2017
King County
Sexually Transmitted Infection
Epidemiology Report

Public Health
Seattle & King County

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Executive Summary

The 2017 Sexually Transmitted Infections (STI) Epidemiology report describes recent trends in chlamydial infection, gonorrhea, and early syphilis among King County residents and additional sexually transmitted infections and PrEP use among Public Health – Seattle & King County STD Clinic patients. Left untreated, these infections may cause serious long-term health consequences including infertility and vision loss. The information contained in this report will be useful to providers, policy-makers, researchers and others interested in reducing the transmission of sexually transmitted infections in King County.

Key findings in the epidemiology of STIs in King County in 2017 include:

- **Rates of bacterial STIs among men who have sex with men (MSM) continued to increase reaching their highest level in 25 years.** In 2017, rates of syphilis, gonorrhea, and chlamydia among MSM in King County reached their highest levels since data became available in 1992. While some of the observed increase in STI rates likely reflect increased screening – particularly increased testing of asymptomatic persons – the increase in urethral gonorrhea and symptomatic syphilis strongly suggests that a true increases in the rates of these infections are ongoing. The causes for these increases are uncertain, but likely includes decreased condom use in an era of decreased HIV transmission. The rise in STI rates among MSM merit continued efforts to promote condom use and increased STI screening, particularly for syphilis and extragenital gonorrhea and chlamydial infection.

  Recommendations:

  - Public Health – Seattle & King County (Public Health) urges medical providers to perform at least annual STI and HIV screening on all sexually active MSM and transgender persons who have sex with men.
  - MSM should promptly seek medical evaluation for sores on the penis, mouth or anus or for body rash, and specifically ask to be tested for syphilis.
  - HIV medical providers should test their sexually active MSM patients for syphilis each time they draw blood. (Men with a single, mutually monogamous partner do not require STI testing.)
  - MSM and transgender persons who have sex with men with any of the following risks in the prior year should test for STIs (and HIV if not HIV-positive) every three months:
    - diagnosis of syphilis, gonorrhea or chlamydia,
    - methamphetamine or amyl nitrite (popper) use,
    - condomless anal sex with an HIV-positive or unknown status partner, or

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- ≥10 sex partners.
- Persons taking HIV pre-exposure prophylaxis (PrEP).

Additional information on local MSM STI screening and PrEP guidelines are available at: http://www.kingcounty.gov/healthservices/health/communicable/hiv/providers.aspx

- **Chlamydia rates among heterosexuals are relatively stable.** Young women continue to experience high incidence of chlamydial infection.

- **Syphilis rates among women rose 29% between 2016 and 2017, and have increased 87% since 2008.** Although the overall incidence of syphilis among women remains low, the incidence has increased substantially over the last decade. In 2017, medical providers diagnosed 63 King County women with syphilis. No cases of congenital syphilis occurred in King County in 2017.

- **Gonorrhea rates increased among heterosexuals and the rate among women has increased 76% in the last decade.** The rate of gonorrhea among women in King County has increased steadily since 2012. This increase was first observed in Washington State and other western U.S. states and is now being observed nationally.

  Recommendations for medical providers:

  - Routinely test all sexually active women under the age of 25 annually for gonorrhea and chlamydial infection.
  - Rescreen all persons treated for gonorrhea 3 months after their initial infection.
  - Ensure that all potentially exposed sex partners of persons with gonorrhea or chlamydial infection receive treatment.

  Public Health and the WA State Department of Health provider free medications for medical providers to use as expedited partner therapy (EPT). More information about EPT is available at: https://www.kingcounty.gov/depts/health/communicable-diseases/hiv-std/providers/partner-notification/ept-guidelines.aspx

- **An estimated 6% of gonorrhea in King County is resistant to azithromycin.** In 2017, Public Health participated in two Centers for Disease Control and Prevention (CDC) antimicrobial-resistant *Neisseria*

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gonorrhoeae surveillance activities: Gonococcal Isolate Surveillance Project (GISP) and Strengthening the U.S. Response to Resistant Gonorrhea (SURRG). Public Health tested almost 14% of all reported gonorrhea cases for antimicrobial resistance in 2017. Of tested cases, 6% were resistant to azithromycin, but none had evidence of resistance to ceftriaxone or cefixime.

In the 2015 STD CDC Treatment Guidelines, dual therapy is the recommended treatment for gonococcal infections. The recommended regime is ceftriaxone 250 mg IM in a single dose plus azithromycin 1g orally in a single dose.

- **Rates of all STIs continue to show marked racial and ethnic disparities.** While disparities in rates of STI between Blacks and Whites have declined since 2008, the burden of STI continues to disproportionately affect racial and ethnic minority residents of King County. Rates of gonorrhea, chlamydia and syphilis are consistently higher in Black, Native American and Latinx women, with the highest burden of infection occurring in Native American and Black women. Among MSM, Latino men experience the highest incidence of gonorrhea and chlamydial infection, with rates almost twice those observed in White MSM.

- **The Public Health STD Clinic remains a vital resource, diagnosing a substantial proportion of all reportable STIs reported in King County.** In 2017, the STD clinic diagnosed 19% of all early syphilis cases, 16% of all gonorrhea cases, 14% of all HIV cases, and 6% of all chlamydial cases reported in King County. The STD clinic also provides EPT, partner services, long-acting reversible contraception, and PrEP services to eligible patients. MSM patients continue to account for the majority of the STD clinic patients.

- **Family planning clinics play a critical role in the control of chlamydial infection in King County.** Family planning clinics diagnosed 16% of the total reported cases of chlamydial infections and 22% of the cases among women in King County.

Data Sources and Technical Notes

King County morbidity data:

This report describes case numbers and rates of infection for three sexually transmitted infections in King County. These three infections (chlamydia, gonorrhea, and syphilis) are notifiable diseases in Washington State. Medical providers and laboratories are required by law to report all laboratory confirmed cases of these infections to Public Health. The Public Health HIV/STD Program forwards these reports to the Washington State Department of Health. For this report, yearly infection totals are based on year of diagnosis. The numbers contained in the chlamydia, gonorrhea, and syphilis sections of this report are for cases diagnosed from 1992-2017 and reported through March 15, 2018. Throughout this report, Hispanic/Latino ethnicity is treated as a separate racial group, and all other racial groups (White, Black, Native American (including Alaska Natives), and Asian/Pacific Islander (including Native Hawaiians) are non-Hispanic.

Population data:

Incidence rates were calculated using population estimates provided by the Washington State Office of Financial Management for intercensal years and U.S. census annual population estimates for 2017. Incidence is a measure describing the number of new diagnoses of infection in a specific population over a period of time. In King County, incidence of STIs is calculated by dividing the number of reported cases of an infection over the total King County population, and is usually expressed as a number of cases per 100,000 population per year.

For years 2013 and earlier, STI estimates in MSM assume that 5.7% of men ages 15 and older in King County were MSM; this percentage comes from King County specific Behavioral Risk Factor Surveillance System (BRFSS) data collected in 2013 and 2014. BRFSS is a national telephone survey conducted annually by the CDC (https://www.cdc.gov/brfss/index.html). Some data suggest that the percentage of men in King County who are MSM is increasing. To address this, from 2014 onward this report bases the estimate of the MSM population size on the two year average of the percentage of men who report being gay or bisexual in BRFSS using data from the two years prior to the year for which STI incidence is estimated (e.g. the 2017 estimate uses data from 2015 and 2016). The percentage of men ages 15 and older estimated to be MSM are as follows:

- 2014 – 6.2%
- 2015 – 6.3%
- 2016 – 6.4%
- 2017 – 6.6%

Population estimates for HIV-positive and negative MSM were provided by the Public Health HIV/AIDS Epidemiology Unit from National HIV Surveillance System data.

Data Sources and Technical Notes

Data limitations:

Notifiable disease data have several limitations. In some cases, considerable differences in numbers and rates of infection between subgroups are attributable in large part to screening and testing practices. For example, the rate of chlamydial infection in King County is substantially higher among women than men, reflecting national recommendations that young women be screened for chlamydia annually, and the absence of corresponding recommendations for young men.

While chlamydial infection, gonorrhea, and syphilis are all notifiable diseases in Washington State, these data are subject to under-reporting by physicians and laboratories. Additionally, because undiagnosed infections cannot be reported, infections that are frequently experienced with no symptoms, such as chlamydia, may exist at higher levels in the population than notifiable disease data indicate.

Men are stratified by gender of sex partners into MSM and men who have sex with women only (MSW). Male cases were classified as MSM if any of the following criteria were met: 1) medical provider indicated the case had male sex partners on the case report, 2) sex with men in the last year was reported during partner services interviews, or 3) were diagnosed with rectal gonorrhea or chlamydial infection. Men without rectal infections who are missing gender of sex partners data are classified as MSW, which may result in misclassification of these men and underestimation of incidences among MSM. In 2017, 16%, 9%, and 3% of male cases of chlamydial infection, gonorrhea, and early syphilis were missing this information, respectively.

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Chlamydial Infection

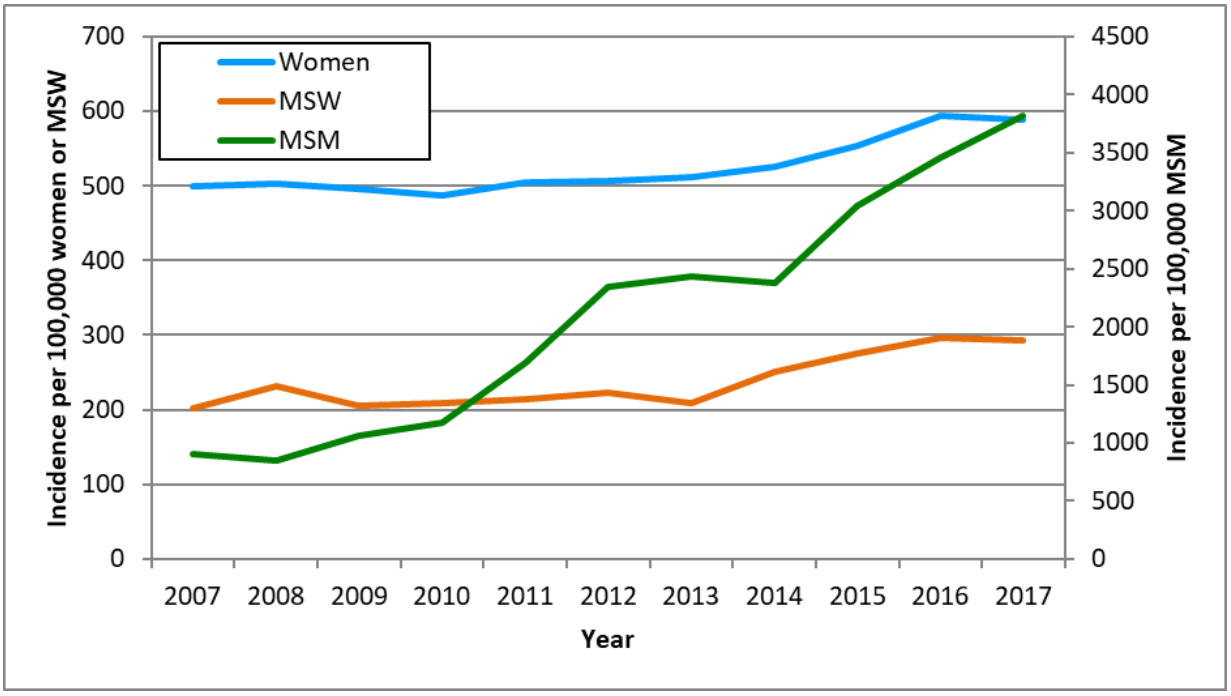
Overview

In 2017, 9,955 cases of chlamydial infection were reported among King County residents, representing an overall reported incidence of 462 per 100,000 people (Table 1), a 2% increase over the incidence in 2016 (Table 2). Among women, 5,297 cases were reported for an incidence of 492 per 100,000 women, and 4,655 cases were reported among men for a reported incidence of 433 per 100,000 men (Table 1). Incidence of reported chlamydial infection in persons ages 15 and older remains much higher among MSM (3,818 per 100,000) than among MSW (293 per 100,000) or women (588 per 100,000) (Figure 1).

