

# Surveillance for congenital syphilis using the Montana Fetal Death Certificate, 2017-2023

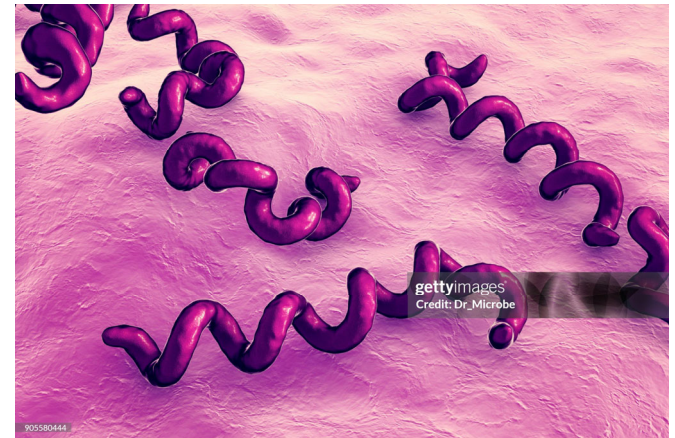
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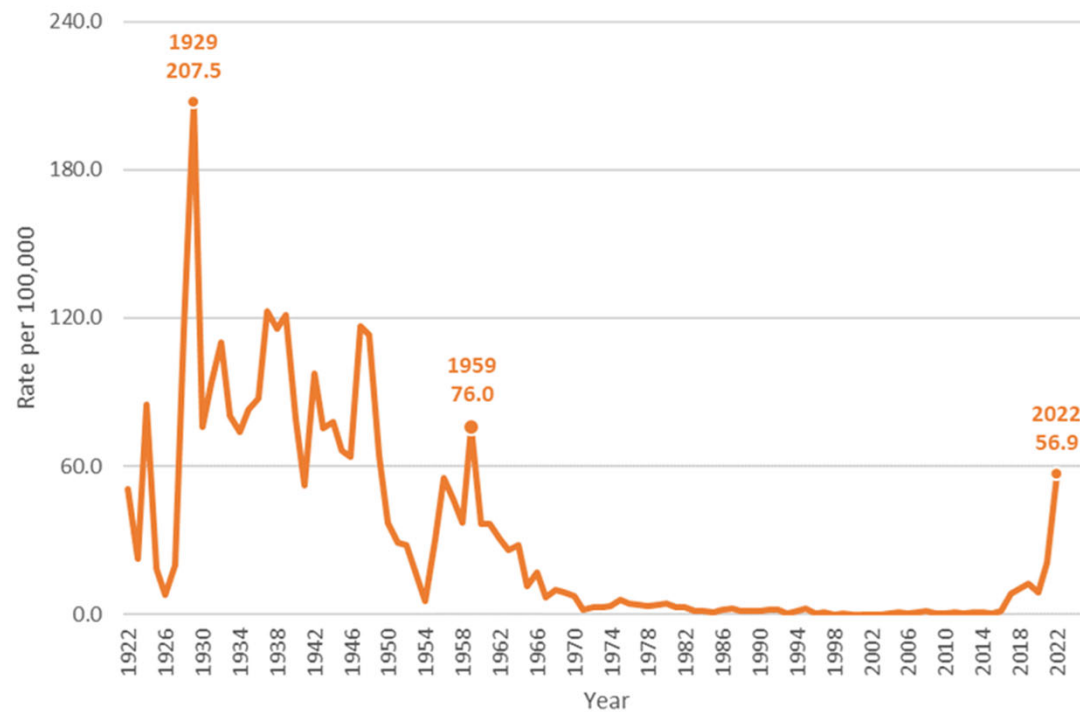
# Background

- Syphilis is a sexually transmitted infection.
- Can cause serious health effects, including death.
- Syphilis is curable with penicillin



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# Syphilis incidence (all stages) per 100,000 population, Montana, 1919-2022



