

# **Current Epidemiology of Selected STDs**

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# What we will cover today

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- Diseases
  - Chlamydia
  - Gonorrhea
  - Syphilis
  - Viral STDs
    - HSV-2
    - HPV
- Special Populations
  - Adolescents and young adults
  - Men who have sex with men
  - Racial and ethnic minorities

# What is epidemiology?

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- Distribution and determinants of disease within a populations
  - Who, what, and where
- Part of the core function of public health
  - Assessment
  - Assurance
  - Policy development
- Importance
  - Where disease is occurring and with whom
  - Plan for prevention and control

# Sources for surveillance data

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- 1) Notifiable disease reporting from state & local STD programs
- 2) Projects that monitor STD positivity & prevalence
- 3) Other national surveys implemented by federal and private organizations

# A few key terms

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Term	Definition
Incidence	Estimated number of persons <i>newly</i> infected during a specified time period.
Rate	A measure of frequency of an event compared with the number of persons at risk for an event. Rates are calculated by dividing the number of events (numerator) by the size of the population (denominator).
Prevalence	The number of persons in a population with disease.

# CHLAMYDIA

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# Epidemiology of Chlamydia

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- Incidence
  - 1,422,976 cases reported in 2012
    - Largest # of cases reported to CDC for any condition
    - Most frequently reported STD in the US
  - Case Rate = 456.7 per 100,000 population
    - .07% increase from 2011
- Female rate is 2.4 x the male rate
  - Higher screening rates in women
  - Male screening increased with urine based testing
  - Reported rates underestimate the burden of disease

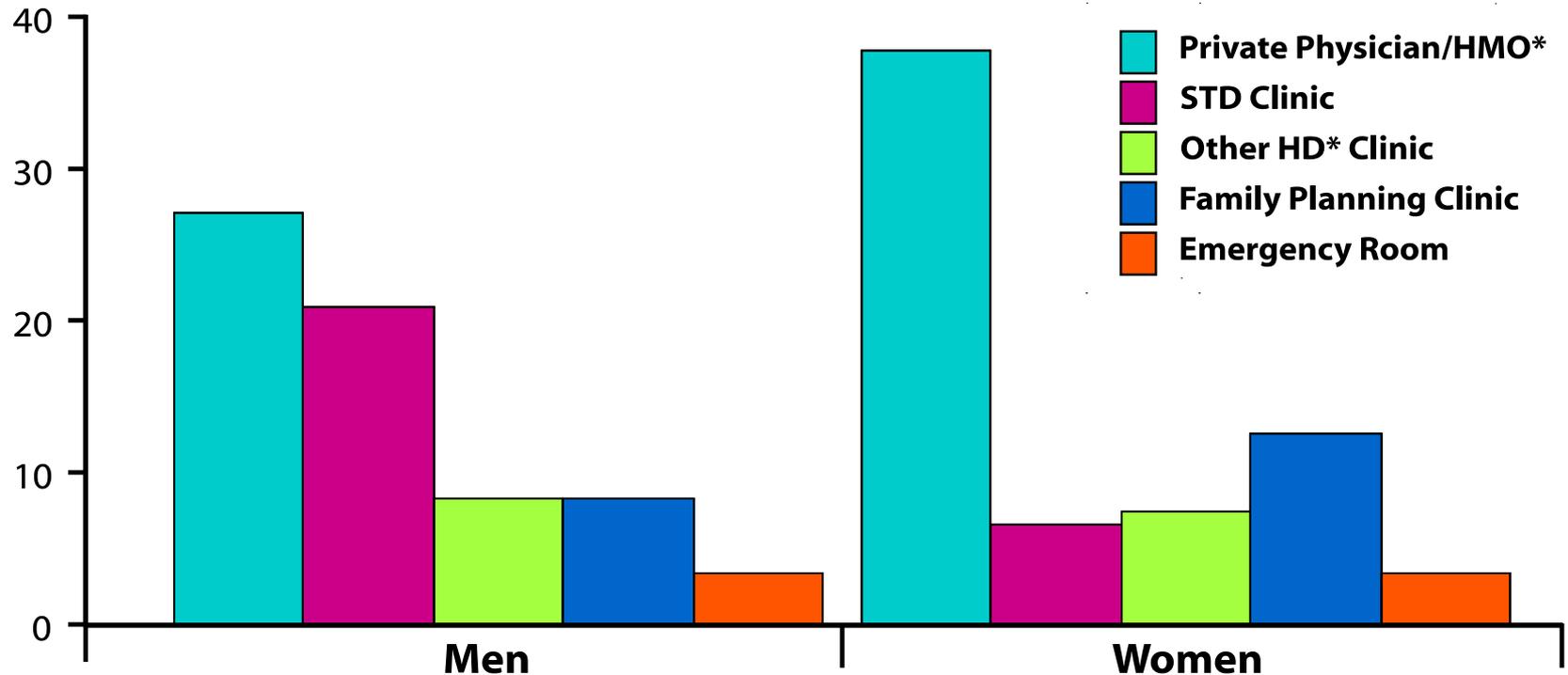
# Where are most chlamydia cases reported?

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- Private physician/HMO
- STD clinic
- Other Health Department Clinic
- Family planning clinics
- Emergency room

# Chlamydia—Percentage of Reported Cases by Sex and Selected Reporting Sources, United States, 2012

Percentage



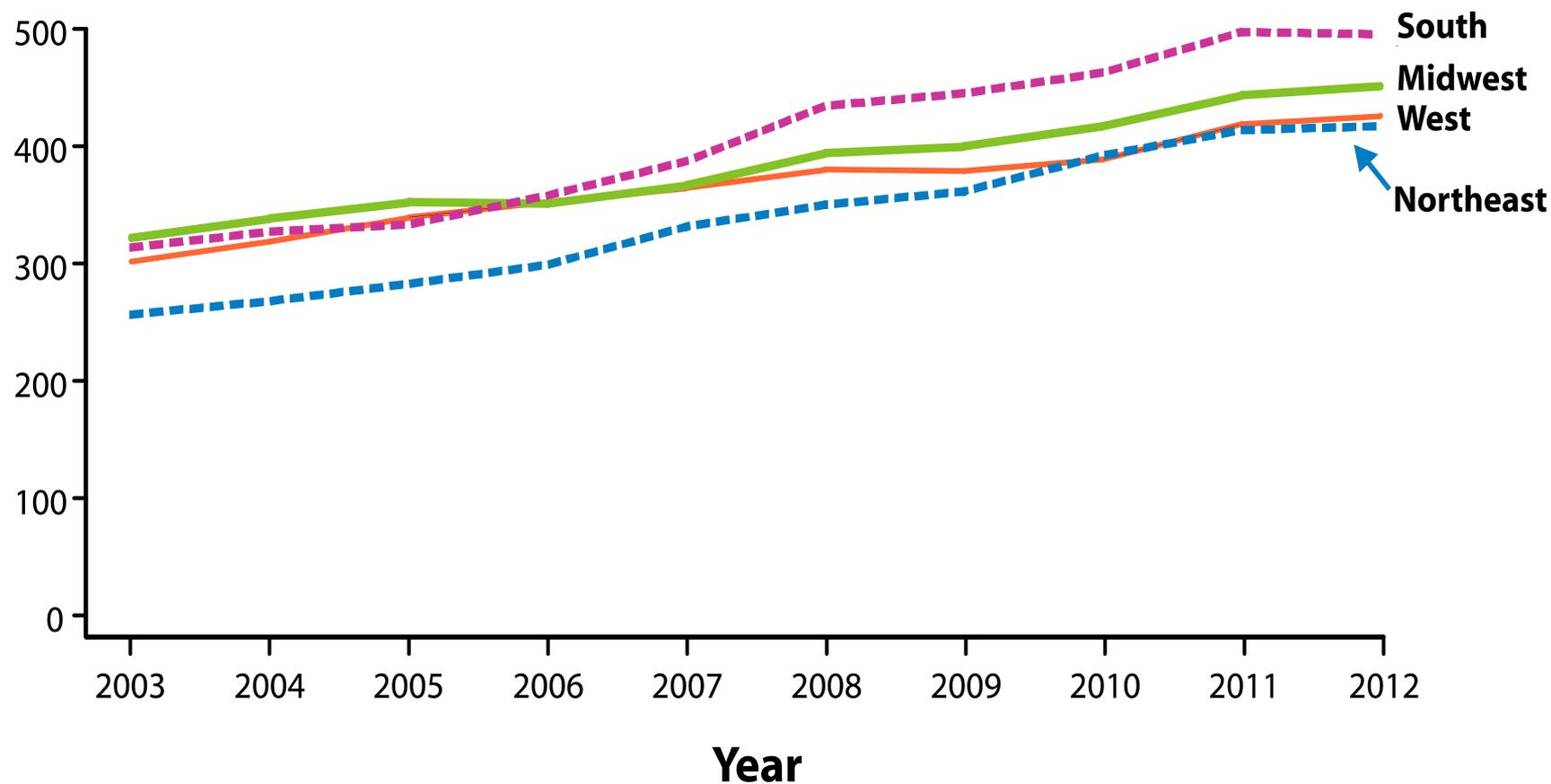
\*HMO=health maintenance organization; HD=health department

**NOTE:** Of all cases, 11.4% had a missing or unknown reporting source. Among cases with a known reporting source, the categories presented represent 69.8% of cases; 30.2% were reported from sources other than those shown.

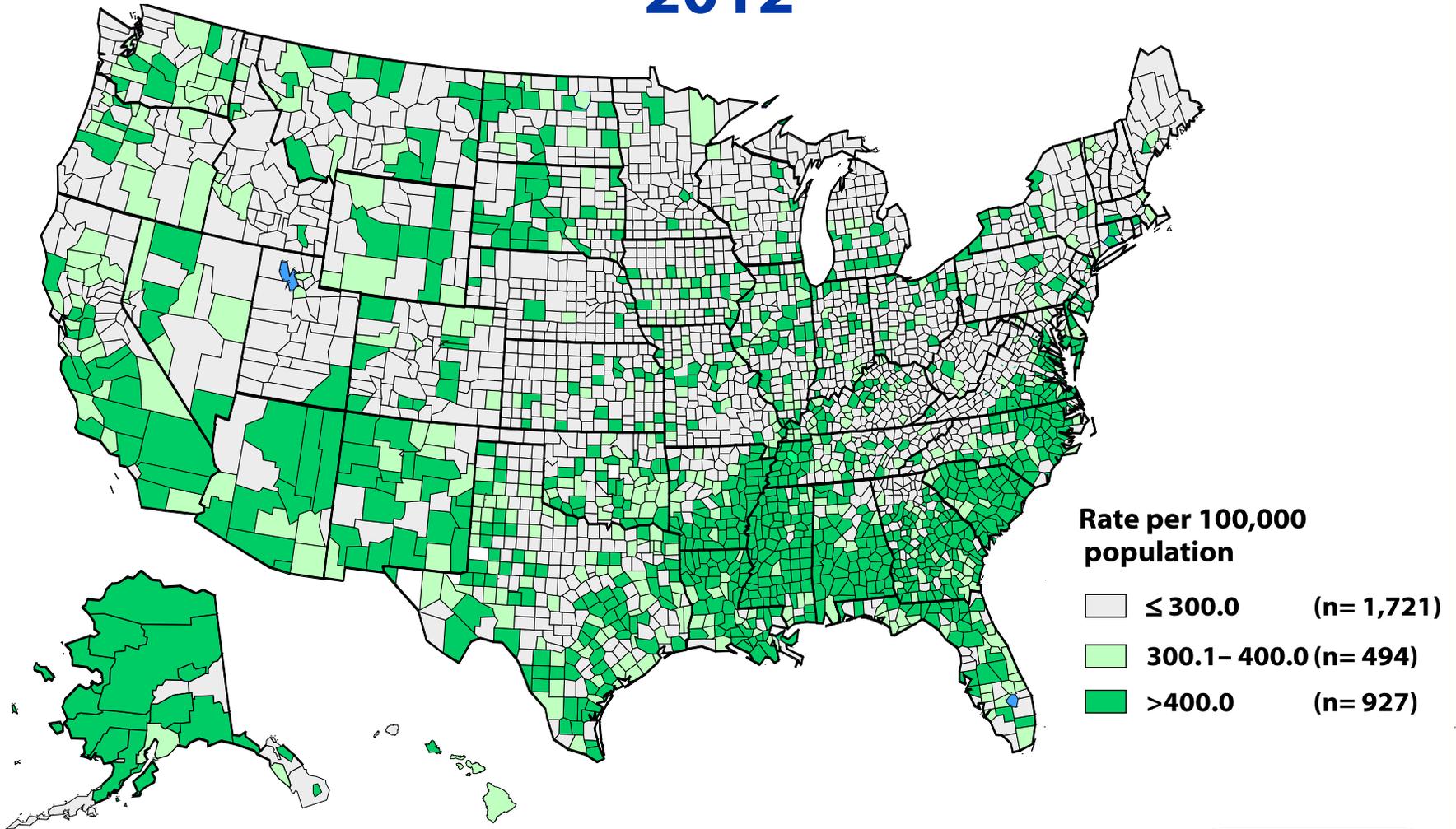


# Chlamydia—Rates by Region, United States, 2003–2012

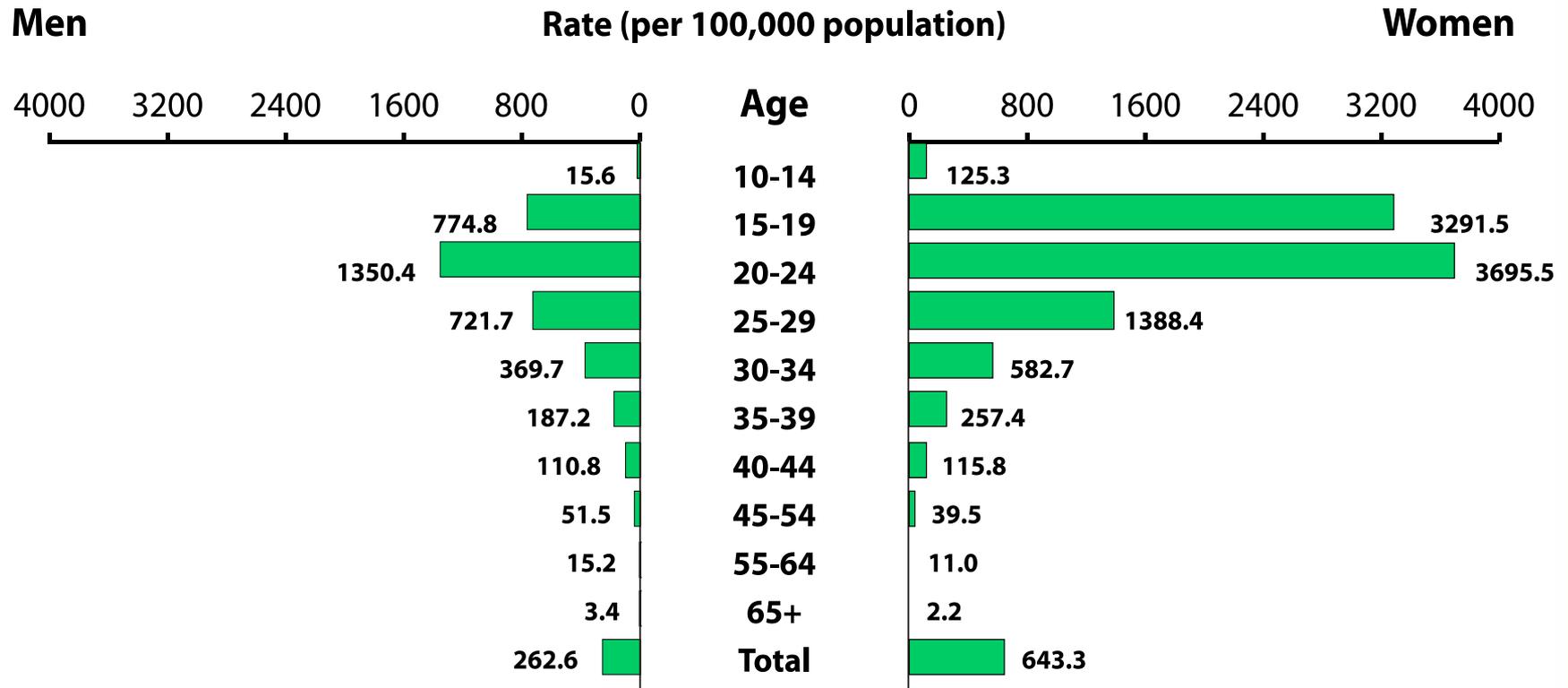
Rate (per 100,000 population)



# Chlamydia—Rates by County, United States, 2012

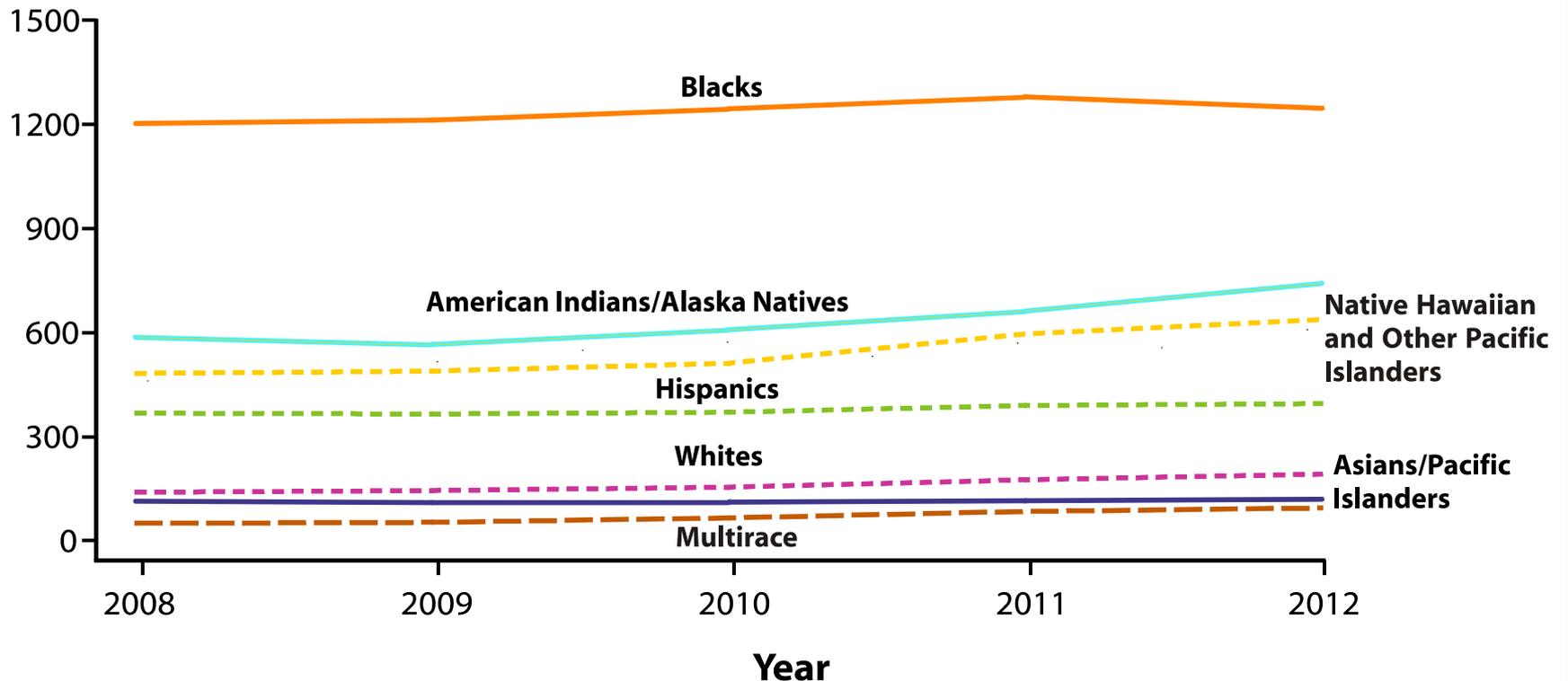


# Chlamydia—Rates by Age and Sex, United States, 2012



# Chlamydia—Rates by Race/Ethnicity, United States, 2008–2012

Rate (per 100,000 population)



**NOTE:** Includes 38 states and the District of Columbia reporting race/ethnicity data in Office of Management and Budget compliant formats during 2008–2012.



