Tracking the Surge: Rising Trends in Congenital Syphilis From 2019-2024 and The Impact on Neonatal Health

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No financial or commercial relationships to disclose.

Presentation Overview

1. Background
2. Current Literature & Study Contributions
3. Project Overview
4. Methods
5. Results & Discussion

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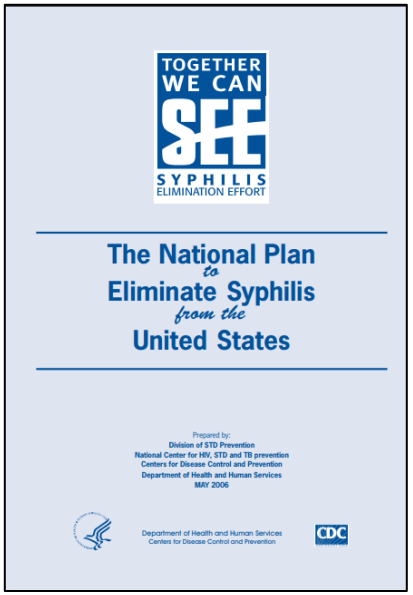
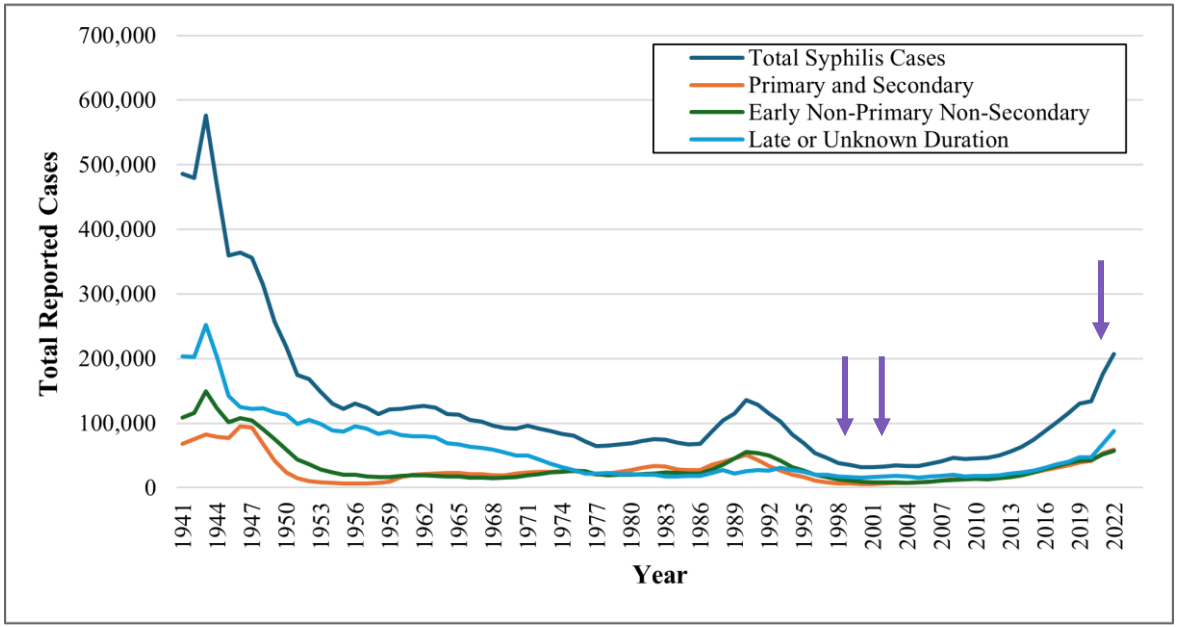
The National Plan to Eliminate Syphilis - 1999



Syphilis Elimination Goal	Syphilis Elimination Strategies
1. **Investment in, and enhancement of, public health services and interventions.** Public health services will achieve excellence in the diagnosis, management and reporting of syphilis and its adverse outcomes, especially those at greatest risk of health disparities.	1. Improve and enhance syphilis surveillance and outbreak response 2. Improve and quality assure clinical and partner services 3. Improve and quality assure laboratory services
2. **Prioritization of evidence-based, culturally competent interventions.** Public health services will improve the advocacy, acceptability and appropriateness of their response to syphilis epidemics through the creation of productive and proactive partnerships with external stakeholders.	1. Mobilization of affected communities 2. Tailoring intervention strategies for affected populations 3. Mobilization of, and creating alliances with health care providers
3. **Accountable services and interventions.** Public health services will improve the effectiveness of their interventions by improving accountability for their planning, implementation, and evaluation.	1. Training and staff development 2. Evidence-based action planning, monitoring, and evaluation 3. Research and development

What has happened since then?



