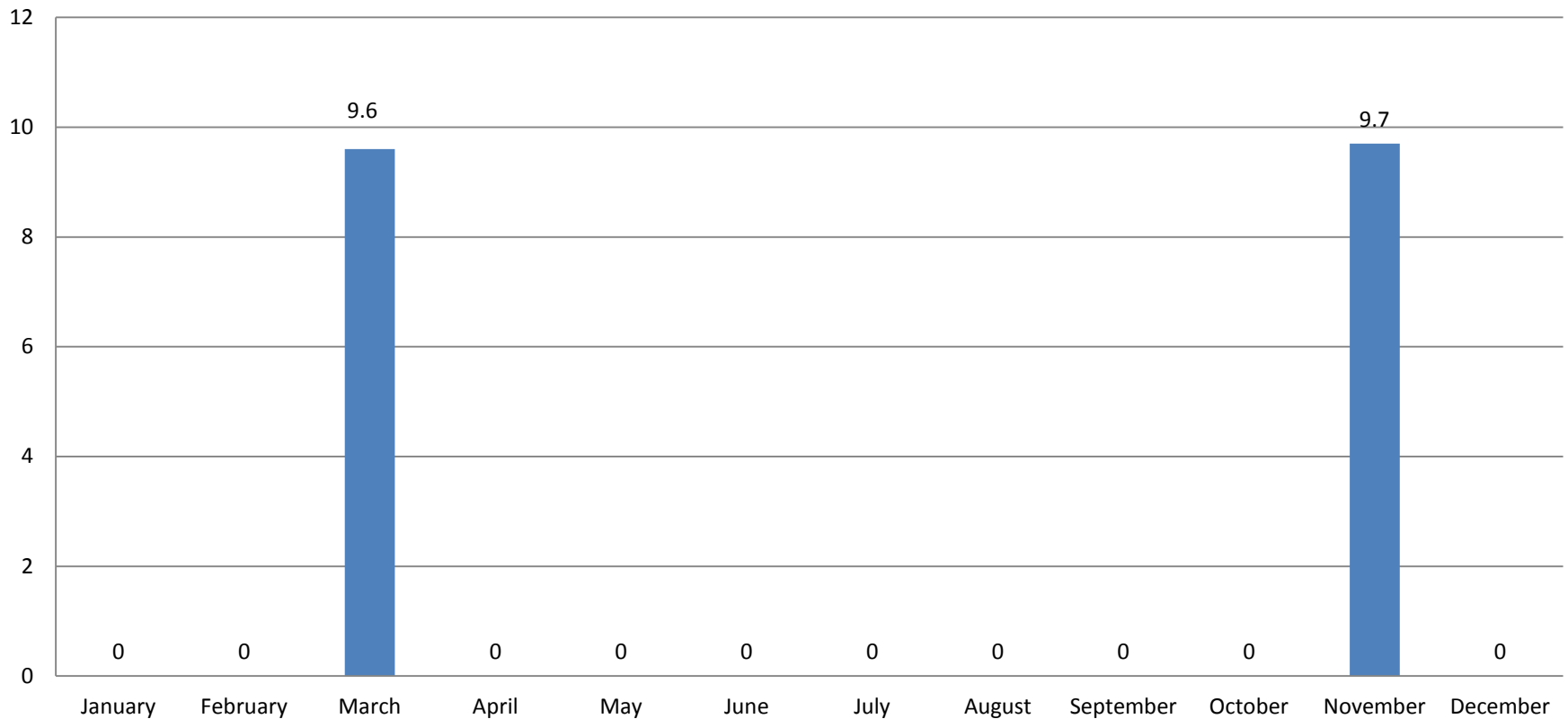


\*The change in monthly rate was not statistically significant for any region.