# **GONORRHEA**

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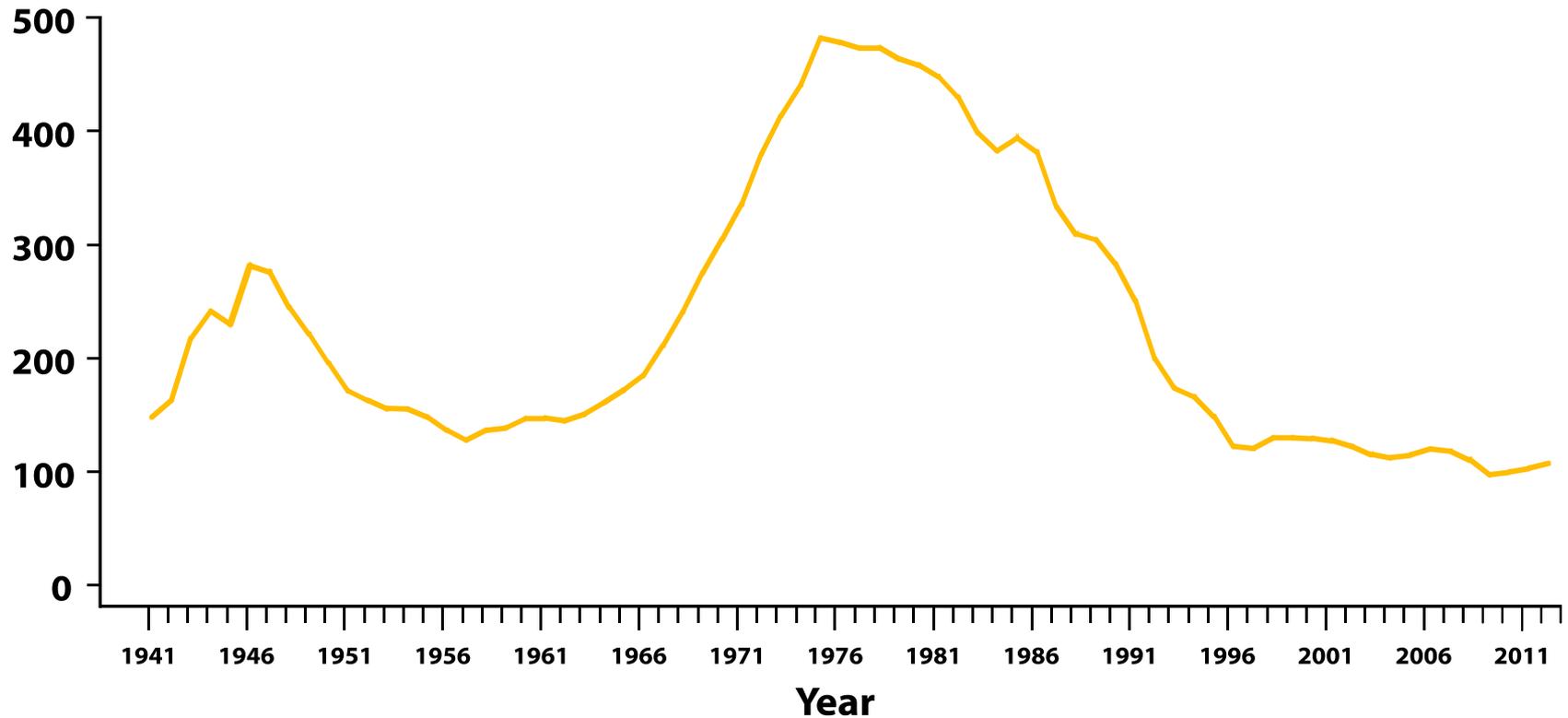
# Epidemiology of Gonorrhea

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- Incidence
  - 334,826 cases reported in 2012
    - Downward trend 1975-1997, then plateaued until 2009
    - 2009 was the lowest since national reporting began
  - Case Rate = 107.5 per 100,000 population
    - 4% increase from 2011
- Slightly higher rates in females
  - 15-24 highest rates for women
  - 20-24 highest rates for men
- Antimicrobial resistance remains an important treatment consideration

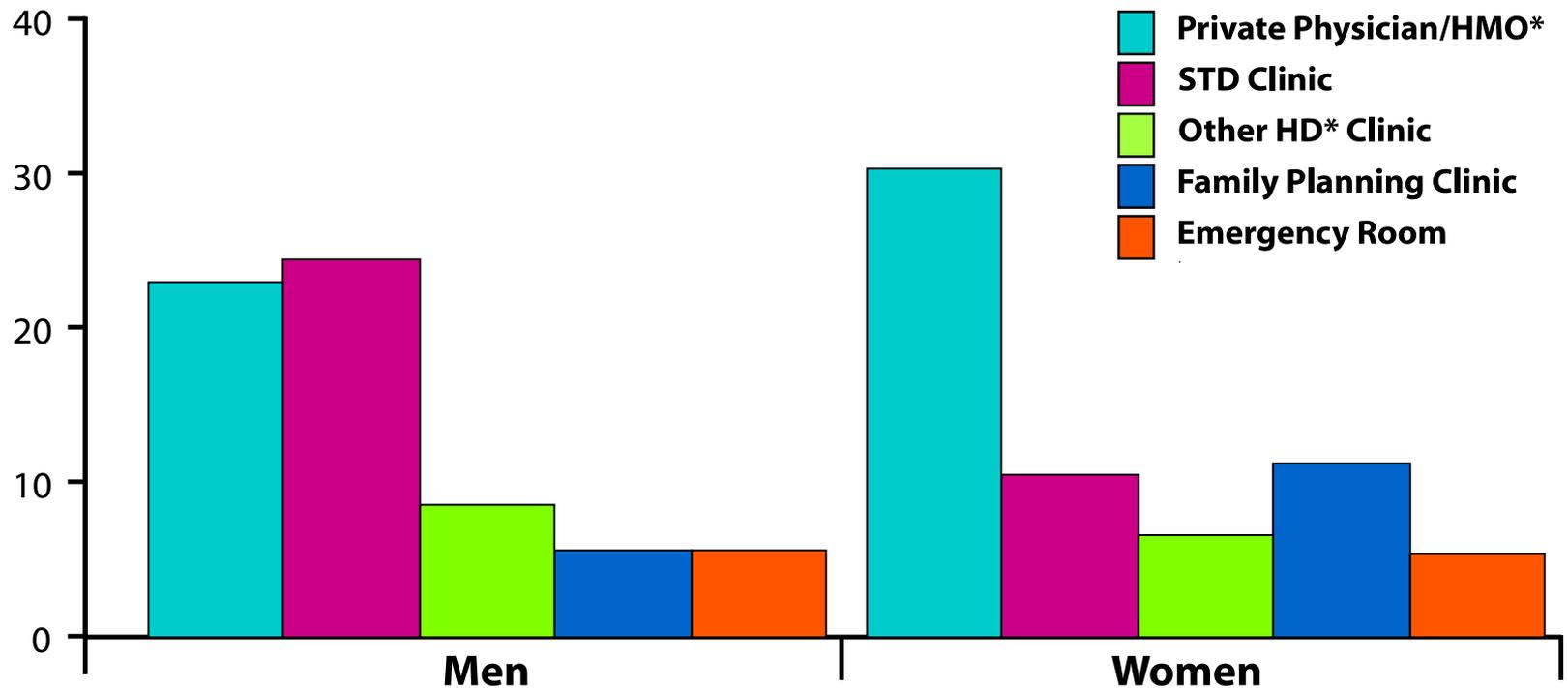
# Gonorrhea—Rates, United States, 1941–2012

Rate (per 100,000 population)



# Gonorrhea—Percentage of Reported Cases by Sex and Selected Reporting Sources, United States, 2012

Percentage

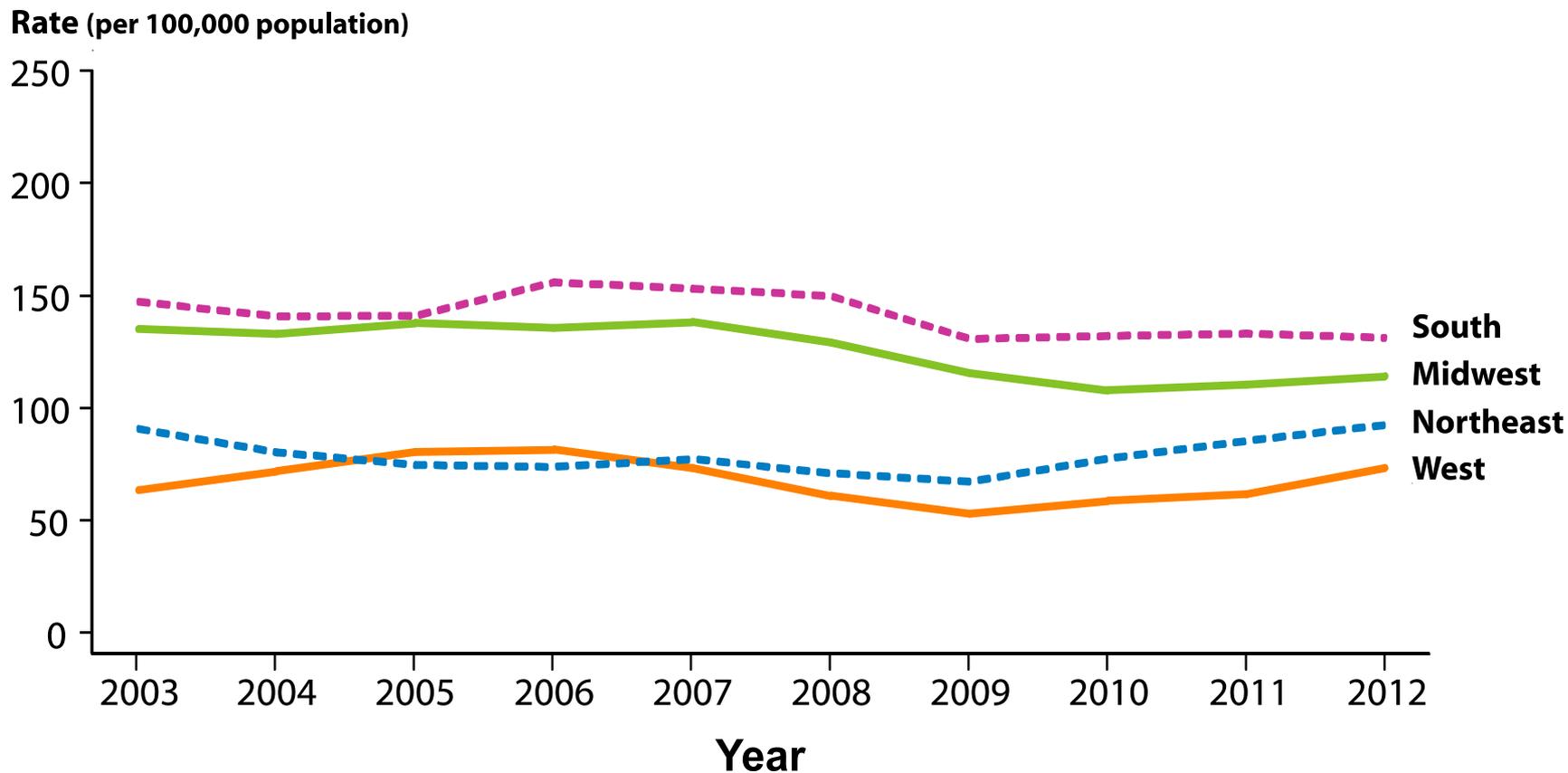


\*HMO=health maintenance organization; HD=health department

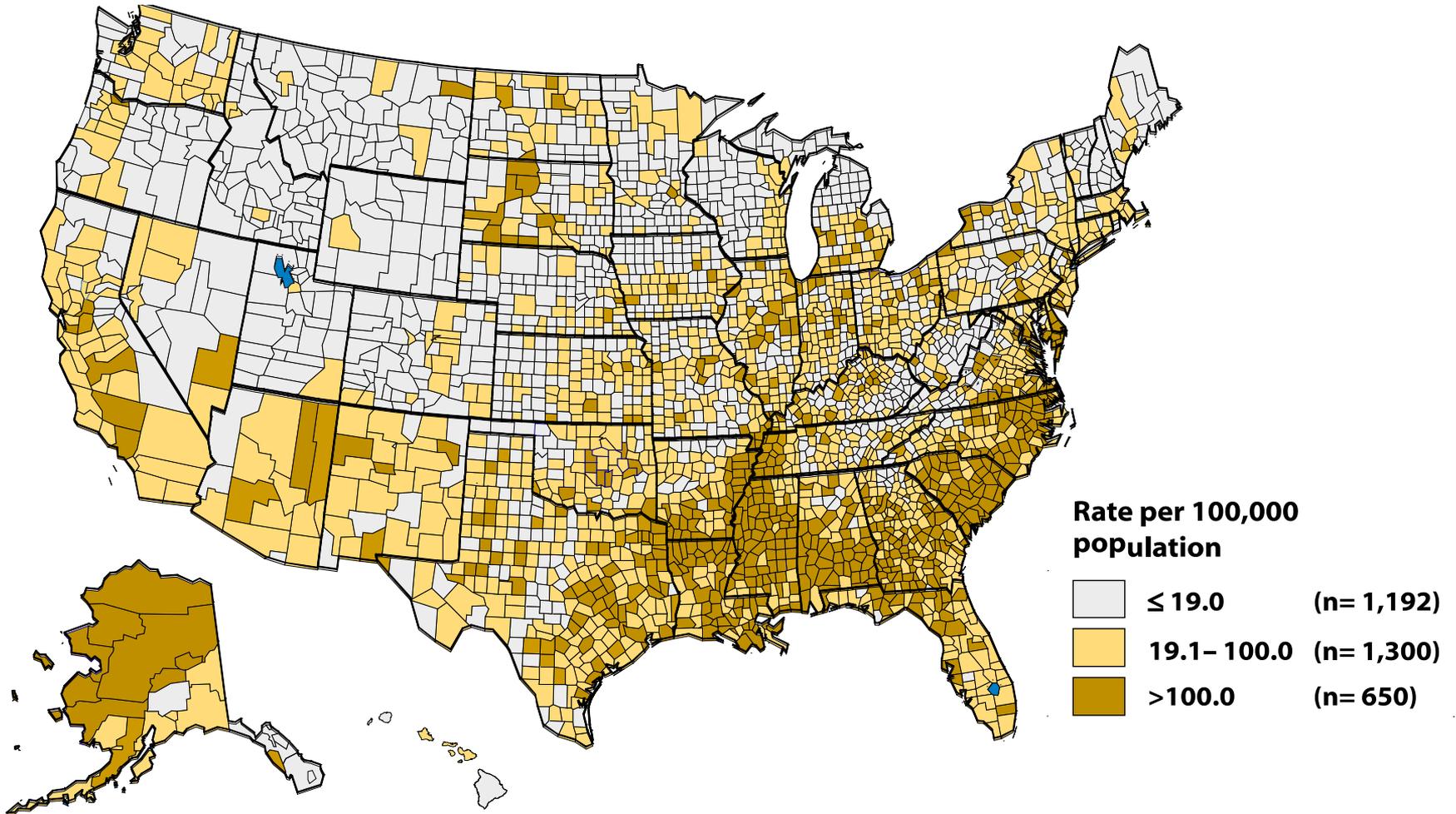
**NOTE:** Of all cases, 11.7% had a missing or unknown reporting source. Among cases with a known reporting source, the categories presented represent 66.2% of cases; 33.8% were reported from sources other than those shown.



# Gonorrhea—Rates by Region, United States, 2003–2012



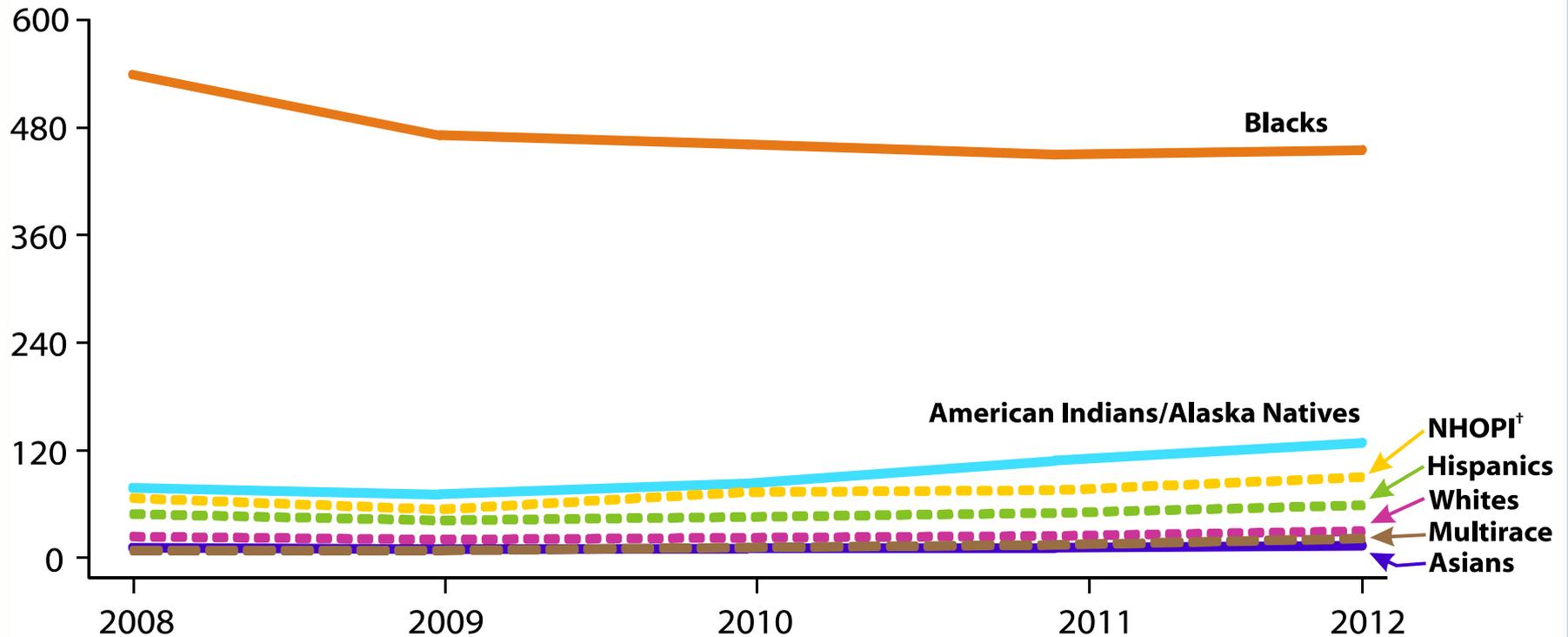
# Gonorrhea—Rates by County, United States, 2012





# Gonorrhea—Rates by Race/Ethnicity, United States, 2008–2012

Rate (per 100,000 population)



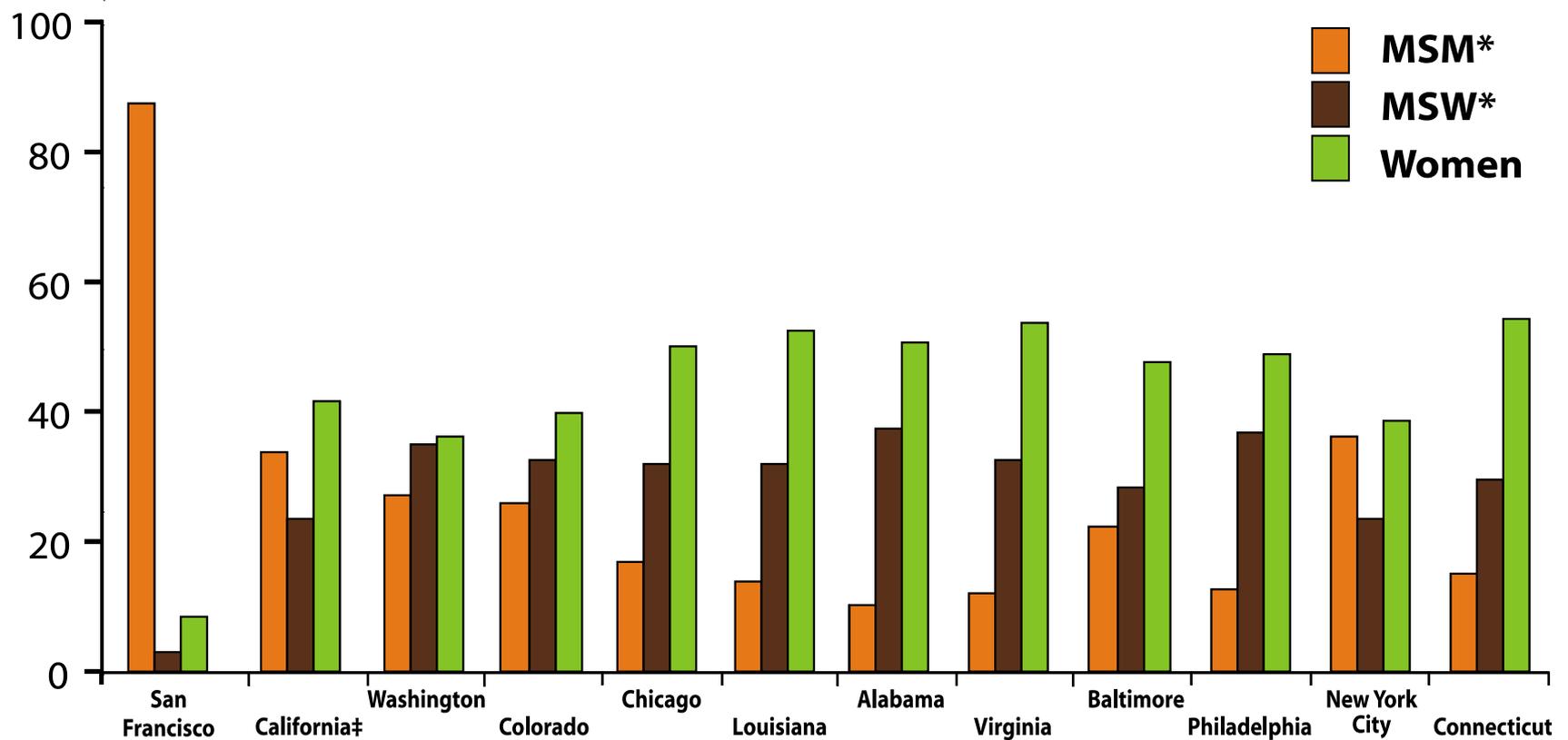
†NHOPi = Native Hawaiian and Other Pacific Islanders.

