



Prevention of Congenital Syphilis with Oregon PQC NNPQC Thematic Webinar

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Congenital syphilis: opportunities for prevention and collaboration

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Disclosures

- We have no conflicts of interest to declare

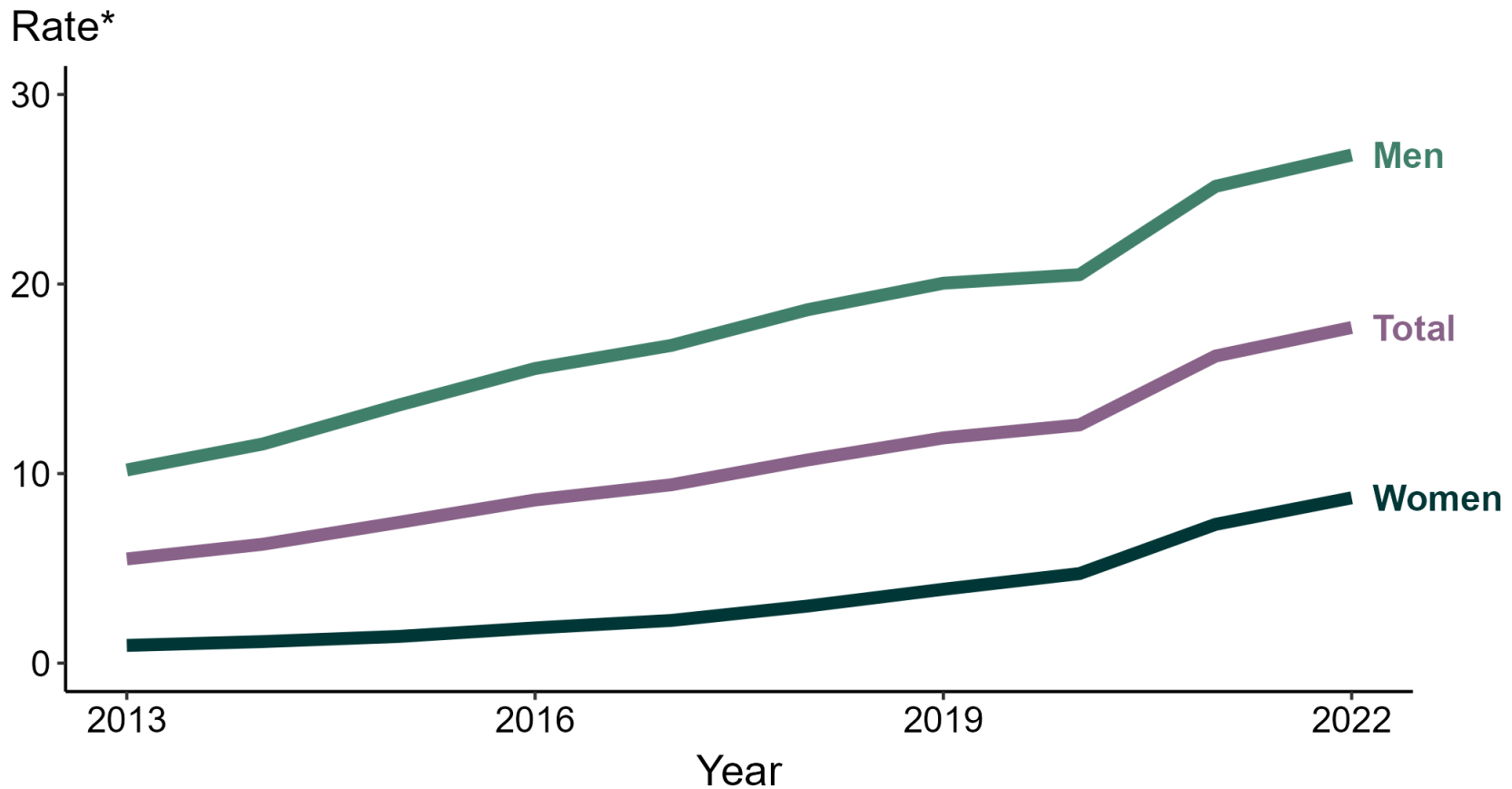
Objectives

- Describe the epidemiology of syphilis and congenital syphilis
- Review Oregon-based screening recommendations for syphilis
- Discuss the findings of an anonymous survey of prenatal care providers
- Explore predictors of being associated with a case of congenital syphilis among pregnant people with syphilis
- Discuss opportunities for addressing provider knowledge and practice and access to CS prevention

Disclaimer

- I will present data on syphilis by race.
- Race is a social construct.
- Racism, not race, leads to inequities in congenital syphilis.

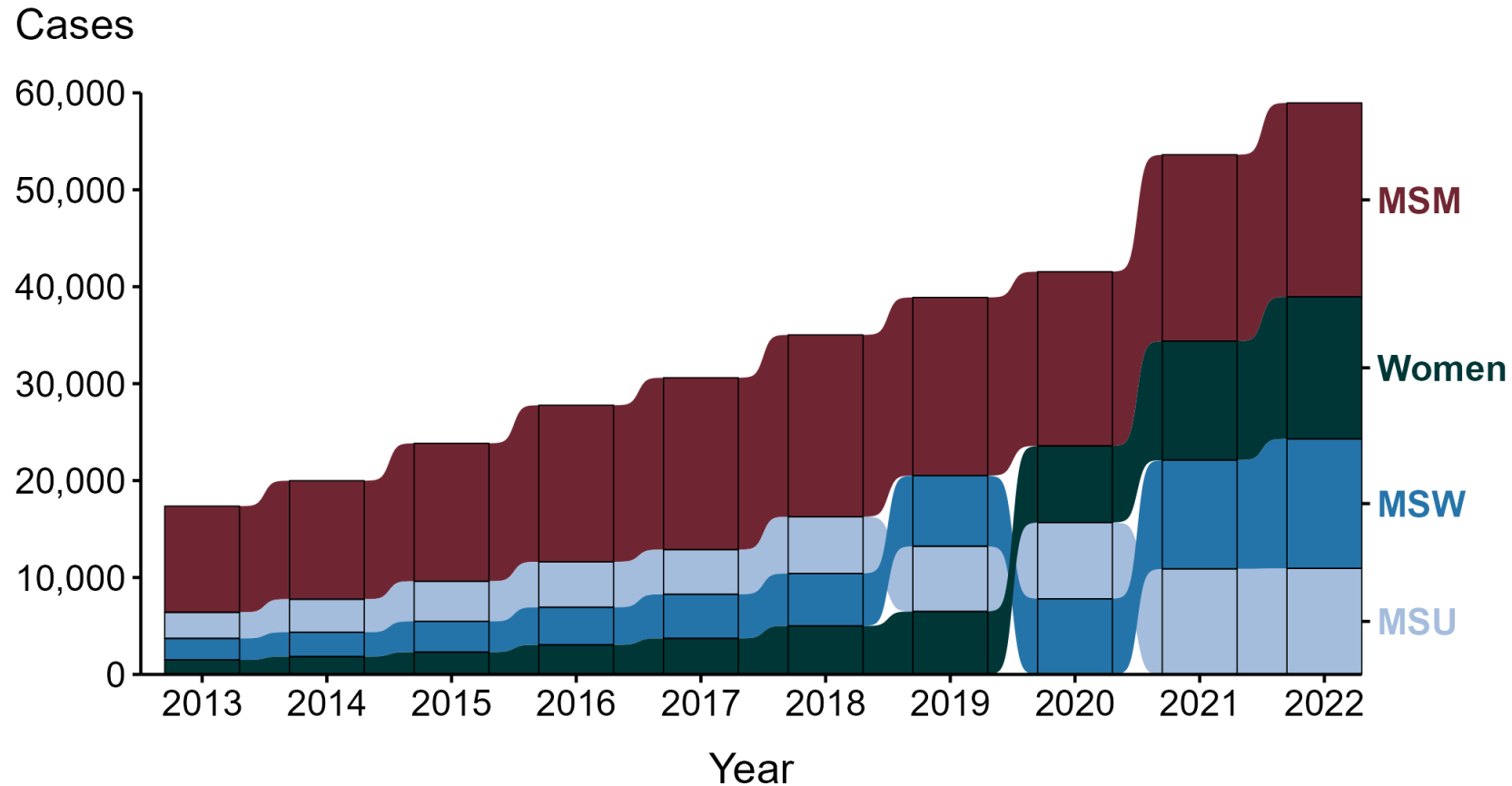
Primary and Secondary Syphilis — Rates of Reported Cases by Sex, United States, 2013–2022



* Per 100,000



Primary and Secondary Syphilis — Reported Cases by Sex and Sex of Sex Partners, United States, 2013–2022



ACRONYMS: MSM = Men who have sex with men; MSU = Men with unknown sex of sex partners; MSW = Men who have sex with women only



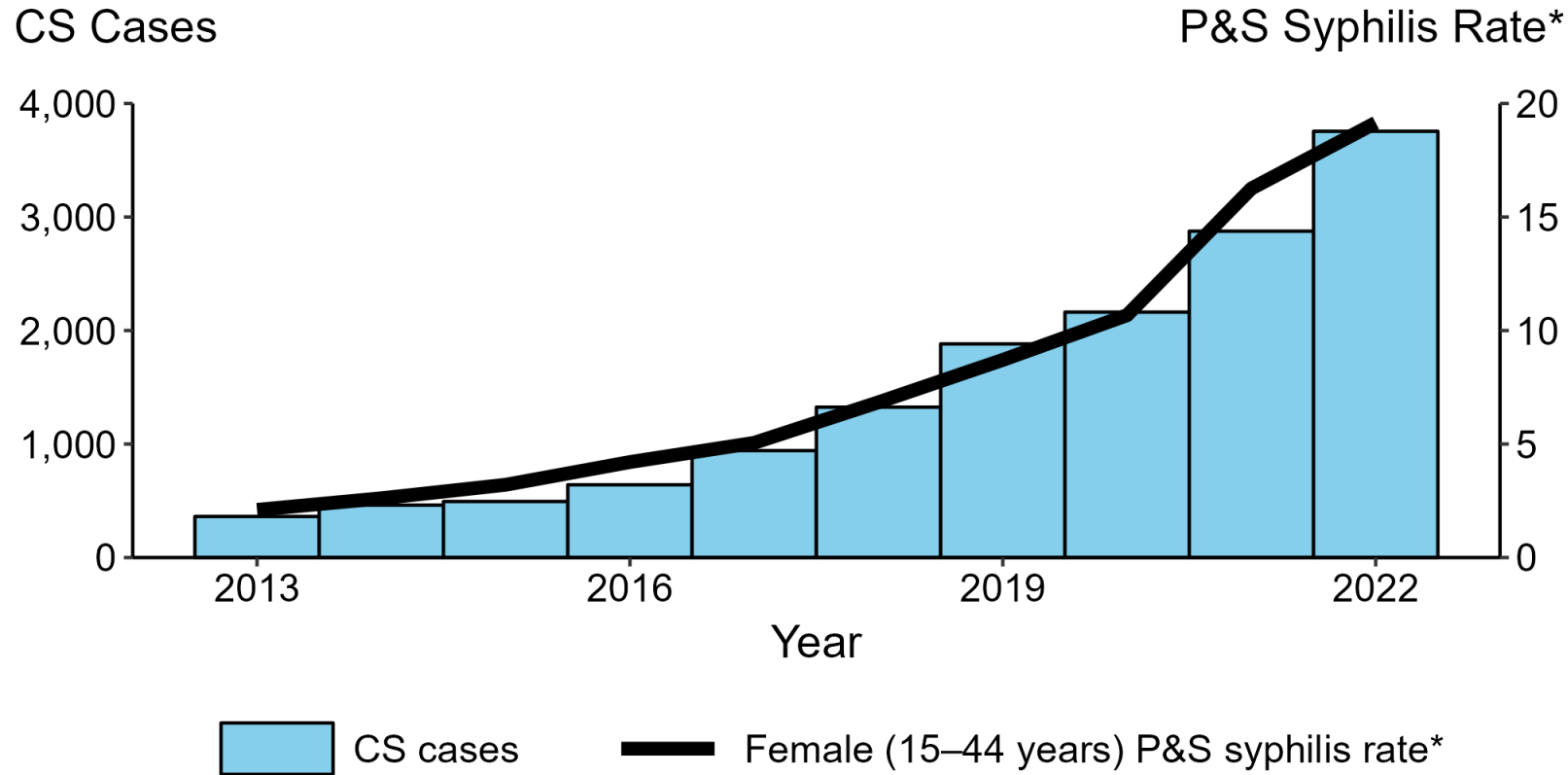
Syphilis Cases among People Assigned Female at Birth Interviewed for Partner Services by Stage and Risk, Oregon, 2021

	N	%	N	%
Total cases (% interviewed)	388	68%	225	52%
	Stage			
	Early		Late	
	N	%	N	%
Total interviewed cases	265	100%	116	100%
Individual-level risk				
Methamphetamine	75	28%	46	40%
PWID	53	20%	26	22%
Houseless or unstably housed	39	15%	24	21%
Transactional sex	16	6%	8	7%
Criminal justice involvement	11	4%	4	3%
Prior STI (prior 2 years) and HIV/HCV (ever)				
Prior chlamydia	39	15%	15	13%
Prior gonorrhea	37	14%	21	18%
Prior syphilis	16	6%	4	3%
Prior HCV case	4	2%	4	4%
Prior HIV case	1	<1%	0	0%
Partner-level risk				
Partner: PWID	75	28%	42	36%
Partner: Houseless	4/81	5%	3/27	11%
Partner: criminal justice involvement	3/81	4%	0	0%
Risk Identified (any of above)	143	54%	65	56%
No Risk Identified	122	46%	51	44%

Updates to Oregon-specific Syphilis Screening Recommendations

- Screen all sexually active adults under 45 years of age at least once if they have not been screened since 1/1/2021
- This recommendation is in addition to screening during pregnancy

Congenital Syphilis — Reported Cases by Year of Birth and Rates of Reported Cases of Primary and Secondary Syphilis Among Women Aged 15–44 Years, United States, 2013–2022