# Rate by Month, Jackson-Madison\*

## Jackson-Madison

■ Rate per 1,000 live births



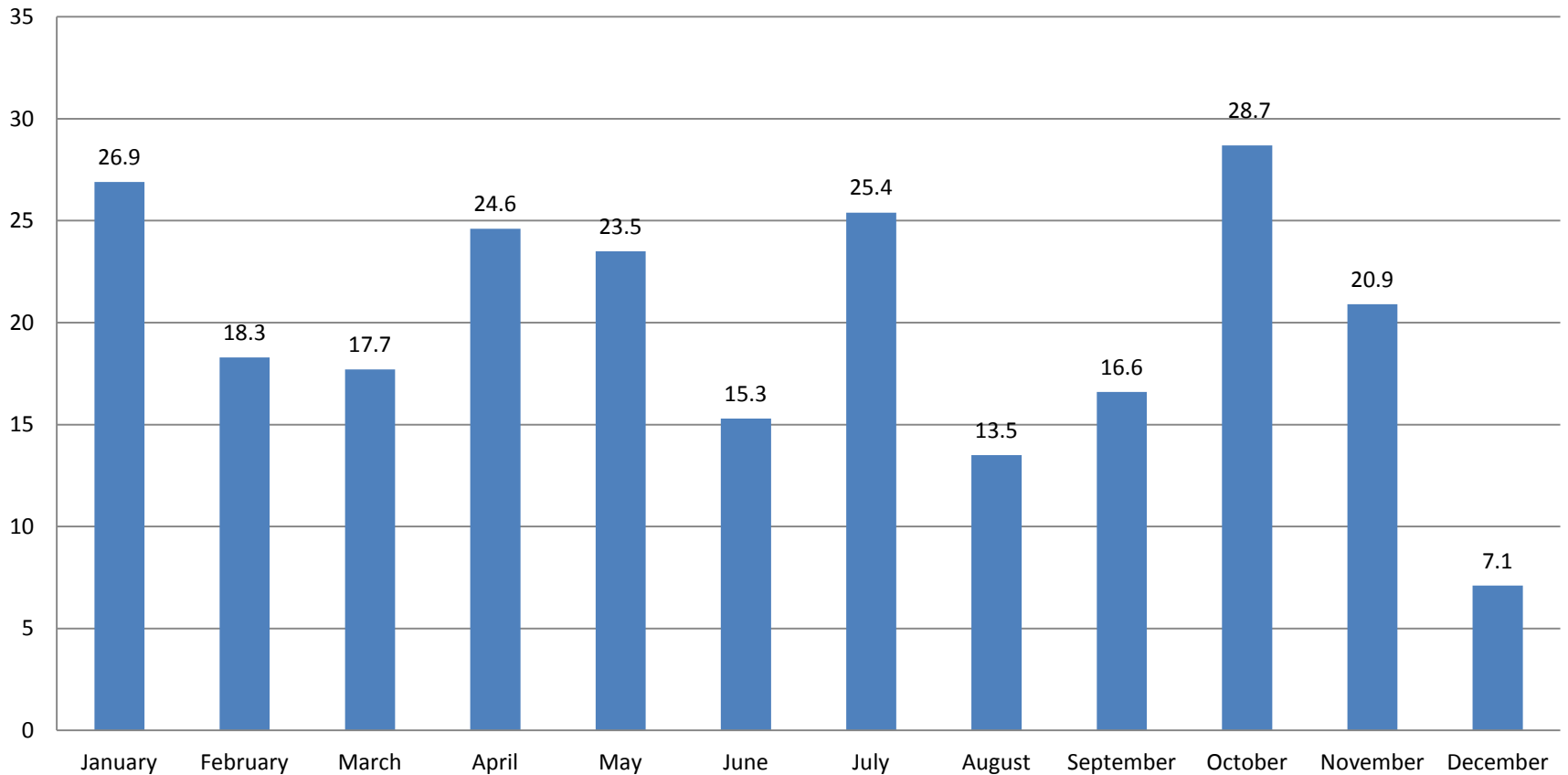
\*Only 2 NAS cases reported in 2013

The change in monthly rate was not statistically significant for any region.

# Rate by Month, Knox

## Knox County

■ Rate per 1,000 live births



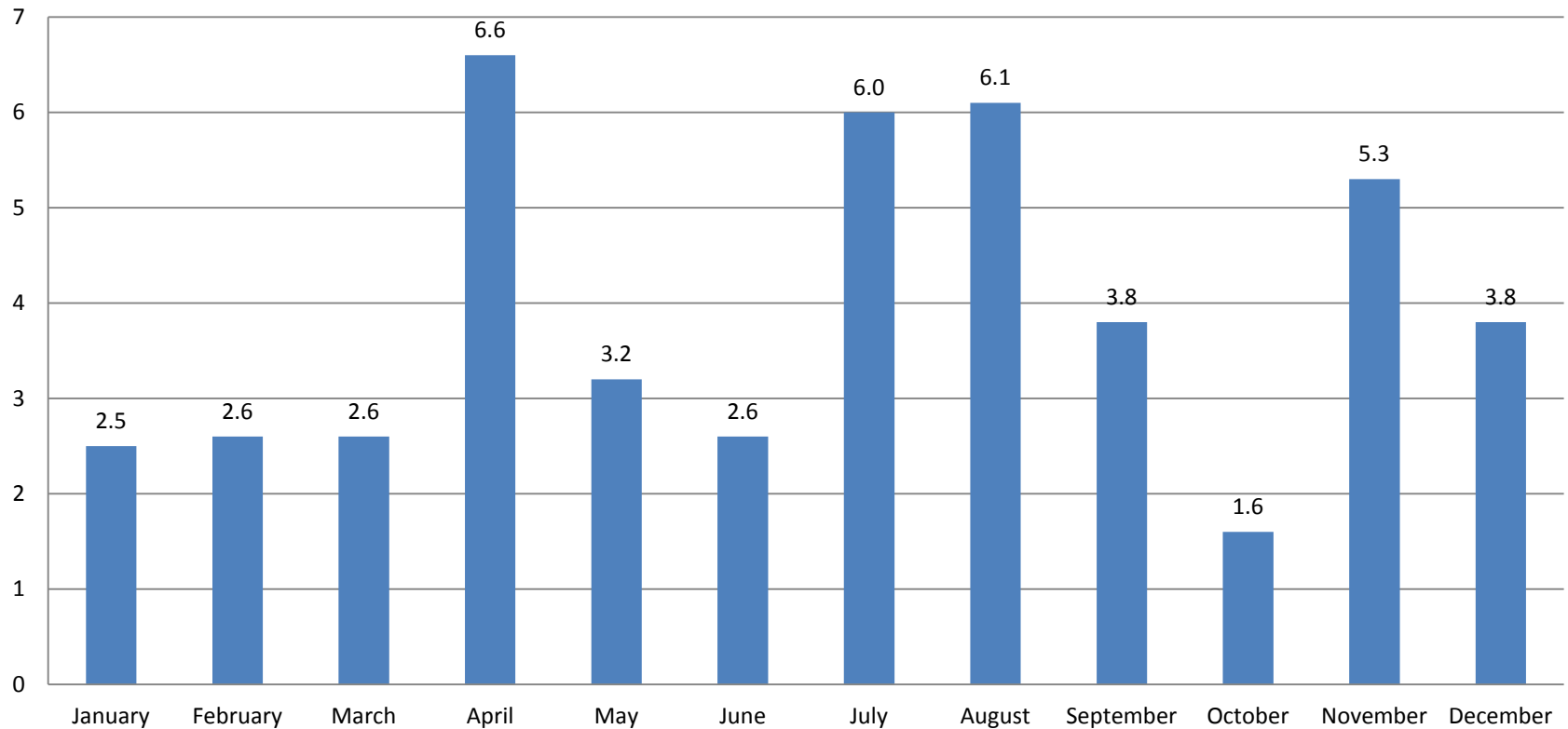
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# Rate by Month, Mid-Cumberland