NOTE: Includes 38 states and the District of Columbia reporting race/ethnicity data in Office of Management and Budget compliant formats during 2008–2012.



# Estimated Proportion of MSM\*, MSW\*, and Women Among Gonorrhea Cases<sup>†</sup> by Site, STD Surveillance Network (SSuN), 2012

Percentage



\***MSM**=men who have sex with men; **MSW**=men who have sex with women only.

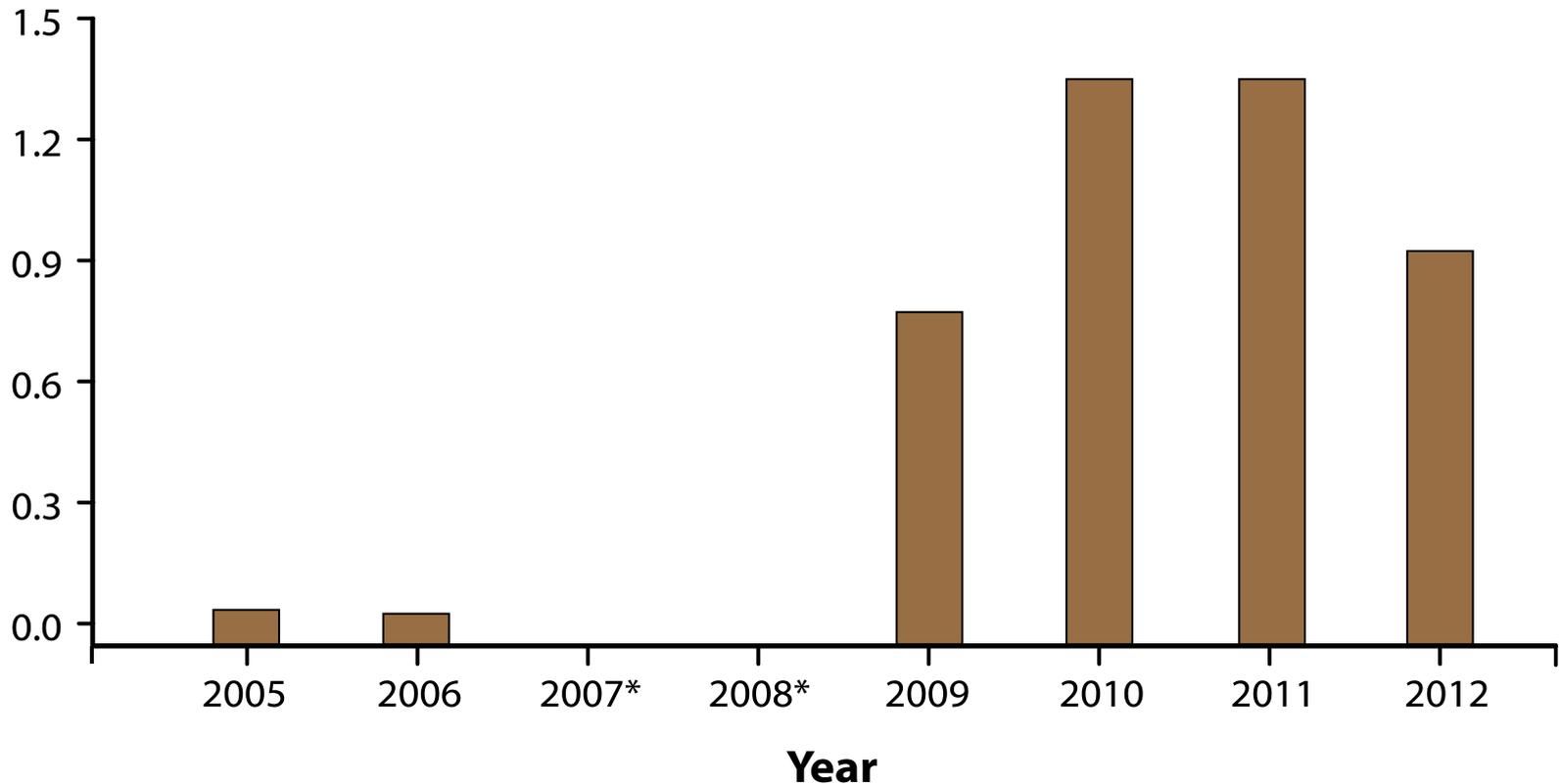
<sup>†</sup>Estimate based on interviews (n=6,228) conducted from a random sample of reported cases of gonorrhea in 2012; cases weighted for analysis by county and to adjust for non-response.

<sup>‡</sup>California data excludes San Francisco County (shown separately).



# Percentage of *Neisseria gonorrhoeae* Isolates with Elevated Cefixime Minimum Inhibitory Concentrations (MICs) ( $\geq 0.25$ $\mu\text{g/ml}$ ), Gonococcal Isolate Surveillance Project (GISP), 2005 – 2012

Percentage



**\*NOTE:** Isolates were not tested for cefixime susceptibility in 2007 and 2008



# **SYPHILIS**

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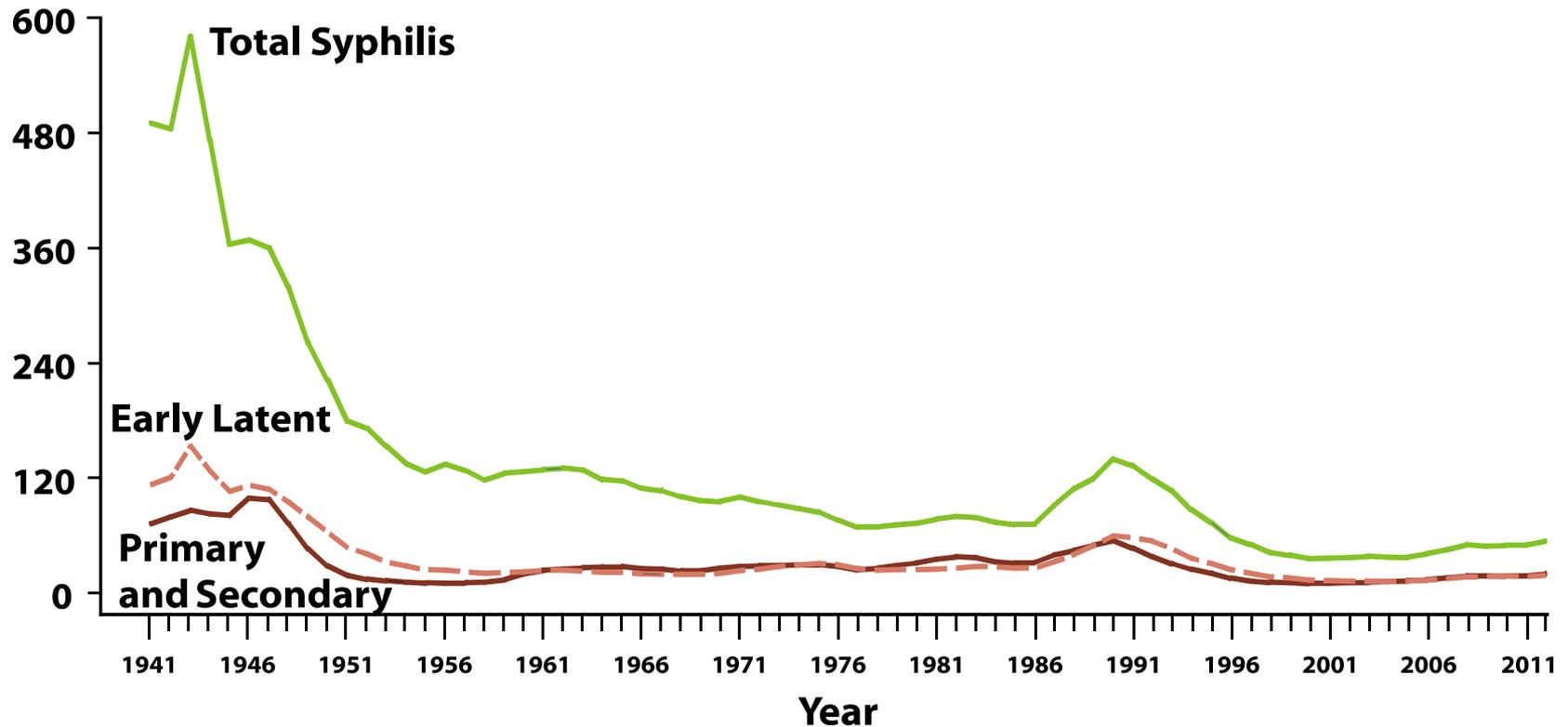
# Epidemiology of Syphilis

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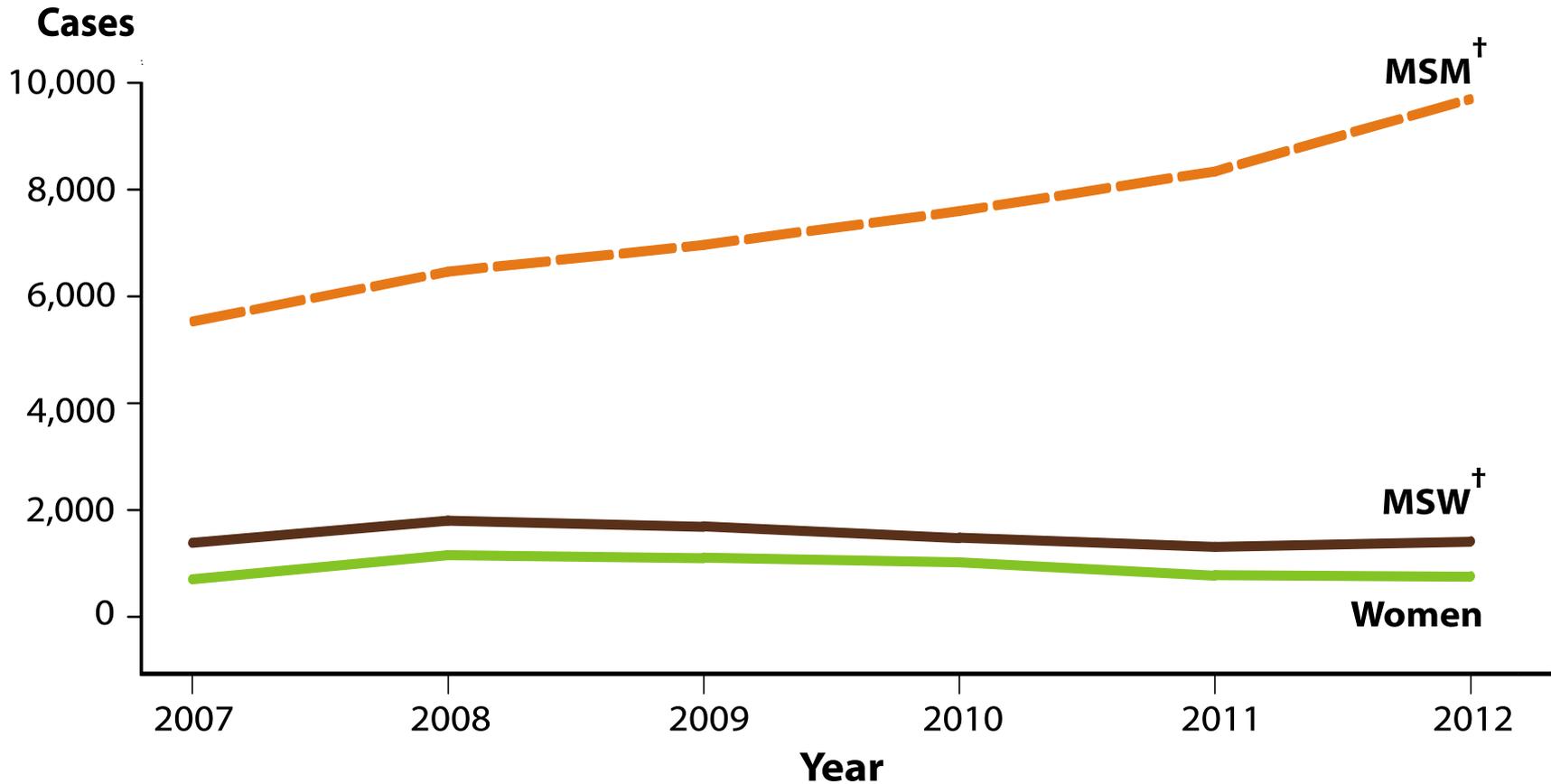
- Incidence
  - 15,667 cases (primary and secondary) reported in 2012
    - Annual increase from 2001-2009
    - 1,697 more cases than 2011
    - Approximately 75% of cases in MSM
  - Case Rate = 5.0 per 100,000 population
    - 11.1% increase from 2011
      - Solely among men with an increase of 14.8%
- Congenital syphilis rates decreased 10% from 2011 (26% since 2008)

# Syphilis—Reported Cases by Stage of Infection, United States, 1941–2012

Cases (in thousands)



# Primary and Secondary Syphilis—by Sex and Sexual Behavior, 33 Areas\*, 2007–2012



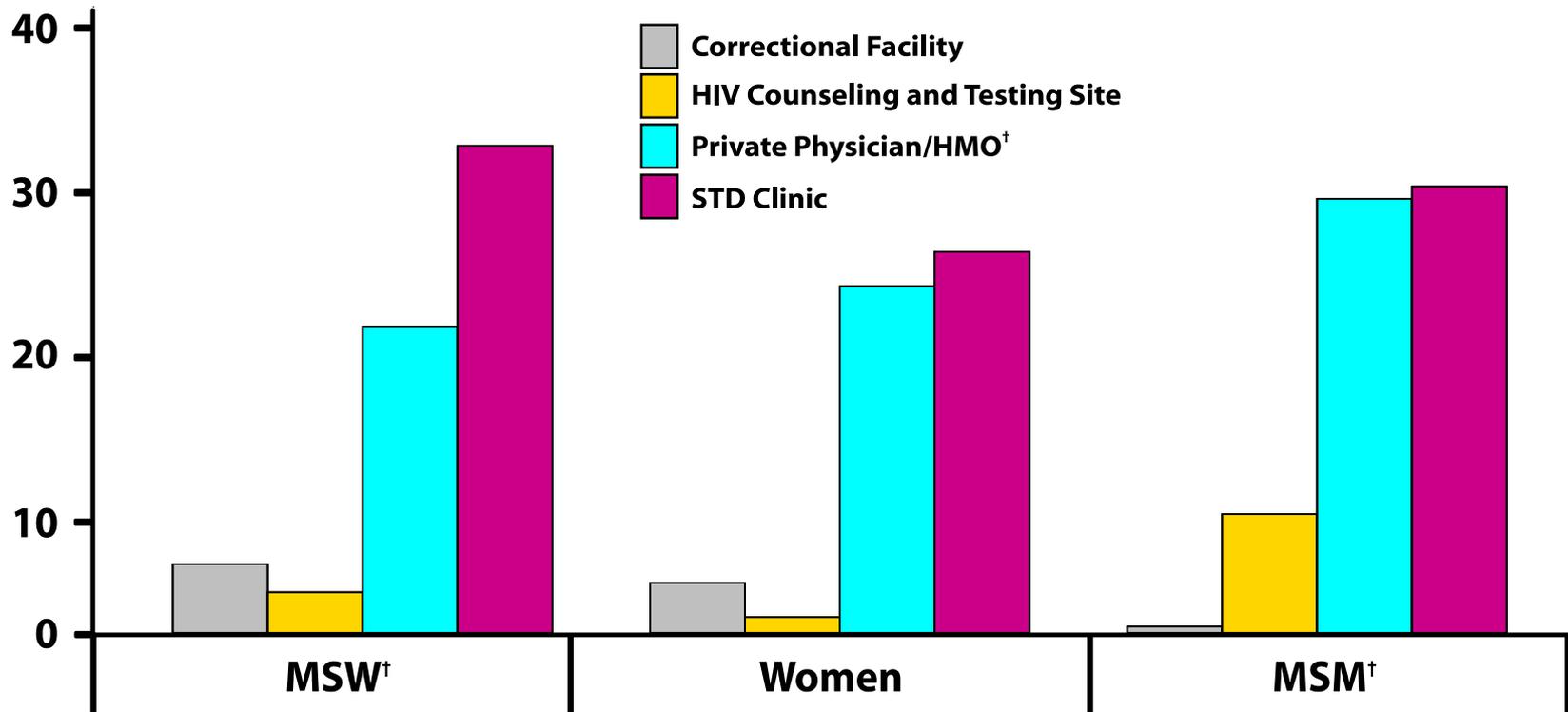
\*32 states and Washington, DC reported sex of partner data for  $\geq 70\%$  of cases of P&S syphilis for each year during 2007-2012.

<sup>†</sup>**MSM**=men who have sex with men; **MSW**=men who have sex with women only.



# Primary and Secondary Syphilis—Percentage of Reported Cases\* by Sex, Sexual Behavior, and Selected Reporting Sources, 2012

Percentage, %



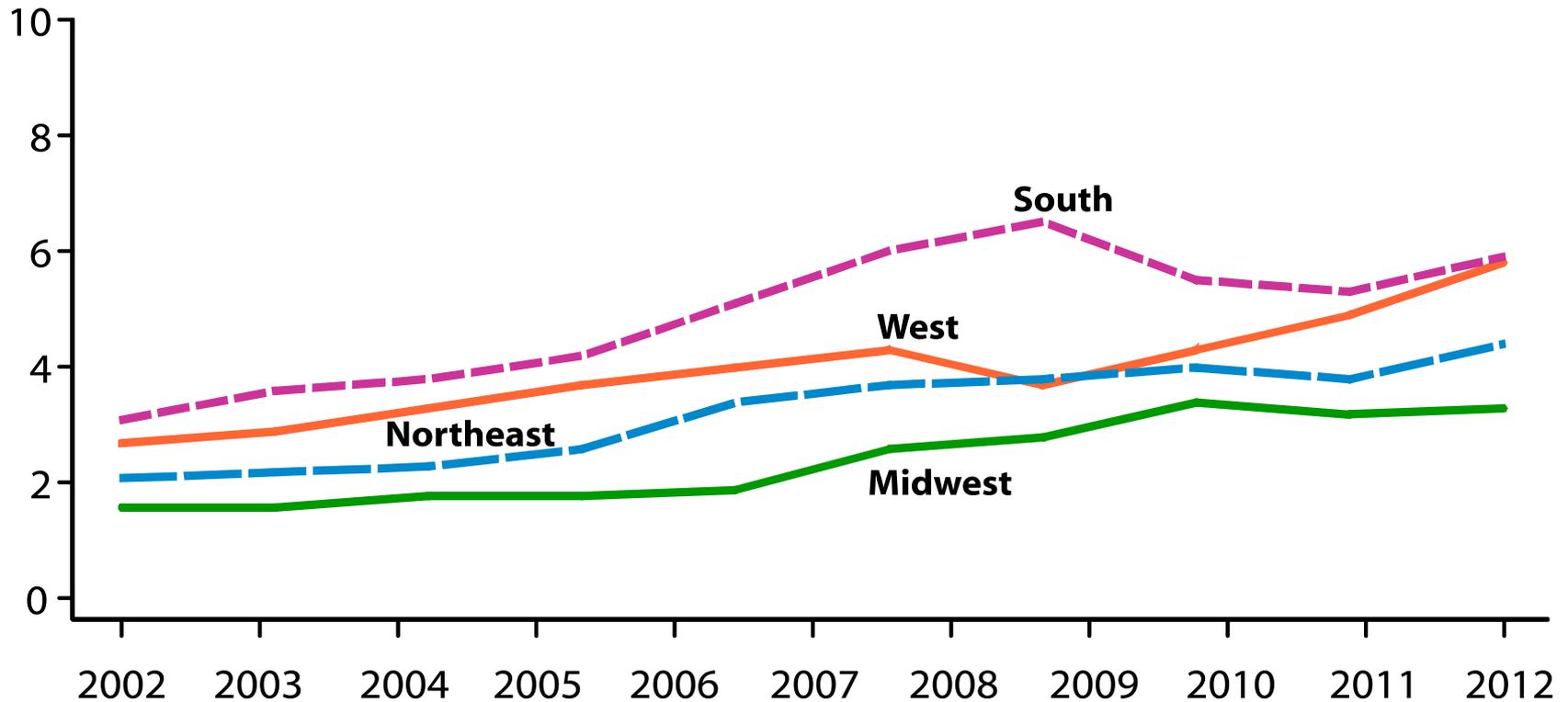
\* Of the reported male cases of primary and secondary syphilis, 17.4% were missing sex of sex partner information, and 6.2% of reported male cases with sex of sex partner data were missing source of information data.