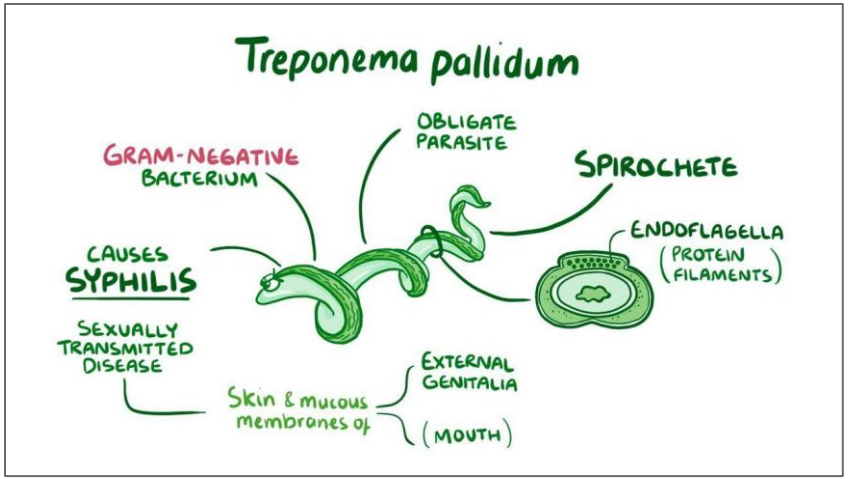
Centers for Disease Control and Prevention: Sexually Transmitted Infections Surveillance [2022]. Atlanta: US Department of Health and Human Services

After reaching historic lows in 2001, rates of primary and secondary syphilis have increased nearly every year since.

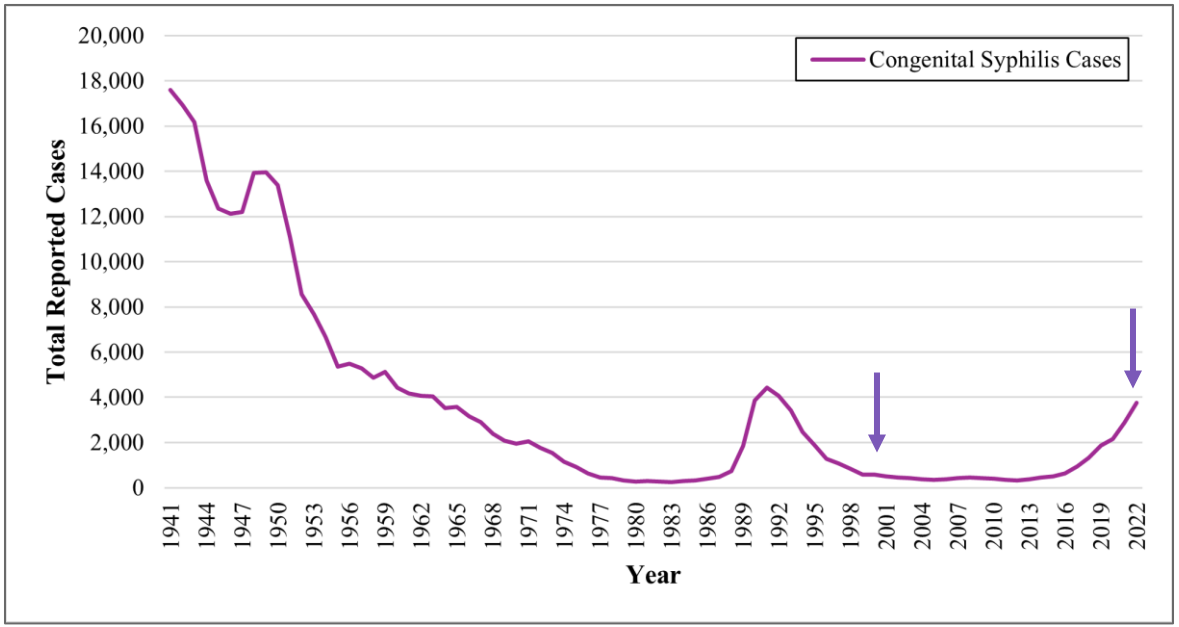
In 2022, the CDC reported 207,255 cases, an 80% increase from 2018.