Table 1: Chlamydia Infection - Number of Reported Cases and Incidence, King County, WA, 2017

	Cases	Incidence per 100,000 population
Sex		
Women	5,297	492
Men	4,655	433
Unknown	3	
Total cases	9,955	462

Figure 1: Chlamydial Infection – Incidence among Women, Heterosexual Men (MSW), and Men who have sex with men (MSM) ages 15 years and older, King County, WA, 2007-2017



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Age and gender

Adolescent females ages 15-19 years have traditionally had the highest rates of chlamydia diagnosis. However, since 2011 the rate among King County women ages 20-24 years has exceeded that of adolescents ages 15-19 years, reflecting a 37% reduction in the rate of chlamydia diagnoses among teens between 2004, when the rate was highest, and 2015, when the rate of chlamydial infection was lowest. During this same period, the rate of chlamydial infection among women ages 20-24 consistently rose. The reasons for this change are uncertain, but

Table 2: Number of Reported Chlamydia Cases and Incidence among Men and Women King County, WA, 1992-2017

	Women		Men		Total	
Year	Cases	Incidence per 100,000 population	Cases	Incidence per 100,000 population	Cases	Incidence per 100,000 population
1992	3,000	375	965	124	3,965	251
1993	2,563	316	813	102	3,376	210
1994	2,742	334	811	101	3,553	219
1995	2,410	291	802	98	3,212	196
1996	2,356	282	880	107	3,236	195
1997	2,247	266	903	108	3,150	188
1998	2,447	286	1,071	127	3,518	207
1999*	2,719	315	1,357	158	4,076	237
2000	3,388	388	1,653	191	5,041	290
2001	3,285	373	1,612	184	4,897	279
2002	3,483	390	1,750	198	5,233	294
2003	3,796	423	2,031	228	5,827	326
2004	4,108	455	2,061	230	6,172	343
2005	4,070	447	2,188	242	6,261	345
2006	3,956	428	2,016	219	5,974	324
2007	3,926	419	1,860	199	5,791	309
2008	4,011	423	2,061	218	6,072	321
2009	3,975	416	1,986	208	5,961	312
2010	3,961	409	2,086	217	6,047	313
2011	4,132	424	2,366	244	6,498	335
2012	4,155	423	2,740	281	6,895	352
2013	4,233	426	2,721	275	6,954	351
2014	4,437	439	3,165	314	7,602	377
2015	4,760	463	3,780	369	8,540	416
2016	5,218	495	4,312	410	9,532	453
2017	5,297	492	4,655	433	9,955	462

*Some Public Health – Seattle King County (PHSKC) clinics began using nucleic acid amplification test (NAAT) testing for chlamydial infection in 1994, and all PHSKC clinics were using NAATs by 1999.

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may reflect later age of sexual debut and increased condom use[1]. The rate of chlamydia diagnosis in 15-19 year old females in 2017 was 22% higher than it was in 2015, though it remains 24% below the peak rate in 2004 (Table 3, Figure 2). Among men, reported incidence was also highest among 20-24 year olds (1,567 per 100,000). Higher rates among women than men largely reflect differential screening practices in King County, where asymptomatic women are more frequently screened for chlamydial infection compared to men.

Table 3: Incidence of Reported Chlamydial Infection among Men and Women Ages 15-29*, King County, WA, 1992-2017

	Women, ages 15-29		Men, ages 15-29		Total, ages 15-29	
Year	Cases	Incidence per 100,000 population	Cases	Incidence per 100,000 population	Cases	Incidence per 100,000 population
1992	2,658	1,531	805	452	3,464	985
1993	2,212	1,276	695	390	2,908	827
1994	2,302	1,337	637	358	2,939	840
1995	2,051	1,188	642	359	2,693	766
1996	1,976	1,136	664	367	2,640	744
1997	1,942	1,105	644	353	2,586	722
1998	2,081	1,170	788	426	2,869	790
1999**	2,357	1,320	934	502	3,291	903
2000	2,918	1,624	1,154	617	4,071	1,110
2001	2,877	1,595	1,065	569	3,942	1,072
2002	3,050	1,669	1,215	642	4,265	1,146
2003	3,312	1,795	1,385	725	4,698	1,251
2004	3,589	1,917	1,349	696	4,938	1,296
2005	3,536	1,860	1,508	768	5,045	1,305
2006	3,359	1,716	1,297	642	4,656	1,171
2007	3,355	1,678	1,190	578	4,545	1,120
2008	3,447	1,703	1,376	660	4,823	1,174
2009	3,493	1,716	1,354	646	4,847	1,174
2010	3,340	1,666	1,321	637	4,661	1,142
2011	3,503	1,757	1,434	695	4,937	1,217
2012	3,514	1,813	1,656	828	5,170	1,313
2013	3,552	1,817	1,559	776	5,111	1,290
2014	3,644	1,812	1,855	898	5,498	1,349
2015	3,899	1,886	2,098	989	5,997	1,432
2016	4,281	1,958	2,372	1,058	6,653	1,502
2017	4,375	1,923	2,564	1,102	6,939	1,508

*Cases with unknown age were included in age-specific counts and rates after being distributed among age categories based on the distribution of cases with known age.

**Some Public Health – Seattle King County (PHSKC) clinics began using nucleic acid amplification test (NAAT) testing for chlamydial infection in 1994, and all PHSKC clinics were using NAATs by 1999.

[1]Abma JC, Martinez GM. Sexual activity and contraceptive use among teenagers in the United States, 2011–2015. National health statistics reports; no 104. Hyattsville, MD: National Center for Health Statistics. 2017.

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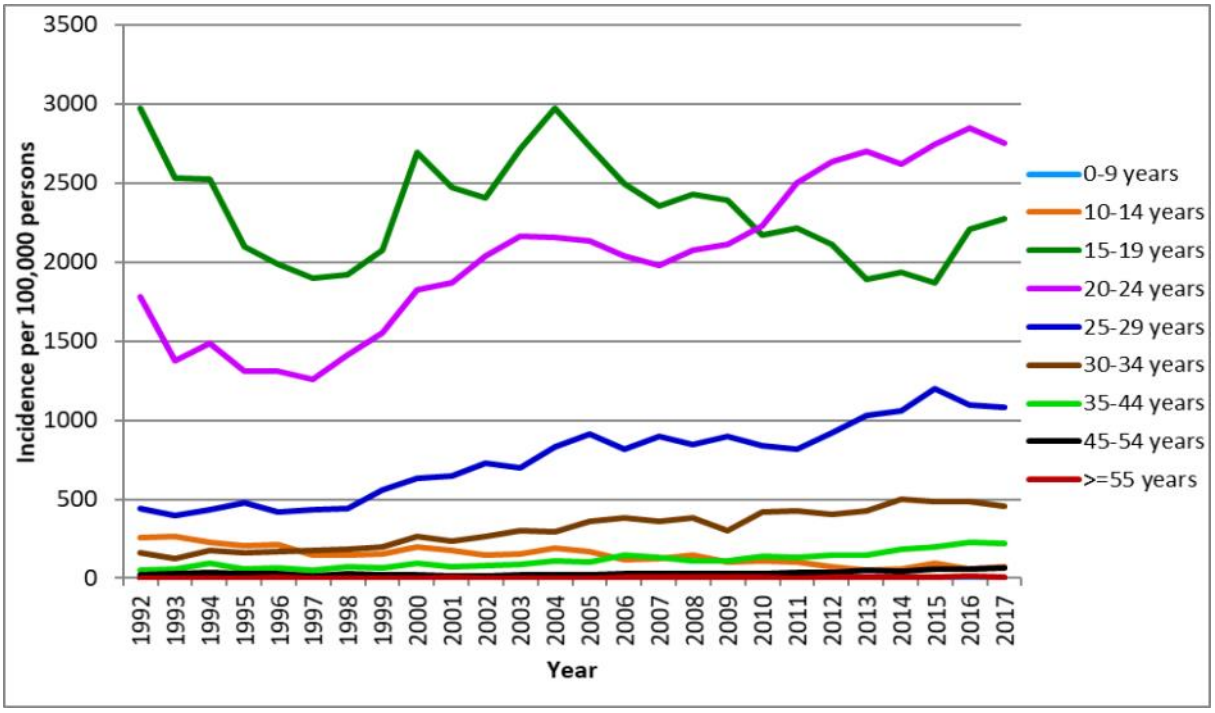
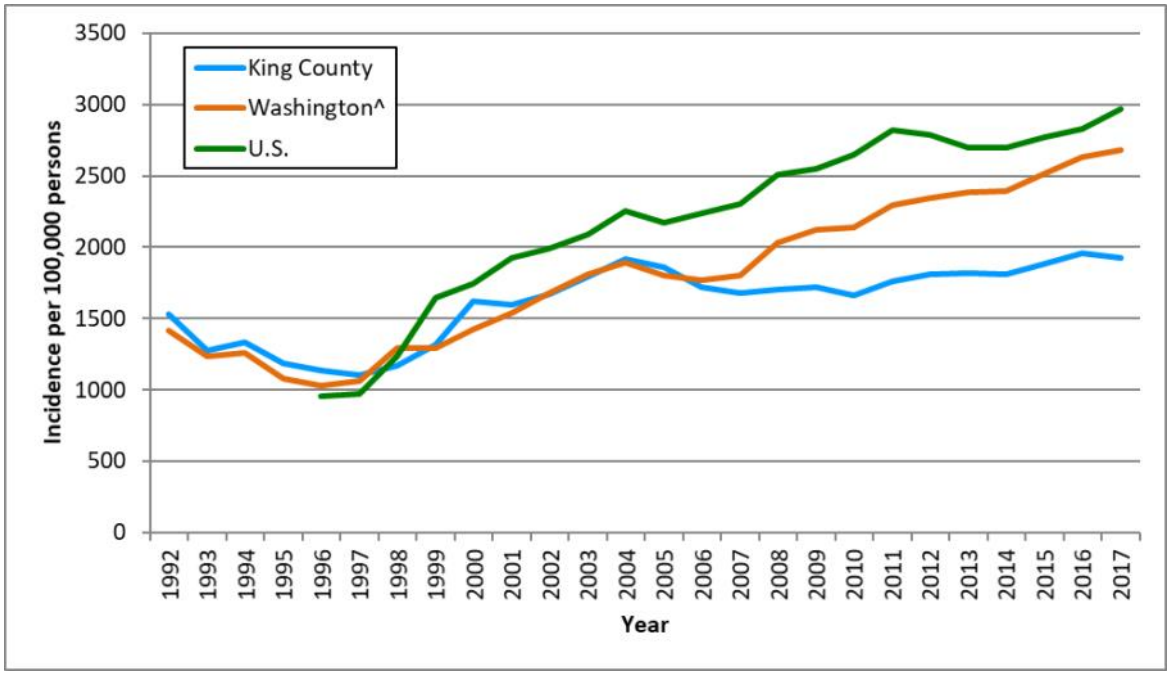
Figure 2: Chlamydial Infection – Incidence among Women by Age King County, WA, 1992-2017*



*Cases with unknown age were distributed according to annual age distributions among cases with known age and included in age-specific incidences.