<sup>†</sup> HMO=health maintenance organization; MSM=men who have sex with men; MSW=men who have sex with women only.

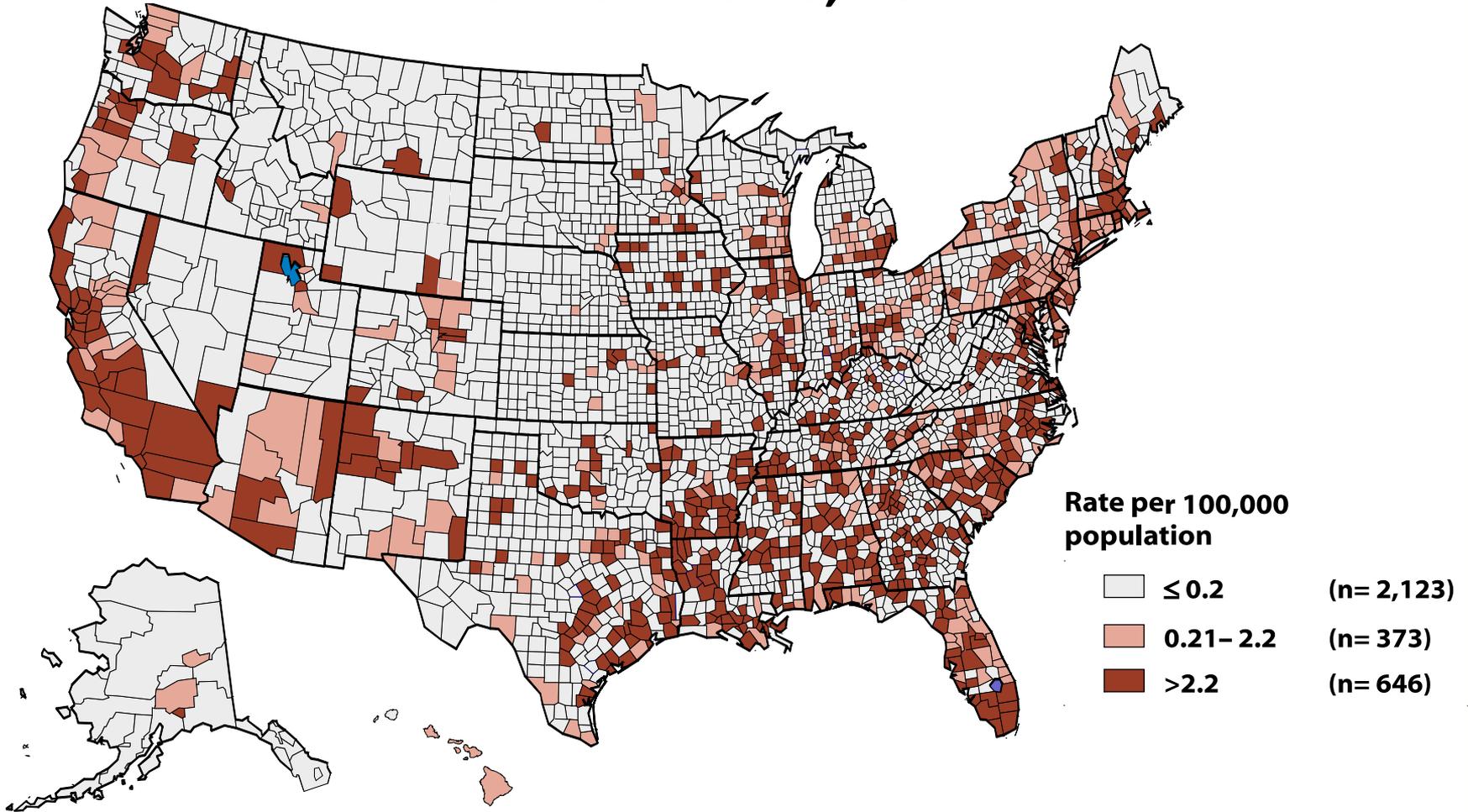


# Primary and Secondary Syphilis—Rates by Region, United States, 2003–2012

Rate (per 100,000 population)

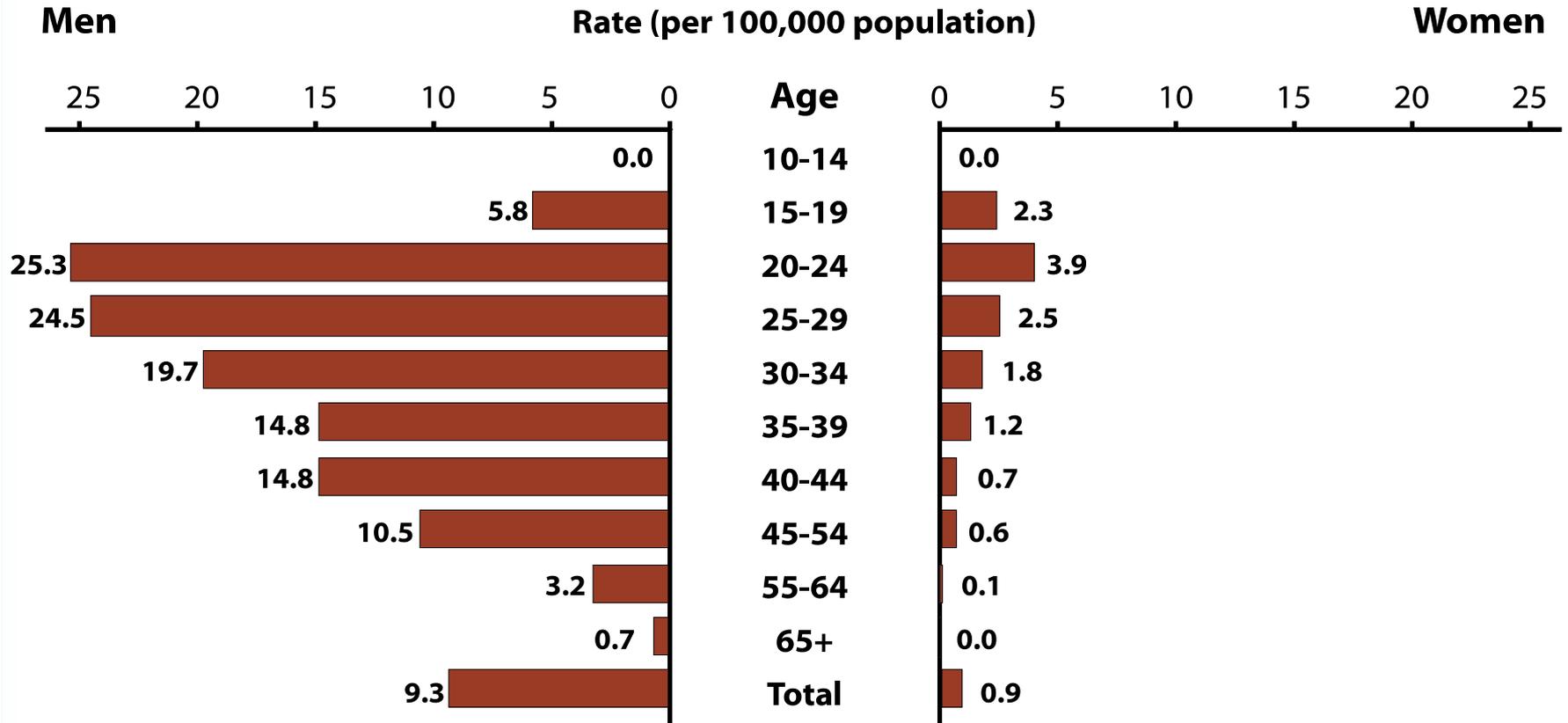


# Primary and Secondary Syphilis—Rates by County, United States, 2012



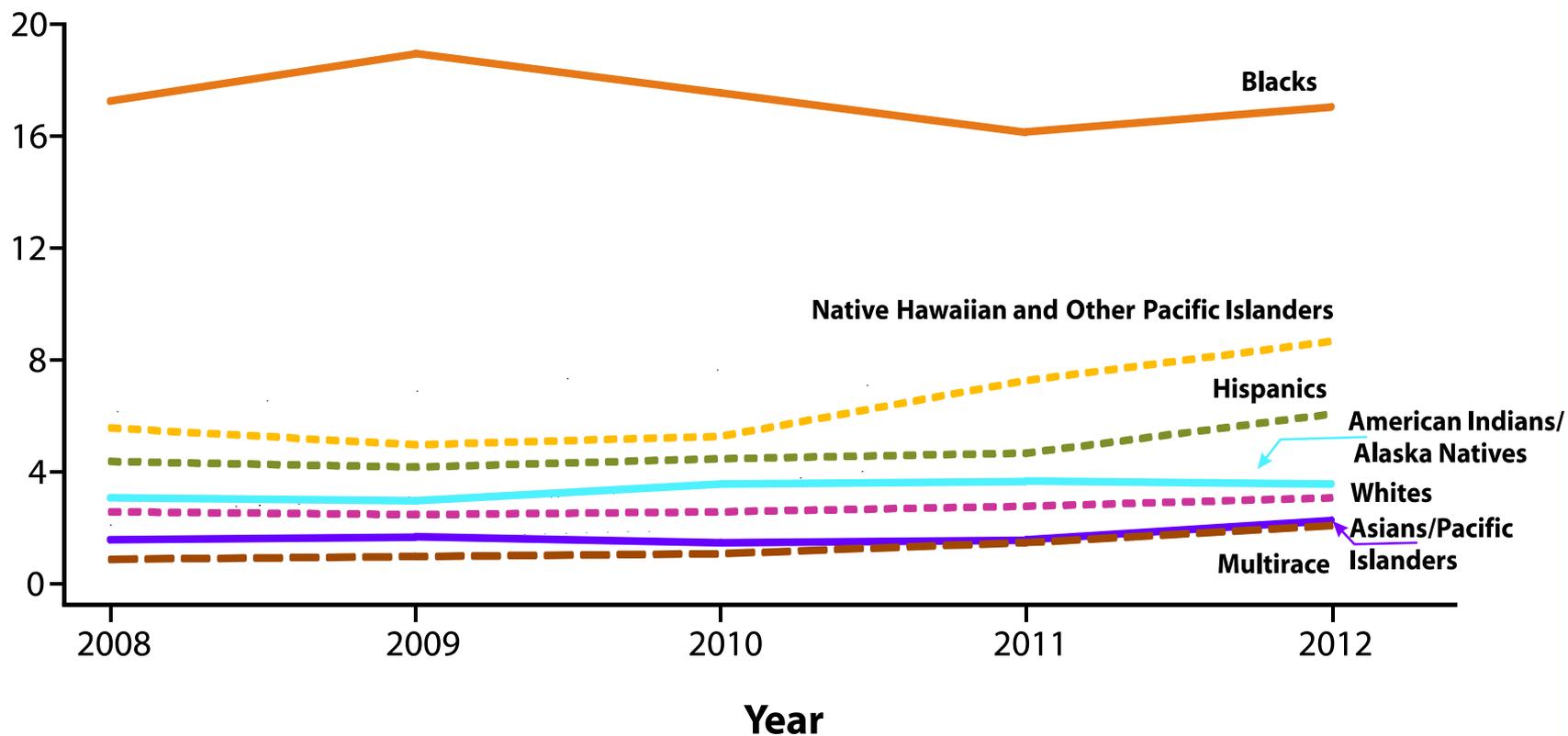
**NOTE:** In 2012, 2,123 (67.6%) of 3,142 counties in the United States reported no cases of primary and secondary syphilis.

# Primary and Secondary Syphilis—Rates by Age and Sex, United States, 2012



# Primary and Secondary Syphilis—Rates by Race/Ethnicity, United States, 2008–2012

Rate (per 100,000 population)

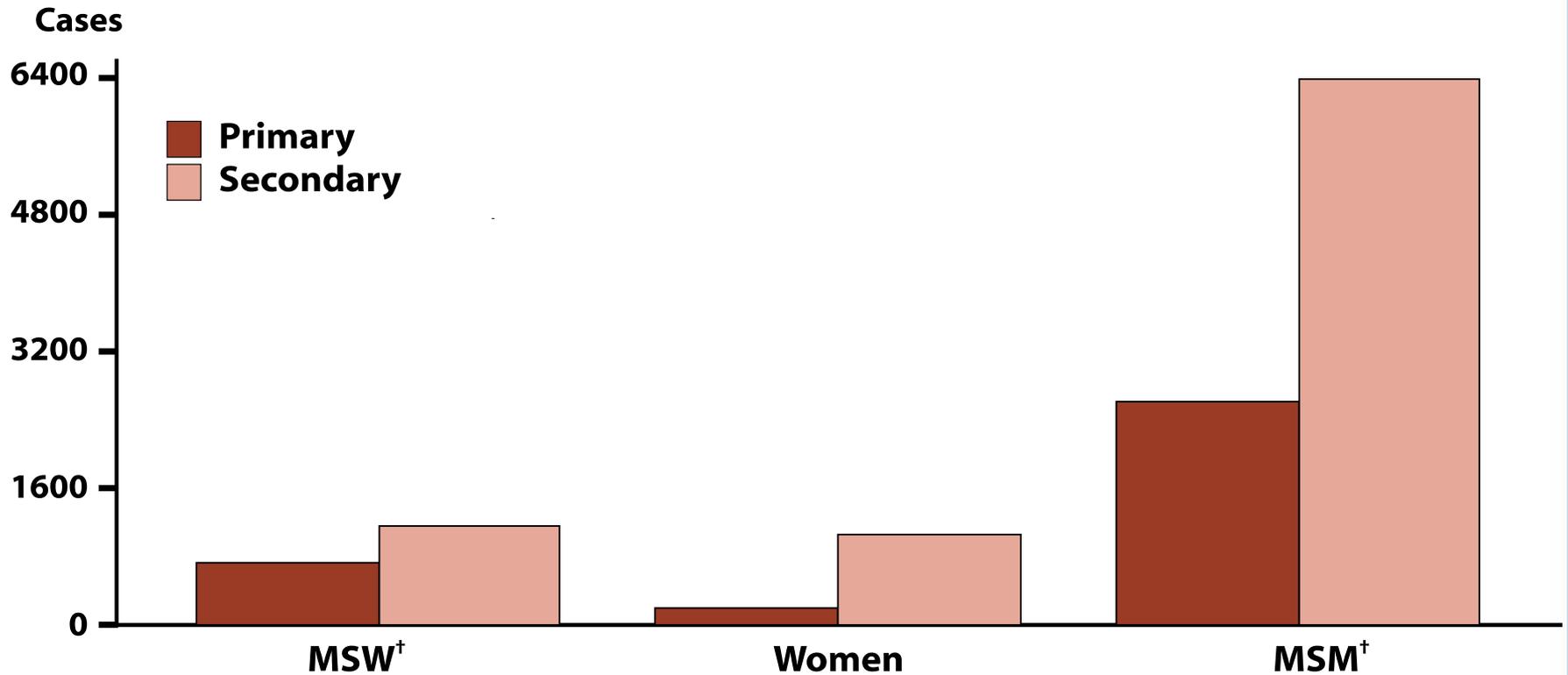


\* AI/AN = American Indians/Alaska Natives; NHOPI = Native Hawaiian and Other Pacific Islanders.

**NOTE:** Includes 38 states and the District of Columbia reporting race/ethnicity data in Office of Management and Budget compliant formats during 2008–2012.



# Primary and Secondary Syphilis—Reported Cases\* by Stage, Sex, and Sexual Behavior, 2012

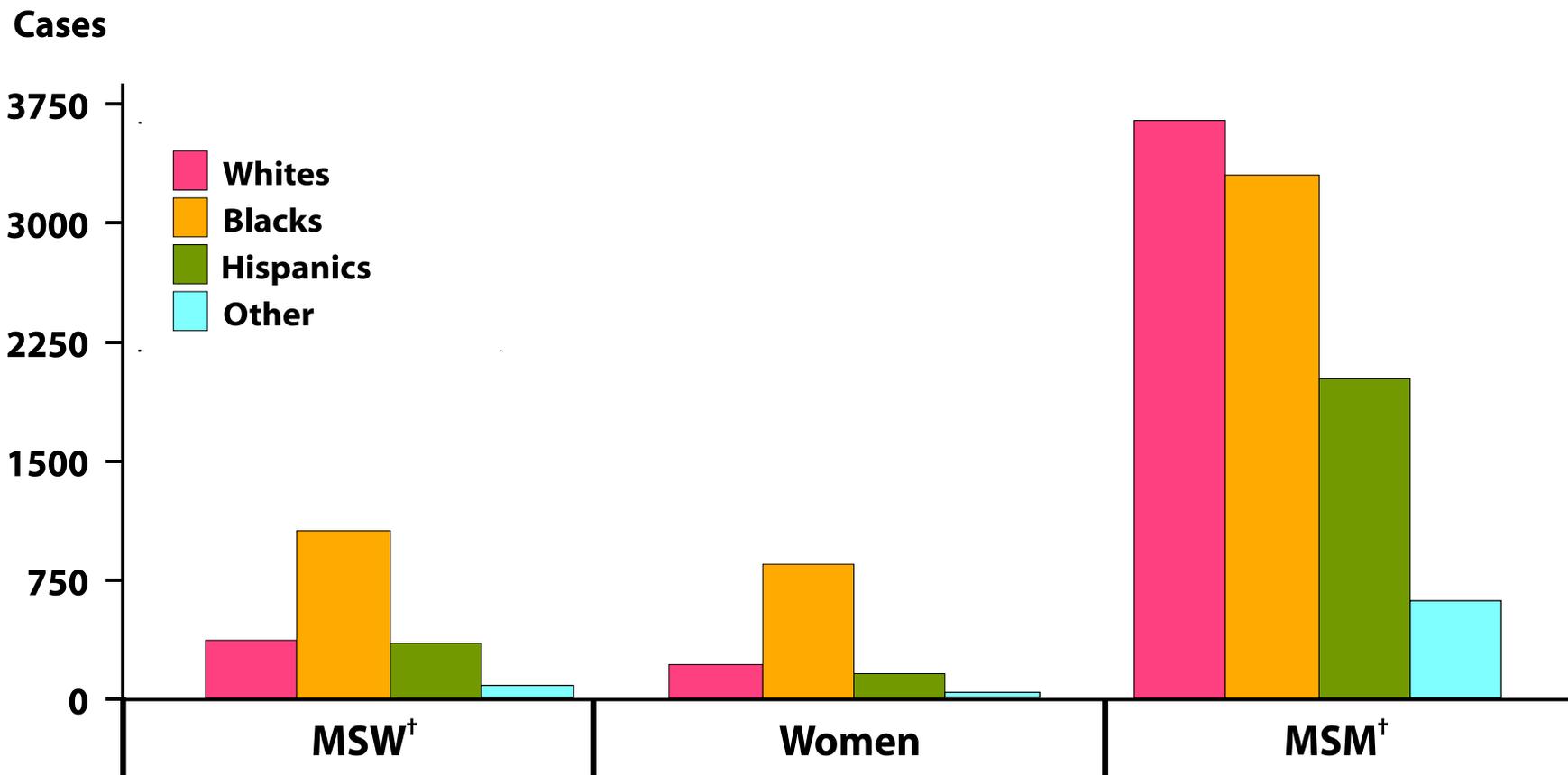


\* Of the reported male cases of primary and secondary syphilis, 17.4% were missing sex of sex partner information.