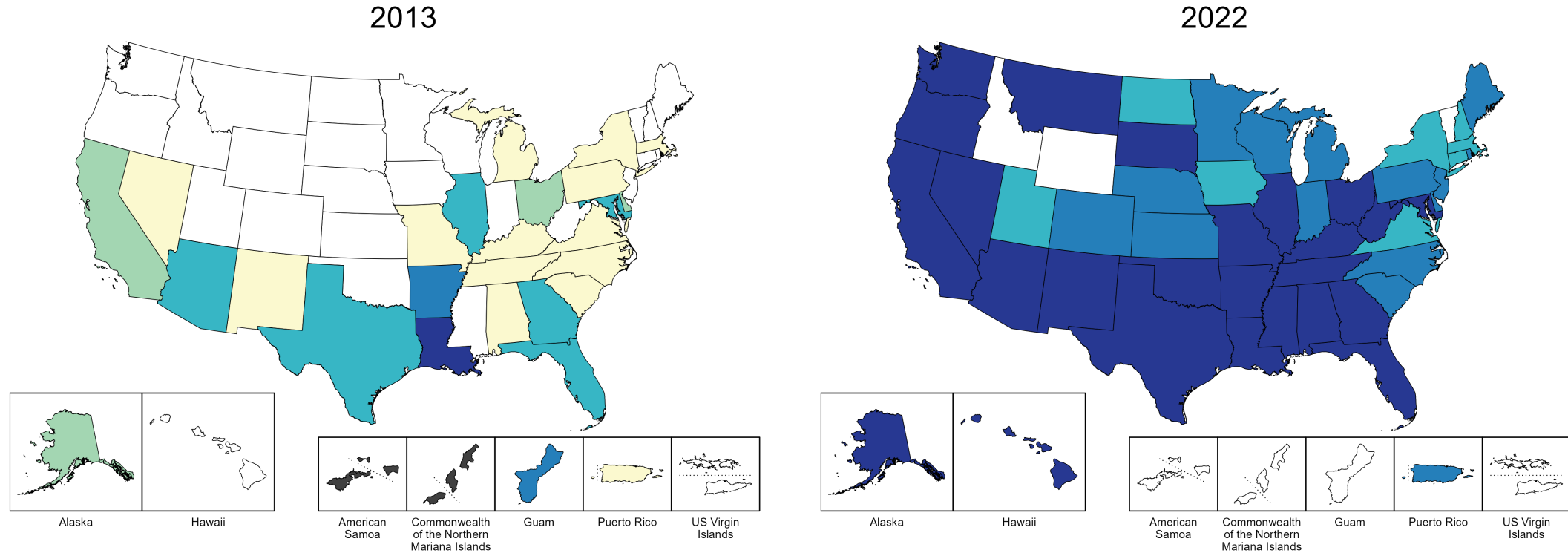


* Per 100,000

ACRONYMS: CS = Congenital syphilis; P&S Syphilis = Primary and secondary syphilis



Congenital Syphilis — Rates of Reported Cases by Year of Birth and Jurisdiction, United States and Territories, 2013 and 2022

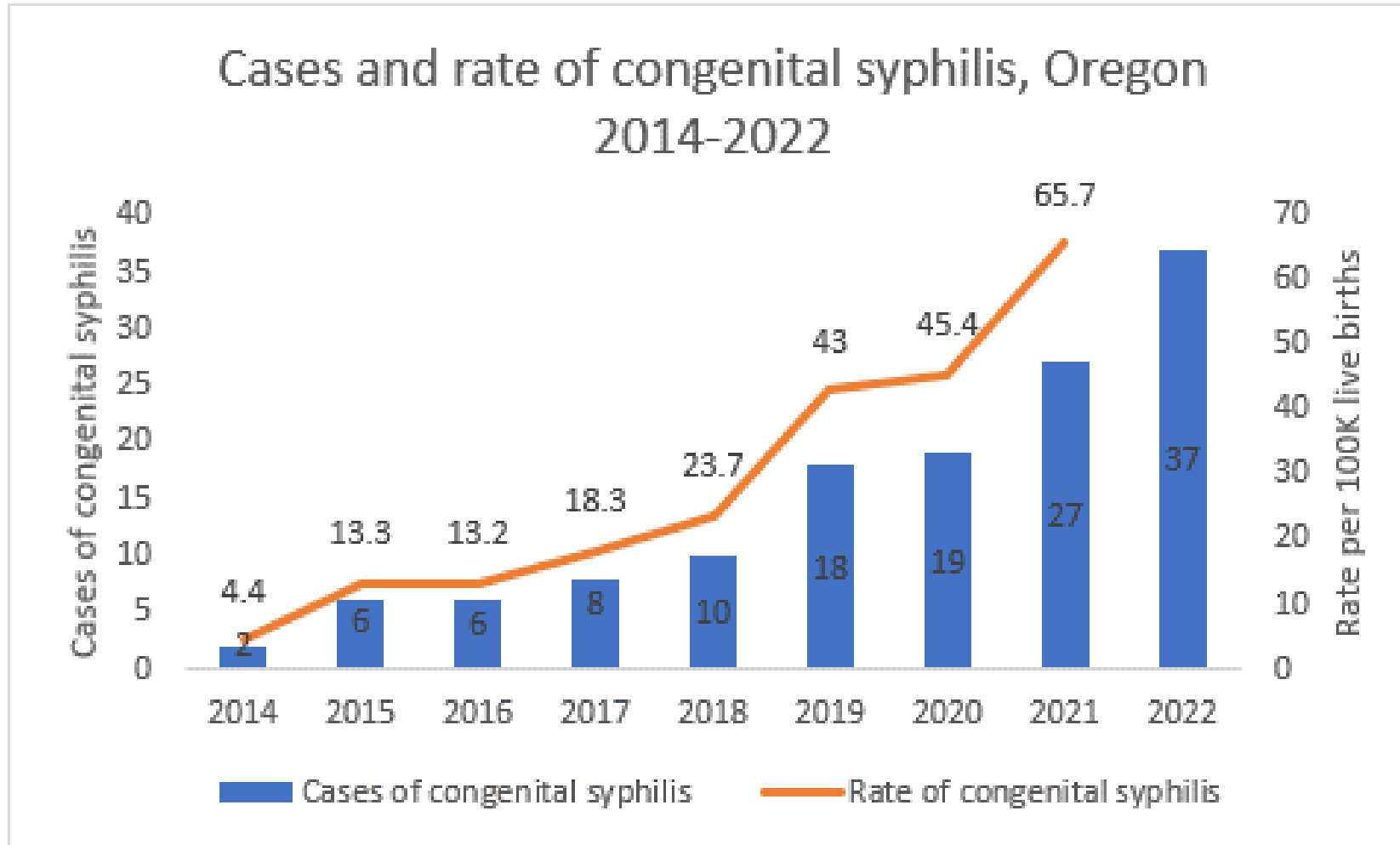


Rate* No cases reported 1–8 9–14 15–24 25–53 54–355 Unavailable

* Per 100,000 live births



There were 2 cases of CS in 2014 and 37 cases of CS in 2022 (n=133)



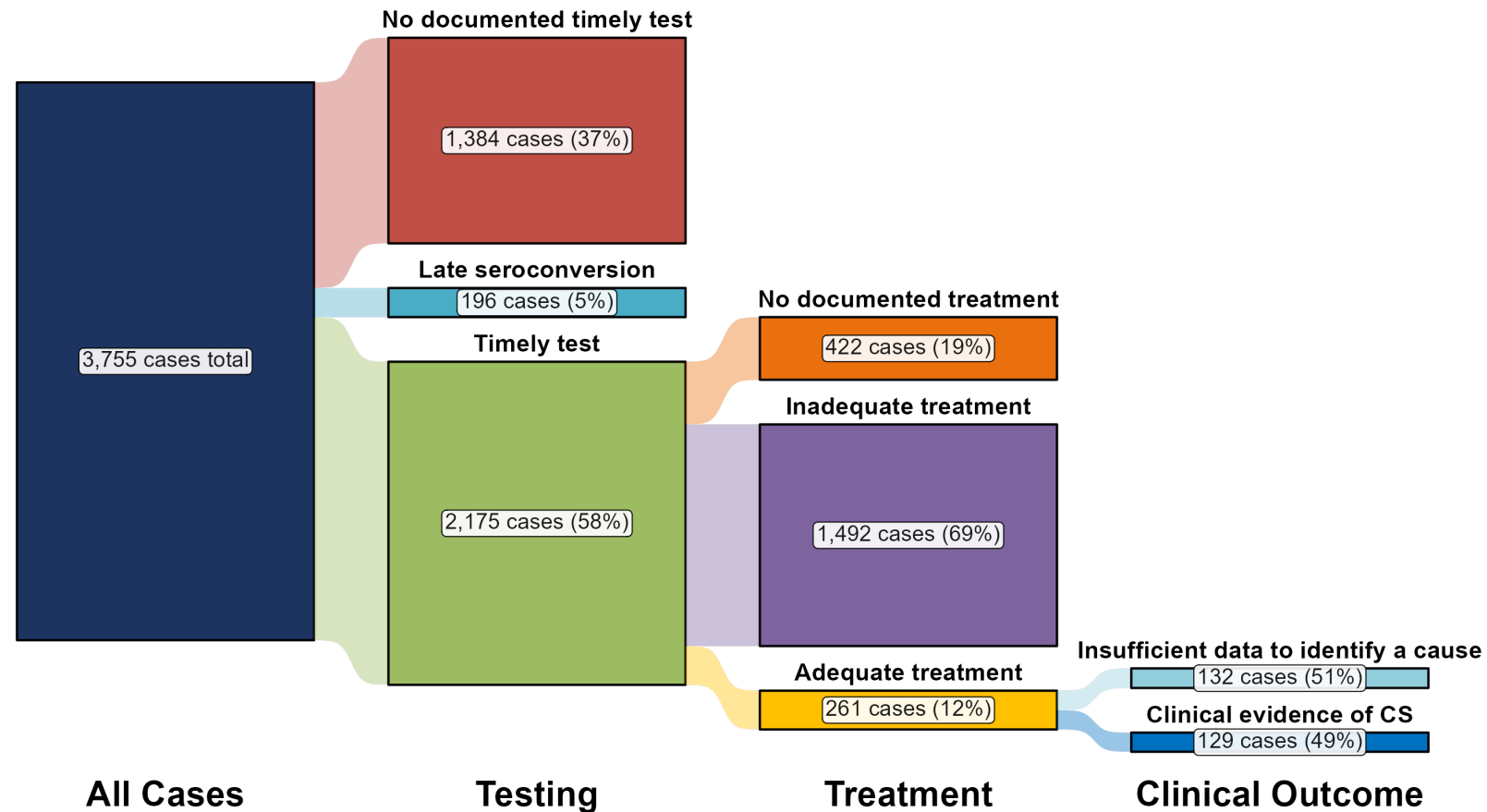
Recommendations for Syphilis Screening in Pregnancy in Oregon

Boodman et al. CJPH, 2023: triple screening is highly cost-avoidant
Hersh et al. Obs Gyn, 2018: third trimester screening is cost effective

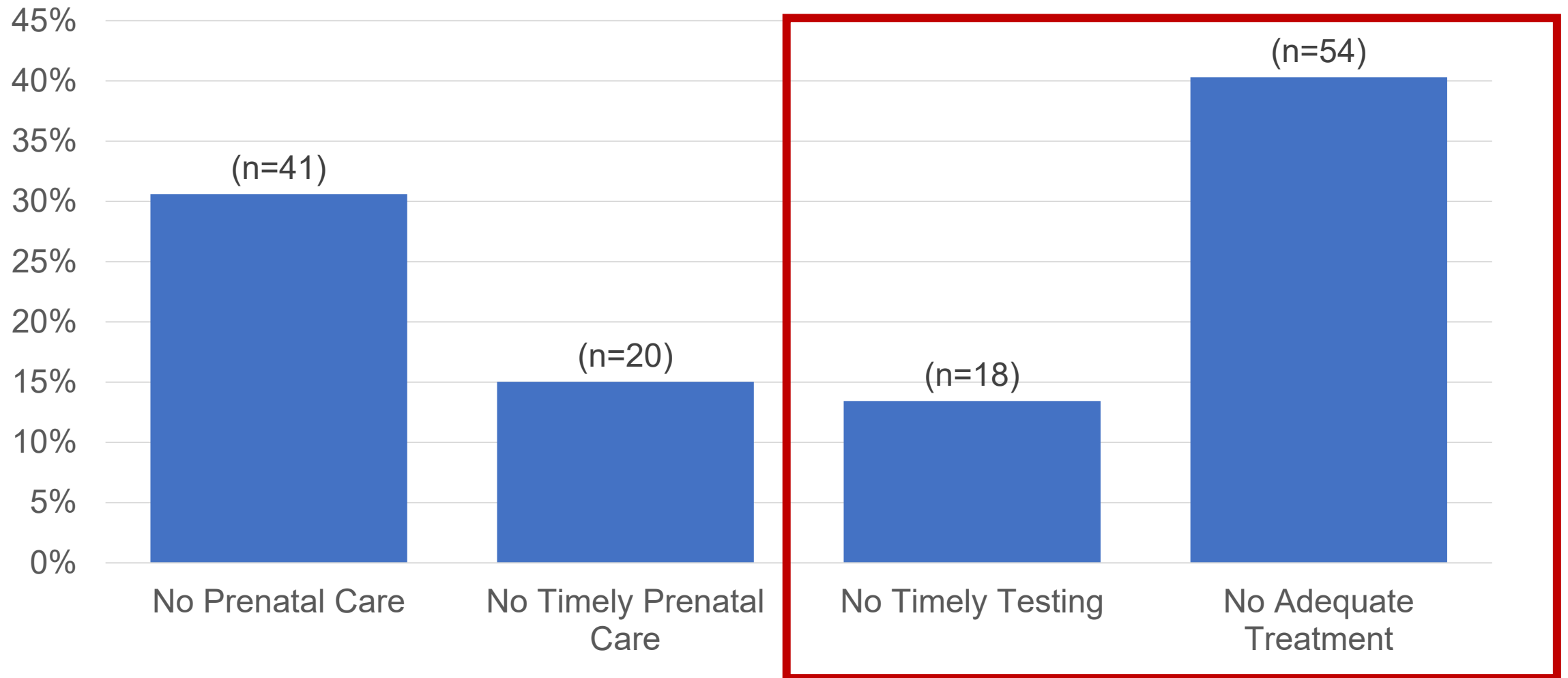
- Screen at first presentation to care
- Screen again at 24-28 weeks (early third trimester)
 - We recommend pairing with an oral glucose tolerance test
 - Allows enough time to arrange for treatment
 - Detects seroconversion and re-infection
- Screen at delivery

All visits are prenatal visits: at presentation to ER/urgent care, carceral settings, and substance use disorder treatment when syphilis/prenatal care status is unknown

Congenital Syphilis — Distribution of Receipt of Testing and Treatment by Pregnant Persons with a Congenital Syphilis Outcome, United States, 2022



Lack of access to prenatal care and inadequate treatment are the most common missed opportunities to prevent CS