Figure 3: Chlamydial Infection – Incidence among Women Ages 15-29*
King County, Washington State, and U.S., 1992-2017



*Cases with unknown age were distributed according to annual age distributions among cases with known age and included in age-specific incidences.
^Washington State rates exclude King County.

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The incidence of reported chlamydial infection among 15-29 year-old women in King County is substantially lower than that observed nationally or in the rest of Washington State (Figure 3). Trends in King County have also varied from those observed in the rest of the state and nationally. Among women aged 15-29, reported incidence in King County rose between the mid-1990s and 2004, declined somewhat between 2004 and 2010 and has gradually increased since that time (Figure 3). In contrast, the incidence of reported chlamydial infection among 15-29 year-old women in the U.S. and in Washington State (excluding King County) has been steadily rising since 2007.

Table 4: Chlamydial Infection – Number of Reported Cases and Incidence among Men and Women by Age and Race/Ethnicity King County, WA, 2017

	Women (N=5,297)		Men (N=4,655)	
	Cases	Incidence per 100,000 population	Cases	Incidence per 100,000 population
Race/ethnicity*^				
White, Non-Latino	1,756	320	2,007	362
Black, Non-Latino	731	1,314	616	1,031
Nat Am, Non-Latino	81	1,418	38	666
Asian/PI, Non-Latino	701	426	403	268
Latino	929	1,090	692	714
Other	80		52	
Multiple	157	367	118	287
Unknown	862		729	
Age*				
0-9 years	1	1	1	1
10-14 years	42	71	9	15
15-19 years	1,394	2,273	381	604
20-24 years	1,944	2,752	1,103	1,567
25-29 years	1,035	1,084	1,080	1,088
30-34 years	432	459	775	762
35-44 years	339	220	764	474
45-54 years	89	64	396	274
>=55 years	19	7	146	60
Unknown	2		0	

*Cases with unknown race and ethnicity were included in race/ethnicity-specific rates after being distributed among race/ethnicity categories based on the distribution of cases with known race/ethnicity. Cases with unknown age were included in age-specific counts and rates after being distributed among age categories based on the distribution of cases with known age.
^Race/ethnicity specific rates exclude cases reported with "multiple" or "other" races.

Race and ethnicity

Among women, reported incidence was highest among Native American women (1,418 per 100,000 women),

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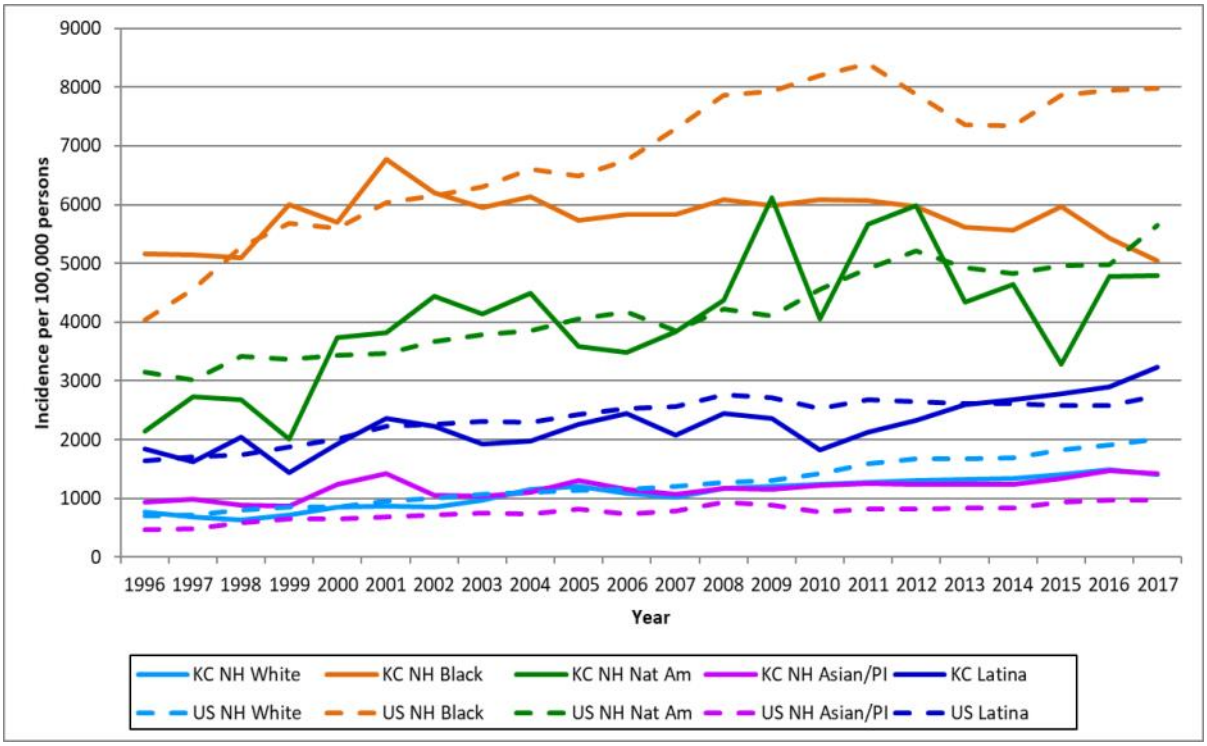
followed by Black (1,314 per 100,000), Latina (1,090 per 100,000), Asian/Pacific Islander (426 per 100,000), and White (320 per 100,000) women (Table 4). This pattern of disparity was also evident for women ages 15-29 with Black, Native American, and Latina women having much higher rates than among Asian/Pacific Islander or White women. Compared to the national rates in women in this age group, King County had higher rates among Asian/Pacific Islander women (KC rate 46% higher) and Latina women (18% higher), but substantially lower rates among Black women (37% lower), White women (30% lower), and Native American women (15% lower) (Figure 4).

Figure 4: Chlamydial Infection – Incidence among Women Ages 15-29 by Race and Ethnicity King County, WA and U.S., 1996-2017*



NH = Non-Hispanic, Nat Am = Native American, PI = Pacific Islander
*Cases with unknown race, ethnicity, and age were distributed according to annual race, ethnicity, and age distributions among cases with known race, ethnicity, and age and included in race/ethnicity-specific incidences.

Because the racial and ethnic composition of King County is different from that of the U.S. as a whole and rates of chlamydial infection vary by race/ethnicity, we calculated race/ethnicity standardized rates of chlamydial infection in King County using the U.S. population as the standard. Based on this calculation, the rate of chlamydial infection among females age 15-29 in King County was 21% lower than the national rate (Figure 5).

Similar general patterns of disparities were evident among men, though the magnitude of disparities was generally greater among women than among men (Figure 6). Since 2008, the relative disparity between Whites and Blacks has decreased among both men (Relative rate 8.0 to 2.8) and women (Relative rate 5.7 to 3.6). Despite this encouraging trend, large and critically important disparities in rates of chlamydial infection persist.

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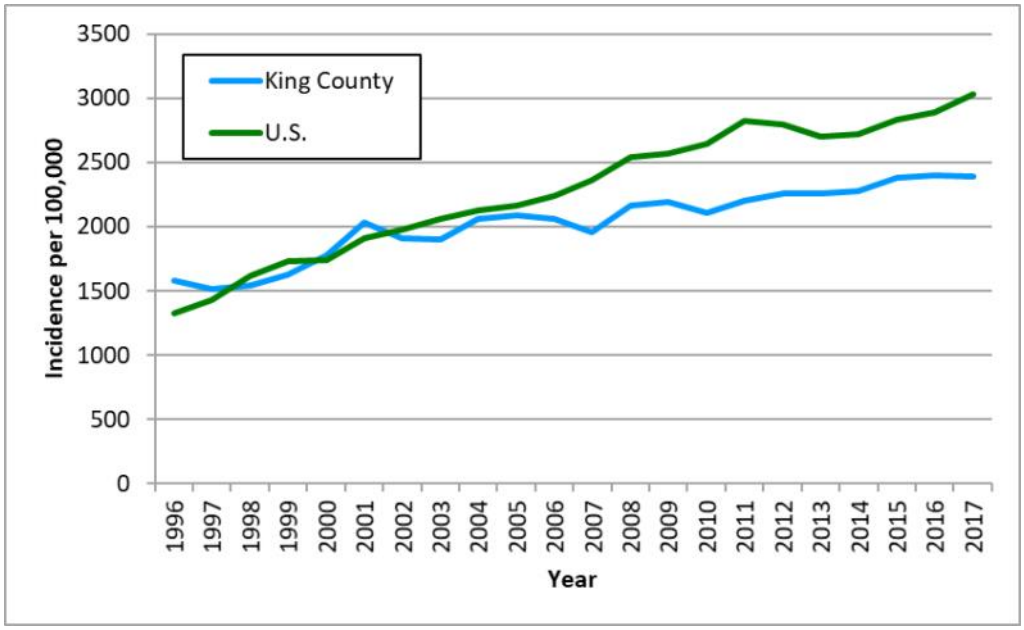
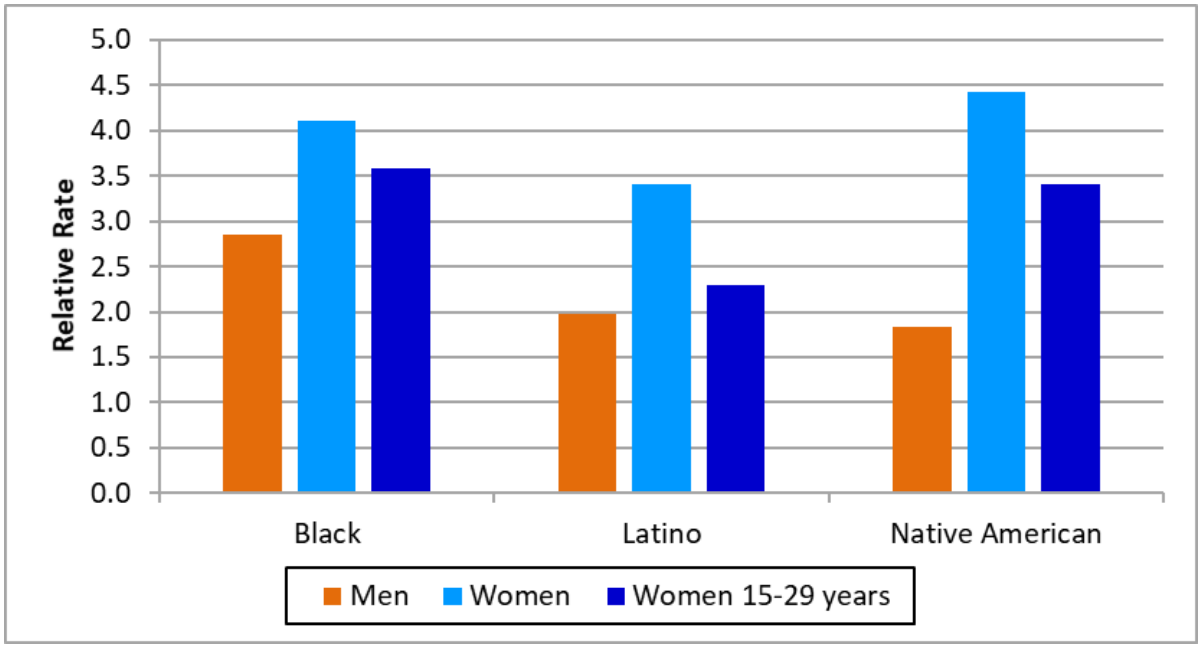
**Figure 5: Chlamydial Infection – Race Adjusted Incidence among Women Ages 15-29*
King County and U.S., 1996-2017**



*Cases with unknown age were distributed according to annual age distributions among cases with known age and included in age-specific incidences. U.S. population was used for race standardization. Rates exclude cases reported with multiple or other races.