† **MSW**=men who have sex with women only; **MSM**=men who have sex with men.



# Primary and Secondary Syphilis—Reported Cases\* by Sex, Sexual Behavior, and Race/Ethnicity, United States, 2012



\*Of the reported male cases of primary and secondary syphilis, 17.4% were missing sex of sex partner information; 2.0% reported male cases with of sex partner data were missing race/ethnicity data.

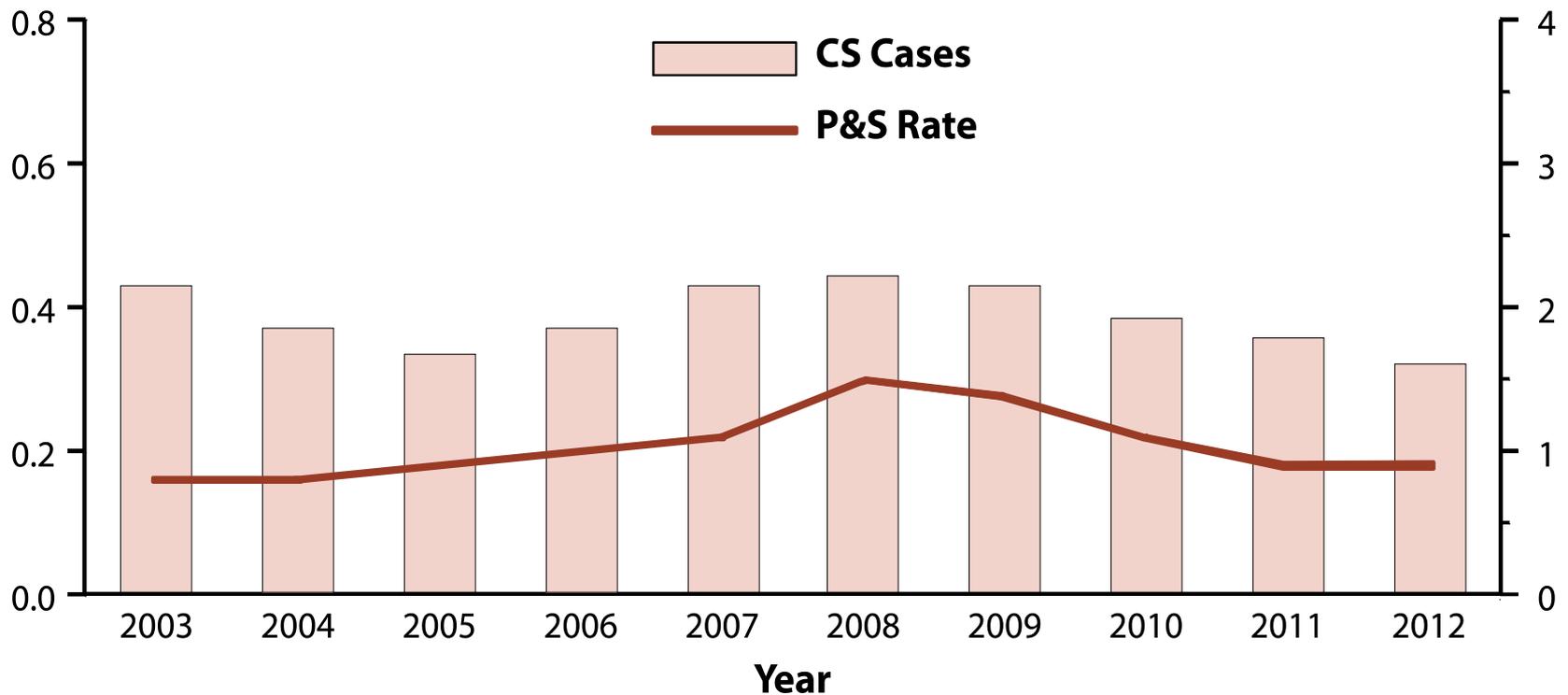
<sup>†</sup>MSW=men who have sex with women only; MSM=men who have sex with men.



# Congenital Syphilis—Reported Cases Among Infants by Year of Birth and Rates of Primary and Secondary Syphilis Among Women, United States, 2003—2012

CS\* cases (in thousands)

P&S\* rate (per 100,000 women)



\* CS=congenital syphilis; P&S=primary and secondary syphilis.



# HUMAN PAPILLOMAVIRUS

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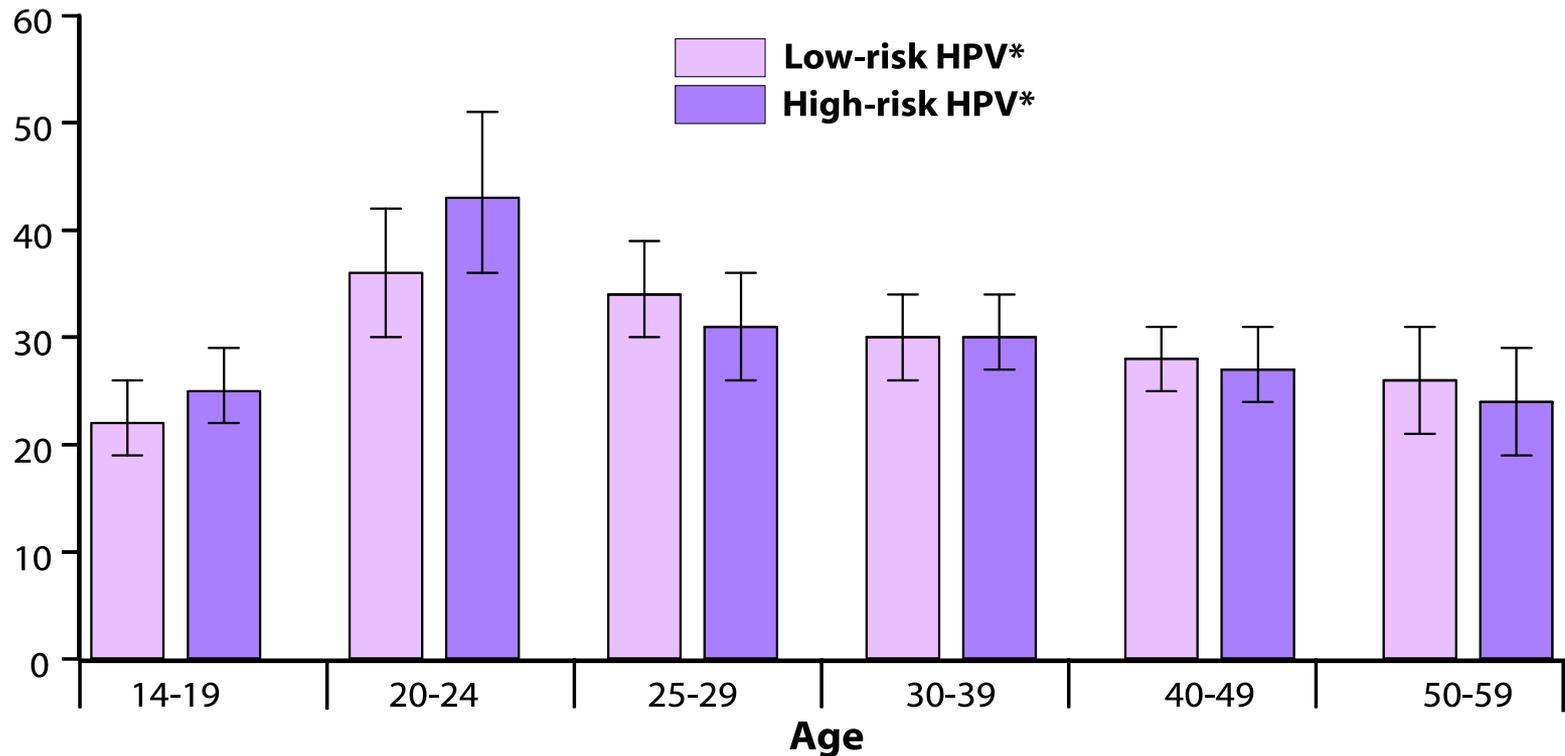
# Epidemiology of HPV

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- Low-risk types (6,11) are responsible for about 90% of anogenital warts
- High-risk oncogenic types (16,18, others) cause 70% of cervical cancers worldwide
- Overall HPV prevalence among women 42.5%
- 5.6% of sexually active adults 18-59 have self-reported history of genital warts

# Human Papillomavirus—Prevalence of High-risk and Low-risk Types Among Females Aged 14–59 Years, National Health and Nutrition Examination Survey, 2003–2006

Prevalence, %



\*HPV=human papillomavirus.

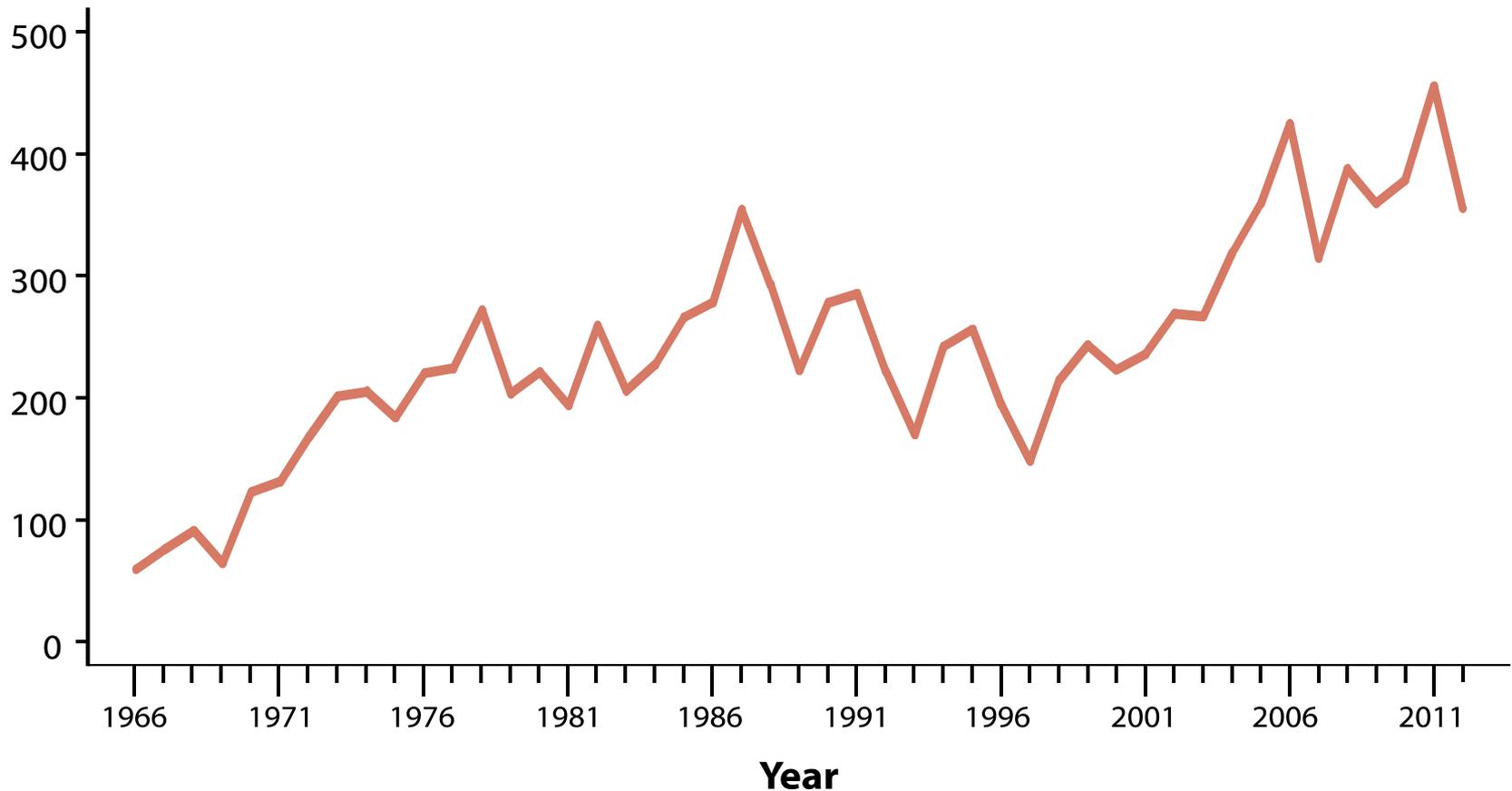
**NOTE:** Error bars indicate 95% confidence intervals. Both high-risk and low-risk HPV types were detected in some females.

**SOURCE:** Hariri S, Unger ER, Sternberg M, Dunne EF, Swan D, Patel S, et al. Prevalence of genital HPV among females in the United States, the National Health and Nutrition Examination Survey, 2003-2006. *J Infect Dis.* 2011;204(4):566-73.



# Genital Warts—Initial Visits to Physicians’ Offices, United States, 1966–2012

Visits (in thousands)



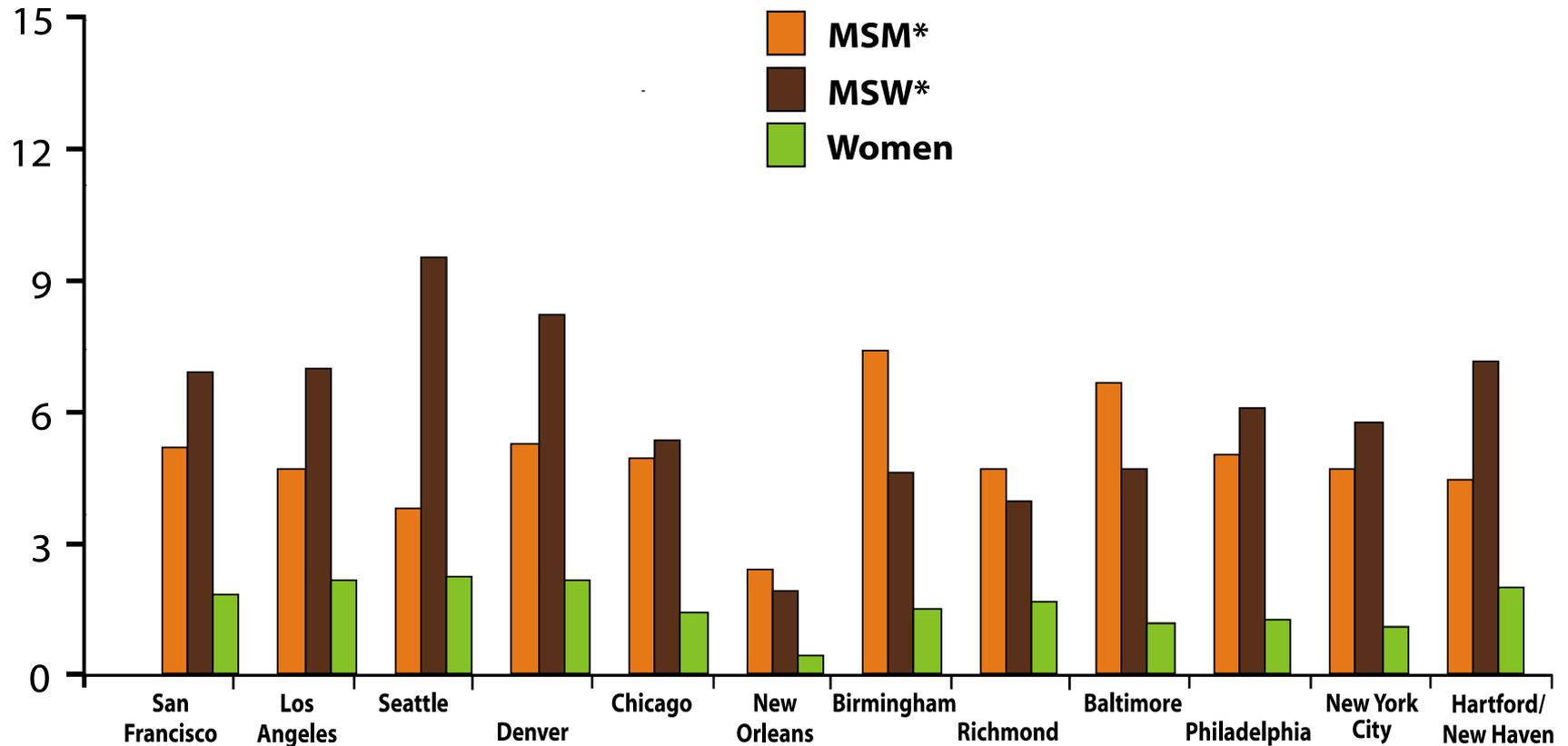
**NOTE:** The relative standard errors for genital warts estimates of more than 100,000 range from 18% to 30%.

**SOURCE:** IMS Health, Integrated Promotional Services™. IMS Health Report, 1966–2012.



# Genital Warts—Prevalence Among STD Clinic Patients by Sex, Sex of Partners, and Site, STD Surveillance Network (SSuN), 2012

Prevalence, %



\*MSM=men who have sex with men; MSW=men who have sex with women only.



# GENITAL HERPES

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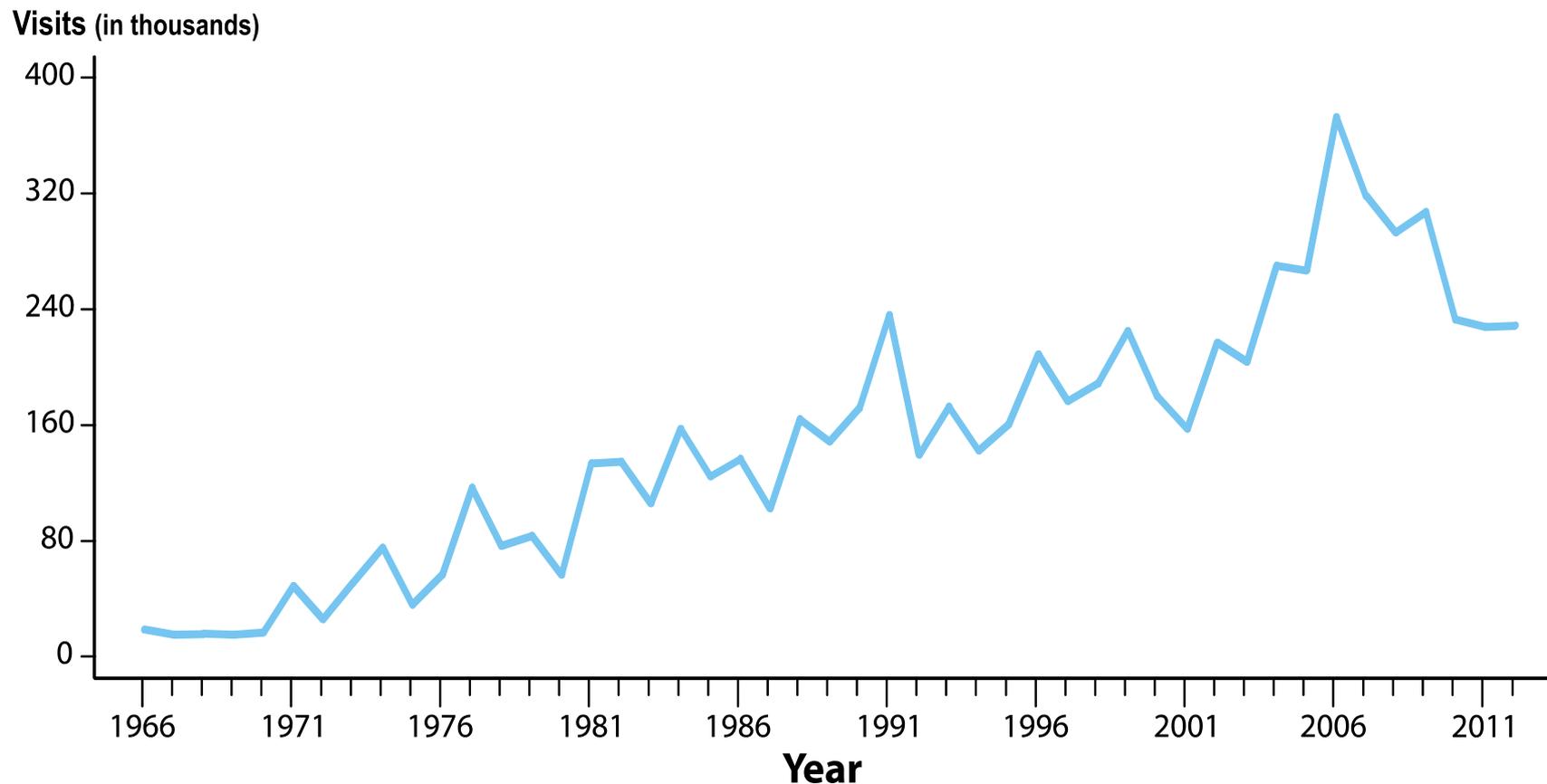
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# Epidemiology of Genital Herpes