## Mid-Cumberland Region

■ Rate per 1,000 live births

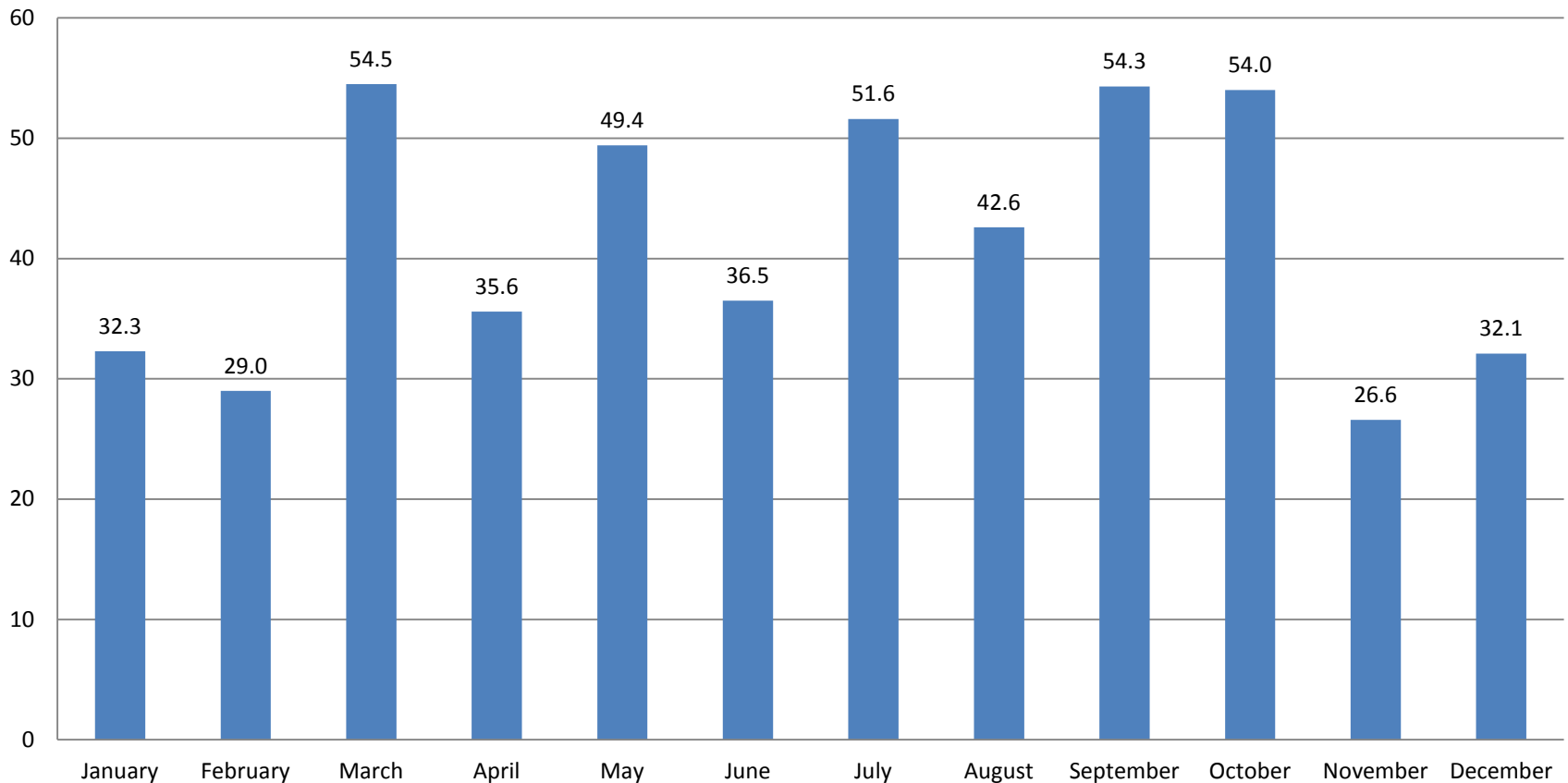


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# Rate by Month, North East

## North East Region

■ Rate per 1,000 live births

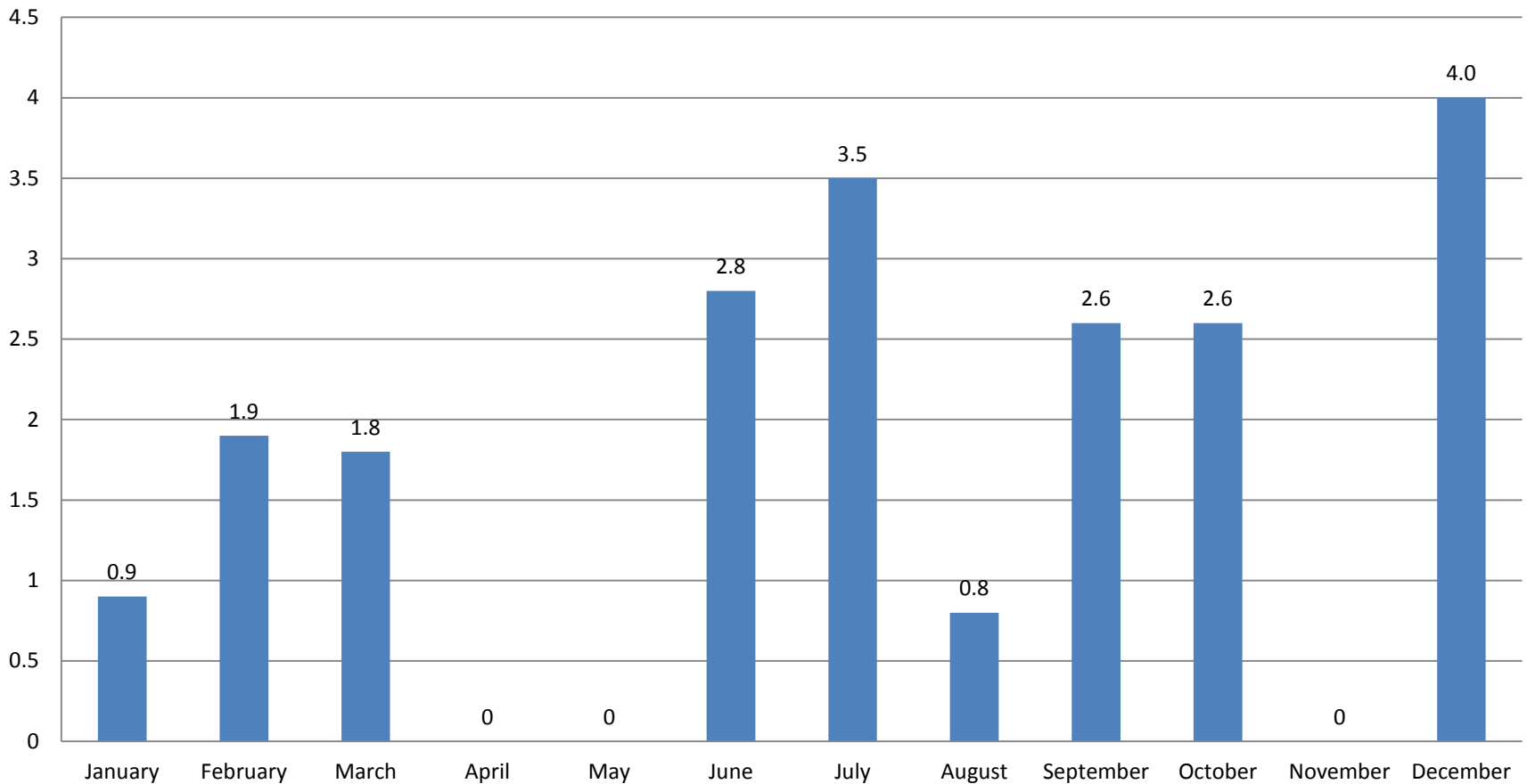