Figure 6: Chlamydial Infection – Relative Rate Disparities among Blacks, Latinos, and Native Americans Compared to Whites, King County 2017



Relative rate disparities were calculated using a ratio of the rates. Relative rates represent a measure of health disparity on the relative scale regardless of the sizes of racial/ethnic groups, and a value of 1 corresponds to no disparity.

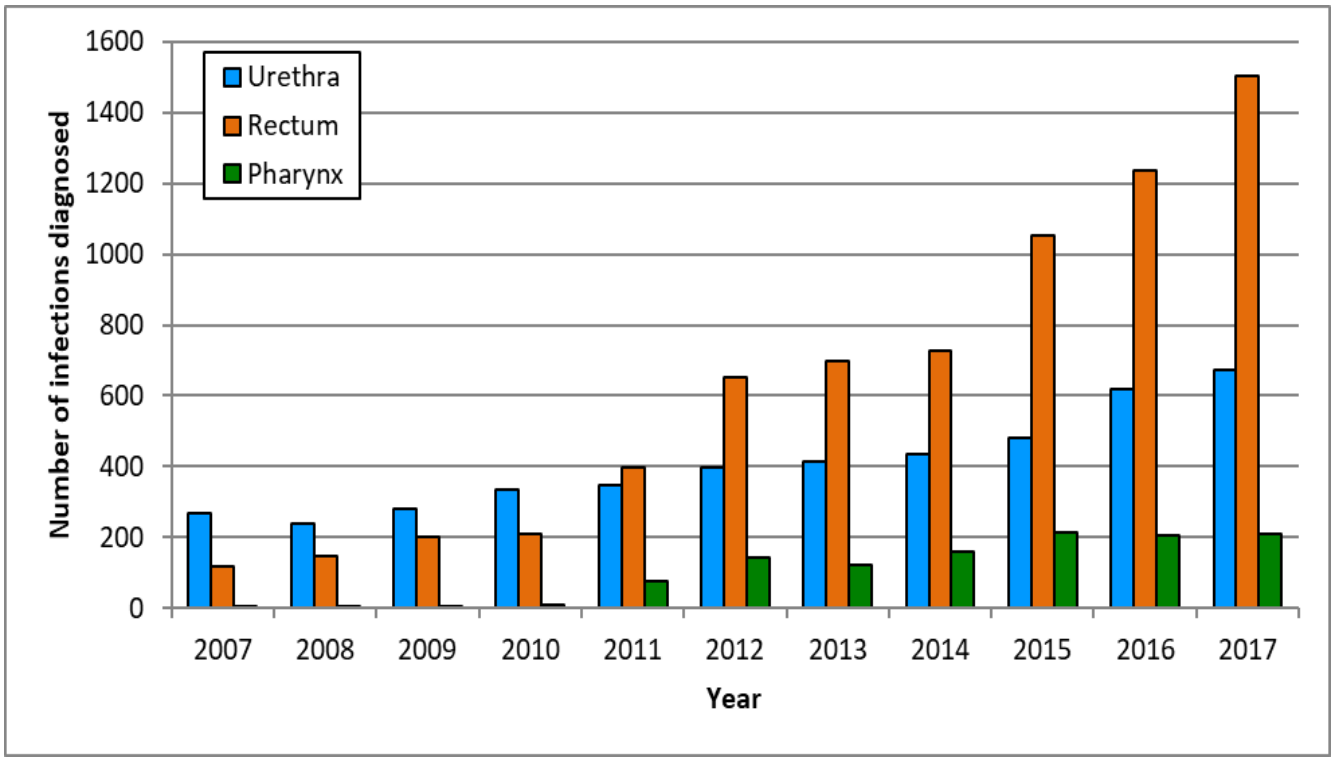
Chlamydial Infection

Men who have sex with men

The number of cases of chlamydial infection reported among MSM has increased each year since 2008 and incidence has increased each year since 2014 (Figure 1). In 2017, 2,228 cases of chlamydial infection were reported among MSM for an incidence of 3,818 per 100,000 MSM, up from 2,383 per 100,000 in 2014.

The increase in reported chlamydial infections observed in MSM varied substantially by anatomic site of infection (Figures 7 and 8). Since 2010, the rate of reported rectal chlamydial infection among MSM has increased from 469 to 2,579 per 100,000, more than a 450% increase. Meanwhile, the rate of urethral infection increased from 748 to 1,152 per 100,000, a 54% increase. Of MSM with diagnosed urethral infection, 50% were symptomatic and the rate of MSM with urethral infection reporting symptoms as the reason for testing increased from 462 to 542 per 100,000, a 17% increase. The percentage of MSM with urethral chlamydial infection that are symptomatic has remained relatively stable since 2011. The dramatic difference in the trends between urethral and rectal infections likely reflects increased rectal screening for chlamydial infection and widespread adoption of more sensitive nucleic acid amplification tests (NAATs) to test for rectal chlamydial infection.

Figure 7: Chlamydial Infection - Number of Infections among men who have sex with men (MSM) by Anatomic Site, King County, WA 2007-2017*



*Each case can have more than one site of infection. In 2017, 8% of MSM diagnosed with chlamydial infection were infected at more than one anatomic site.

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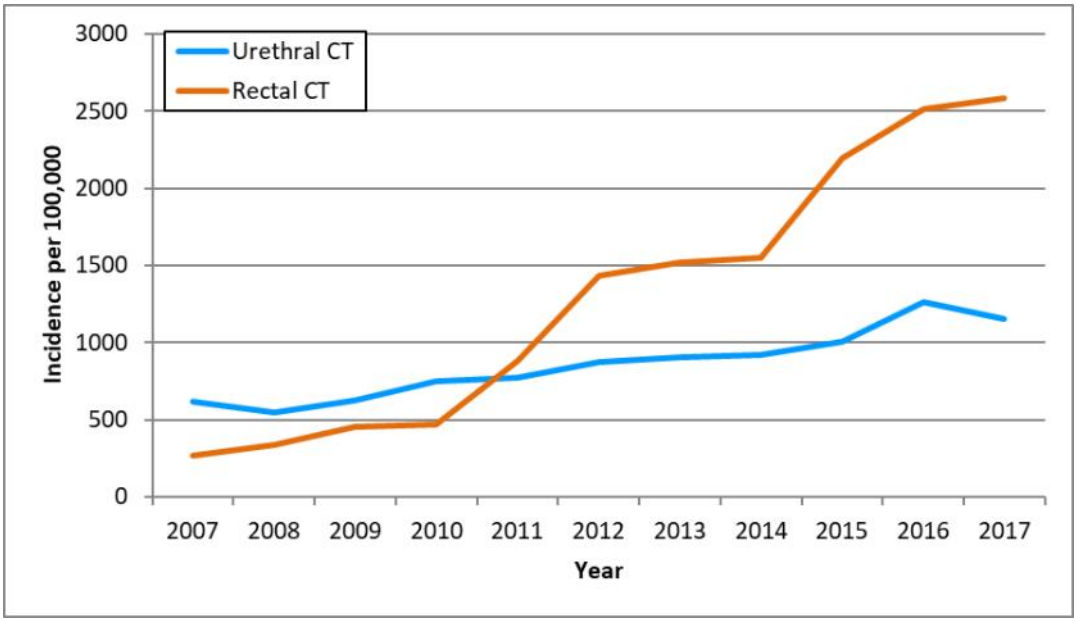
Figure 8: Chlamydial Infection - Incidence among men who have sex with men (MSM) by Anatomic Site, King County, WA, 2007-2017*



*Each case can have more than one site of infection. In 2017, 8% of MSM diagnosed with chlamydial infection were infected at more than one anatomic site.

As in the heterosexual population, chlamydia rates in MSM vary greatly by race/ethnicity (Figure 9). In 2017, Latino MSM had the highest rate of chlamydial infection (7,196 per 100,000 MSM), followed by White (4,210 per 100,000), Black (3,770 per 100,000), and Asian/Pacific Islander (2,894 per 100,000) MSM. The high rate of chlamydial infection among Latino MSM reflects a continuation of a trend evident since 2011, in which the rate of infection among Latinos has risen more dramatically than among other racial and ethnic groups.

Medical venues diagnosing chlamydial infection

The majority of chlamydia infections (75% overall and 74% of female cases) were diagnosed by community providers outside a family planning, public health, or correctional setting. However, family planning clinics continue to play an important role in efforts to control chlamydial infection, diagnosing 16% of all infections and 22% of infections in women.