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- Majority of genital and perirectal herpetic outbreaks in the US are caused by HSV-2
- Most persons with HSV-2 have not received a diagnosis of genital herpes
- Case reporting are not available
  - Trend data based on estimates of initial visits to physicians offices

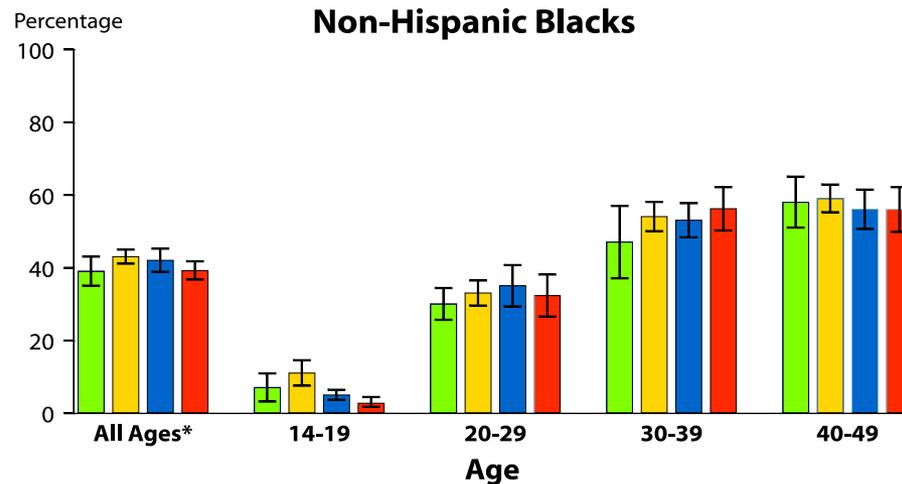
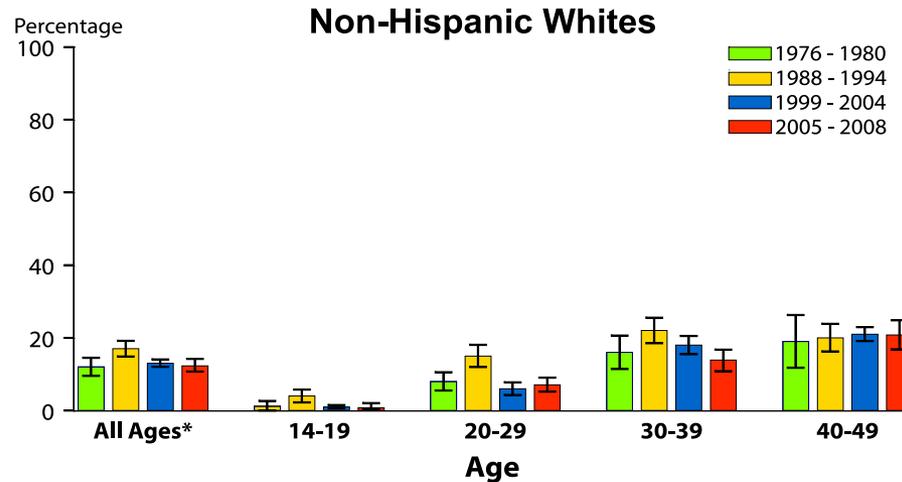
# Genital Herpes—Initial Visits to Physicians' Offices, United States, 1966–2012



**NOTE:** The relative standard errors for genital herpes estimates of more than 100,000 range from 18% to 30%. **SOURCE:** IMS Health, Integrated Promotional Services™. IMS Health Report, 1966–2012.



# Herpes Simplex Virus Type 2—Seroprevalence Among Non-Hispanic Whites and Non-Hispanic Blacks by Age Group, National Health and Nutrition Examination Survey, 1976–1980, 1988–1994, 1999–2004, 2005–2008



\*Age-adjusted by using the 2000 U.S. Census civilian, non-institutionalized population aged 14-49 years as the standard.

**NOTE:** Error bars indicate 95% confidence intervals.



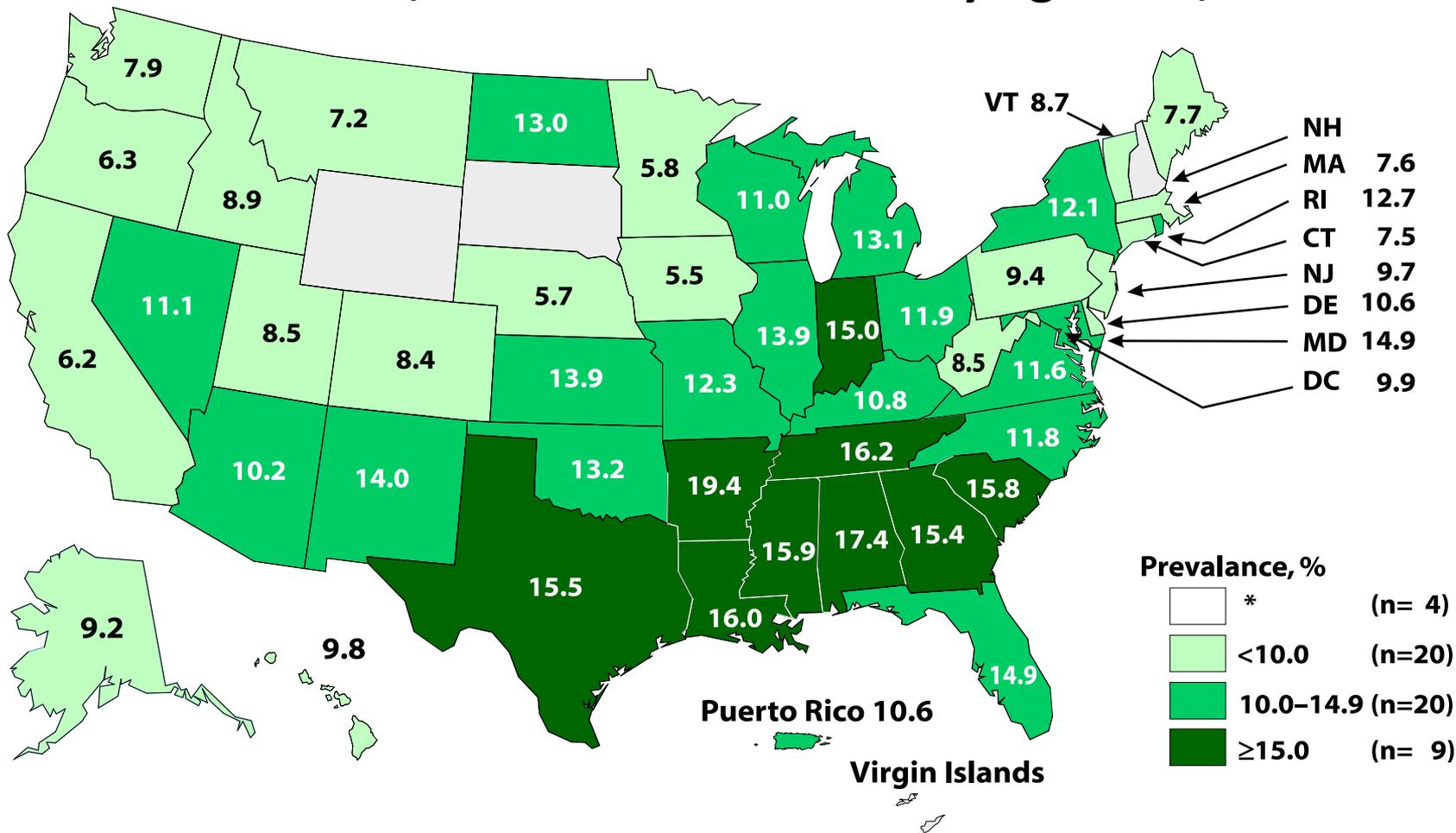
# **ADOLESCENTS AND YOUNG ADULTS**

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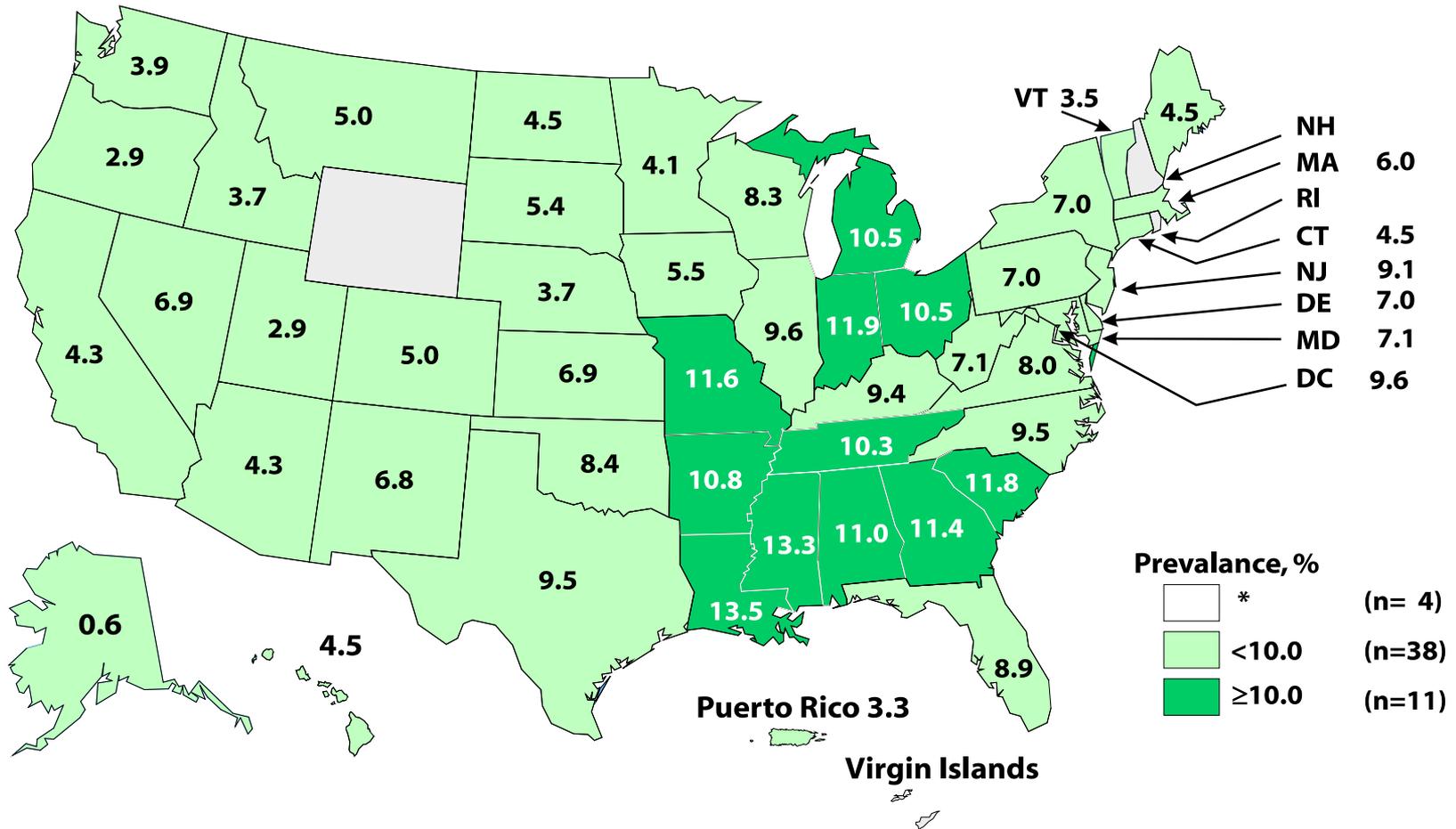
# Chlamydia—Prevalence Among Women Aged 16–24 Years Entering the National Job Training Program, by State of Residence, United States and Outlying Areas, 2012



\*Fewer than 100 women who resided in these states/areas and entered the National Job Training Program were screened for chlamydia in 2012.



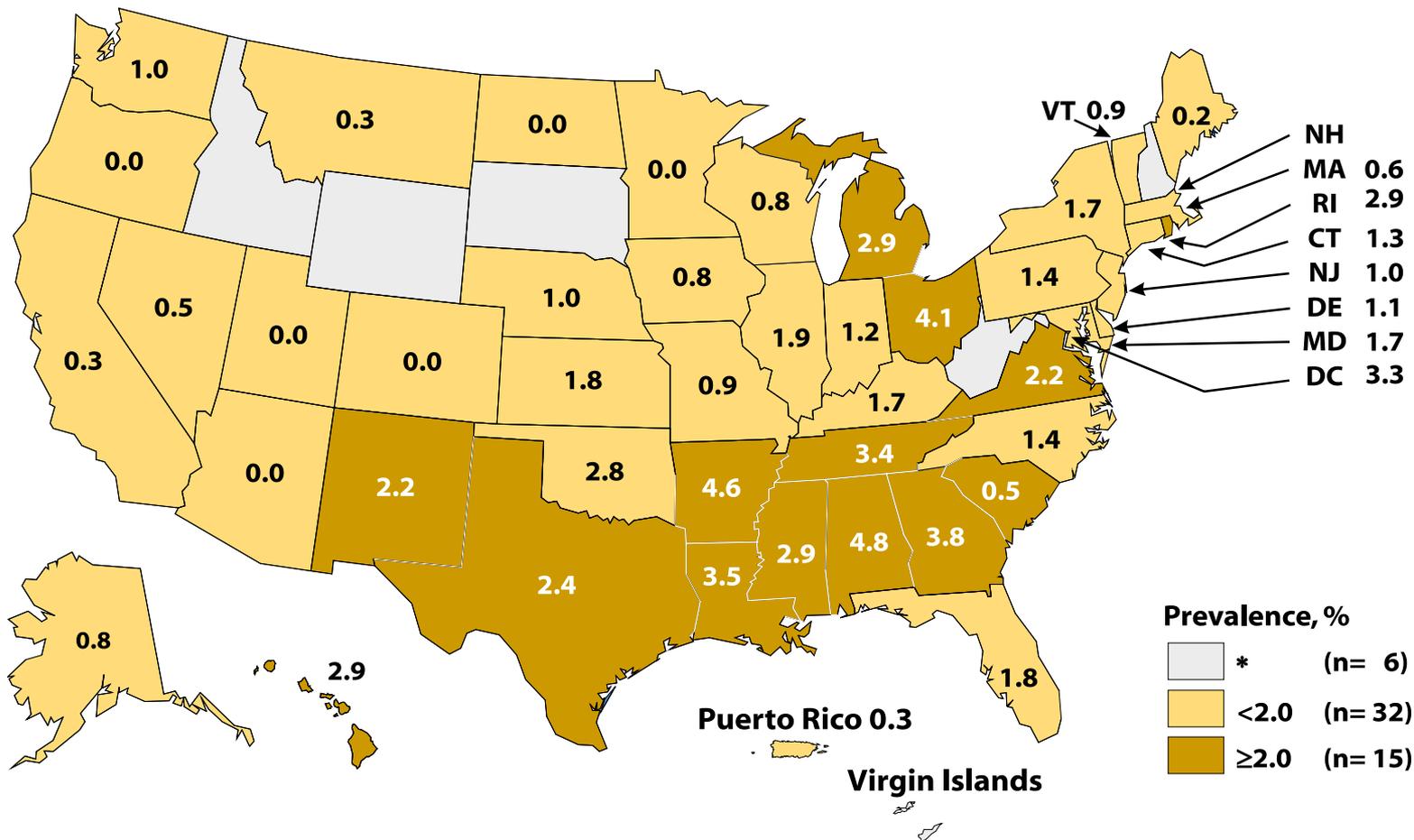
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# Gonorrhea—Prevalence Among Women Aged 16–24 Years Entering the National Job Training Program, by State of Residence, United States and Outlying Areas, 2012

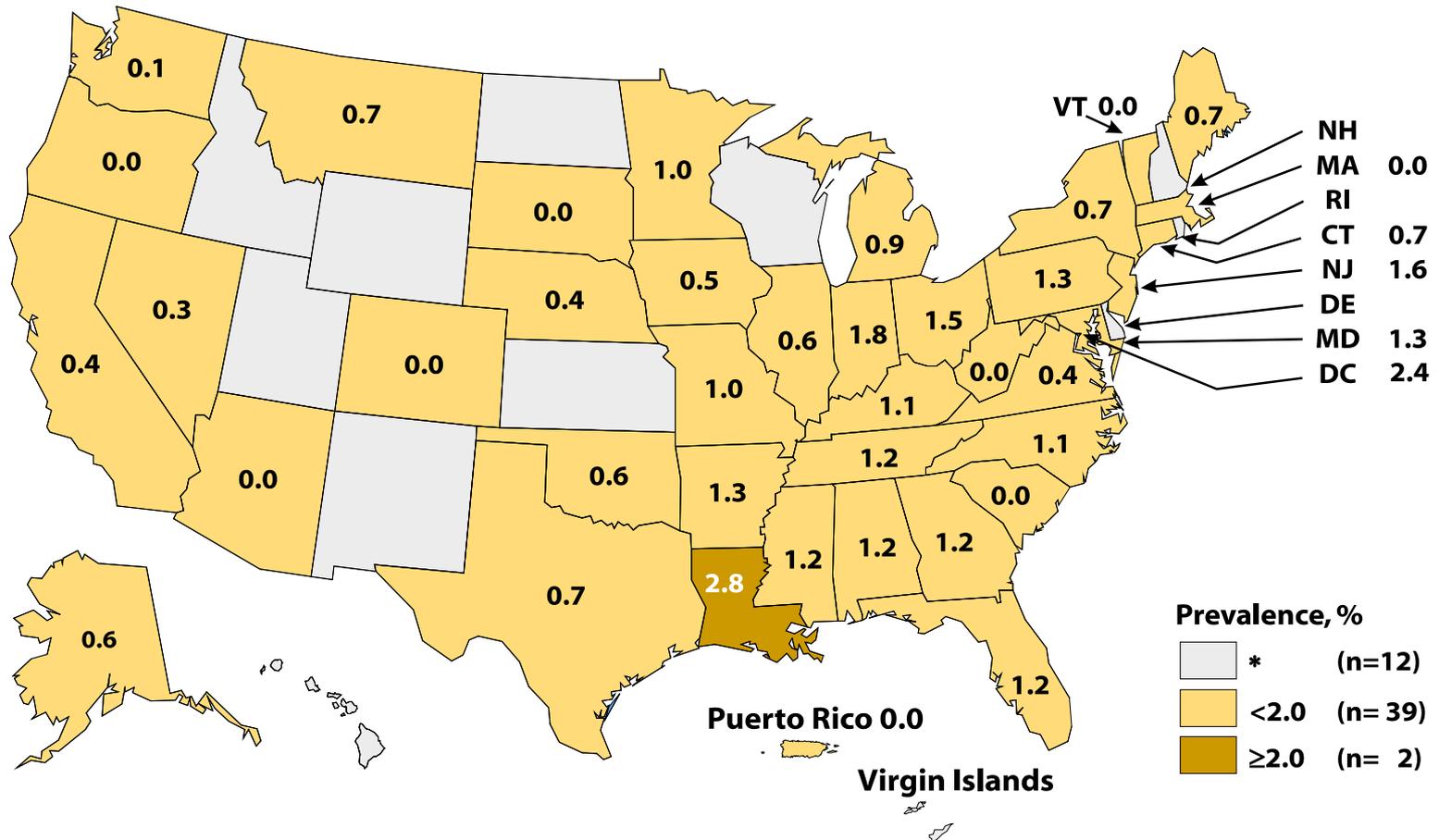


\*Fewer than 100 women who resided in these states/areas and entered the National Job Training Program were screened for gonorrhea in 2011.