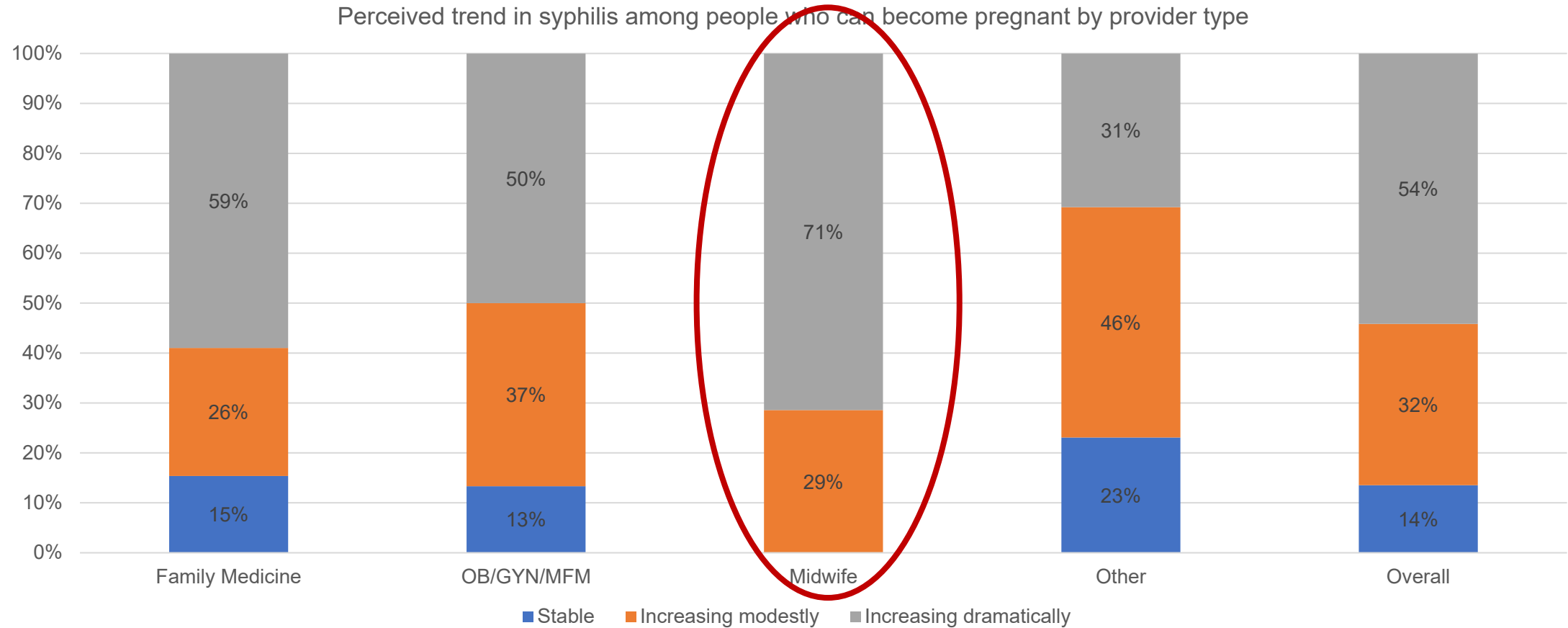


Anonymous survey of prenatal care clinicians in Oregon

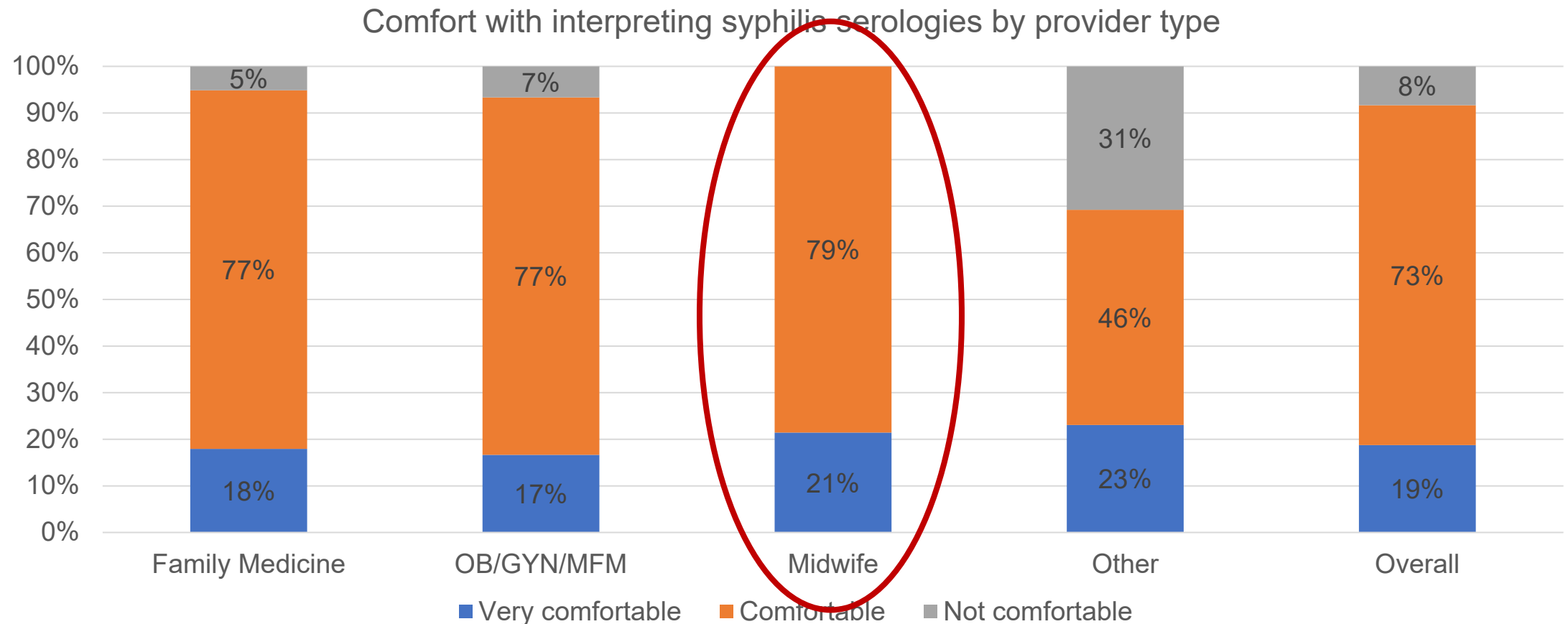
- Issued via Oregon Health Alert Network and professional societies of prenatal care clinicians
- Survey was open from January-March 2021
- N = 96

Characteristic, n (%)	N = 96
Specialty	
Family medicine	39 (41%)
OB/GYN/MFM	30 (31%)
Midwife	14 (15%)
Other (PA, NP, internal med, preventive med)	13 (14%)
Years in practice	
Less than 5 years	26 (27%)
5-10 years	21 (22%)
More than 10 years	49 (51%)
Number of pregnant people seen per year	
Less than 50	47 (49%)
More than 50	49 (51%)
Practice in Portland Tri-County Area	62 (65%)

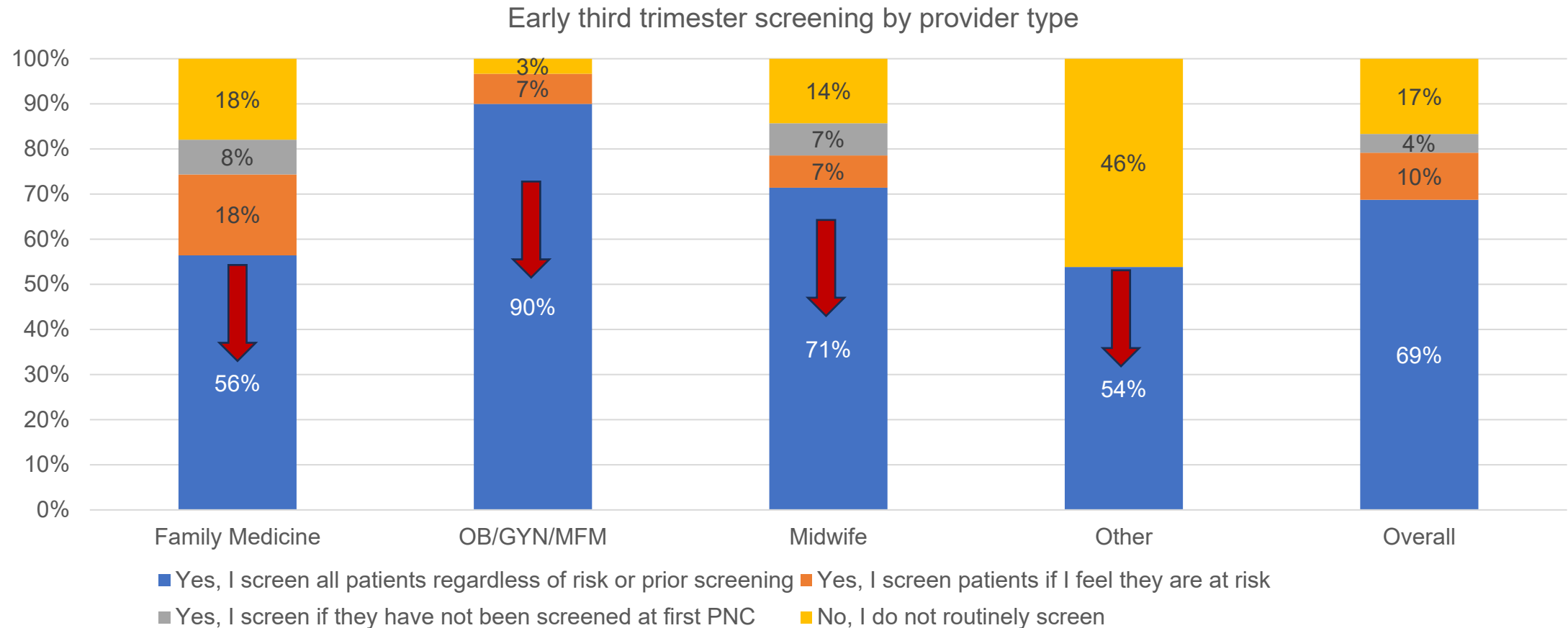
Overall, 54% perceived that syphilis has been increasing dramatically



Only 19% reported being very comfortable interpreting syphilis serologic testing



While almost all clinicians offer routine screening at the first prenatal care visit, only 69% screen routinely in the early third trimester



Increasing provider knowledge



- [Publication of comprehensive best practices for the prevention of CS with the Oregon Perinatal Collaborative](#)

- Increase access to care
- Increase the quality of care
- Enhance provider education
- Build and maintain strong partnerships

Emerging Practices for Responding to the Congenital Syphilis Emergency in Oregon: Recommendations for Health Care Providers

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Increasing provider knowledge

- CS detailing and consultation
- Regular provider education throughout the state
- Facilitation of provider-LPHA connections (“matchmaking”)
- Quarterly CS case review boards

**BAY AREA HOSPITAL
GRAND ROUNDS**

AN UPDATE ON SYPHILIS

Presented by:
DR. TIMOTHY MENZA
MEDICAL DIRECTOR HIV/STD/TB SECTION
PUBLIC HEALTH DIVISION
OREGON HEALTH AUTHORITY

**! SYPHILIS CASES ARE ON THE RISE IN COOS COUNTY:
WITH 16 TOTAL CASES IN 2022,
2023 HAS ALREADY SEEN 16 NEW CASES BY MARCH**