Limitations of data

Public Health does not currently monitor the number of chlamydial tests performed in the population. Therefore, we cannot estimate the extent to which changes in the number of cases reported reflect true changes in incidence vs. increased case detection or ascertainment due to changes in the number of tests performed,

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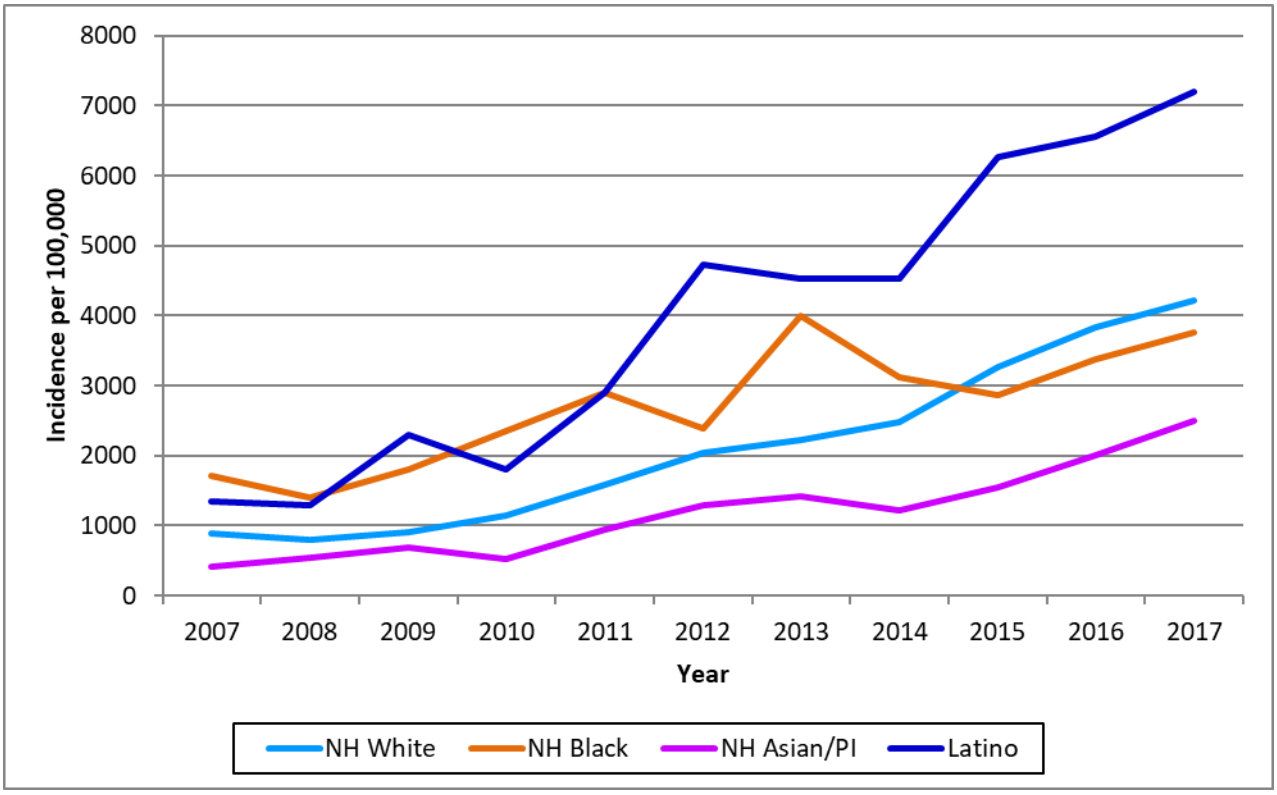
changes in the sensitivity of the tests employed, or more complete reporting of diagnosed cases. The increase observed in national reported chlamydial incidence from 1997 through 2004 is likely due, at least in part, to increased screening among women in states that did not previously have screening programs. Changes in testing technology may also have influenced trends in reported incidence. Locally, Public Health began pilot testing NAATs for chlamydial infection in 1994 and these more sensitive tests may have resulted in increases in chlamydia diagnoses. All Public Health clinics and sites participating in the Infertility Prevention Project, a national chlamydial testing program, were using NAATs by the end of 1999.

Figure 9: Chlamydial Infection - Incidence among men who have sex with men (MSM) by Race and Ethnicity King County, WA, 2007-2017*



NH = Non-Hispanic, PI = Pacific Islander

*Cases with unknown race and ethnicity were distributed according to annual race and ethnicity distributions among cases with known race and ethnicity and included in race/ethnicity-specific incidences.

Gonorrhea

Overview

King County continues to experience increasing epidemics of gonorrhea among both heterosexuals and MSM. The rate of infection among MSM is now at a 25 year high, while the rate in women is at its highest level in over a decade. Both of these epidemics reflect broader international trends in rates of STIs that are ongoing in North America[2], Europe[3], and Australia[4]. In 2017, 4,284 cases of gonorrhea were reported among residents of King County, resulting in an overall incidence of 199 per 100,000 persons (Table 5), a 22% increase since 2016 and a 183% increase since 2008 (Table 6). Among women, 993 cases of gonorrhea were reported in 2017 for an incidence of 92 per 100,000 women, a 20% increase since 2016, and a 76% increase since 2008. Among men, 3,289 cases were reported in 2017, a 23% increase since 2016, and a 247% increase over the last decade.

The rate of gonorrhea among MSM, MSW and women have been rising in parallel over the last several years, though the increase among MSM started in 2009, while the increase among women and MSW was not evident until 2013 (Figure 10). Gonorrhea trends in King County are consistent with national gonorrhea trends, though the increase in gonorrhea among women in King County started several years before the increase in national data; this earlier increase was also seen elsewhere in the Western U.S. (Table 6, Figure 11)[5]. We calculated race/ethnicity standardized rates of gonorrhea infection in King County using the U.S. population as the standard as was done for chlamydial infection. Based on this calculation, the rate of gonorrhea infection among females age 15-29 in King County was 27% lower than the national rate (Figure 12).

Table 5: Number of Reported Gonorrhea Cases and Gonorrhea Incidence, King County, WA, 2017

	Cases	Incidence per 100,000 population
Sex		
Women	993	92
Men	3,289	306
Unknown	2	
Total cases	4,284	199

[2]Choudhri Y, Miller J, Sandhu J, Leon A, Aho J. Gonorrhea in Canada, 2010-2015. Can Commun Dis Rep. 2018;44(2):37-42. https://doi.org/10.14745/ccdr.v44i02a01

[3]Public Health England, National STI surveillance data tables 2017

[4]Kirby Institute. HIV, viral hepatitis and sexually transmissible infections in Australia: annual surveillance report 2018. Sydney: Kirby Institute, UNSW Sydney; 2018.

[5]Centers for Disease Control and Prevention. *Sexually Transmitted Disease Surveillance 2017*. Atlanta: U.S. Department of Health and Human Services; 2018.

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Table 6: Number of Reported Gonorrhea Cases and Incidence among Men and Women King County, WA, 1992-2017

	Women		Men		Total	
Year	Cases	Incidence per 100,000 population	Cases	Incidence per 100,000 population	Cases	Incidence per 100,000 population
1992	900	113	1,052	135	1,952	124
1993	649	80	878	111	1,527	95
1994	543	66	675	84	1,218	75
1995	516	62	762	94	1,278	78
1996	354	42	559	68	913	55
1997	395	47	519	62	914	54
1998	324	38	655	77	979	58
1999	347	40	608	71	955	56
2000	583	67	894	103	1,477	85
2001	727	82	1,164	133	1,891	108
2002	584	65	1,197	135	1,781	100
2003	528	59	1,119	126	1,647	92
2004	556	62	1,021	114	1,577	88
2005	788	87	1,457	161	2,245	124
2006	962	104	1,506	164	2,468	134
2007	557	59	866	93	1,428	76
2008	495	52	831	88	1,329	70
2009	293	31	822	86	1,115	58
2010	414	43	1,190	124	1,606	83
2011	394	40	1,011	104	1,406	72
2012	336	34	1,228	126	1,560	80
2013	407	41	1,399	142	1,806	91
2014	589	58	1,668	166	2,257	112
2015	796	77	2,188	213	2,984	145
2016	810	77	2,619	249	3,429	163
2017	993	92	3,289	306	4,284	199

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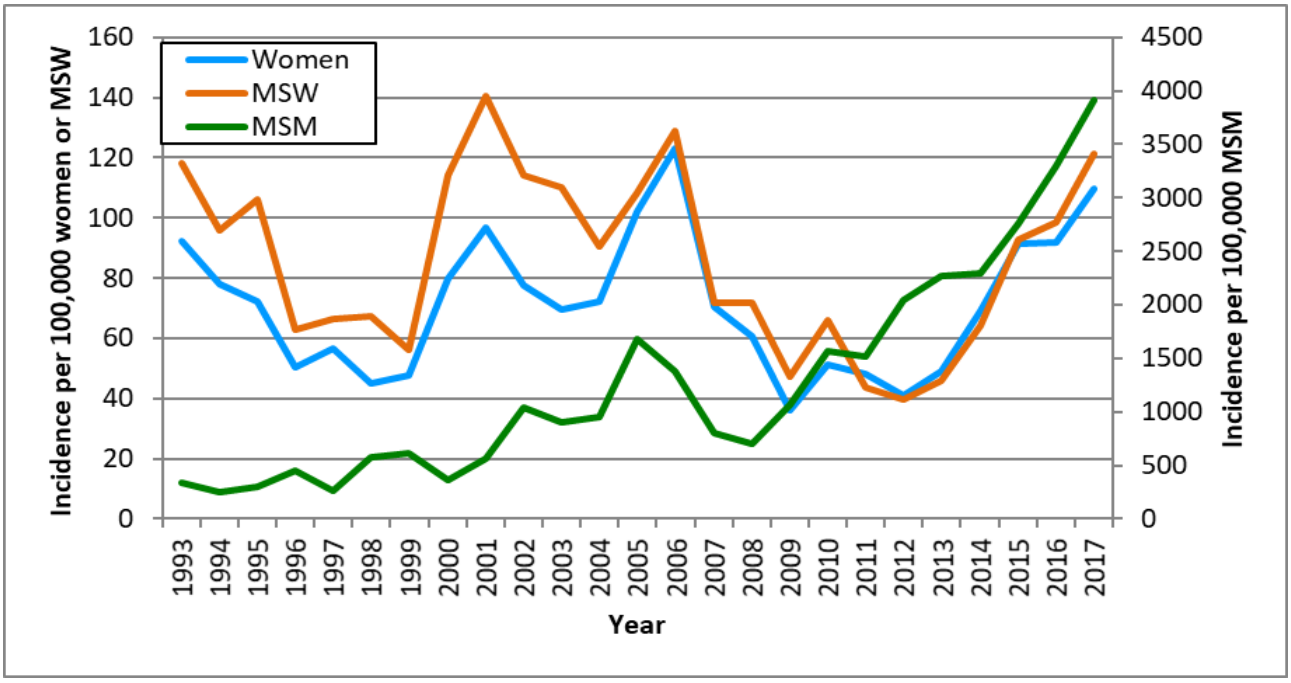
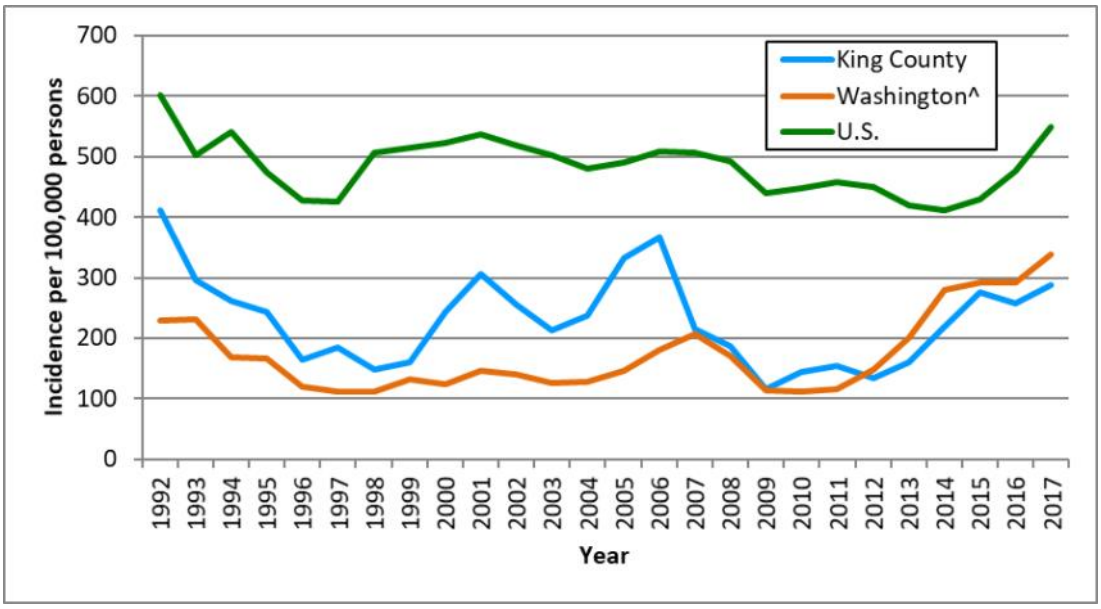
Figure 10: Gonorrhea –Incidence among Women, Heterosexual Men (MSW), and Men who have sex with men (MSM) ages 15 years and older, King County, WA, 2007-2017*



*In 2004, a field for gender of sex partners was added to the STD case report form. Before this addition, ascertainment of MSM status was likely less complete and therefore underestimated.