Etiology of Congenital Syphilis (CS)

- **Transmission of bacterium *Treponema pallidum* during pregnancy or at birth**
- **Transplacental transmission can begin in 9/10th week of gestation, and with any stage of disease**
  - Fetal abnormalities worse after ~20 weeks gestation occurring from inflammatory response – Kassowitz rule



Congenital Syphilis - where are we at now?



Centers for Disease Control and Prevention: Sexually Transmitted Infections Surveillance [2022]. Atlanta: US Department of Health and Human Services

Rates of congenital syphilis have increased by more than 250% since 2017.

51% tested positive for syphilis in pregnancy and did not receive appropriate or timely treatment.

37% resulted from people who did not have prenatal care.

Why does this matter?

Previous studies have highlighted CS infection as being associated with…

Negative birth outcomes, including:

- Stillbirth, premature birth, low birth weight

Neonatal/early infancy sequelae:

- Jaundice, hydrocephalus, sensorineural hearing loss, cerebral palsy, intellectual disability, musculoskeletal deformities, among others

Late >2 years:

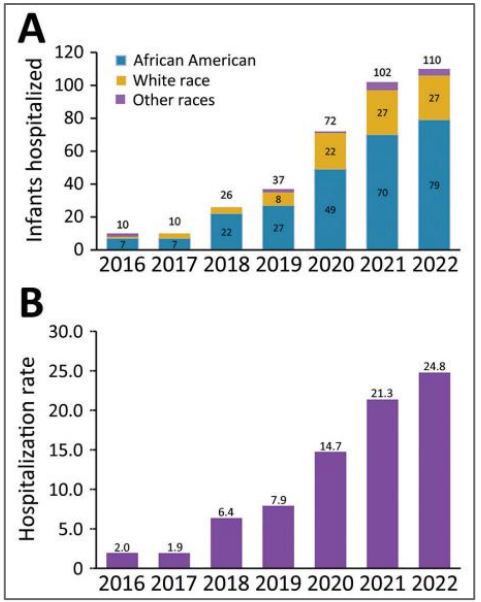
- Adverse sequelae related to bones, teeth, eyes, skin

Current Literature

Spike in Congenital Syphilis, Mississippi, USA, 2016–2022

Manuela Staneva, Charlotte V. Hobbs, Thomas Dobbs

- **367 infants hospitalized with a CS diagnosis:**
  - 93% were covered by Medicaid
  - 71% were African-American/Black
  - 58% were nonurban residents
- **Newborns with CS had higher odds of:**
  - Affected by maternal illicit drug use
  - Prematurity (<37 weeks)
  - Very low birthweight (<1,500 g)



Staneva et al., 2023

Study Contributions

This present study addresses the gap in contemporary nationwide research on patient- and hospital-level outcomes among those born with CS by examining nationwide demographics, risk factors, and neonatal outcomes from 2019 to 2024, while incorporating a vulnerability index to identify social needs and barriers to healthcare at a neighborhood level.

What does this study contribute?

- Large clinical data base representing 98% of AMCs and over 1,350 member hospitals participating
- Data recency – 2019-2024
- Examining an array of adverse perinatal outcomes, alongside relevant risk factors

Learning Outcomes

- ✓ **Identify index encounters and trends of CS cases in children under 24 months.**
- ✓ **Compare characteristics of those with and without CS diagnoses.**
- ✓ **Evaluate predictors of CS and assess in-hospital outcomes among a delivery subcohort.**

Vizient® Clinical Data Base (CDB)

Comprehensive Database

Discharge and line-item, patient-level data from Vizient® members

1,350+ Hospitals

Vizient Clinical Data Base; **98%** of all AMCs, **850+** community hospitals

Transparent Clinical Data

Drill into data by hospital name and benchmark outcomes across Clinical Data Base members