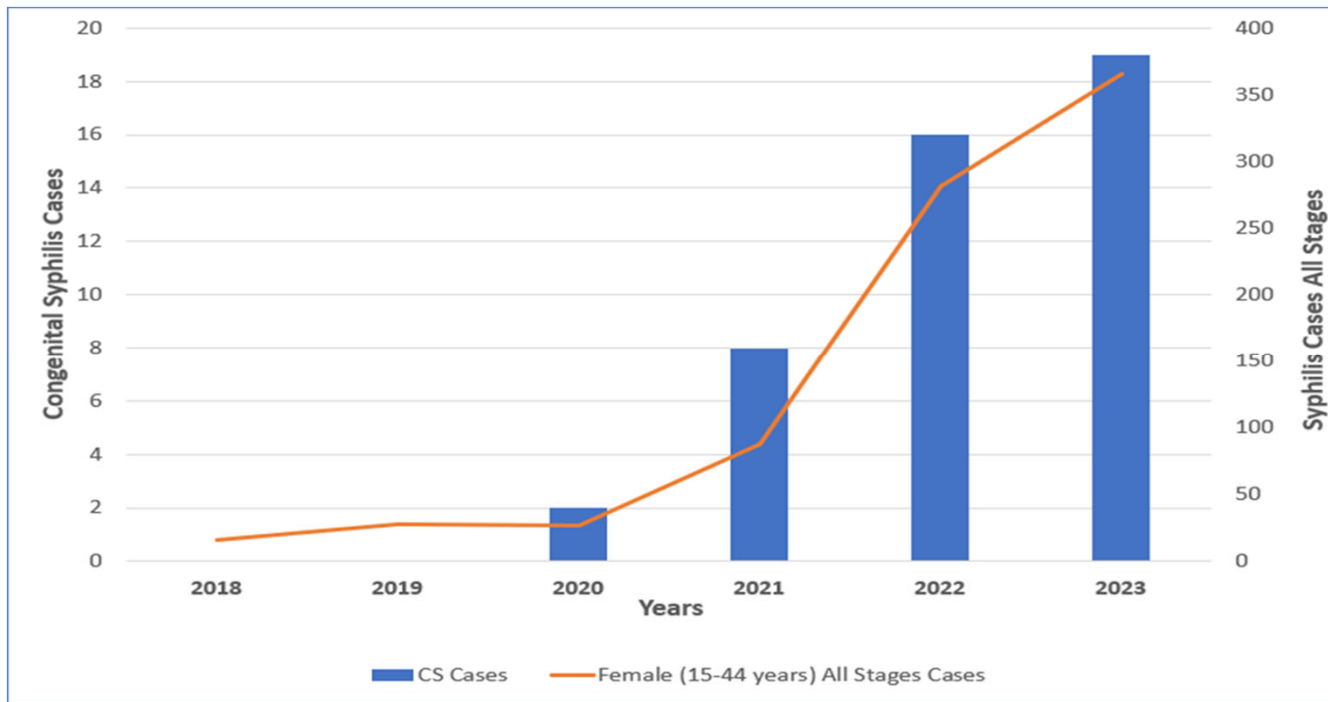
Data source: Montana State Board of Health and Montana Department of Public Health and Human Services, 1919-2022.

# Syphilis among pregnant persons

- Syphilis infection in pregnant persons can spread to unborn baby (called vertical transmission).
- The risk of stillbirth or infant death is high.
- Timely testing and adequate treatment of the pregnant person can prevent poor outcomes for the fetus.
- Screening for syphilis is required by law at least once during pregnancy.
  - DPHHS recommended screening 3 times during pregnancy (1<sup>st</sup> prenatal visit, 28 weeks, and delivery).