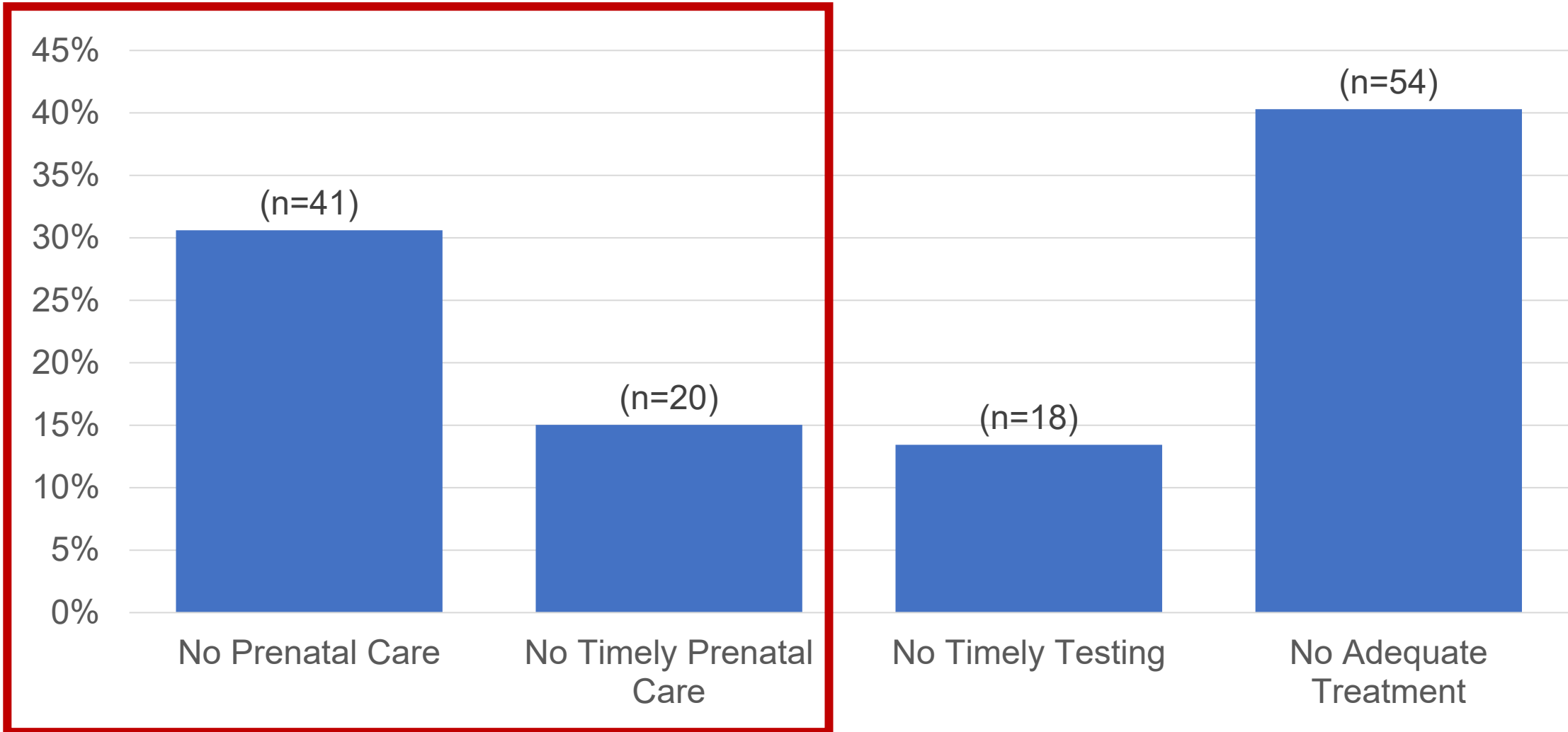
**April 27 2023
12:30 pm**

**Myrtle Conference Room
and via Zoom.**

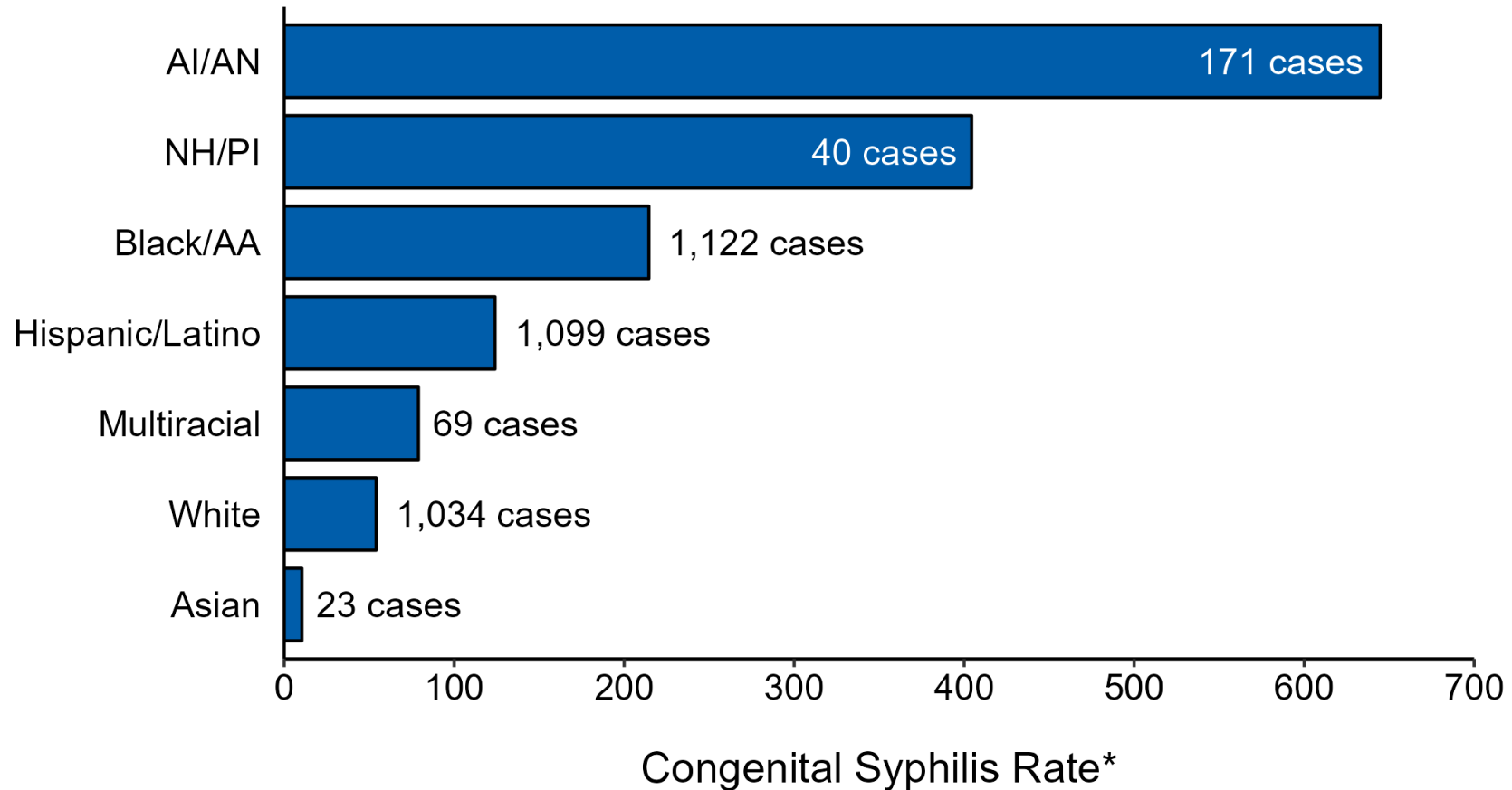
Facilitating screening and treatment

- The rates of CS and syphilis among people who can become pregnant as public health accountability metrics
- Advocate for OR Medicaid to adopt metrics to track and incentivize screening at three time points in pregnancy (following [ASTHO](#) recommendations)
- EMR alerts for screening
- Support laboratory capacity to perform syphilis testing to avoid delays related to send-out testing
- Bicillin access program

Lack of access to prenatal care and inadequate treatment are the most common missed opportunities to prevent CS



Congenital Syphilis — Case Counts and Rates of Reported Cases by Race/Hispanic Ethnicity of Mother, United States, 2022



* Per 100,000 live births

NOTE: In 2022, a total of 197 congenital syphilis cases (5.2%) had missing, unknown, or other race and were not reported to be of Hispanic ethnicity.

ACRONYMS: AI/AN = American Indian or Alaska Native; Black/AA = Black or African American; NH/PI = Native Hawaiian or other Pacific Islander



Individual and community-level factors that exacerbate the risk of CS

Individual-level factors

- Lack of health insurance, diagnosis in inpatient or ER settings
- Substance use (esp, methamphetamine and injection drug use)
- Housing instability
- Transactional sex
- Educational opportunity
- Mental health

Community-level factors

- Poverty and educational attainment among women
- Income inequality
- Urbanicity
- Violent crime
- Insurance status
- Population proportions of Latinx, Black, and Native Hawaiian/Pacific Islander people

Among pregnant people associated with a case of CS, housing instability and criminal justice involvement are very common

Housing

- 49/133 (37%) were houseless or unstably housed

Criminal justice involvement (2014-2021 only)

- 54/95 (57%) had any history of criminal justice involvement
 - 17/95 (18%) had criminal justice involvement in the 12 months prior to syphilis diagnosis, including incarceration, community supervision, outstanding cases or warrants

Many pregnant people associated with a case of CS report substance use or have had prior STI diagnoses

Substance use

- 57/133 (43%) had a history of injection drug use
- 60/133 (45%) had a history of methamphetamine use
- 30/133 (23%) had a history of heroin/opiate use

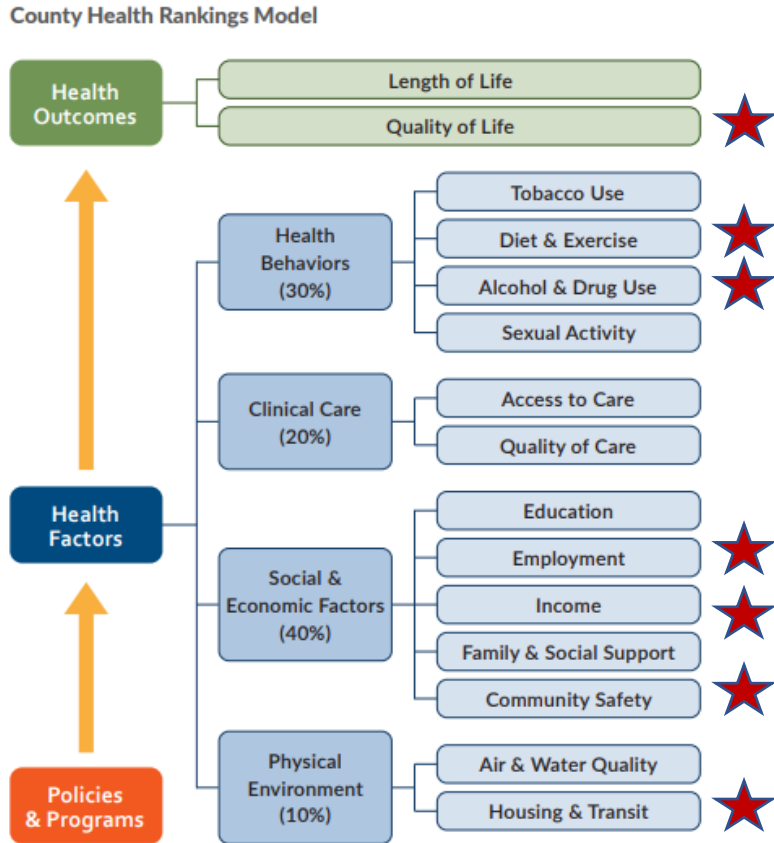
HIV/STI and HCV

- Most patients reported 1 male sexual partner in the prior 12 months (max = 8)
- None were known to be living with HIV
- 63/133 (47%) had a history of either chlamydia or gonorrhea
- 18/133 (14%) had chronic HCV prior to syphilis diagnosis in pregnancy

Analysis of individual- and county-level predictors of CS, 2013-2021*

- Among pregnant people with syphilis (N = 343), what factors are associated with being associated with a case of CS (n = 95)?
- Socio-ecological approach
 - Individual-level factors
 - ORPHEUS, or Oregon Public Health Epidemiologists' User System
 - Data gathered from case investigation
 - County-level factors
 - County Health Rankings
- Multilevel mixed effects random-intercept Poisson model with robust standard error estimation

Selecting county-level metrics



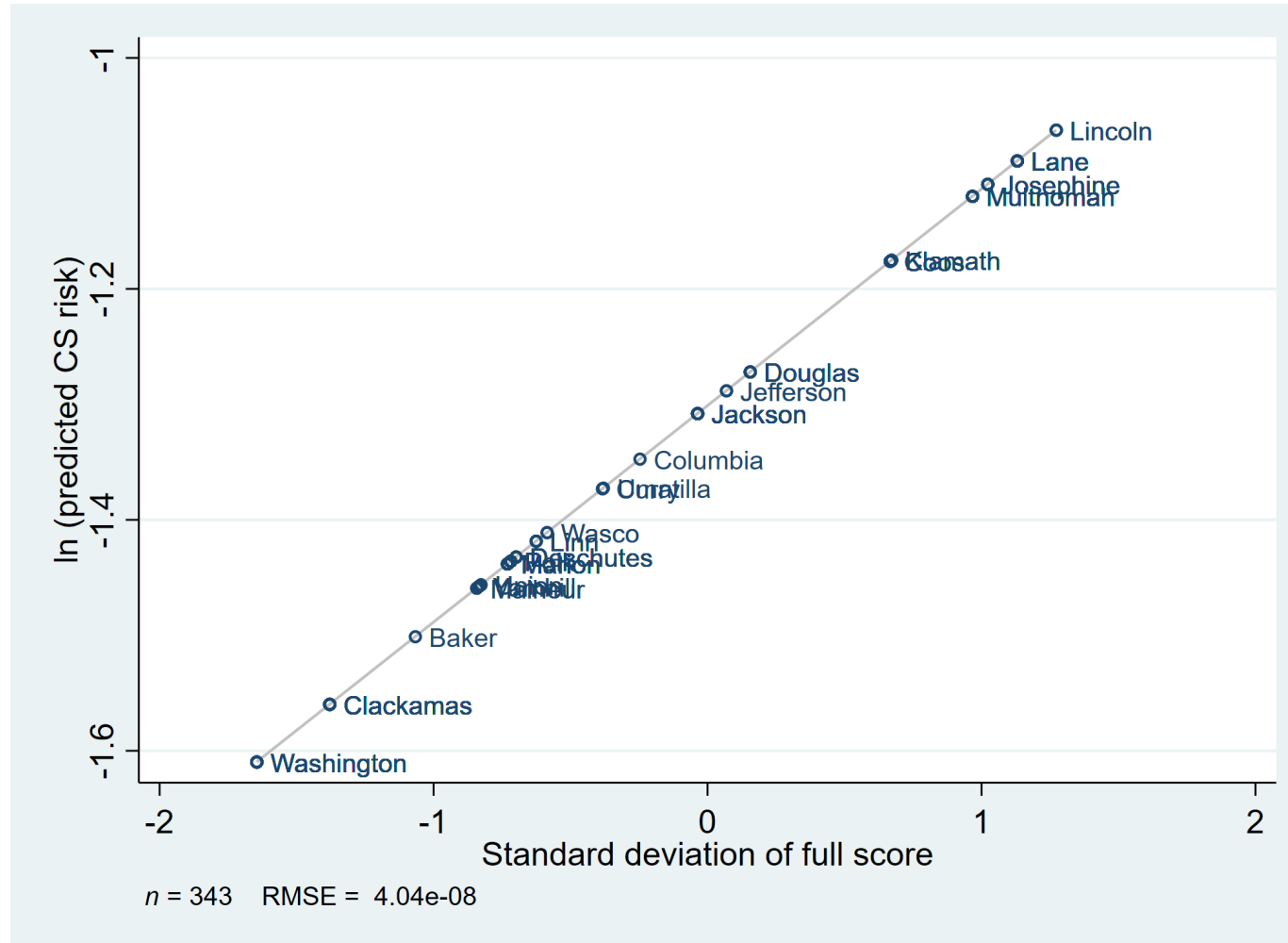
County Health Rankings model © 2014 UWPHI

- Quality of life
 - Mental health
- Health behaviors
 - Food insecurity
 - Methamphetamine overdose
- Social and economic factors
 - Unemployment
 - Poverty, income inequality
 - Adverse childhood experiences
 - Violent crime
- Physical environment
 - Houselessness

County-level variables

County-level metric	Source	Year
Average number of poor mental health days	BRFSS	2020
% food insecurity	Map the Meal Gap	2020
Methamphetamine overdose death rate	OHA Overdose Dashboard	2019
% unemployed	Bureau of Labor Statistics	2020
% population in poverty	ACS 5-Year Estimates	2016-2020
Income inequality ratio	ACS 5-Year Estimates	2016-2020
% population with at least 1 adverse childhood experience	BRFSS	2017-2021
Violent crime rate	FBI Crime Data	2014 & 2016
Houseless rate	Oregon PIT Count	2019

Counties with higher scores (greater disadvantage) are associated with greater CS risk



County-level socioeconomic disadvantage, injection drug use, and corrections involvement increase the risk of CS

	Multivariable* RR (95%CI)	Population attributable fraction
Score	1.22 (1.04, 1.43)	19%
Injection drug use, ever	1.88 (1.32, 2.68)	20%
Corrections involvement, ever	1.43 (1.10, 1.87)	17%
GC diagnosis, prior 2 years	0.50 (0.32, 0.77)	

*Multivariable models also include age, race, time period
CI, confidence interval; GC, gonorrhea; RR, risk ratio

Finding and leveraging touchpoints for prevention

Q. **PP use of services**

People may access many other services during their pregnancy, did you use any of the following services during your most recent pregnancy?

↔

A.

WIC - Special Supplemental Nutrition Program	Visits from homeless services and outreach sta
Visiting nurse program	Services offered by cultural/religious
Homeless shelter	Service for domestic violence survivors
Syringe service program	Other
Peer support program for pregnant person	
Peer support program for persons who use	
Peer support program for persons with mental	
Individual counseling	
Group counseling	
Food bank	

Notes

Q. **PP received resources**

What if any of the following resources did you receive during your most recent pregnancy?

↔

A.

SNAP - Supplemental Nutrition Assistant Program,	
SSI - Supplemental Security Income	
Social Security	
HCV - Housing Choice Voucher program, section	
Public Housing	
Unemployment	
TANF - Temporary Assistance for Needy Families	
Not Applicable	
Other	

Notes

Expanding the reach of CS prevention

- STD 340B ODOC partnership and expansion of current STD 340B local jail partnerships to encourage opt-out screening and treatment for HIV, STI, viral hepatitis
 - OR correctional health HIV/STI/hepatitis community of practice forthcoming
- Promotion of opt-out HIV, syphilis, and viral hepatitis testing in emergency departments and SUD treatment/peer programs with a focus on pregnant people (all visits are prenatal care visits!)