Figure 11: Gonorrhea – Incidence among Women Ages 15-29 King County, Washington State, and U.S., 1992-2017*



*Cases with unknown age were distributed according to annual age distributions among cases with known age and included in age-specific incidences.

^ Washington State rates exclude King County.

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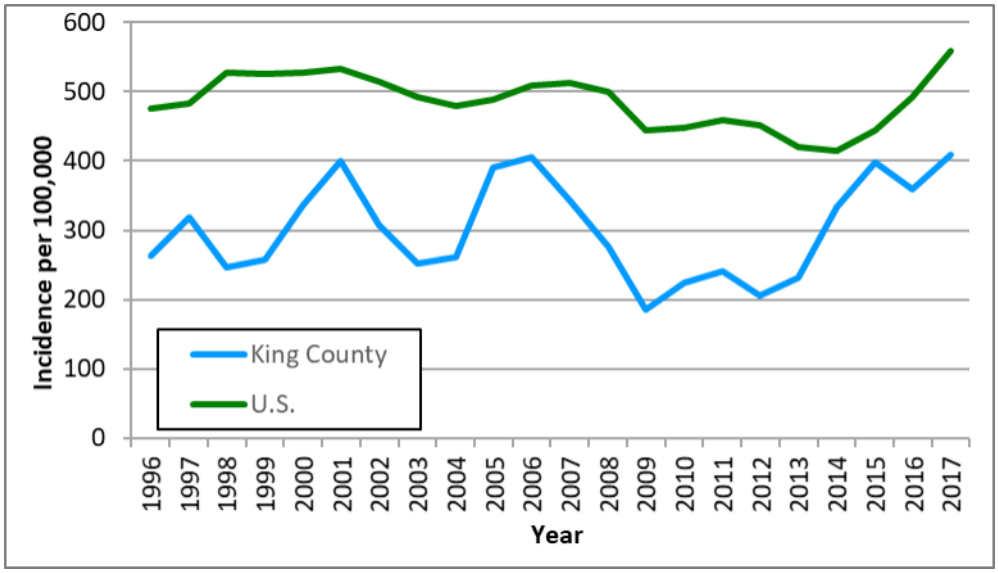
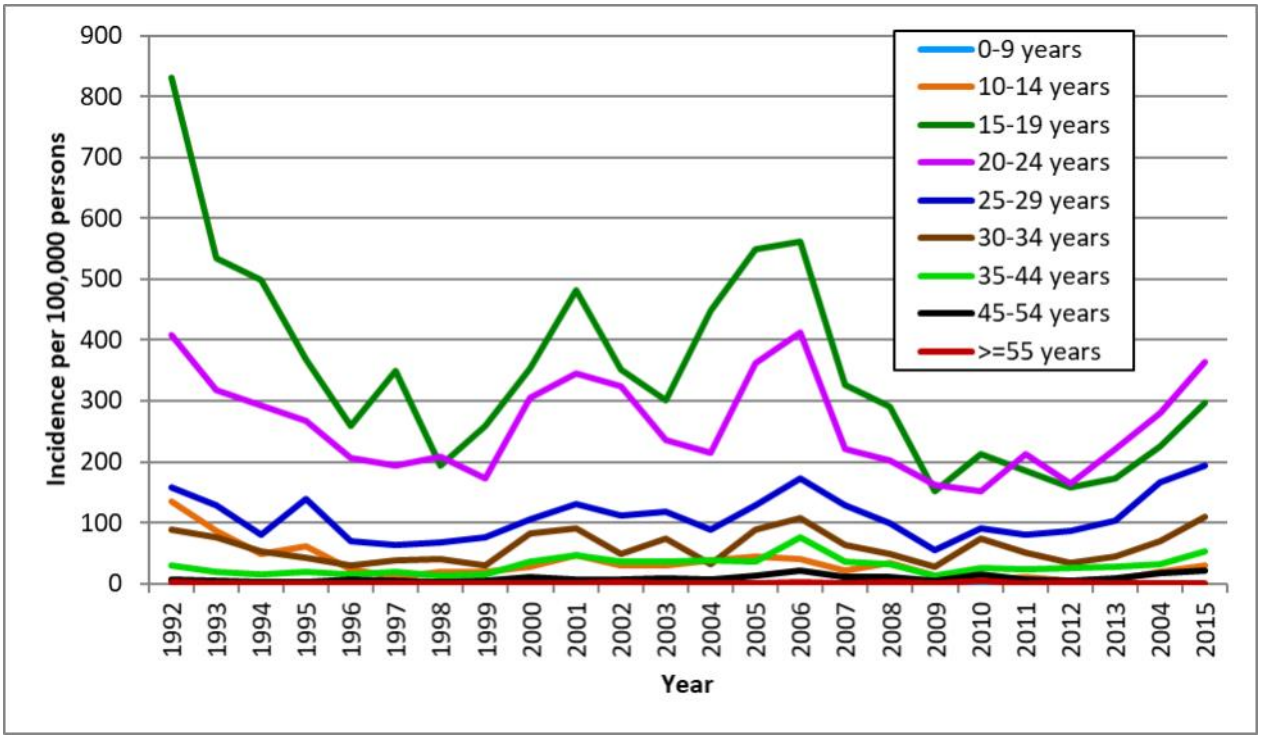
Figure 12: Gonorrhea – Race Adjusted Incidence among Women Ages 15-29* King County and U.S., 1996-2017



*Cases with unknown age were distributed according to annual age distributions among cases with known age and included in age-specific incidences. U.S. population was used for race standardization. Rates exclude cases reported with multiple or other races.

Figure 13: Gonorrhea – Incidence among Women by Age King County, WA, 1992-2017*



*Cases with unknown age were distributed according to annual age distributions among cases with known age and included in age-specific incidences.

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Age and gender

Among women, the incidence of gonorrhea was highest among 20-24 year olds (410 per 100,000), followed by 15-19 year olds (311 per 100,000) in 2017. This epidemiologic pattern, with higher rates among 20-24 years olds than among 15-19 year olds, is similar to that observed in chlamydial infection and, like chlamydia, represents a change compared to the period from 1990-2010 (Figure 13). As with chlamydial infection, the reasons for this change are uncertain, but may reflect later age of sexual debut and increased condom use[6]. Among men, the rate of gonorrhea was highest in the 20-24 age group (757 per 100,000), followed by the 25-29 age group (734 per 100,000) (Table 7).

Table 7: Number of Reported Gonorrhea Cases and Incidence among Men and Women, by Age and Race, King County, WA, 2017

	Women (N=993)		Men (N=3,289)	
	Cases	Incidence per 100,000 population	Cases	Incidence per 100,000 population
Race/ethnicity* ^				
White, Non-Hispanic	362	60	1,557	256
Black, Non-Hispanic	275	451	565	861
Nat Am, Non-Hispanic	30	479	29	463
Asian/PI, Non-Hispanic	70	39	229	139
Hispanic	112	120	523	492
Other	50		31	
Multiple	13	28	112	236
Unknown	81		243	
Age*				
0-9 years	2	2	1	1
10-14 years	12	20	2	3
15-19 years	191	311	140	222
20-24 years	290	410	533	757
25-29 years	172	180	729	734
30-34 years	139	148	581	572
35-44 years	115	75	734	455
45-54 years	55	39	398	276
>=55 years	17	6	170	70
Unknown	0		1	

*Cases with unknown race and ethnicity were included in race/ethnicity-specific rates after being distributed among race/ethnicity categories based on the distribution of cases with known race/ethnicity. Cases with unknown age were distributed according to annual age distributions among cases with known age and included in age-specific incidences.

^Race/ethnicity specific rates exclude cases reported with "other" races.

[6]Abma JC, Martinez GM. Sexual activity and contraceptive use among teenagers in the United States, 2011–2015. National health statistics reports; no 104. Hyattsville, MD: National Center for Health Statistics. 2017.

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Race and ethnicity

Among both women and men, gonorrhea rates vary substantially among different racial and ethnic groups. In 2017, Native Americans (479 per 100,000) had the highest rate of gonorrhea among women, followed by Black women (451 per 100,000). Among women ages 15-29, the age group with the highest rate of gonococcal infection, the incidence rates of gonorrhea in Native American and among Black women were ten and eight times higher than among White women, respectively (Table 8, Figure 14).

Table 8: Number of Reported Gonorrhea Cases and Incidence among Men and Women ages 15-29,* King County, WA, 1992-2017

	Women, ages 15-29		Men, ages 15-29		Total, ages 15-29	
Year	Cases	Incidence per 100,000 population	Cases	Incidence per 100,000 population	Cases	Incidence per 100,000 population
1992	713	411	706	396	1419	403
1993	514	296	530	297	1044	297
1994	451	262	421	237	872	249
1995	420	243	422	236	842	240
1996	287	165	302	167	589	166
1997	325	185	258	141	583	163
1998	262	147	334	180	596	164
1999	286	160	317	171	603	166
2000	436	243	378	202	815	222
2001	552	306	549	293	1101	300
2002	466	255	557	294	1023	275
2003	392	212	464	243	856	228
2004	444	237	419	216	864	227
2005	630	332	648	330	1278	331
2006	716	366	699	346	1416	356
2007	430	215	426	207	856	211
2008	377	186	411	197	788	192
2009	238	117	416	199	654	158
2010	289	144	482	232	771	189
2011	306	154	475	230	781	193
2012	259	134	557	279	816	207
2013	314	161	629	313	943	238
2014	442	220	820	397	1262	310
2015	572	277	1021	482	1593	380
2016	563	257	1161	518	1724	389
2017	653	287	1402	603	2055	447

*Cases with unknown age were included in age-specific counts and rates after being distributed among age categories based on the distribution of cases with known age.