# Number of syphilis cases (all stages) among women aged 15-44 years and congenital syphilis cases, Montana, 2018-2023

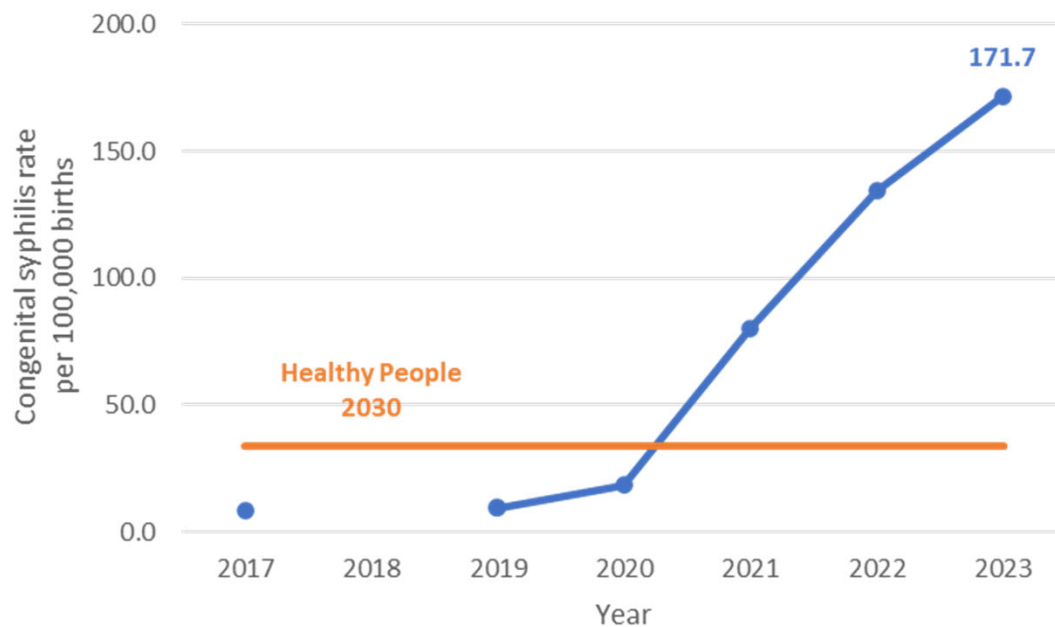


Data source: Montana Infectious Disease Information System, 2018-2023



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# Congenital syphilis rate in Montana compared to Healthy People 2030 target, 2017-2023



Data source: Montana Infectious Disease Information System, 2017-2023

# Surveillance activities for congenital syphilis in Montana

- Syphilis and congenital syphilis reportable by state law (ARM 37.114.203)
- Case investigation conducted by county or tribal health department staff
  - Recommended prioritized case investigations for women aged 18-44 years
  - Emphasis on ascertaining pregnancy status
- Identification of congenital syphilis relies on
  - public health follow-up throughout pregnancy.
  - Syphilis testing of people following stillbirth.



# Enhanced surveillance for congenital syphilis

- Congenital Syphilis Review Committee
- Enhanced surveillance for congenital syphilis
  - Matching female syphilis cases with birth certificates and fetal death certificates
- Other states which perform matching of cases with vital records have reported increased case ascertainment of congenital syphilis by 27-31%.



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Citations: Winscott et al. *Sexually Transmitted Diseases*, 2010; Robbins et al, *2006 National STD Prevention Conference*; CDC Preventing Congenital Syphilis in the U.S., 2019.



# Purpose

- To examine the fetal death certificates to identify fetal deaths in which syphilis infection may have caused or contributed to the death and require further investigation by DPHHS.



# Methods



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# Data source for syphilis and congenital syphilis cases

- Montana Infectious Disease Information System (MIDIS)
  - Female syphilis cases, 2017-2023 (n=873)
    - Confirmed, Probable, Suspect following the CDC case definition
  - Syphilitic stillbirths, 2021-2023 (n=8)
    - A fetal death that occurs after a 20-week gestation or in which the fetus weighs greater than 500 g and the mother had untreated or inadequately treated syphilis at delivery.