OPC Emergency Department Work

Plan to build relationships with Oregon EDs for congenital syphilis prevention:

- Present on congenital syphilis prevention at meeting of ED directors
- Meet with county health departments to learn about their syphilis prevention work, capacity, and relationship with EDs
- Ask maternity providers and county health departments for introductions to ED staff
- Add ED visits to birthing hospital visiting project

Focus of all communication:

- Improve screening for pregnancy in EDs
- Every visit with a pregnant person is a prenatal visit
- Screen pregnant people with limited prenatal care for syphilis at any presentation to care
- County health department will follow up on all positive results
- Treat empirically if positive or with symptoms of primary or secondary syphilis

Building relationships with EDs will support PQC work in other areas too!

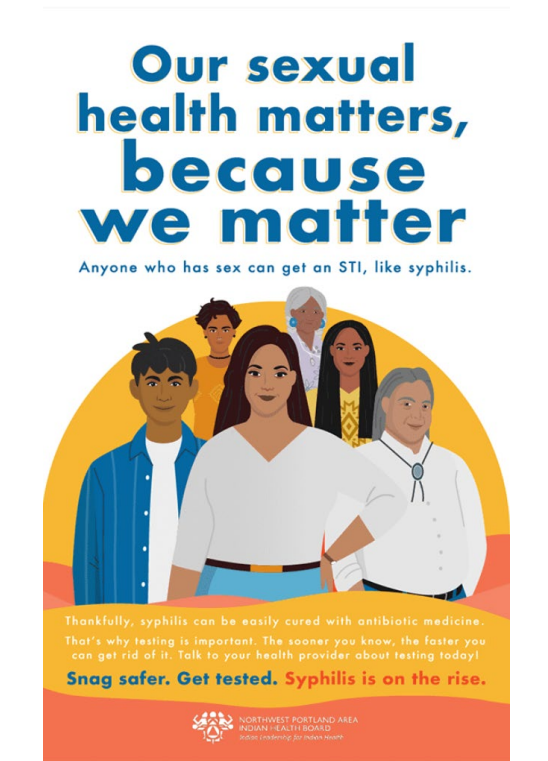
Expanding the reach of CS prevention

- Street medicine partnerships for education, testing, and treatment
- Expansion of low barrier treponemal testing (DBS, rapid syphilis testing)
 - Sites (e.g., SSP, WIC, food banks, community supervision, housing programs)
 - Providers (e.g., doulas, visiting nurses, harm reduction peers, CHWs)



Supporting patients

- Incentive program for patients and partners for testing and treatment
- Special needs funding for motel vouchers, gas, transportation, transit passes, and to address other social determinants of health during syphilis treatment
- Low-barrier, incentivized prenatal care programs with a focus on harm reduction and trauma-informed care, including mobile sites, pop-up venues, co-location with CBOs
- Field testing and treatment
- Community-engaged education and messaging (see: stoppsyphilis.org)



Addressing poverty

- Medicaid 1115 waiver to address social determinants of health for members (starting 2024)
 - People experiencing housing instability and being released from correctional settings
- Integrate education about sexual health and syphilis for pregnant people accessing anti-poverty programs (e.g., WIC, food banks, SNAP, TANF)
- Abundant Birth Project: California model of universal basic income for Pacific Islander and Black pregnant people to reduce inequities in maternal and infant outcomes



Opportunity for collaboration: National Syphilis and Congenital Syphilis Syndemic Federal Task Force

- The Task Force will focus its efforts on Arizona, Arkansas, California, the District of Columbia, Florida, Georgia, Louisiana, Mississippi, New Mexico, New York, Ohio, Oklahoma, South Dakota, and Texas
- Together, these jurisdictions make up nearly 75 percent of congenital cases and 50 percent of our nation's syphilis cases.
- Goal: decrease CS by 5% by 9/2024 through increased access to testing and treatment, leveraging alternative testing sites/venues, and working with providers and health departments

Summary of opportunities for CS prevention

- Provider knowledge and practice
 - Working with state Medicaid programs to establish metrics, incentives
 - Issuing guidance recommendations
 - Provider education (detailing, small and large format)
 - Collaborating with health departments
 - CS/syphilis in pregnancy review boards
- Improving access to CS prevention and quality prenatal care
 - Finding and leveraging (non-medical) touchpoints
 - Partnerships with ED's, correctional facilities, substance use disorder treatment programs
 - Expansion of rapid syphilis testing
 - Low-barrier, incentivized care for pregnant people who use drugs and have a history of criminal justice involvement
 - Addressing poverty and other structural determinants of health

Thank you!

- Amy Zlot, MPH
- Yuritzy Gonzalez-Peña, MPH
- Jillian Garai, RN, MPH
- Cedric Cicognani
- Jennifer Li
- Shelley Pearson

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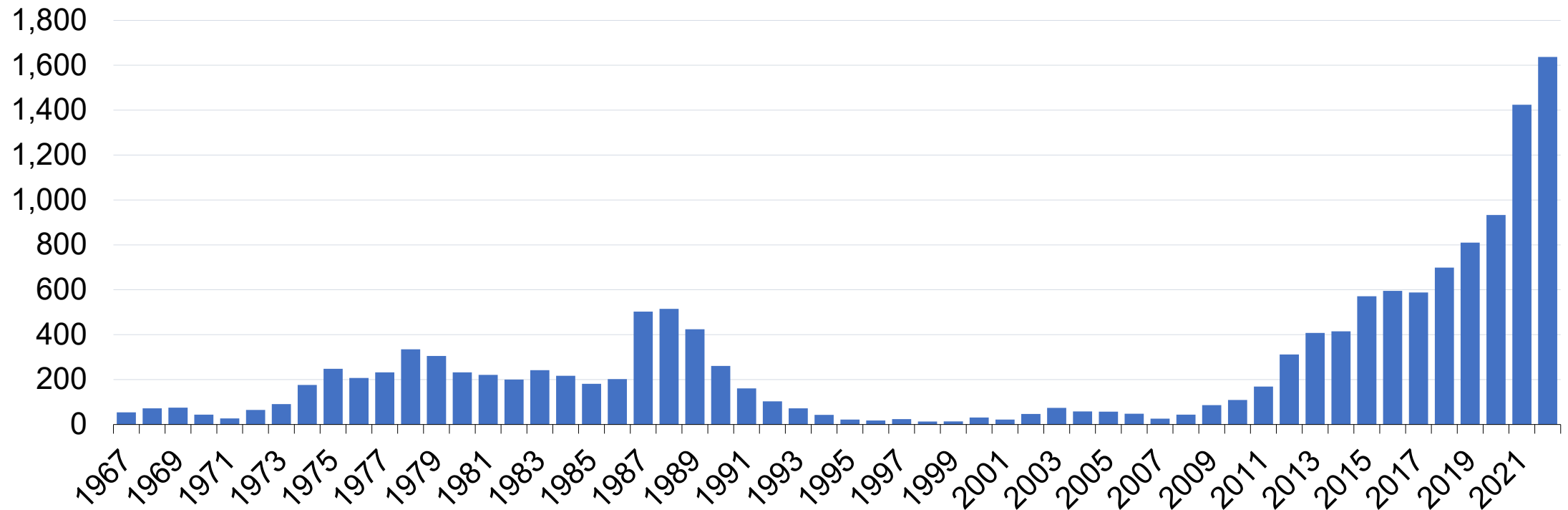
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Extra slides

Early syphilis diagnoses are the highest they've been in recent history

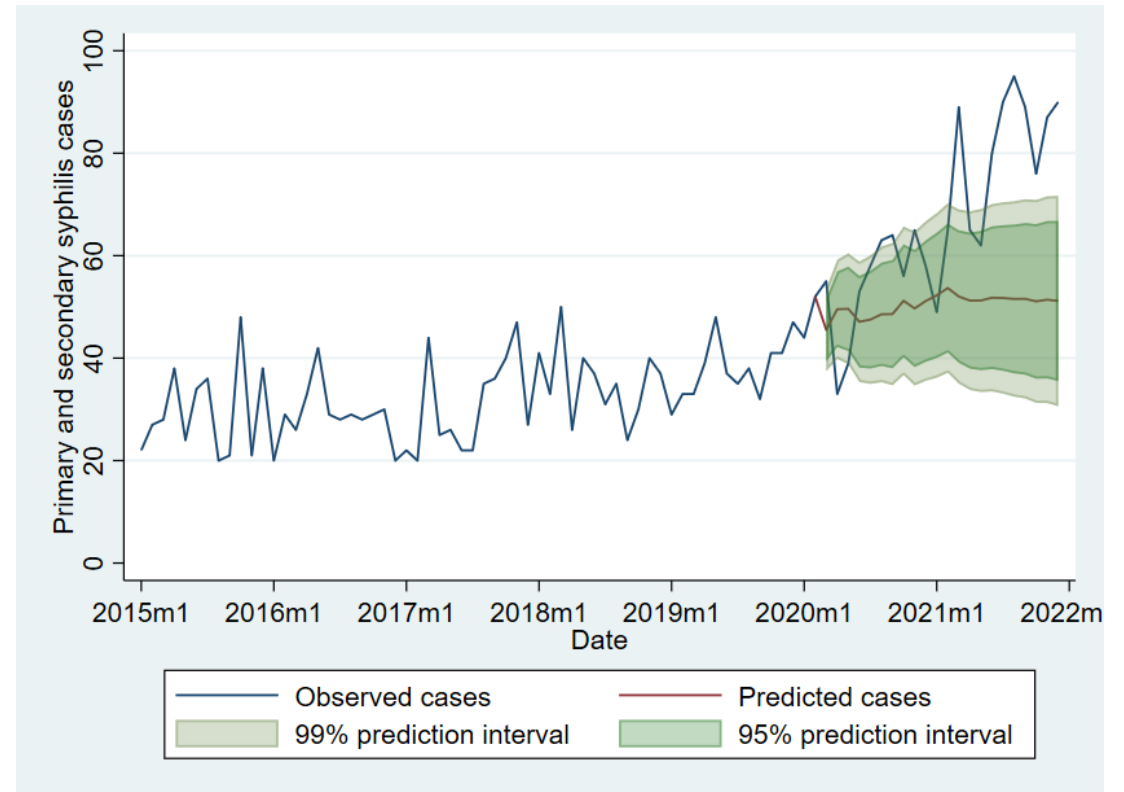
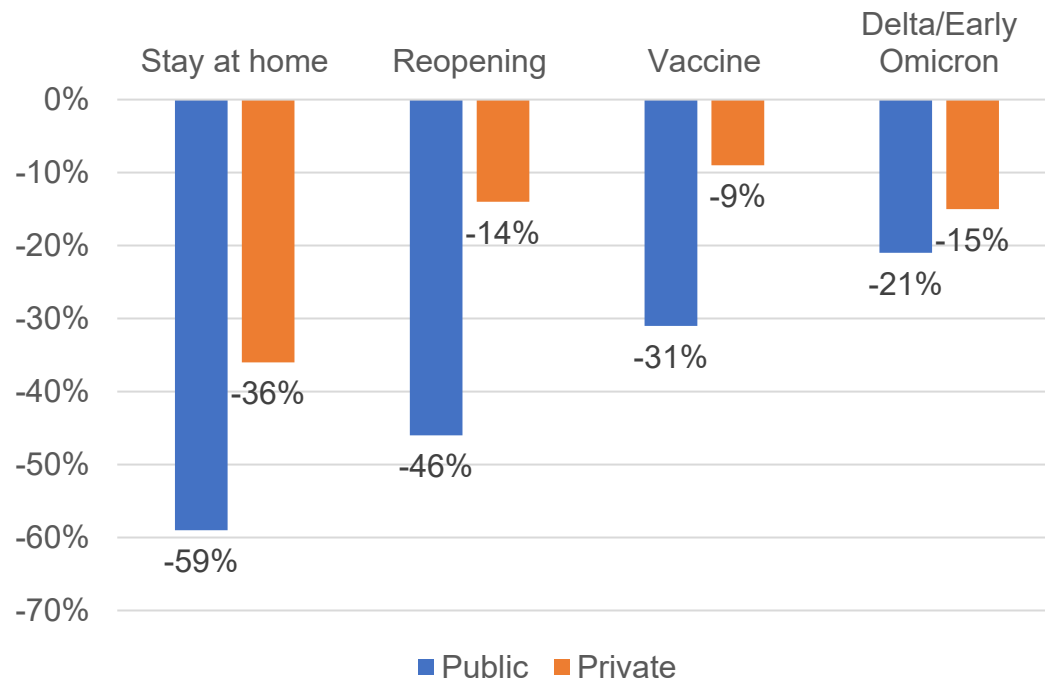
Cases of primary, secondary and non-primary non-secondary syphilis (early syphilis), 1967-2022



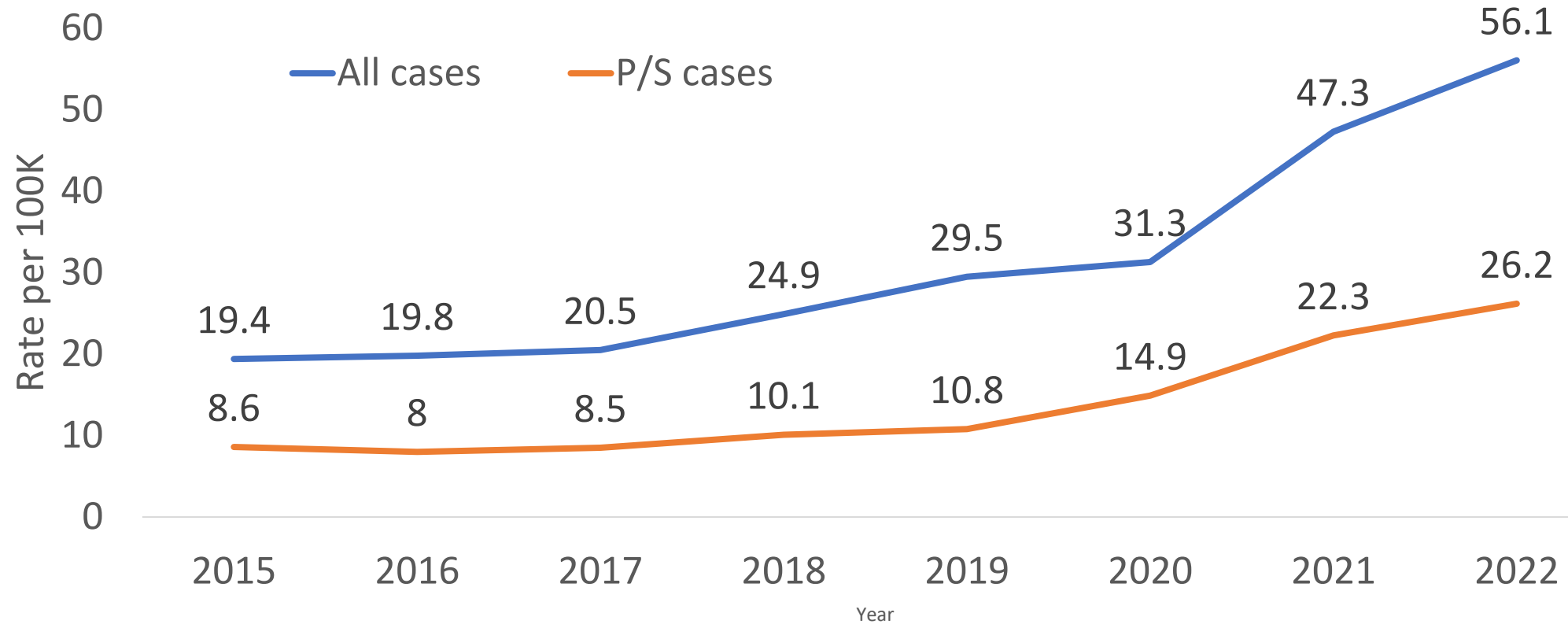
Despite reductions in testing, we observed a ~30% excess in P&S cases during COVID

Menza et al, STD, 2020 and 2023.