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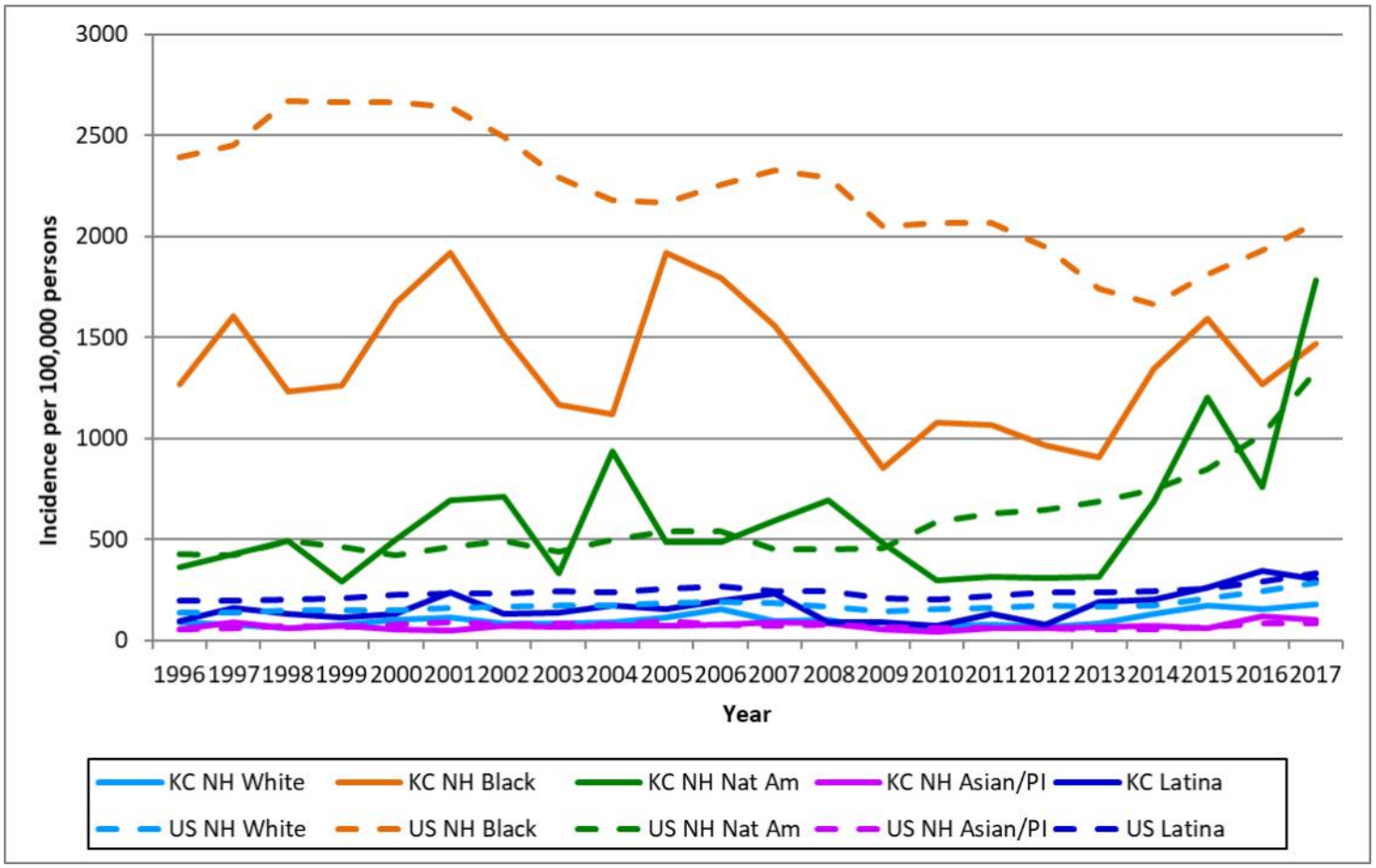
Figure 14: Gonorrhea – Incidence among Women Ages 15-29 by Race and Ethnicity, King County, WA and U.S., 1996-2017*



NH = Non-Hispanic, Nat Am = Native American, PI = Pacific Islander
*Cases with unknown race, ethnicity, and age were distributed according to annual race, ethnicity, and age distributions among cases with known race, ethnicity, and age and included in race/ethnicity-specific incidences.

Since 2008, the rate of gonorrhea has increased among all racial and ethnic subgroups of women ages 15-29. The relative magnitude of these increases (the percentage increase in each group relative to the past) has varied substantially between groups defined by race/ethnicity: Latinas (231% increase), Native Americans (157% increase), Whites (73% increase), Asians/Pacific Islanders (21% increase), and Blacks (20% increase). However, it should be noted that while the relative increase in the rate of infection was smaller for Black women in King County than White or Latina women, the absolute increase in the rate of infection (i.e. the number of infections per 100,000) has been highest for Black and Native American women. The persistence of very large racial disparities in gonorrhea incidence represents a major challenge in King County and in the rest of the U.S. and is a critical area in need of additional clinical and public health intervention (Figure 15).

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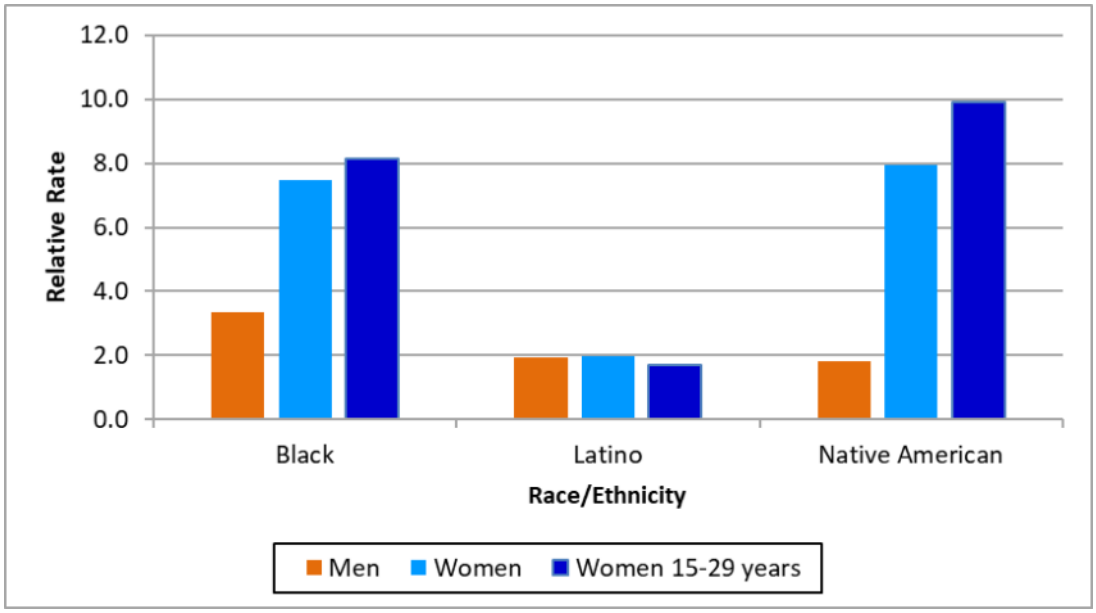
Figure 15: Gonorrhea – Relative Rate Disparities among Blacks, Latinos, and Native Americans Compared to Whites, King County 2017



Relative rate disparities were calculated using a ratio of the rates. Relative rates represent a measure of health disparity on the relative scale regardless of the sizes of racial/ethnic groups, and a value of 1 corresponds to no disparity.

MSM

Gonorrhea diagnoses among MSM have continued to increase steadily since 2008, with incidence reaching a new historical high of 3,916 per 100,000 in 2017 (Figure 10).

Trends in the number of reported gonorrhea cases among MSM vary by anatomic site (Figure 16). The number of reported infections at each anatomic site has steadily increased over the last 6 years (Figure 17), though the magnitude of that increase has varied somewhat by anatomic site, with the largest recent increase observed in pharyngeal gonorrhea (from 854 in 2016 to 1,119 in 2017). Since urethral gonorrhea is almost always a symptomatic infection, the observed increase in urethral gonorrhea (from 609 in 2016 to 744 in 2017) likely represents a true increase in the rate of gonorrhea and not simply an increase in diagnoses due to increased screening.

The incidence of gonorrhea has increased in all racial and ethnic groups of MSM, though like chlamydial infection rates, rates vary greatly by race/ethnicity (Figure 18). In 2017, Latino MSM had the highest rate of gonorrhea infection (8,007 infections per 100,000 MSM), followed by Black (5,058 per 100,000), White (4,237 per 100,000) and Asian/Pacific Islander (1,825 per 100,000) MSM. As with chlamydial infection, the increase in incidence among Latino MSM was particularly great, increasing 8-fold since 2008 (1,030 per 100,000).

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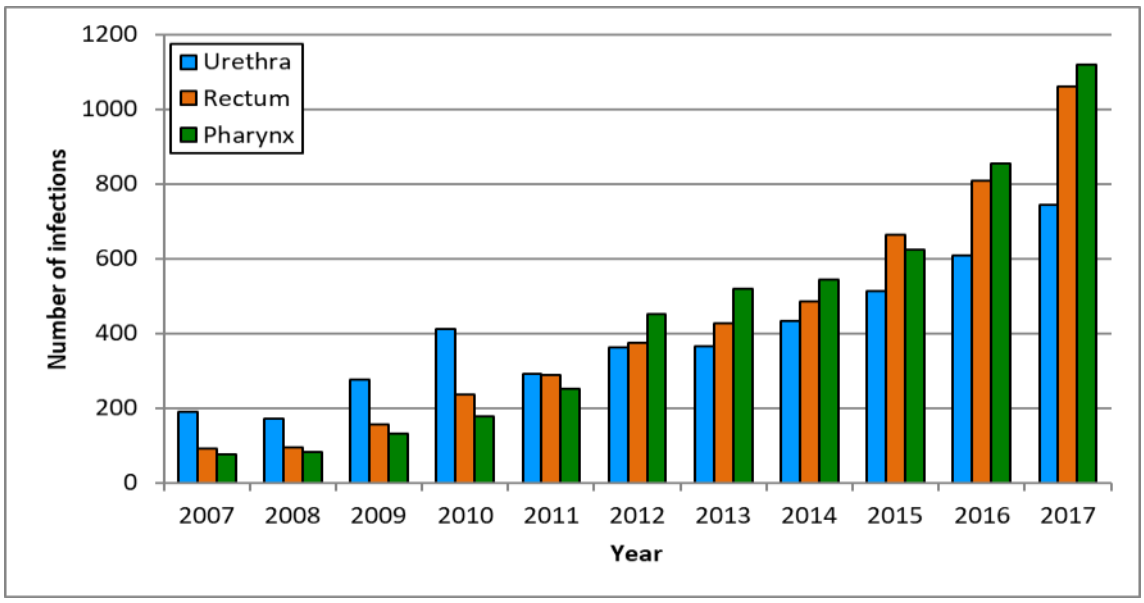
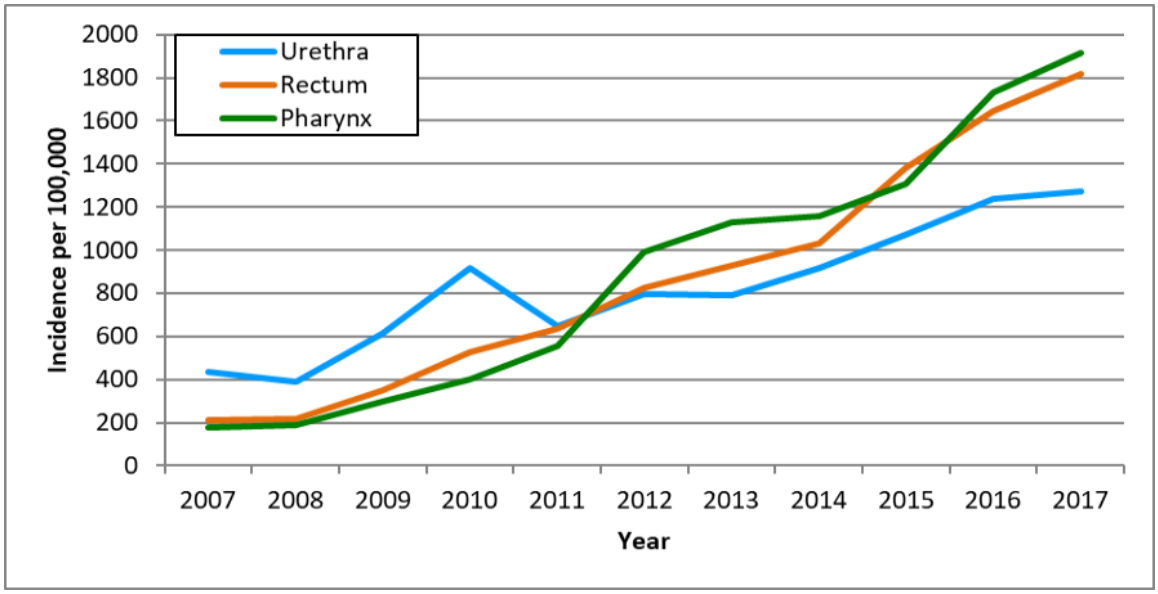
Figure 16: Gonorrhea – Number of Reported Infections among men who have sex with men (MSM) by Anatomic Site* King County, WA, 2007-2017



*Each case can have more than one site of infection. In 2017, 25% of MSM diagnosed with gonorrhea were infected at more than one anatomic site.