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# Rate by Month, Shelby

## Shelby County

■ Rate per 1,000 live births

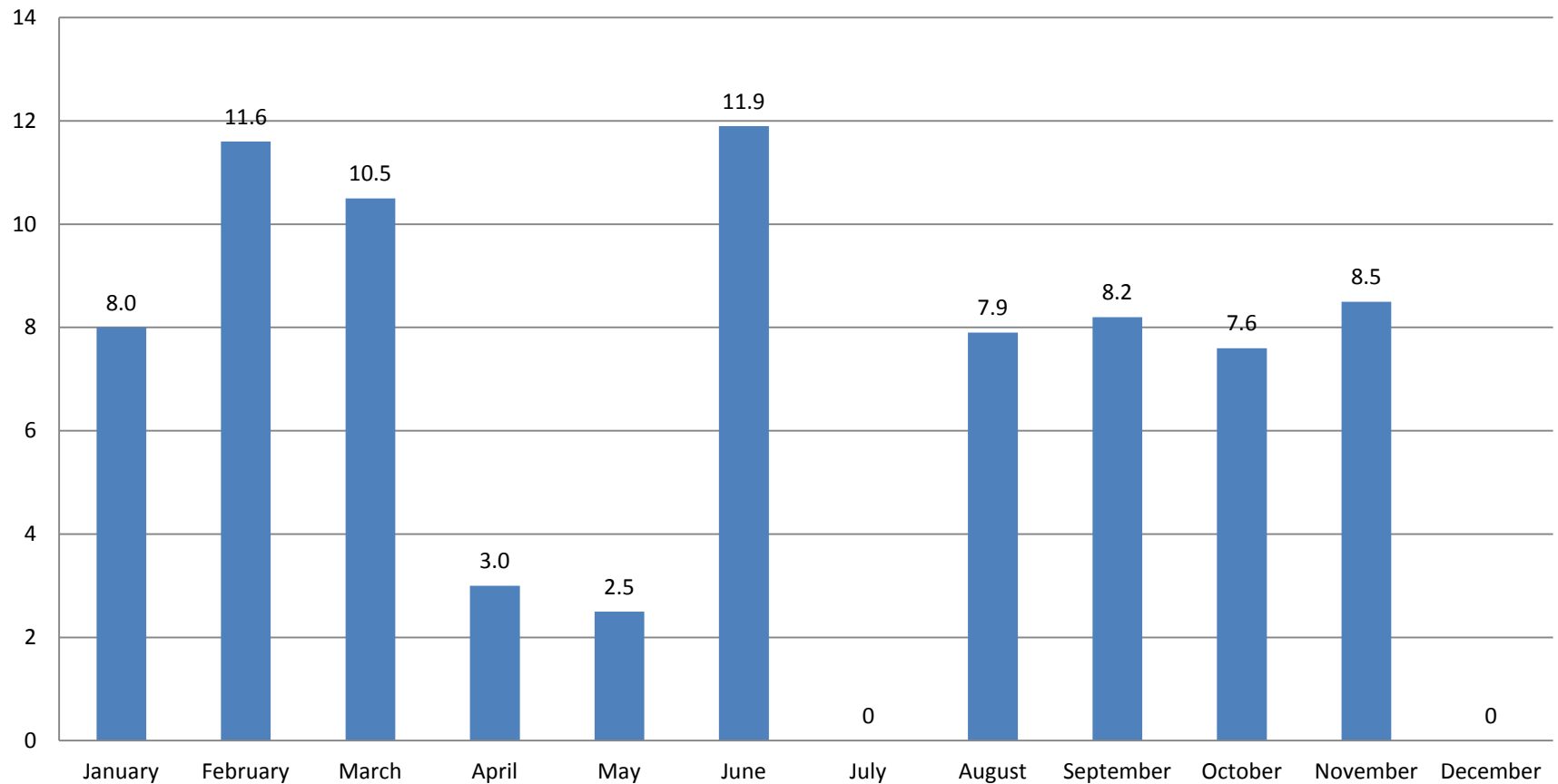


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# Rate by Month, South Central