% reductions in public and private sector syphilis testing compared to 1/2019-2/2020, Oregon

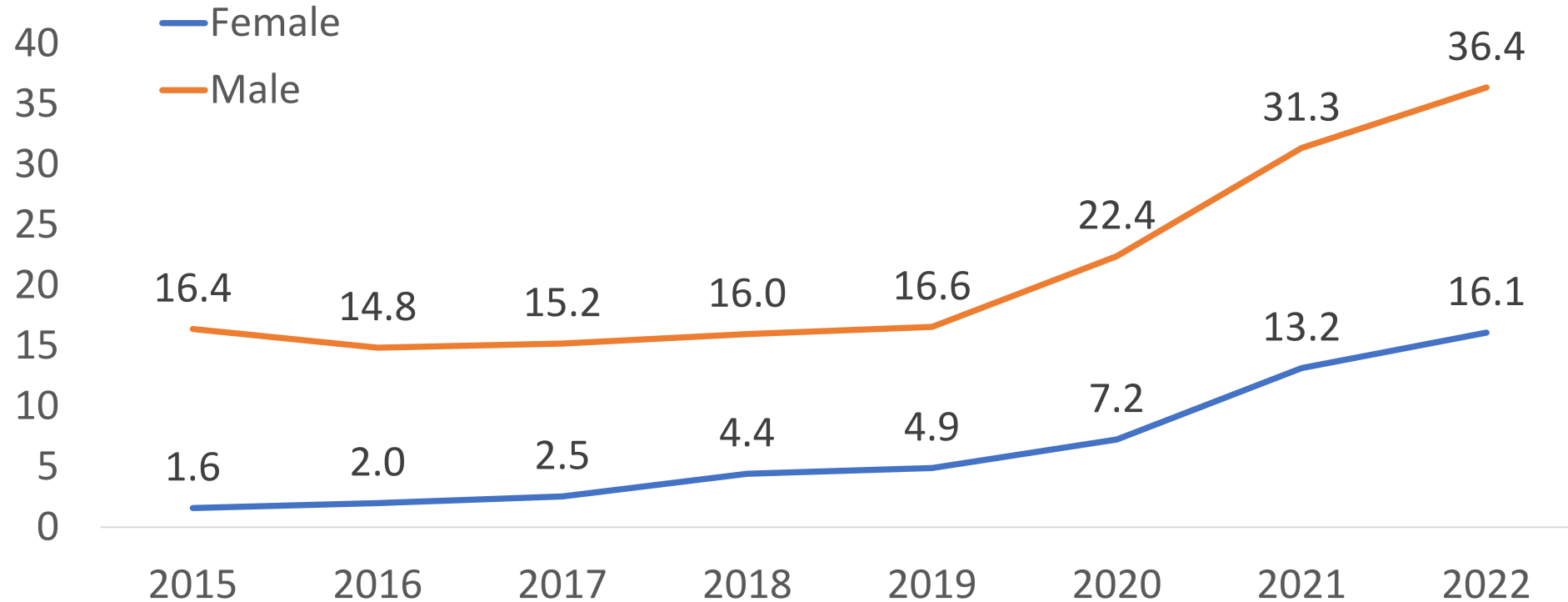


There was a large increase in syphilis diagnoses from 2020 to 2021



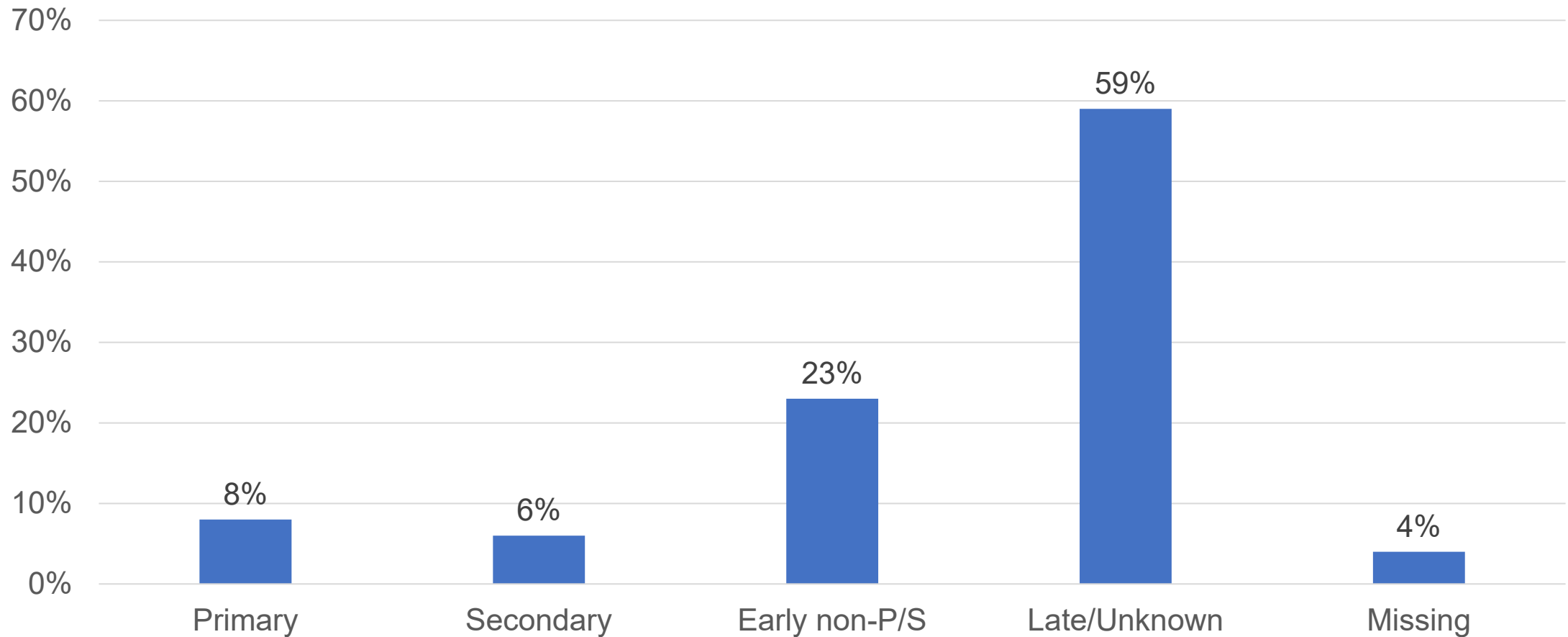
Between 2019 to 2021, there was an almost 3-fold increase in P&S syphilis among people assigned female at birth

Rate of primary and secondary syphilis by sex at birth, Oregon, 2015-2022



Most pregnant people associated with a case of CS are diagnosed with late/unknown duration syphilis

Syphilis stage at diagnosis, Oregon, 2014-2022

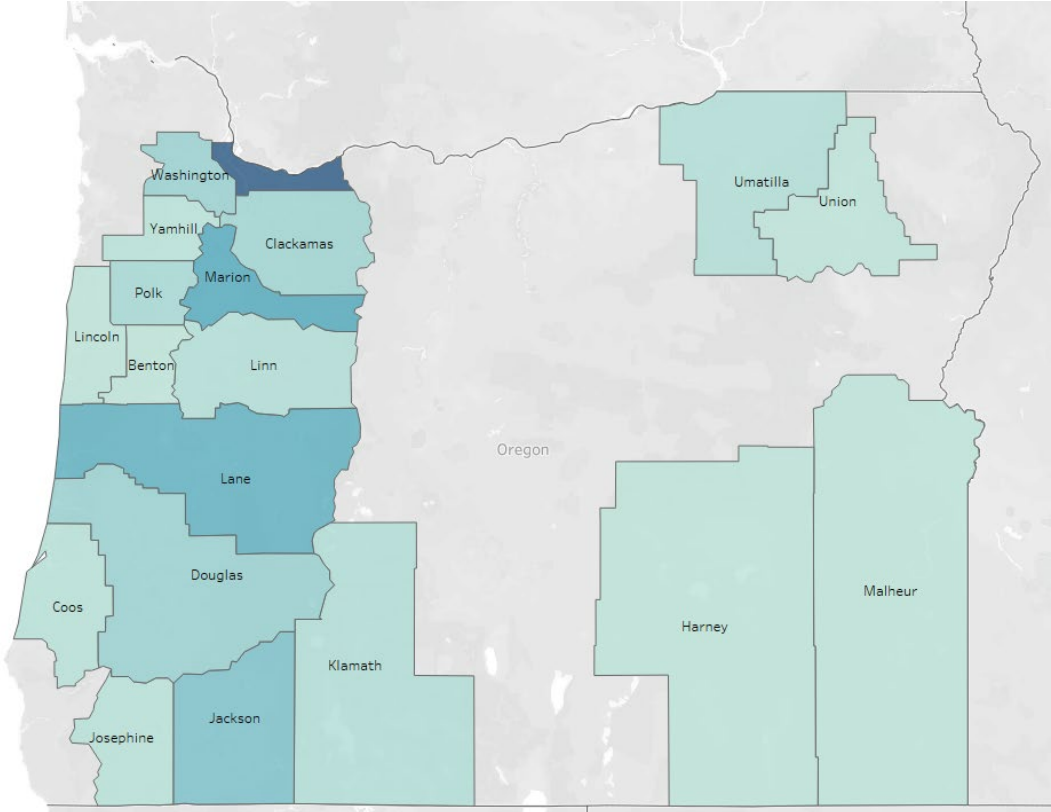
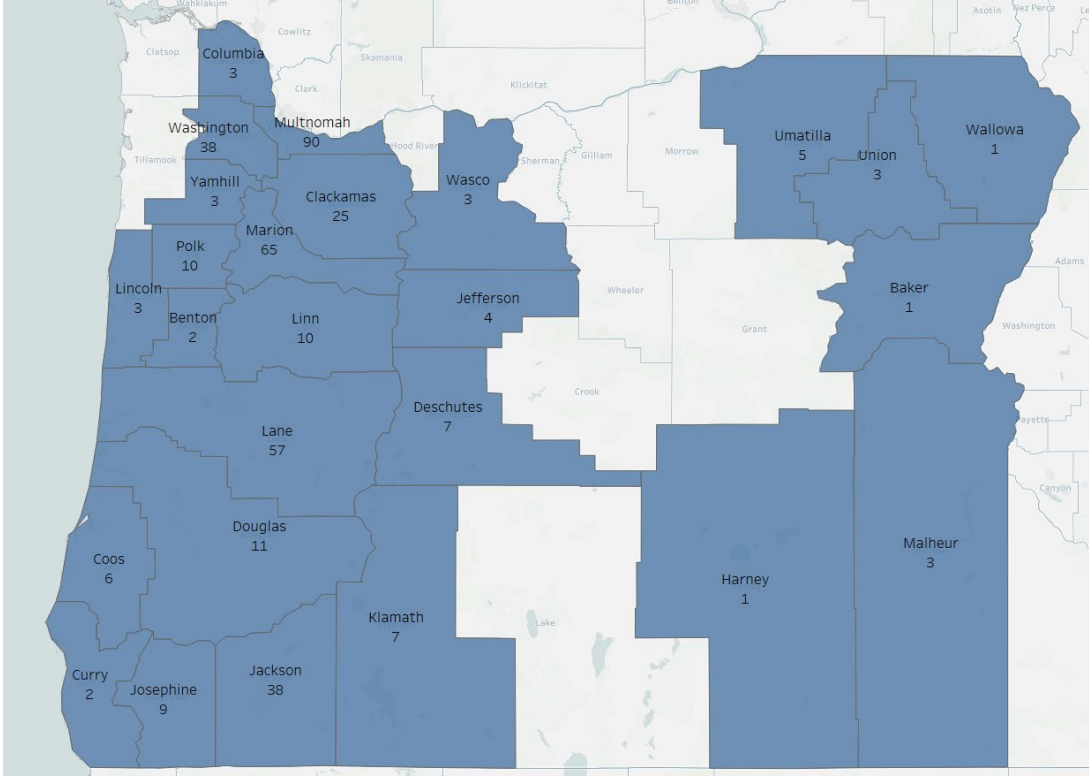


Syphilis in pregnancy and the proportion of pregnant people with syphilis associated with a CS case have been increasing