- **14M** inpatient encounters and **240M** outpatient encounters a year for all ages per year
- **2M** pediatric inpatient encounters (including births) and **23M** pediatric outpatient encounters per year
- Over **120** freestanding children's hospitals and hospitals within a hospital

Methods

Study Period: January 2019-December 2024

Inclusions: Any index pediatric inpatient encounter among persons aged 0-24 months from 777 continuously reporting institutions in the Vizient CDB

Delivery cohort:

- Age at admission 0-3 days
- Presence Z38.XX ICD-10-CM code

Congenital syphilis cases: Presence of A50.XX ICD-10-CM code

Neonatal outcomes: Identified using ICD-10-CM codes

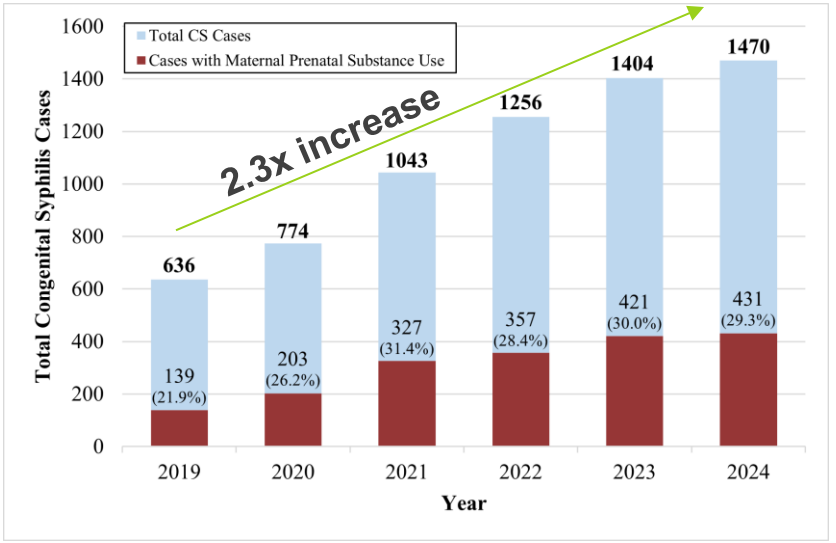
Vizient Vulnerability Index™: Vulnerability index leveraged to examine ZIP code level vulnerability (low, average, high)

Methods

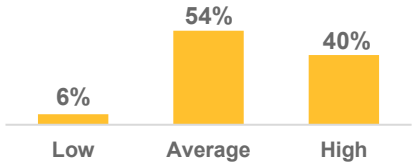
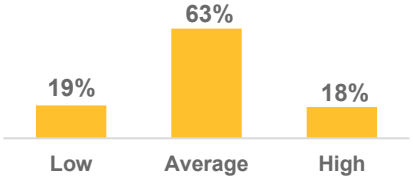
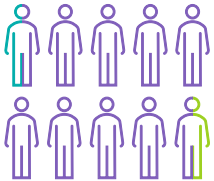
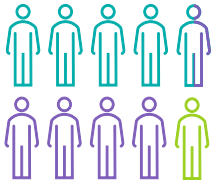
Using the Vizient Clinical Data Base, we identified 6,745,335 unique index patient encounters among persons aged 0-24 months discharged between 2019 and 2024.

Among these, 6,583 (0.1%) had a congenital syphilis diagnosis.

- An increase in prevalence from 0.05% in 2019 to 0.13% in 2024 among the entire study population
- 1,471 (28%) had maternal prenatal substance use, with a significant increase over time



Distribution of CS Cases from 2019-2024

Congenital Syphilis (n=6,583)	No Congenital Syphilis (n=6,738,752)
Race Distribution 36% White 36% Black 1% Asian 21% Other 6% Unknown 	**Race Distribution** 52% White 16% Black 5% Asian 17% Other 11% Unknown 
Vizient Vulnerability Index Category 	**Vizient Vulnerability Index Category** 
Primary Payer  6% Commercial/Private 87% Medicaid 7% Other	**Primary Payer**  48% Commercial/Private 46% Medicaid 7% Other

Among the delivery subcohort:

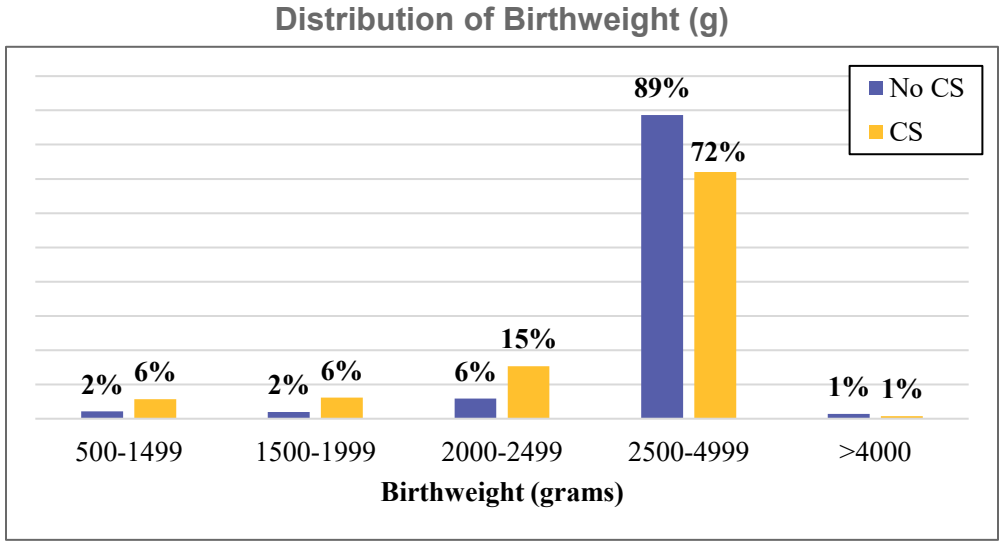
5,313 CS cases identified among those 0-3 days old and with a Z38 ICD code

Prematurity & In-Hospital Outcomes

N (%); Median (IQR)	CS (n=5,313)	No CS (n=6,194,796)	P-value
Preterm			*<0.001*
<27 weeks	85 (1.6%)	37,633 (0.6%)	
27-30 weeks	212 (4.0%)	56,536 (0.9%)	
31-33 weeks	343 (6.5%)	111,648 (1.8%)	
34-36 weeks	963 (18.1%)	474,501 (7.7%)	
Length of stay (days)	11.0 (10.0, 15.0)	2.0 (2.0, 3.0)	*<0.001*
ICU (any)	2,817 (53.0%)	573,413 (9.3%)	*<0.001*
ICU length of stay (days)	10.0 (4.0, 13.0)	4.0 (1.0, 14.0)	*<0.001*
In-hospital mortality	36 (0.7%)	23,888 (0.4%)	*<0.001*

Among the delivery subcohort:

5,313 CS cases identified among those 0-3 days old and with a Z38 ICD code



Note. Birthweight abstracted where available for all newborns.

Among the delivery subcohort, adverse neonatal outcomes differ by CS infection

N (%)	Congenital Syphilis (n=5,313)	No Congenital Syphilis (n=6,194,796)	aOR (95% CI)
Hepatosplenomegaly	26 (1%)	228 (<0.1%)	98.95 (64.94-150.77)*
Neonatal withdrawal syndrome	622 (12%)	33,653 (1%)	15.67 (14.35-17.11)*
Hydrops fetalis	42 (1%)	2,700 (<0.1%)	14.25 (10.47-19.39)*
Maternal prenatal substance use	1,471 (28%)	113,623 (2%)	11.74 (11.02-12.50)*
Microcephaly	172 (3%)	18,162 (<1%)	7.03 (6.03-8.20)*
Meningitis	22 (<1%)	2,644 (<0.1%)	6.28 (4.12-9.57)*
Congenital renal failure	32 (1%)	5,077 (0.1%)	5.10 (3.59-7.23)*
Necrotizing enterocolitis	56 (1%)	10,308 (<1%)	4.01 (3.08-5.23)*
Pseudoparalysis	74 (1%)	26,511 (<1%)	2.85 (2.26-3.59)*
Newborn respiratory distress	1,369 (26%)	605,648 (10%)	2.77 (2.60-2.95)*
Hemolytic anemia	8 (<1%)	3,038 (0.1%)	2.56 (1.28-5.14)*
Jaundice	1,729 (33%)	1,047,940 (17%)	2.27 (2.15-2.41)*
Slow intrauterine growth	61 (1%)	29,045 (1%)	1.93 (1.50-2.49)*

Multivariable logistic regression models adjusted for age, sex, race, ethnicity, payer, Vizient Vulnerability Index, teaching and rural status.