## South Central Region

■ Rate per 1,000 live births

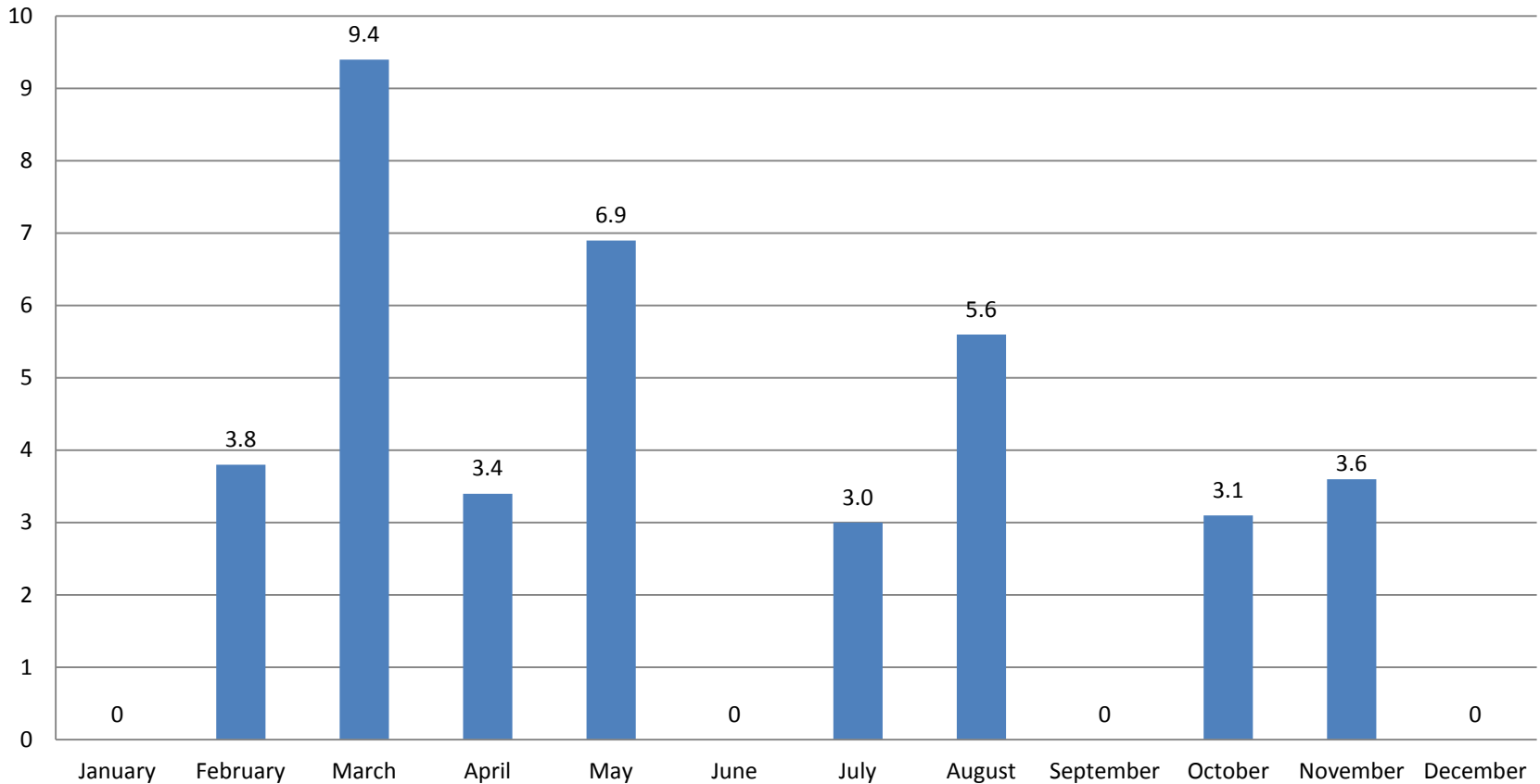


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# Rate by Month, South East

## South East Region

■ Rate per 1,000 live births

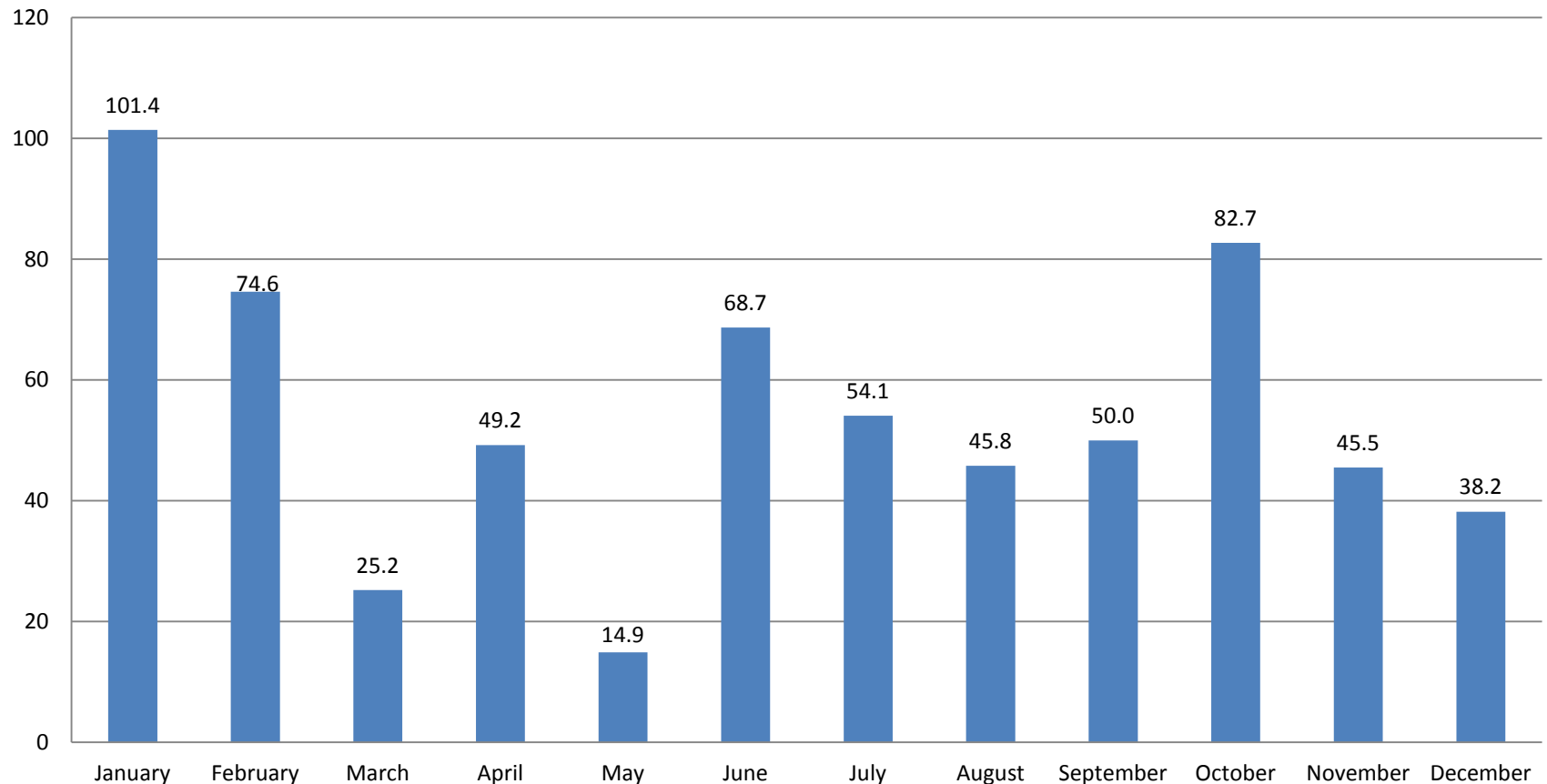