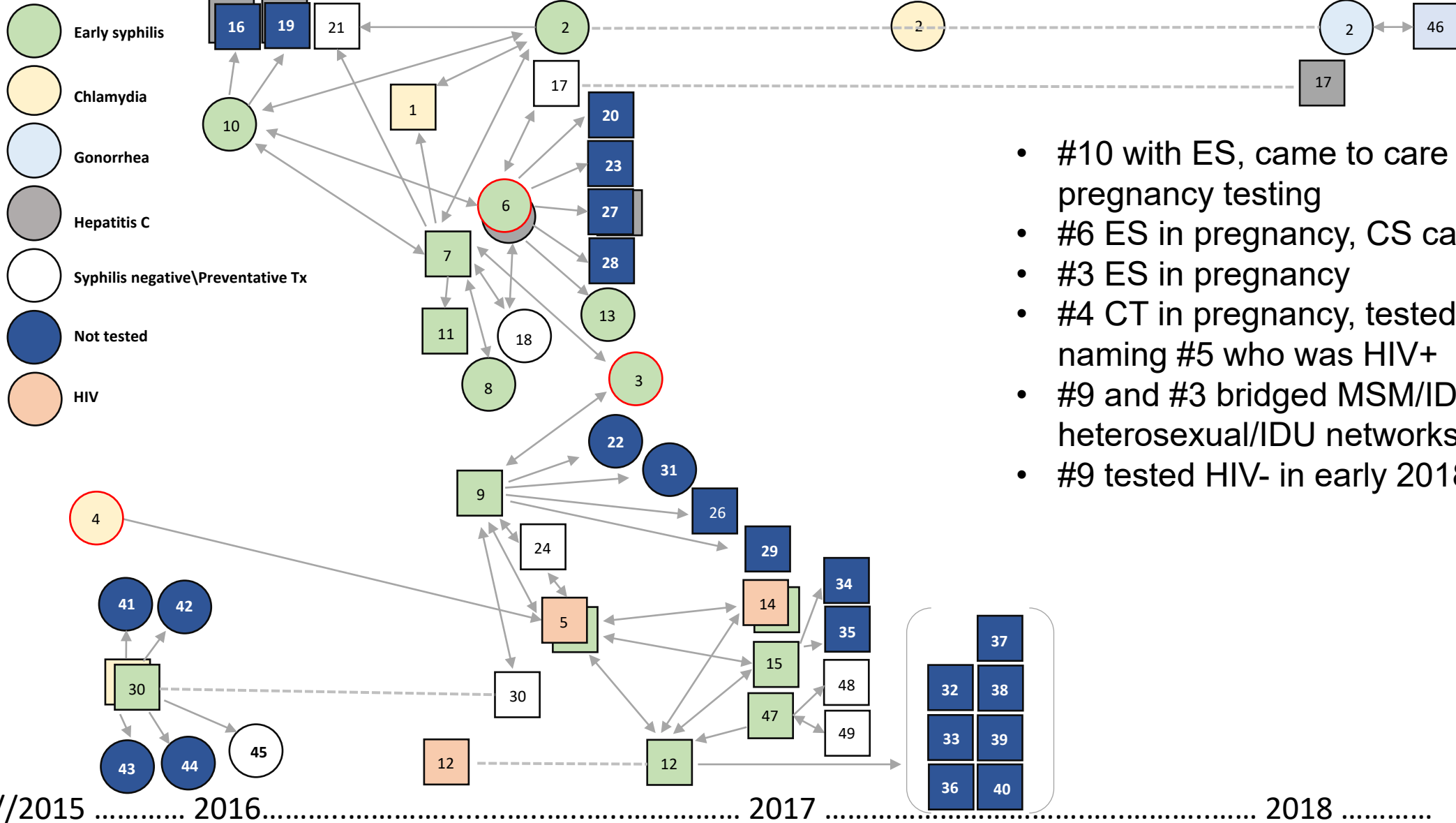
- 422 cases of syphilis in pregnancy from 2014 through 2022
 - 15 cases among 45557 pregnancies, or 3 cases per 10,000 pregnancies, in 2014
 - 86 cases among 40931 pregnancies, or 21 cases per 10,000 pregnancies, in 2021*
- 133 (32%) of pregnant people with syphilis were associated with a case of congenital syphilis
 - 2/15 (13%) cases in 2014
 - 37/88 (42%) cases in 2022

*Oregon vital statistics data have not yet been updated for 2022

As of 2022, 26 counties have reported a syphilis diagnosis in a pregnant person and 19 have reported a CS case



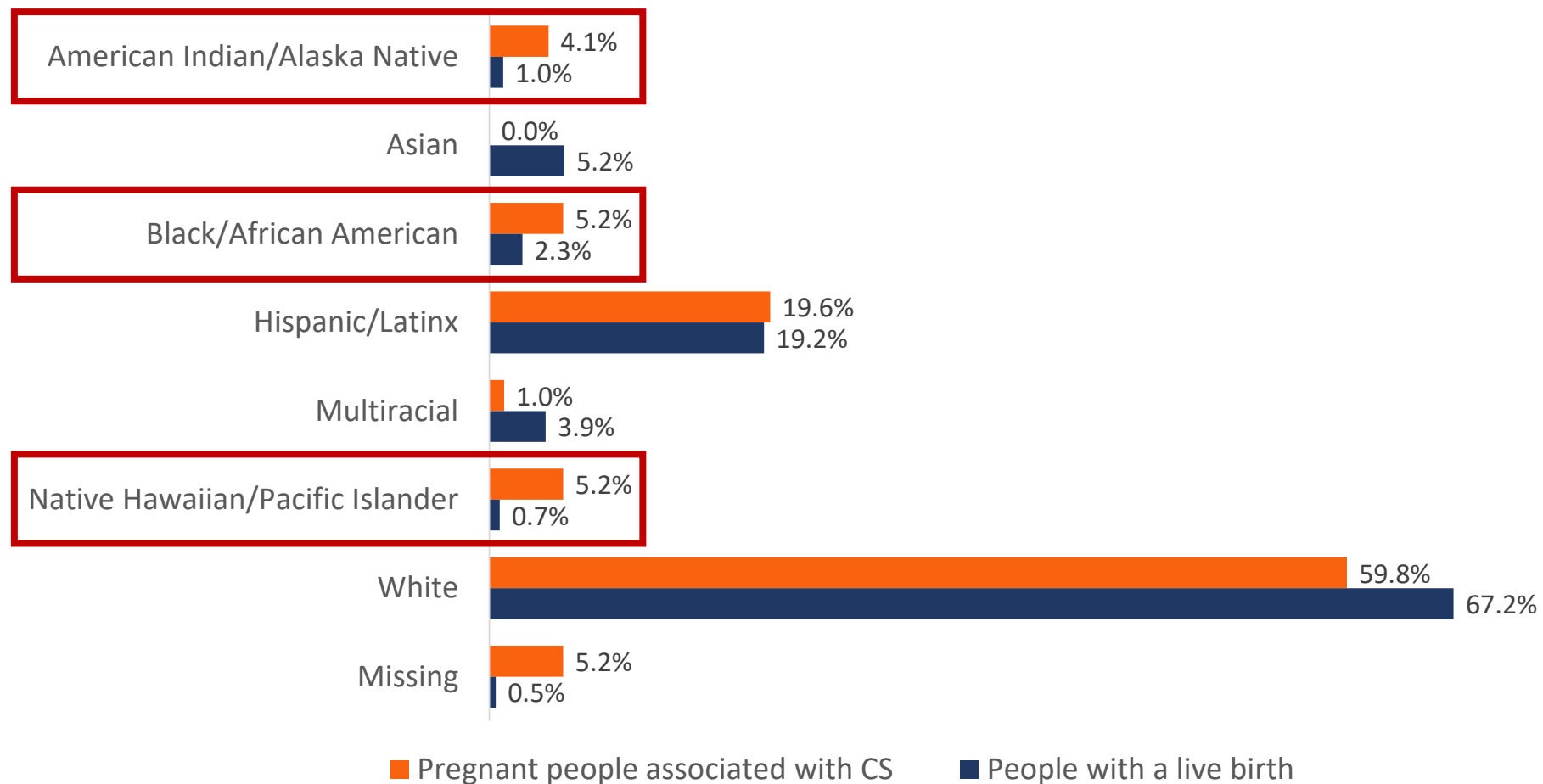
Syphilis contact network



- #10 with ES, came to care for HIV/STI and pregnancy testing
- #6 ES in pregnancy, CS case
- #3 ES in pregnancy
- #4 CT in pregnancy, tested HIV- after naming #5 who was HIV+
- #9 and #3 bridged MSM/IDU and heterosexual/IDU networks
- #9 tested HIV- in early 2018

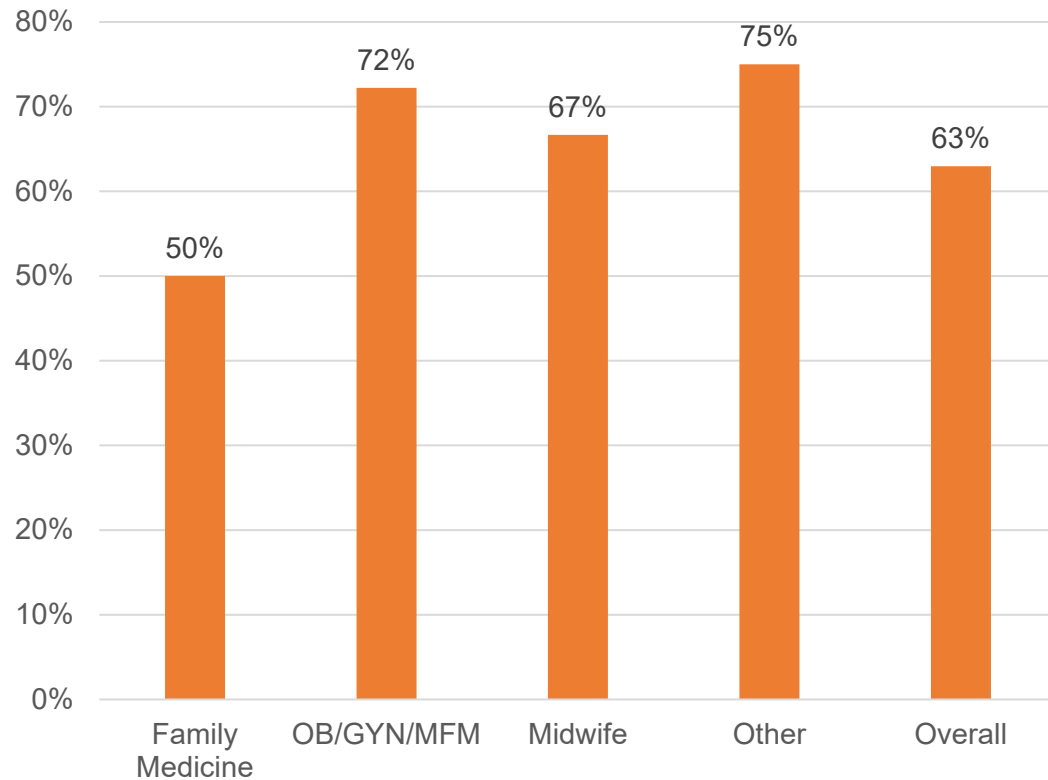
Racism drives inequities in CS

Race/ethnicity of pregnant people associated with a CS case, Oregon 2014-2022

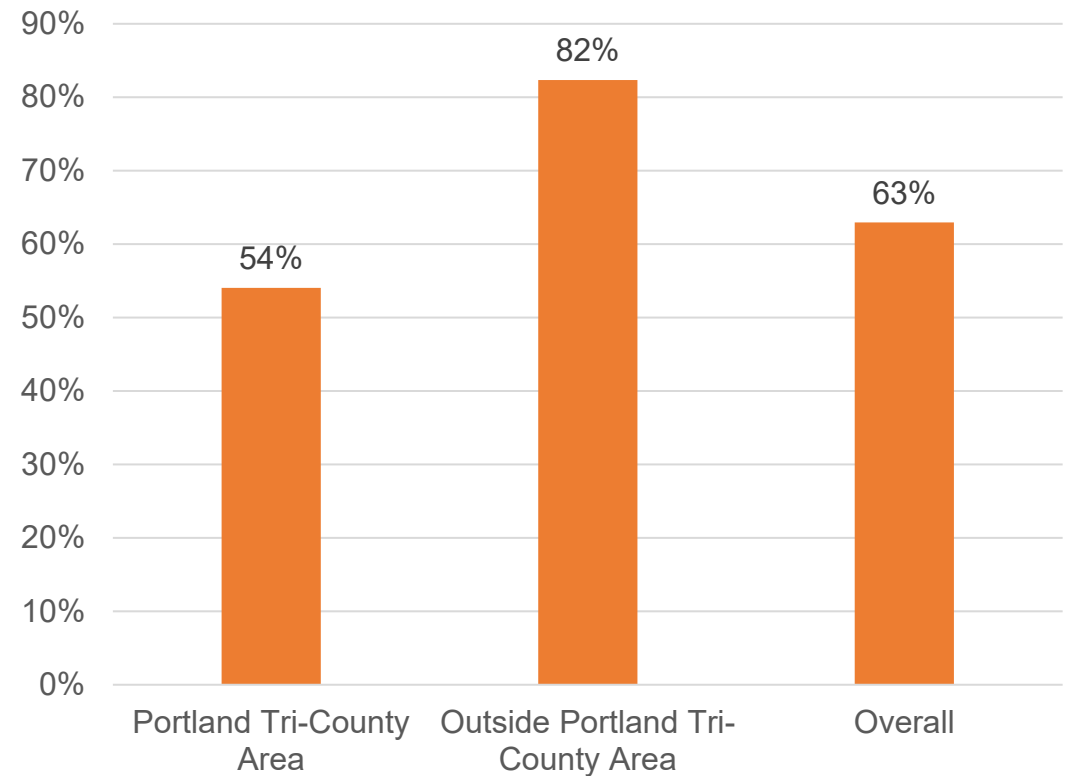


Among those who had ever diagnosed a patient with syphilis, 63% reported working with their local health department

Did you work with the local health department after diagnosis? by provider type

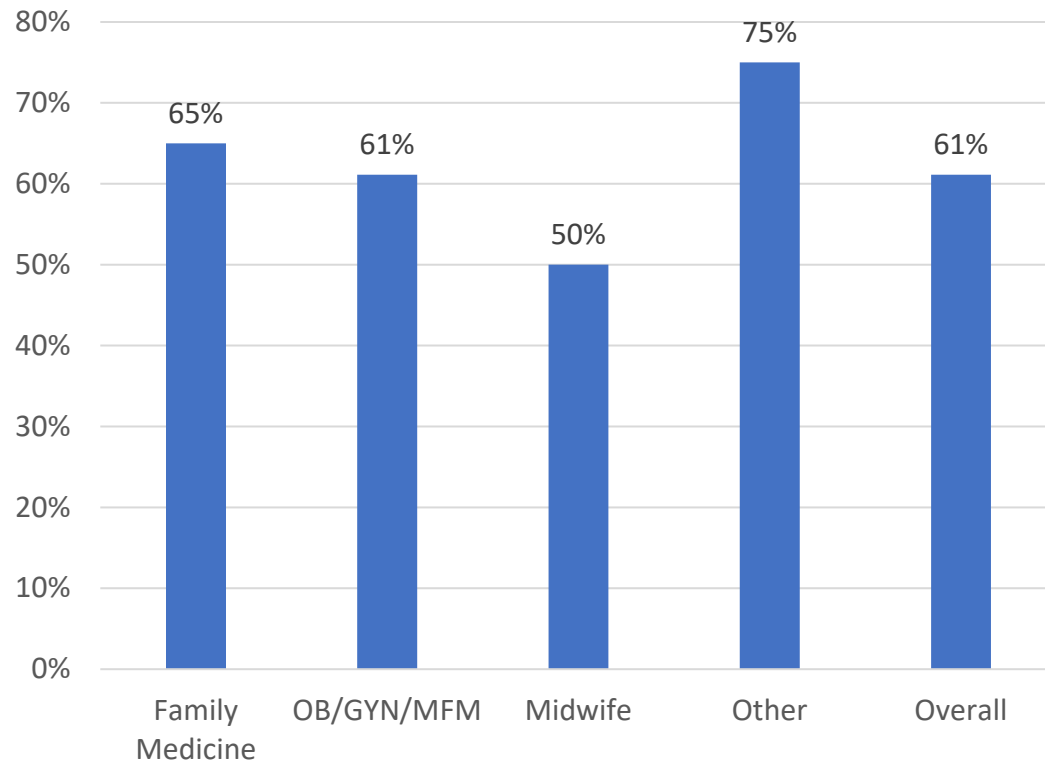


Did you work with the local health department after diagnosis? by practice geography