**NOTE:** Many training centers use local laboratories to test female students for gonorrhea; these results are not available to CDC. For this map, gonorrhea test results for students at centers that submitted specimens to the national contract laboratory were included if the number of gonorrhea tests submitted was greater than 90% of the number of chlamydia tests submitted



# Gonorrhea—Prevalence Among Men Aged 16–24 Years Entering the National Job Training Program, by State of Residence, United States and Outlying Areas, 2012



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# **MEN WHO HAVE SEX WITH MEN**

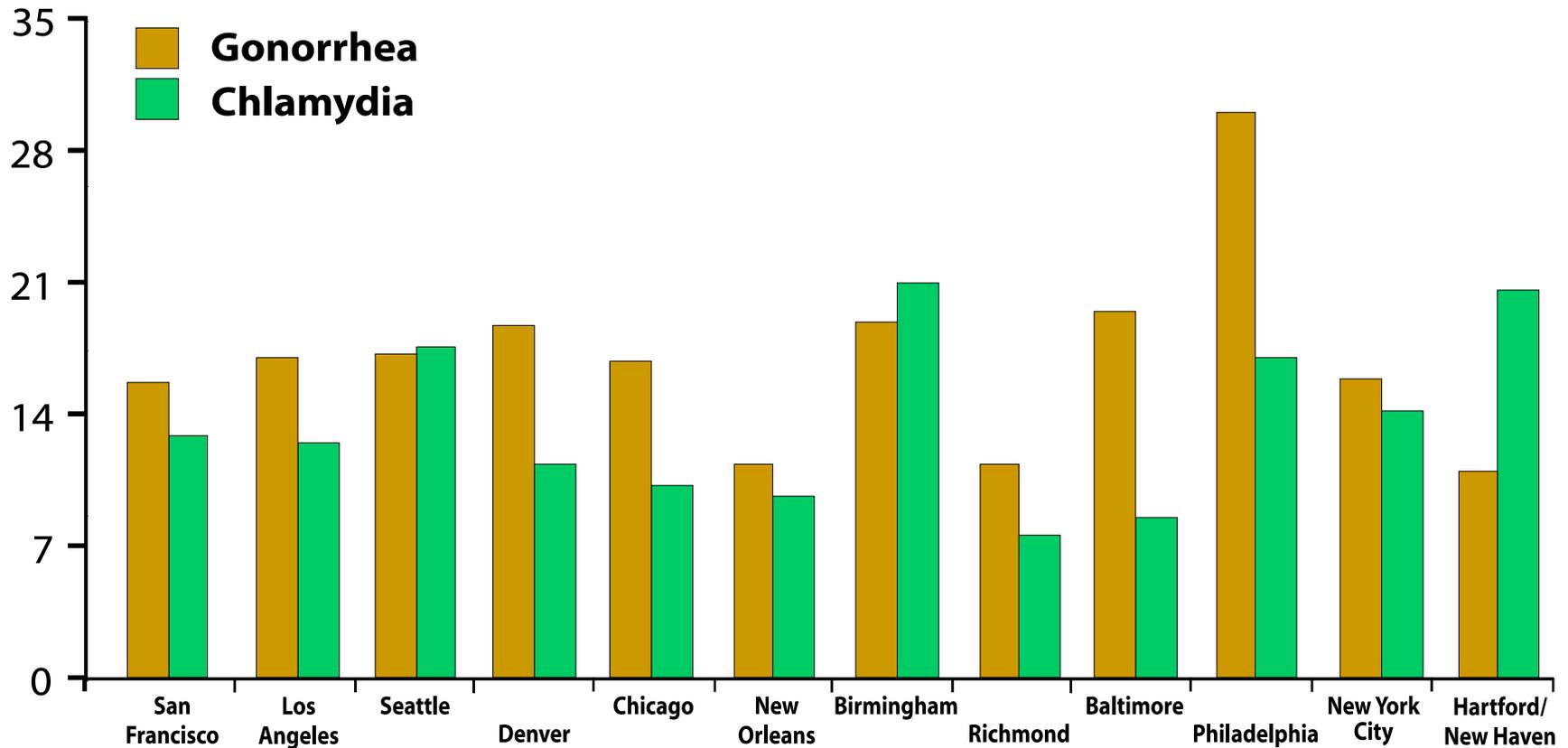
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# Gonorrhea and Chlamydia—Proportion of MSM\* Attending STD Clinics Testing Positive for Gonorrhea and Chlamydia, STD Surveillance Network (SSuN), 2012

Percentage

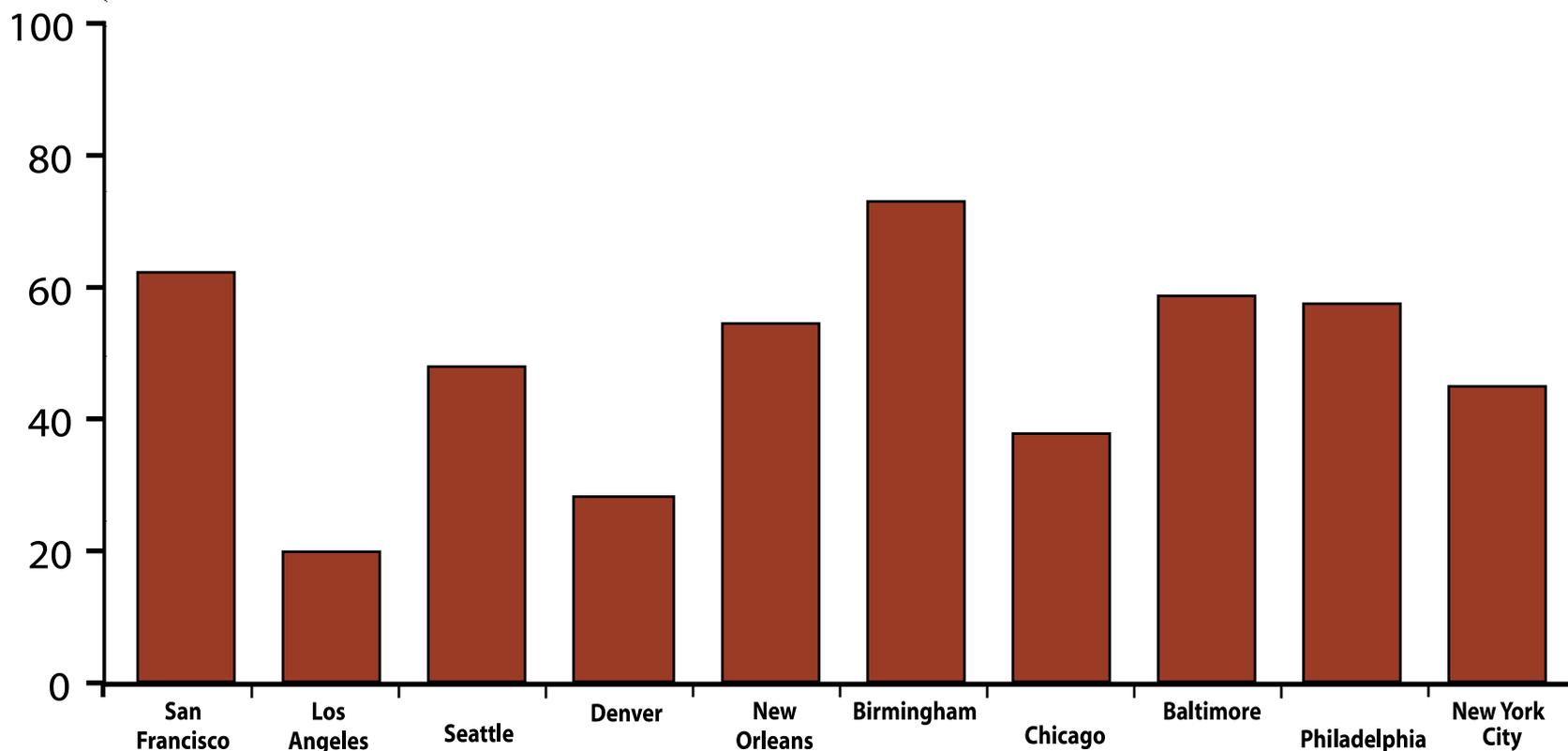


\*Among men who have sex with men who were tested for gonorrhea and/or chlamydia.



# Primary and Secondary Syphilis and HIV—Proportion of MSM\* Attending STD Clinics with Primary and Secondary Syphilis who are Co-infected with HIV, STD Surveillance Network (SSuN), 2012

Percentage



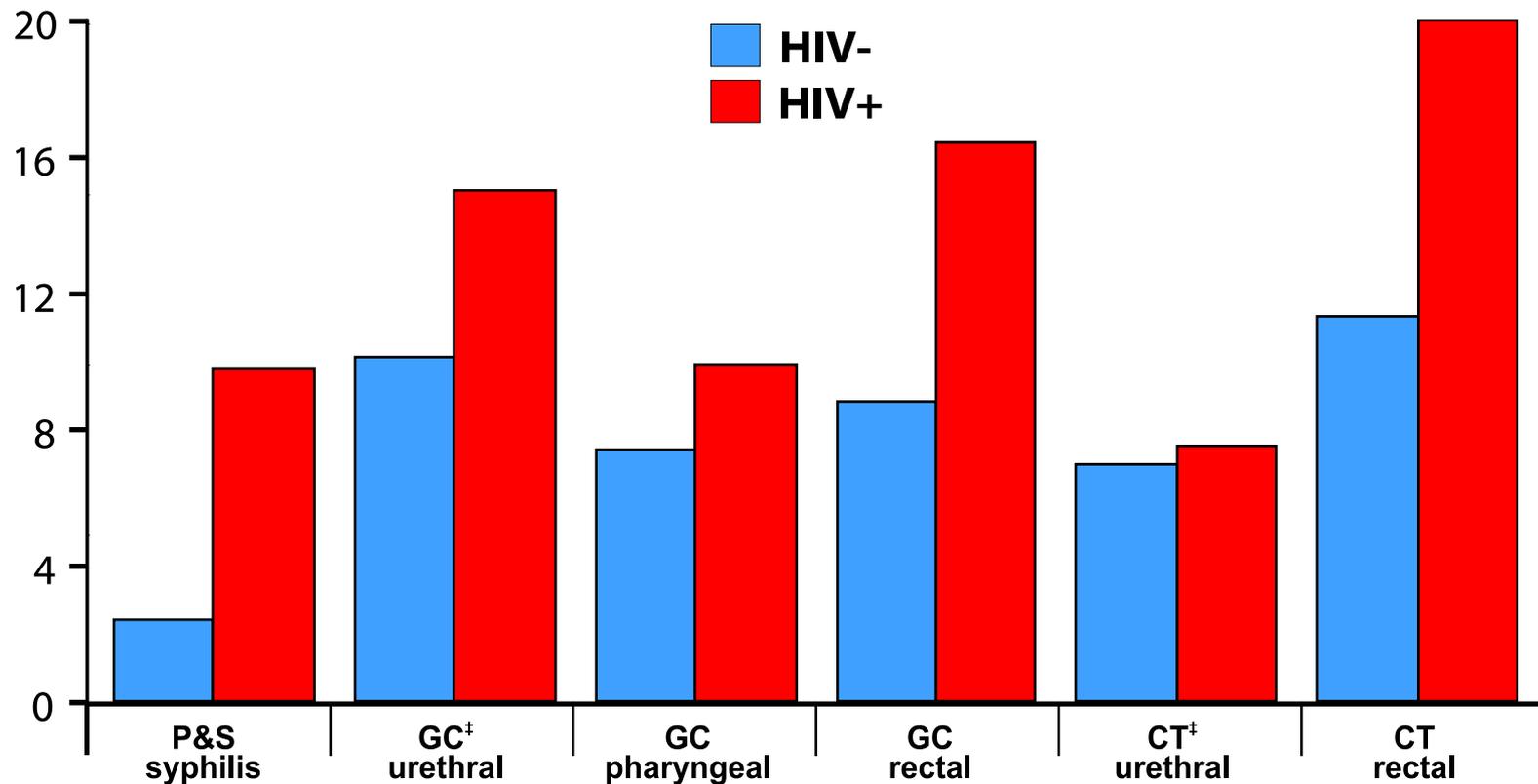
\*MSM=men who have sex with men.

NOTE: Includes sites that reported data on at least 25 MSM with primary and secondary syphilis in 2012.



# Proportion of MSM\* Attending STD Clinics with Primary and Secondary Syphilis, Gonorrhea or Chlamydia by HIV Status<sup>†</sup>, STD Surveillance Network (SSuN), 2012

Percentage



\*MSM=men who have sex with men.

<sup>†</sup>Excludes all persons for whom there was no laboratory documentation or self-report of HIV status.

<sup>‡</sup>GC urethral and CT urethral include results from both urethral and urine specimens.



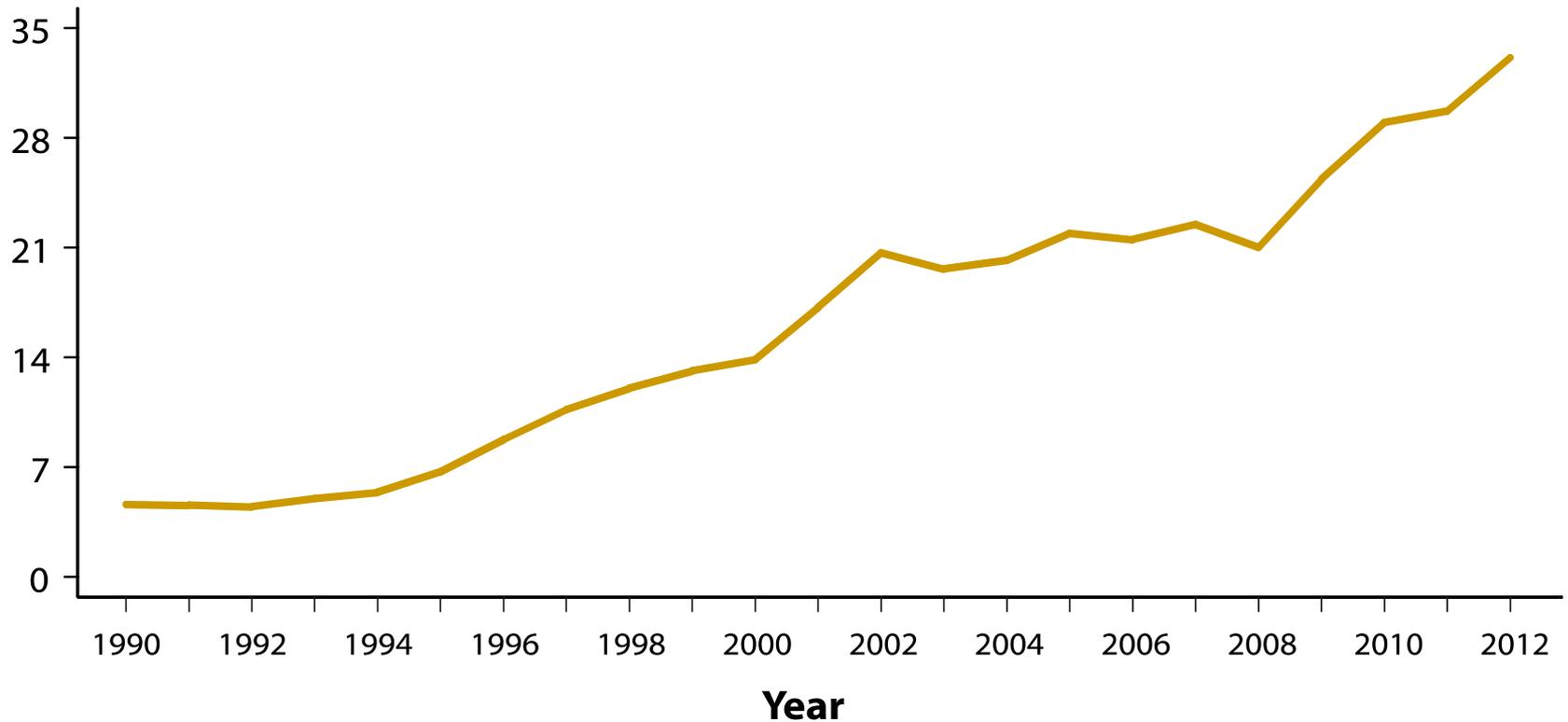
# Syphilis and HIV

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- Co-infection is common
- Syphilis can enhance transmission ( 2- to 5-fold increased risk of acquiring HIV)
- Detection and treatment of syphilis can reduce HIV transmission
- Syphilis may present with non-typical features in people living with HIV

# Percentage of Urethral *Neisseria gonorrhoeae* Isolates Obtained from MSM\* Attending STD Clinics, Gonococcal Isolate Surveillance Project (GISP), 1990–2012

Percentage



\*MSM=men who have sex with men

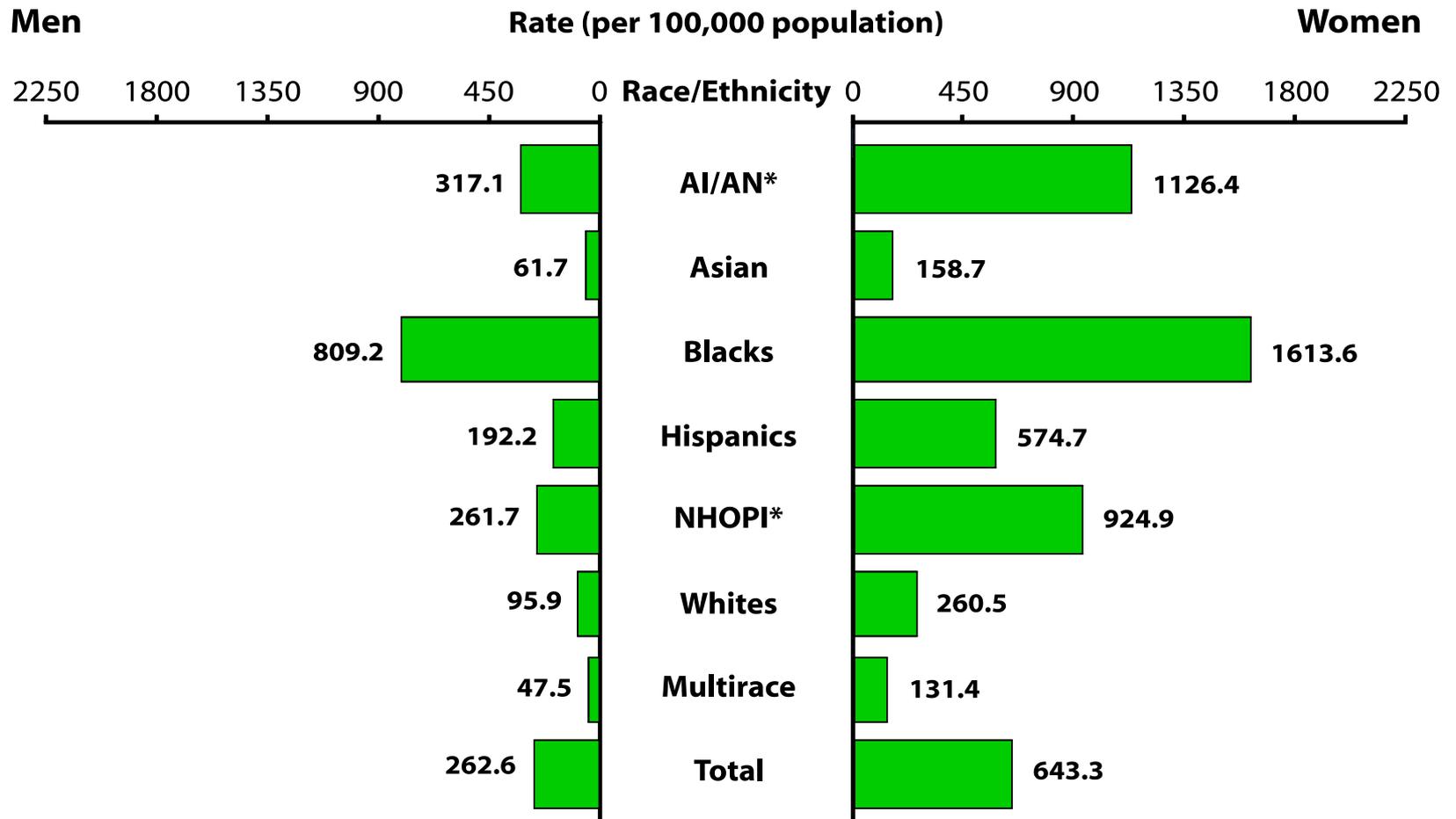


# **RACIAL AND ETHNIC MINORITIES**

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# Chlamydia—Rates by Race/Ethnicity and Sex, United States, 2012