# Data source for fetal deaths

- Montana Fetal Death Certificate
  - Fetal deaths among Montana residents, 2017-2023 (n=307)
- Fetal Death Certificate is filed for fetal demise when:
  - Fetus weighs  $\geq 350$  grams; OR
  - Fetus reached at least 20 weeks gestational age



# Data analysis

## Step 1: Describe fetal death certificates

- Identify fetal death records with:
  - Maternal syphilis infection during pregnancy
  - Underlying cause of

## • Step 2: Match female syphilis cases to fetal death record

- Use probabilistic matching
  - Maternal maiden name, maternal first name, maternal DOB
  - If delivery date was >60 days before positive test, then the match was excluded

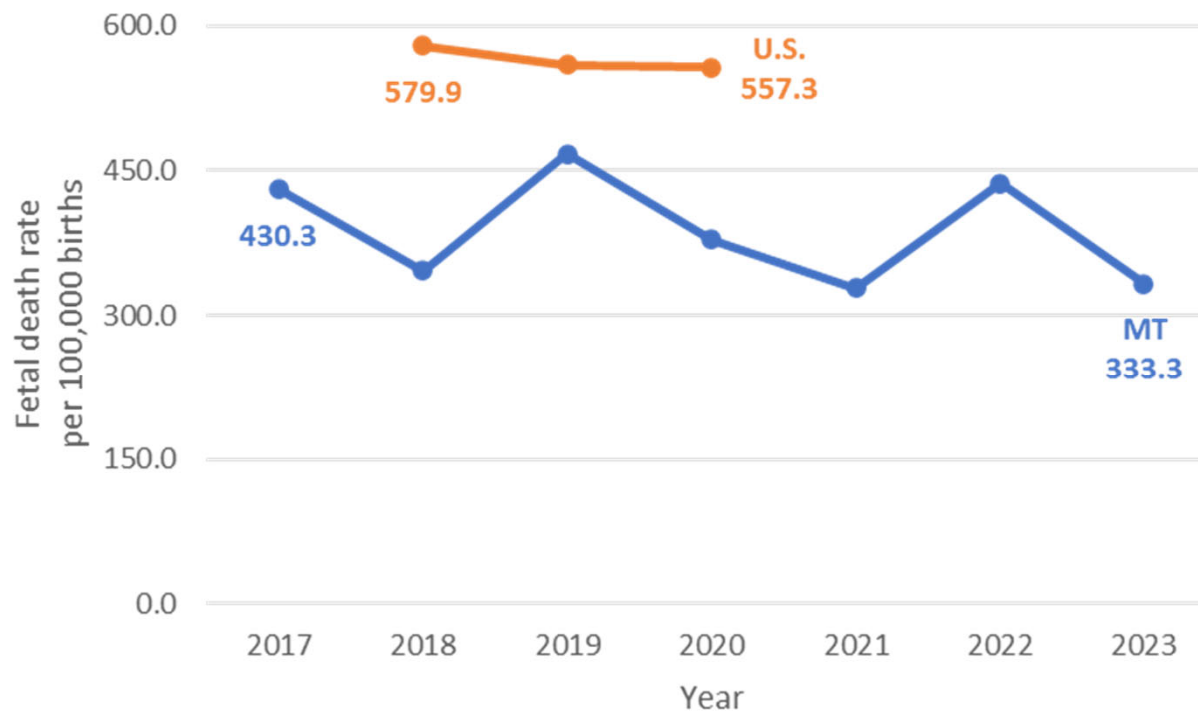
## • Step 3: Manual match syphilitic stillbirths reported to public health with vital records

- Fetal death, death, and birth certificates
- Manual match maternal maiden name, maternal first name, maternal DOB, delivery date



# Results

# Fetal death rate among Montana and U.S. residents, 2017-2023



Data source: Montana Fetal Death Certificates, 2017-2023; U.S. National Center for Health Statistics, 2018-2020.



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# Underlying causes of death, Montana Fetal Death Certificates, 2017-2023

Underlying cause of death (ICD-10)	N = 307 <sup>1</sup>
Placental cord, and membrane complications (P02)	82 (26.7%)
Unspecified (P95)	80 (26.1%)
Congenital malformations (Q00-Q99)	37 (12.1%)
Maternal complications unrelated to this pregnancy (P00)	31 (10.1%)
Missing	30 (9.8%)
Maternal complications (P01)	26 (8.5%)
All other causes	21 (6.8%)
Congenital syphilis (A50)	0 (0.0%)
Congenital viral diseases (P35)	0 (0.0%)
Bacterial sepsis of newborn (P36)	0 (0.0%)
Other congenital infectious and parasitic diseases (P37)	0 (0.0%)
<sup>1</sup> n (%)	