Strengths

- Large clinical data base - for this study, 777 continuously reporting hospitals provided data from all regions in the United States
- Sample size and validated coding allows us to examine potentially rare adverse outcomes
- Multiple primary payer types and a diverse sample set
- Recent data – through 2024

Limitations

- Did not link to maternal records to examine prenatal screening/treatment
- Unable to track across multiple institutions, which may affect insights on continuity of care
- Limited to conditions occurring during the index encounter – with limited historical information

Conclusions & Future Directions

Our findings highlight the resurgence of cases and exacerbation of negative clinical outcomes associated with CS, suggesting a severe clinical and public health burden. This reflects on individual health, but predominately implies a larger systemic issue affecting neonatal care.

While the majority of states (42 and DC) require screening at the first pregnancy visit, only 23 mandate a third-trimester screening, including 5 that screen only for those at increased risk.

The rising CS cases impose substantial costs on hospital resources and finances, and the extreme clinical outcomes associated with CS underscore the urgency of addressing this public health issue.

Let’s work together

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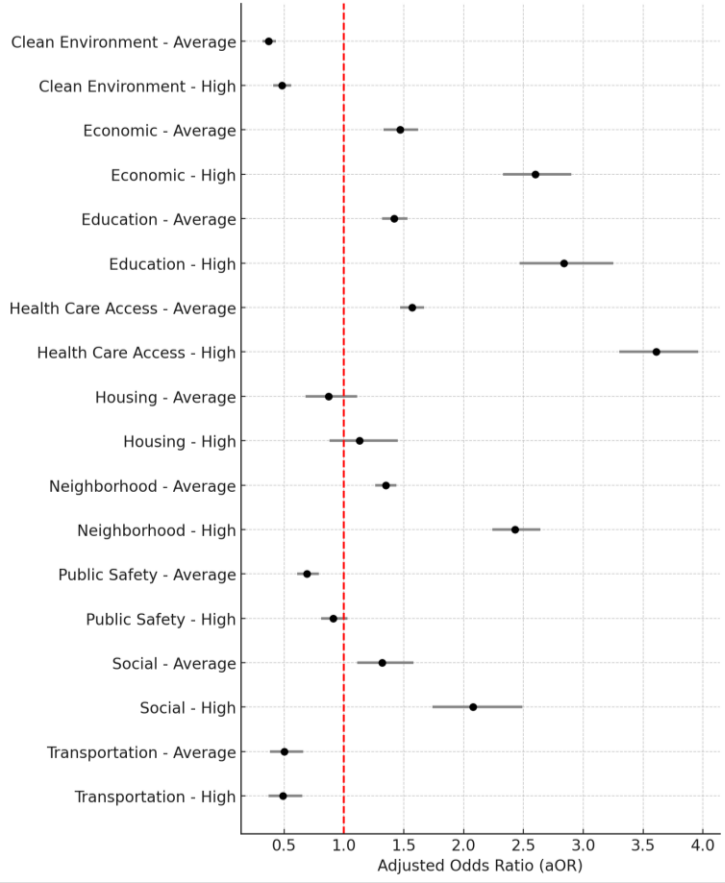
Clean Environment - Average
Clean Environment - High
Economic - Average
Economic - High
Education - Average
Education - High
Health Care Access - Average
Health Care Access - High
Housing - Average
Housing - High
Neighborhood - Average
Neighborhood - High
Public Safety - Average
Public Safety - High
Social - Average
Social - High
Transportation - Average
Transportation - High
0.5
1.0
1.5
2.0
2.5
3.0
3.5
4.0
Adjusted Odds Ratio (aOR)

Odds of Congenital Syphilis

3.6x more likely

High **health care access** vulnerability compared to low vulnerability

Odds of Congenital Syphilis

2.8x more likely

High **education** vulnerability compared to low vulnerability