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# Rate by Month, Sullivan

## Sullivan County

■ Rate per 1,000 live births

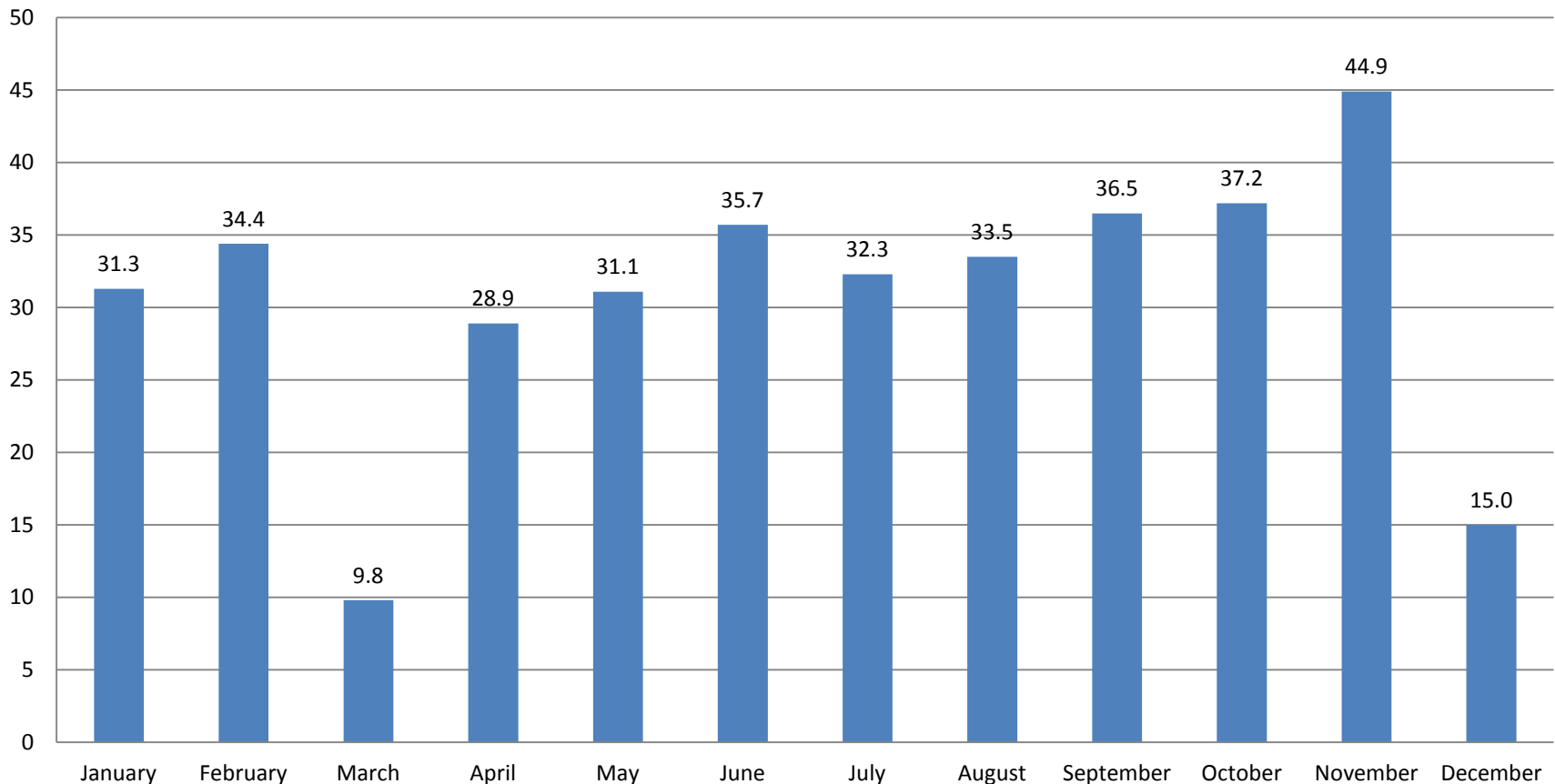


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# Rate by Month, Upper Cumberland