Among those who had ever diagnosed a patient with syphilis, 61% reported managing syphilis themselves

Manage and treat pregnant people with syphilis by provider type

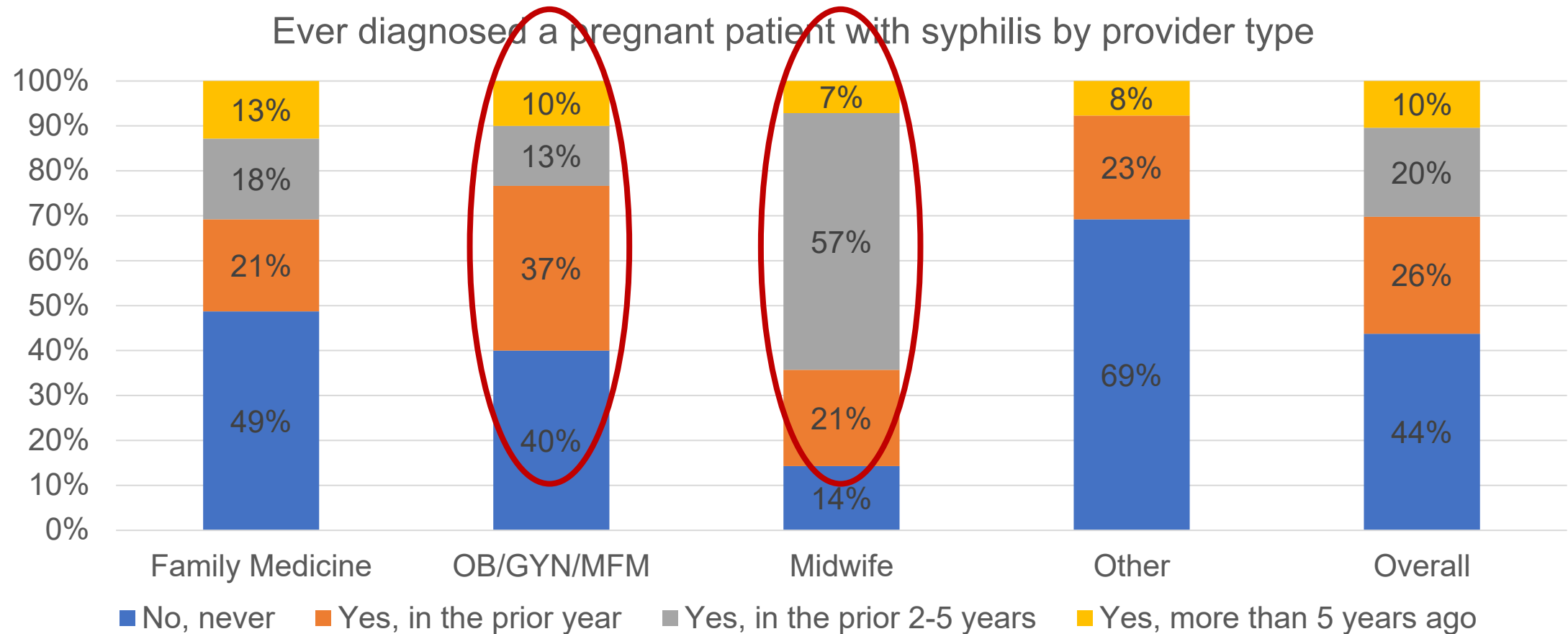


Barriers experienced when managing syphilis in pregnancy	N = 33
Pregnant patients with syphilis do not follow-up for treatment and repeat testing	11 (33%)
I have never seen the physical exam findings of primary and secondary syphilis	8 (24%)
The clinic where I work does not stock Bicillin	6 (18%)
I am not familiar with how to treat pregnant patients with a penicillin allergy	3 (9%)
I'm not comfortable interpreting changes in RPR titers over time	2 (6%)
I'm not familiar with how to stage syphilis	2 (6%)
I cannot take on the frequent follow-up required to manage pregnant patients with syphilis	1 (3%)
Infrequent cases in rural practice	1 (3%)

Most reported no barriers to screening

Barriers to screening	n = 96
No barriers	74 (77%)
The guidelines for syphilis screening in pregnancy are not clear	6
My patients do not want to be screened for syphilis	4
Patients do not get labs drawn	3
I'm not sure what tests to order	2
I am concerned that insurance will not reimburse for several screenings in pregnancy	2
Patients do not show up for appointments	2
The clinic where I work does not have a lab on site	1
Syphilis screening is too costly for my patients	1
My patients do not feel comfortable talking about sex and substance use	1
I'm not comfortable interpreting the results of syphilis testing	1
Health system changes to screening practices	1
Third trimester screening is an additional visit	1

56% had ever diagnosed syphilis in a pregnant person, 26% in the prior year



Local health departments provided partner services, treatment, follow-up, consultation and records

How did the local health department help?	N = 34
The health department contacted my patient's partners for testing and treatment	22 (65%)
The health department arranged patient treatment at a public health clinic	13 (38%)
The health department arranged for follow-up testing at a public health clinic	8 (24%)
The health department provided Bicillin so that I could provide treatment in the clinic where I work	5 (15%)
The health department put me in contact with someone with expertise in syphilis diagnosis and/or treatment	4 (12%)
The health department helped me find records of prior syphilis diagnosis and treatment	2 (6%)

CS case classification

Criteria	N = 95
Maternal only	57 (60%)
Infant only	7 (7%)
Both maternal and infant	23 (24%)
Syphilitic stillbirth	8 (8%)

Maternal criteria



Case classification

Probable: a condition affecting an infant whose mother had untreated or inadequately treated* syphilis at delivery, regardless of signs in the infant, OR an infant or child who has a reactive non-treponemal test for syphilis (VDRL, RPR, or equivalent serologic methods) AND any one of the following:

- Any evidence of congenital syphilis on physical examination (see Clinical description).
- Any evidence of congenital syphilis on radiographs of long bones.
- A reactive CSF VDRL test.
- In a non-traumatic lumbar puncture, an elevated CSF leukocyte (white blood cell [WBC]) count or protein (without other cause):
 - Suggested parameters for abnormal CSF WBC and protein values:
 1. During the first 30 days of life, a CSF WBC count of >15 WBC/mm³ or a CSF protein >120 mg/dL is abnormal.
 2. After the first 30 days of life, a CSF WBC count of >5 WBC mm³ or a CSF protein >40 mg/dL, regardless of CSF serology.
 - The treating clinician should be consulted to interpret the CSF values for the specific patient.

Infant criteria



* Adequate treatment is defined as completion of a penicillin-based regimen, in accordance with CDC treatment guidelines, appropriate for stage of infection, initiated 30 or more days before delivery.

Confirmed: a case that is laboratory confirmed.

Individual-level variables

	All PP with syphilis (n=343)	No CS (n=248)	CS (n=95)
Age, years, median (IQR)	27 (22-31)	27 (23-31)	26 (22-32)
Race/ethnicity			
AI/AN	10 (3%)	6 (3%)	4 (4%)
Asian	8 (2%)	8 (3%)	0
Black	25 (8%)	20 (9%)	5 (5%)
Hispanic	65 (20%)	46 (20%)	19 (21%)
Multiple/other	20 (6%)	17 (7%)	3 (3%)
NH/PI	15 (5%)	10 (4%)	5 (5%)
white	181 (56%)	125 (54%)	56 (61%)
Rural or frontier zip code	80 (23%)	59 (24%)	21 (22%)
Period 2019-2021 (v 2013-2018)	189 (55%)	130 (52%)	59 (62%)

	All PP with syphilis (n=343)	No CS (n=248)	CS (n=95)
Syphilis stage and contacts			
Early syphilis	131 (38.2)	99 (39.9)	32 (33.7)
1+ contacts with a syphilis diagnosis	33 (9.6)	22 (8.9)	11 (11.6)
Substance use and corrections			
Injection drug use, ever	88 (25.7)	47 (19.0)	41 (43.2)
Corrections involvement, ever	149 (43.4)	95 (38.3)	54 (56.8)
Partner uses injection drugs	85 (24.8)	53 (21.4)	32 (33.7)
Prior STI, HCV			
Prior syphilis diagnosis	48 (14.0)	35 (13.1)	13 (13.7)
GC diagnosis, prior 2 years	31 (9.0)	25 (10.1)	6 (6.3)
CT diagnosis, prior 2 years	60 (17.5)	41 (16.5)	19 (20.0)
HCV diagnosis prior to syphilis diagnosis	20 (5.8)	12 (4.8)	8 (8.4)

Injection drug use and corrections involvement increase the risk of being associated with a CS case

	RR (95%CI)
Injection drug use, ever	1.97 (1.22, 3.17)
Corrections involvement, ever	1.45 (1.12, 1.89)
GC diagnosis, prior 2 years	0.49 (0.30, 0.81)

CI, confidence interval; GC, gonorrhea; RR, risk ratio

Notes and limitations to the individual-level data

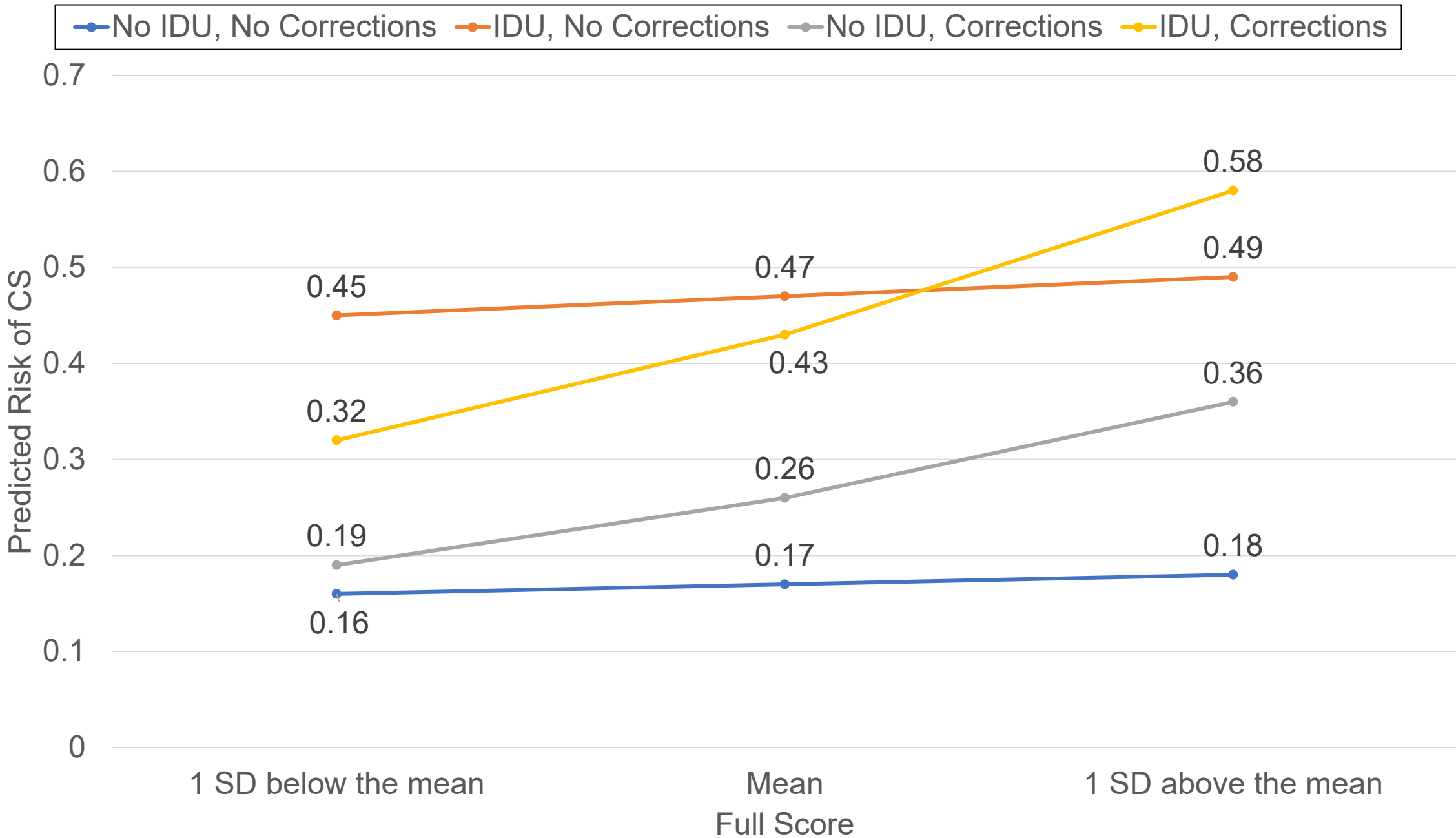
- Prenatal care variables are only available for pregnant people who were associated with a case of CS
- Housing status, transactional sex, more recent substance use had > 30% missingness
- Corrections data gathered from Accurint
 - Corrections involvement is defined as incarceration, community supervision, and/or outstanding cases or warrants (excluding for traffic violations)

County-level variables by counties with and without CS cases

	All Counties (n = 23)	Counties with no CS cases (n = 6)	Counties with at least one CS case (n = 17)
Average poor mental health days	4.9 (0.2)	4.9 (0.1)	4.9 (0.3)
% of the population that is food insecure	12 (2)	11 (1)	12 (2)
Methamphetamine overdose death rate per 100K population	4.3 (4.2)	1.9 (2.1)	5.2 (4.5)
Violent crime rate per 100K population	217 (88)	176 (58)	231 (94)
% unemployment	7.7 (1.1)	7.8 (0.6)	7.6 (1.2)
% population in poverty	13.5 (3.2)	14.1 (3.4)	12.0 (2.0)
Income inequality ratio	4.4 (0.4)	4.3 (0.4)	4.4 (0.4)
% of population with at least one adverse childhood experience	67 (4)	66 (7)	67 (3)
Houseless rate per 100K population	36 (27)	34 (19)	37 (29)

Principal component analysis

- All the county-level variables are highly positively correlated (0.33-0.90)
- And each variable may help explain some proportion of variance in the outcome of CS
- Therefore, we used principal component analysis to create a new variable, a score, that represents a linear combination of the county-level variables and that retains the explanatory variance of the original variables
- Using the first component of two PCA's, we calculated a score where a higher score indicates higher rates or percentages of each of the original variables (i.e., county-level disadvantage)



Limitations and analytic next steps

- Overall, relatively small number of counties ($n = 23$) with a range of pregnant people with syphilis from 1 to 85
 - Time periods represented in county-level variables
 - Interpretation of the score (full v. simple)
-
- Expand the time periods of county-level variables
 - Explore mediators, including metrics of social capital, community resilience



Evaluation