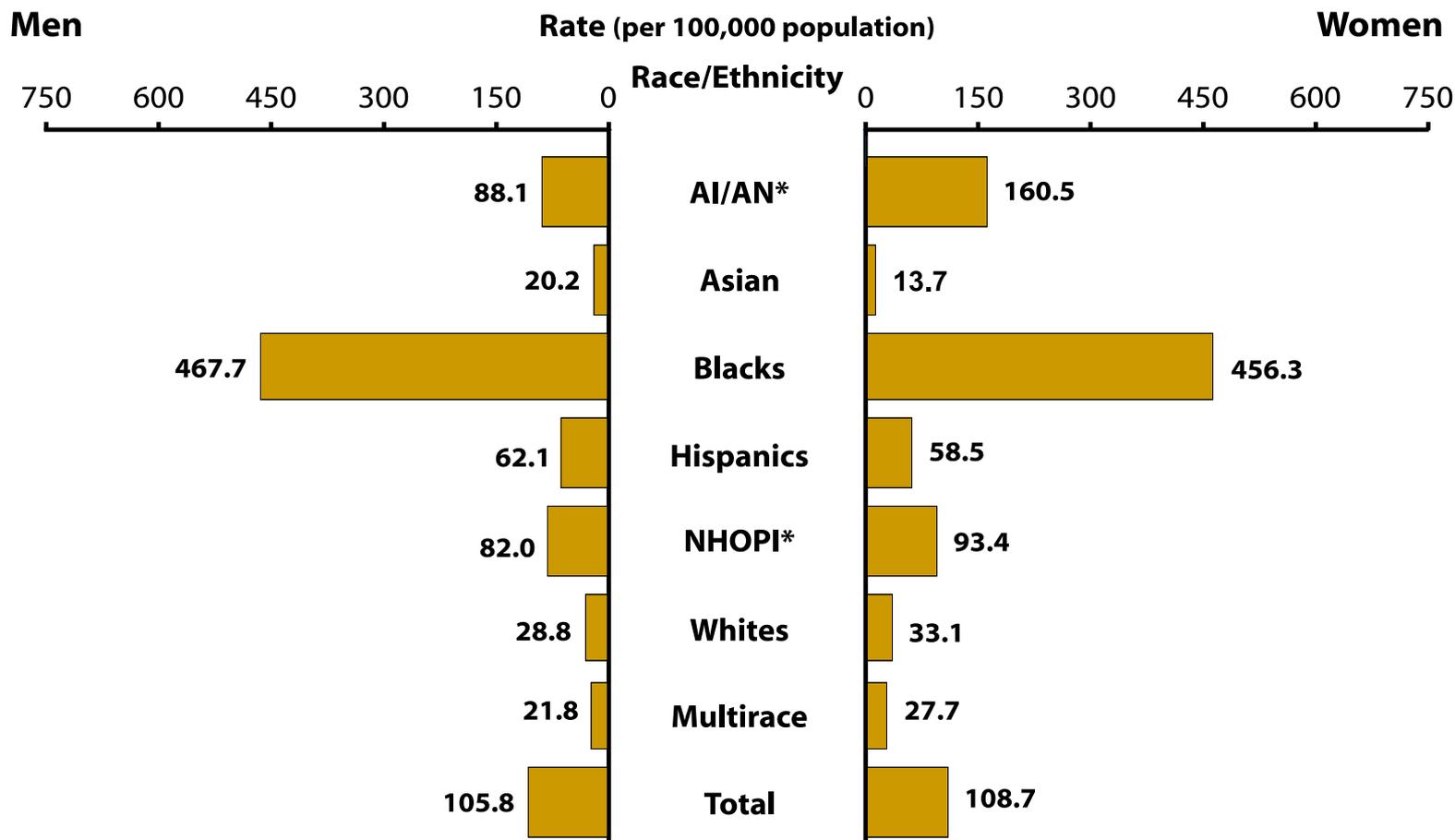


\*AI/AN = American Indians/Alaska Natives; NHOPI = Native Hawaiian and Other Pacific Islanders.

NOTE: Includes 47 states and the District of Columbia reporting race/ethnicity data in Office of Management and Budget compliant formats in 2012.



# Gonorrhea—Rates by Race/Ethnicity and Sex, United States, 2012



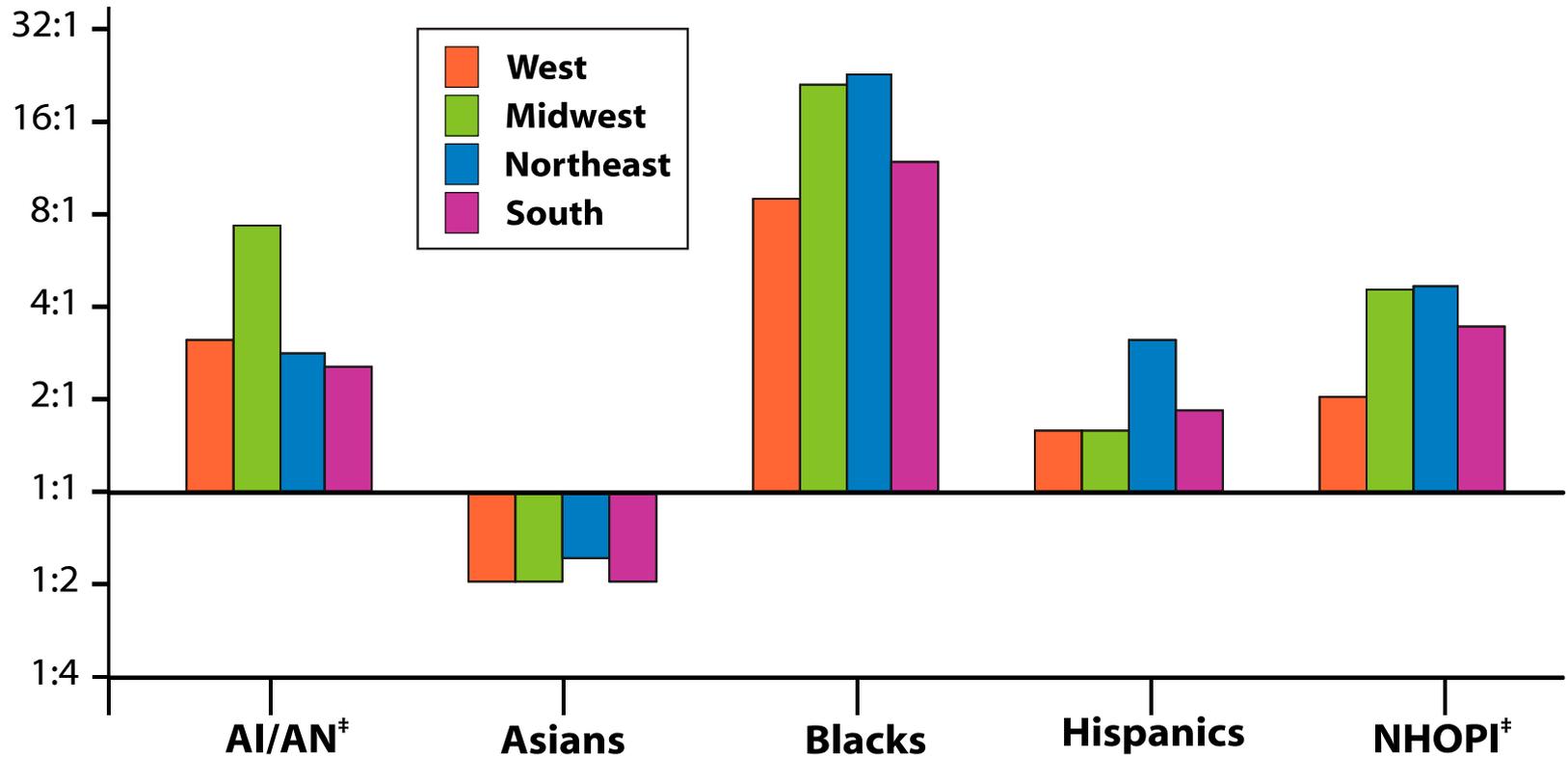
\*AI/AN = American Indians/Alaska Natives; NHOPI = Native Hawaiian and Other Pacific Islanders.

**NOTE:** Includes 47 states and the District of Columbia reporting race/ethnicity data in Office of Management and Budget compliant formats in 2012.



# Gonorrhea—Rate Ratios by Race/Ethnicity and Region, United States, 2012

Rate Ratio<sup>†</sup>



Rate ratios are calculated as the gonorrhea rate per 100,000 population for a given racial or ethnic minority population divided by the gonorrhea rate per 100,000 population for non-Hispanic whites. Any population with a lower rate of gonorrhea than the non-Hispanic white population will have a rate ratio of less than 1:1.

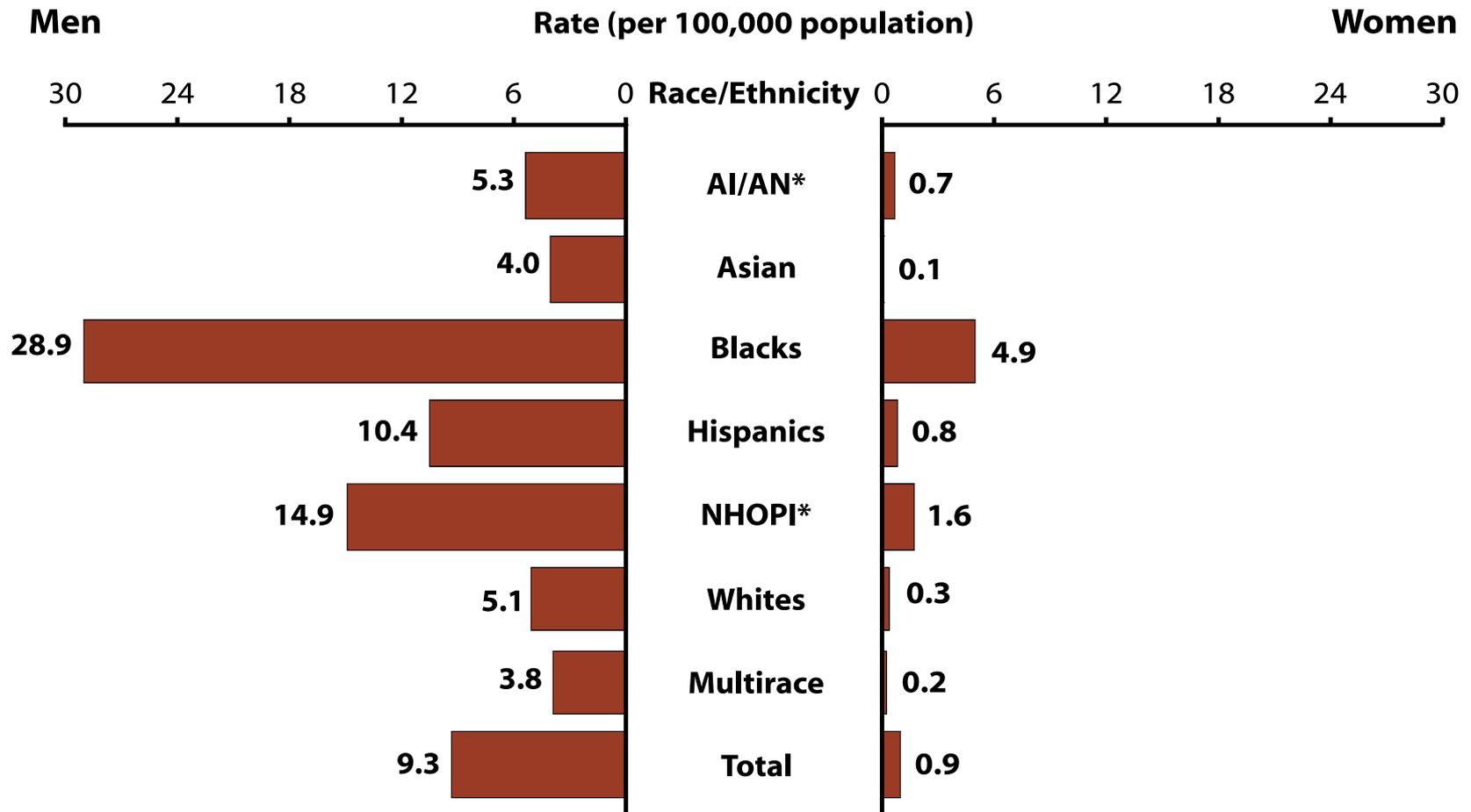
<sup>†</sup> Y-axis is log scale.

<sup>‡</sup> AI/AN = American Indians/Alaska Natives; NHOPI = Native Hawaiian and Other Pacific Islanders.

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# Primary and Secondary Syphilis—Rates by Race/Ethnicity and Sex, United States, 2012



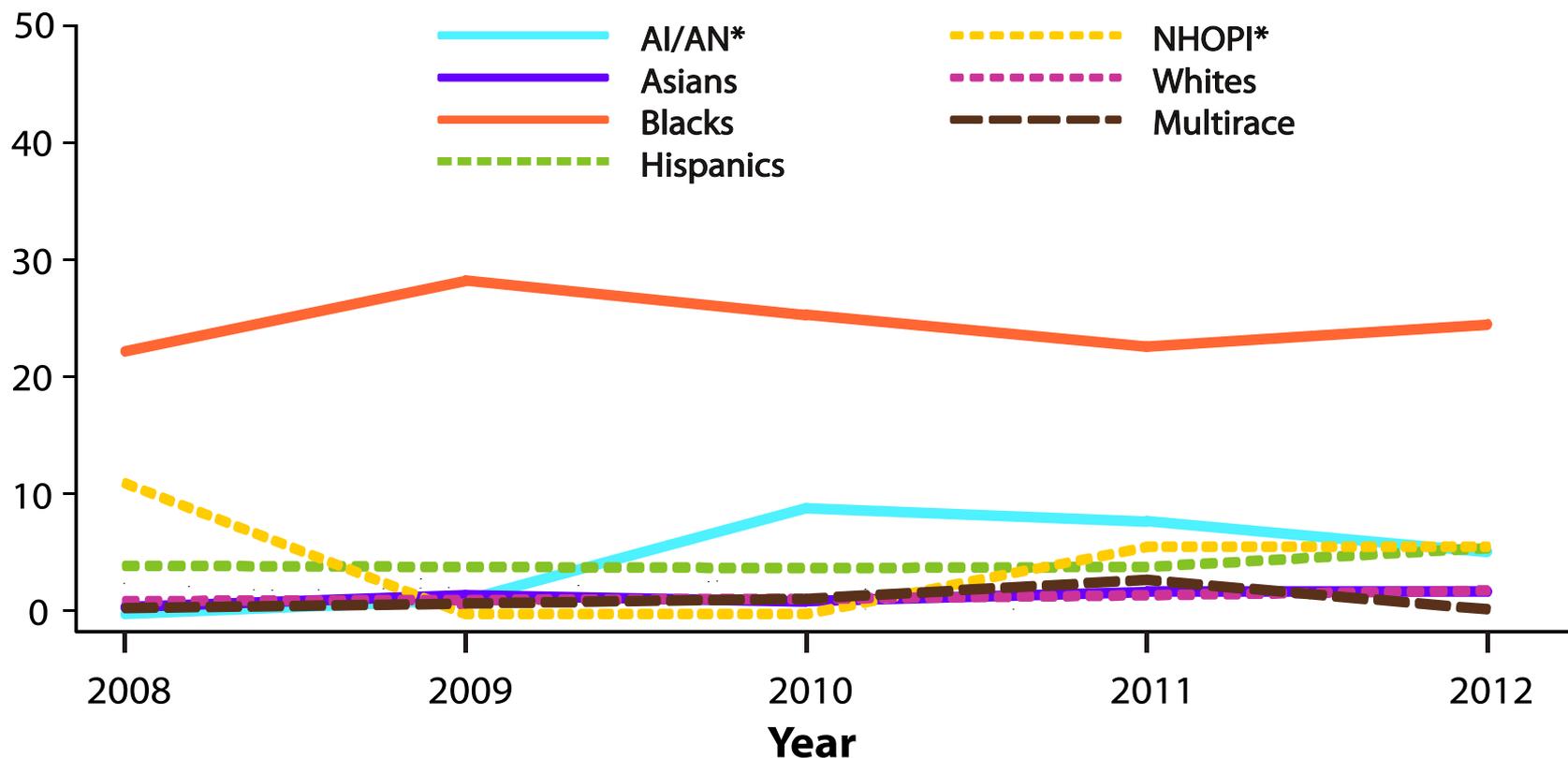
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**NOTE:** Includes 47 states and the District of Columbia reporting race/ethnicity data in Office of Management and Budget compliant formats in 2012.



# Primary and Secondary Syphilis—Rates Among Males Aged 15-19 Years by Race/Ethnicity, United States, 2008–2012

Rate (per 100,000 population)



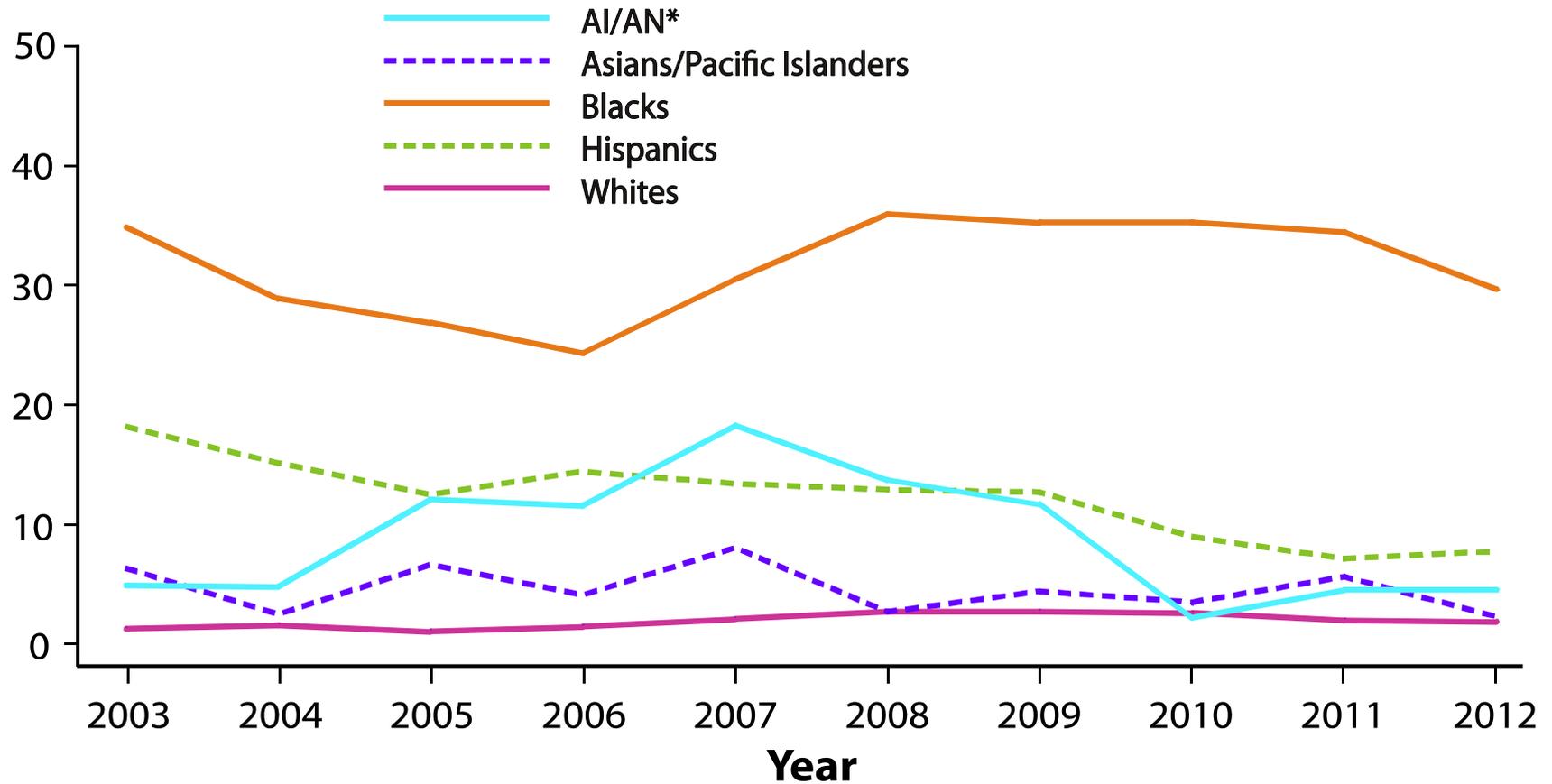
\* **AI/AN** = American Indians/Alaska Natives; **NHOPI** = Native Hawaiian and Other Pacific Islanders.

**NOTE:** Includes 38 states and the District of Columbia reporting race/ethnicity data in Office of Management and Budget compliant formats during 2008–2012.



# Congenital Syphilis—Infants—Rates by Year of Birth and Mother's Race/Ethnicity, United States, 2003—2012

Rate (per 100,000 live births)



\* AI/AN= American Indians/Alaska Natives.

**NOTE:** National Center for Health Statistics bridged race categories are presented to allow the display of data across several years. Cases missing maternal race/ethnicity information were excluded (< 1% of cases).



# Questions?

**Special Thanks to Dr. Bradley Stoner, MD and Dodie Rother, MPH for their contribution to the development of earlier versions of this presentation**