## Upper Cumberland Region

■ Rate per 1,000 live births

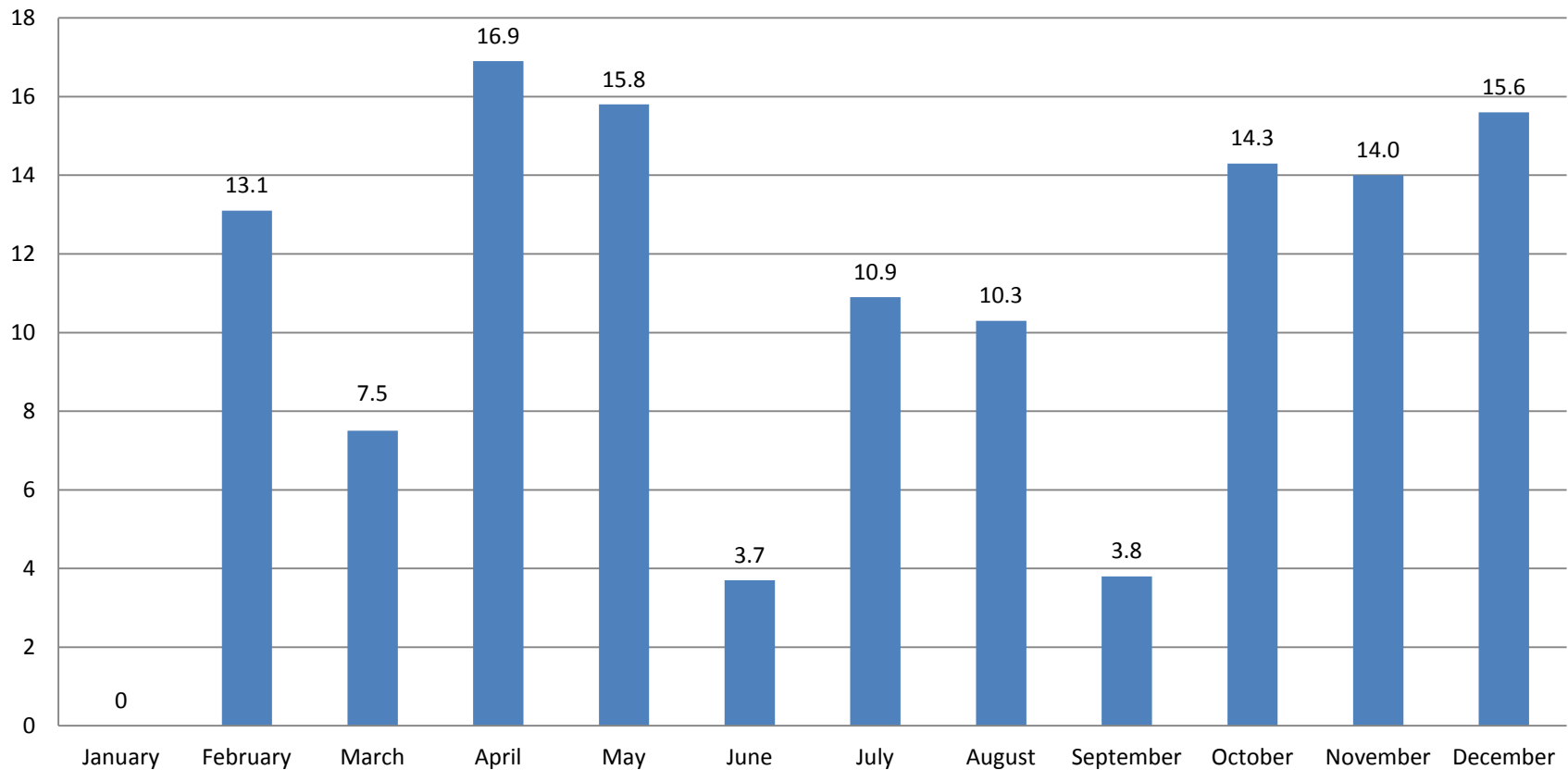


\*The change in monthly rate was not statistically significant for any region.

# Rate by Month, West

## West Region

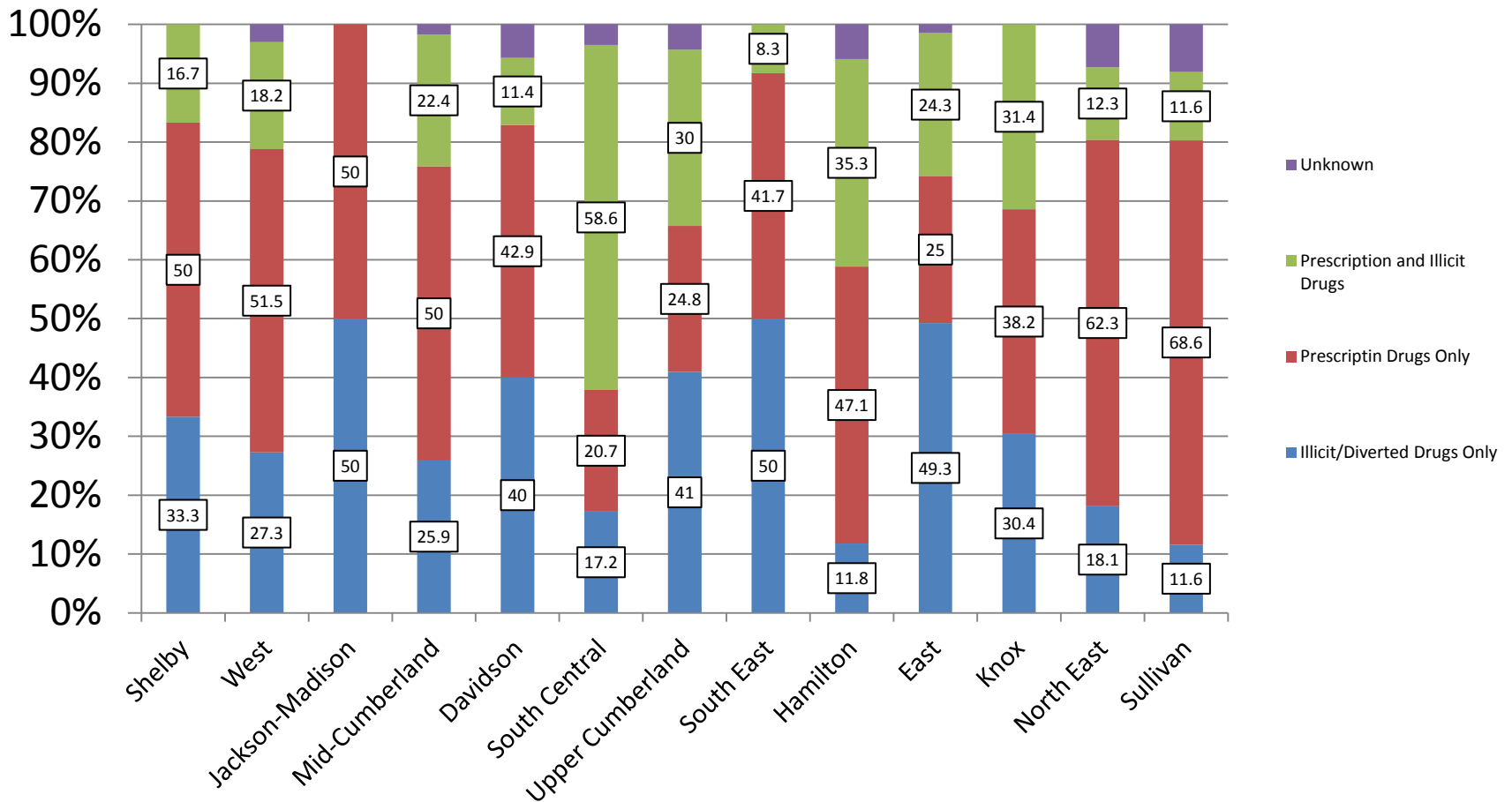
■ Rate per 1,000 live births



\*The change in monthly rate was not statistically significant for any region.



# Mutually Exclusive Categories of Exposure



*\*The distribution of exposure source is statistically significant by region; P<0.0001.*

# Leading Source of Exposure by Region

Region	Prescription Drugs Only	Illicit/Diverted Drugs	Prescription and Illicit Drugs	Unknown
Shelby	*			
West	*			
Jackson-Madison	*	*		
Mid-Cumberland	*			
Davidson	*			
South Central	*			
Upper Cumberland		*		
South East		*		
Hamilton	*			
East		*		
Knox	*			
North East	*			
Sullivan	*			

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- This report was prepared by Angela Miller, PhD, MSPH and Michael Warren, MD, MPH.
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