# Maternal infection or treatment of select infectious diseases during pregnancy, Montana Fetal Death Certificate, 2017-2023

Maternal characteristics	N = 307 <sup>1</sup>
Syphilis	3 (1.0%)
Gonorrhea	3 (1.0%)
Chlamydia	5 (1.7%)
Other non-sexually transmitted infectious disease	8 (2.7%)
<sup>1</sup> n (%)	

# Findings from matching female syphilis cases to fetal death certificate

Mother-infant pairs		N=5
Previously reported to public health		
	<i>Syphilitic stillbirth</i>	2
	<i>Syphilis infant death</i>	1
<u>Not</u> previously reported to public health		
	<i>Not a case</i>	2
	<i>New syphilitic stillbirth</i>	0



# Findings from manual review of vital records

- One previously reported stillbirth's fetal death certificate was identified that was not found during matching. Mother's positive syphilis test was classified as "Not a Case" in MIDIS.
- Among the syphilitic still births with no fetal death record (n=5), there was no identification of a death or live birth certificate either.



# Syphilitic stillbirths that had a fetal death certificate was low

		<i><b>Congenital syphilis cases</b></i>		
		<u><b>Still birth</b></u>	<u><b>No still birth</b></u>	<i><b>Total</b></i>
<i><b>Fetal Death Certificate</b></i>	<u><b>Yes</b></u>	3	1†	4
	<u><b>No</b></u>	5	38	43
Total		8	39	47

Fetal death certificate case  
ascertainment was 37.5%  
(n=3/8)



# Information available on the fetal death certificate

<b>Fetal Death Certificate Information</b>	<b>Syphilitic stillbirths n=3</b>
<b>Cause of death (ICD-10)</b>	
Maternal condition unrelated to pregnancy (P00)	1
Unspecified cause (P95)	1
Missing	1
<b>Maternal syphilis infection</b>	
Yes	1
No	2



# Gestational age of syphilitic stillbirths by fetal death certificate

	Gestational age (weeks)	
	Min-Max	Unknown (n)
<b>Fetal death certificate (n=3)</b>	27-30	1
<b>No fetal death certificate* (n=5)</b>	24-38	1
*Information collected from public health case investigation		



# Discussion



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# Key Findings

- Only 37.5% of syphilitic stillbirths reported to public health had a fetal death certificate.
- Matching female syphilis cases with fetal death certificates as well as manual review for vital records for reported congenital syphilis cases is necessary due to the complicated nature of case classification for syphilis.
- Case investigations by public health nurses are still the gold standard to identify syphilitic stillbirths!
- The fetal death rate in Montana is low compared to the United States. Underreporting of fetal death certificates should be further investigated.



# Role of vital statistics in surveillance of population health

- Vital event reporting plays a critical role in surveillance of population health at the beginning and end of life.
- Fetal death and birth certificates are the only source for population-level information during the perinatal period.
- Investigations by the Fetal, Infant, Child, and Maternal Mortality Reviews (FICMMR) begin with the fetal death or death certificate.
  - What other causes of fetal demise are underreported?
- There is a compelling legal reason for filing live birth and death certificates which may result in high completeness of these vital records.



# Recommendations for improved data quality of fetal death certificates

- **Education** of fetal death certifiers, specifically healthcare providers and coroners, of the legal requirements for such certificate.
- **Communication** Public health practitioners need to demonstrate how vital event information is used to prevent such deaths.



# Challenges for surveillance of congenital syphilis

- Case investigations by public health nurses are still the gold standard!
  - Requires ascertainment and tracking of pregnancy status among women of childbearing age with syphilis.
  - Fetal death certificates were a poor source for case ascertainment and for additional information such as cause of death or maternal syphilis infection.
- Access to timely and adequate prenatal care for timely identification of syphilis throughout pregnancy.



# Enhanced surveillance for congenital syphilis-- Next steps

- Link female syphilis case with the birth certificates to ascertain completeness and identify additional cases not previously reported to public health.
- DPHHS to publish surveillance reports describing the problem and what public health is doing to address it.



Questions?

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**Public Health Nurses!**



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