Figure 17: Gonorrhea - Incidence among men who have sex with men (MSM) by Anatomic Site*, King County 2007-2017



*Each case can have more than one site of infection. In 2017, 25% of MSM diagnosed with gonorrhea were infected at more than one anatomic site.

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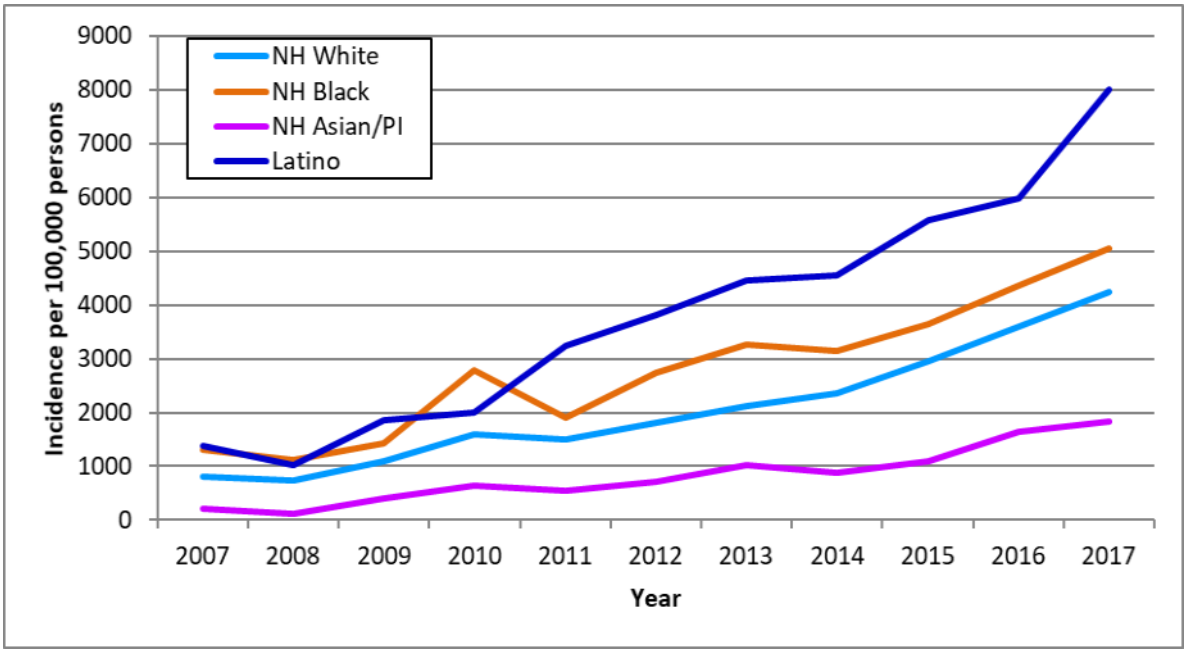
Figure 18: Gonorrhea - Incidence among men who have sex with men (MSM) by Race and Ethnicity*, King County, WA 2007-2017



NH = Non-Hispanic, PI = Pacific Islander
*Cases with unknown race and ethnicity were distributed according to annual race and ethnicity distributions among cases with known race and ethnicity and included in race/ethnicity-specific incidences.

Antimicrobial resistant gonorrhea

Public Health conducts ongoing surveillance of antimicrobial-resistant *Neisseria gonorrhoeae* (ARNG). Since 1986, the Public Health STD Clinic has participated in CDC's GISP in which up to 25 men diagnosed with urethral gonorrhea each month have a culture specimen tested for resistance to antimicrobial drugs used to treat gonorrhea. Since 2017, Public Health as participated in a CDC-funded project called Strengthening the United States Response to Resistant Gonorrhea (SURRG), which expands ARNG surveillance to include all (genital and extragenital) anatomic sites and includes specimens from all genders. The goal of SURRG is to closely monitor trends in ARNG and to rapidly identify and respond to cases of ARNG in order to limit transmission of gonococcal strains that are relatively resistant to antimicrobial drugs. Public Health is partnering with several private clinics in King County to expand the coverage of gonococcal specimens collected and submitted for antimicrobial resistance testing. Nearly 14% of gonorrhea cases diagnosed in King County in 2017 had a gonococcal isolate tested for antimicrobial susceptibility.

From 2009 to 2014, the proportion of GISP urethral isolates with alert values to azithromycin or oral third

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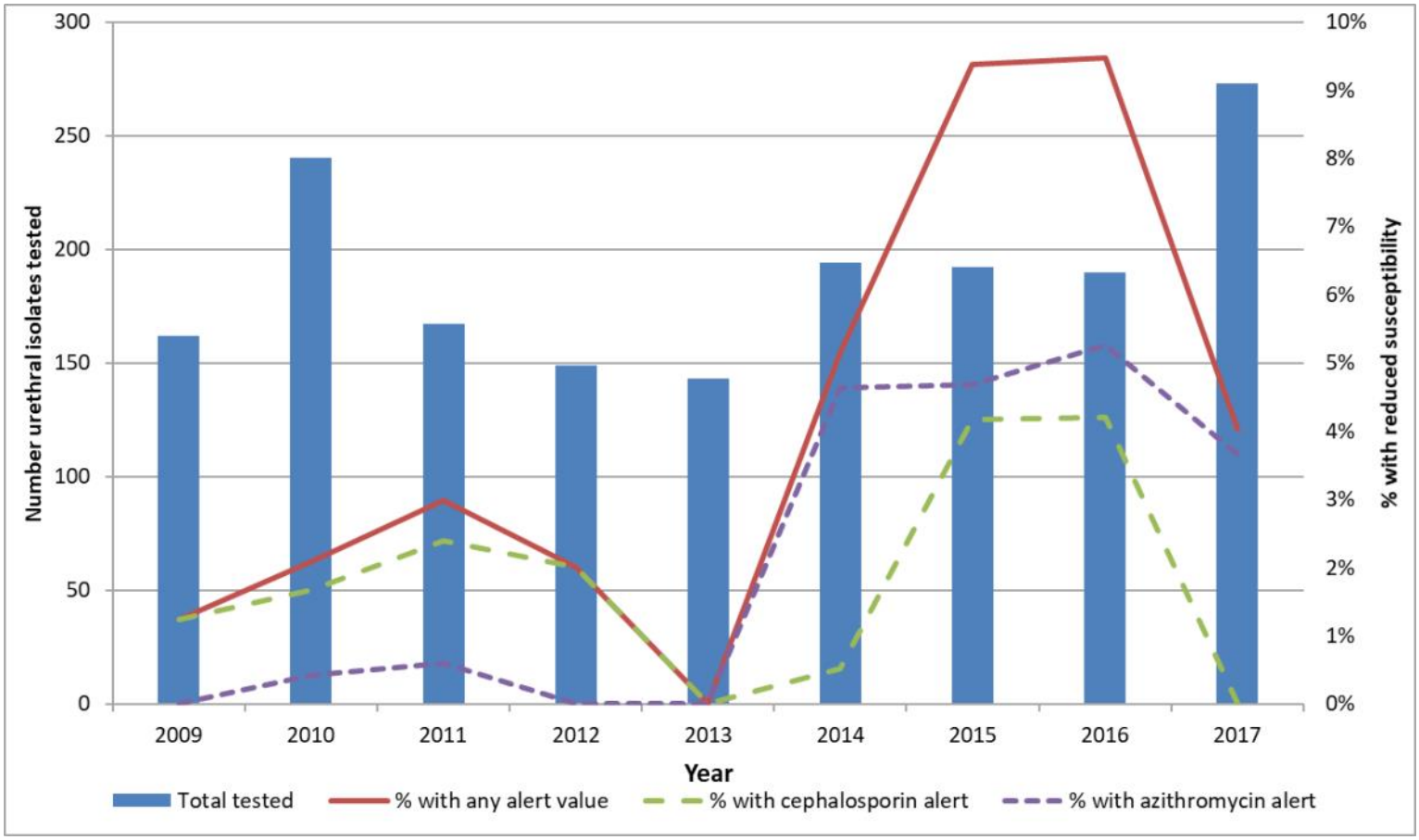
generation cephalosporins (i.e. cefixime) ranged from 0% to 5% (Figure 19). The percentage of urethral isolates with alert values increased sharply to 9% in 2015 and 2016, and then declined to 4% in 2017. CDC defines gonococci as having an alert value if they have laboratory evidence of being relatively resistant to antimicrobial treatment. For azithromycin, alert values have an MIC ≥ 2.0 µg/ml and organisms with alert values are considered to be resistant to azithromycin. CDC alert values for ceftriaxone or cefixime are MIC ≥ 0.125 µg/ml and MIC ≥ 0.25 µg/ml, respectively; the U.S. has not defined a specific laboratory value above which gonococci are considered resistant to ceftriaxone or cefixime, but organisms with MIC's ≥ 0.5 µg/ml are defined as having reduced susceptibility.

Figure 19: Percentage of Male Gonococcal Isolate Surveillance Project Urethral Isolates with Alert Values for Cephalosporins or Azithromycin, King County, WA 2009-2017



There were 495 unique cases of gonorrhea infection that had at least one gonorrhea culture isolate (genital or extragenital) submitted for antimicrobial susceptibility testing in 2017; of these, 29 (6%) were resistant to azithromycin, while none had an alert value to ceftriaxone or cefixime (Tables 9 and 10). Most cases with

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reduced susceptibility were MSM (83%). Azithromycin resistance occurred in 24 (6.2%) of 383 MSM and 5 (4.6%) of 109 isolates from MSW or women (Table 11).

Table 9: Neisseria gonorrhea isolates with antimicrobial resistance by anatomic site, SURRG, King County, WA 2017

	Number isolates tested	% w/reduced susceptibility
Endocervical	14	0%
Pharyngeal	115	6%
Rectal	160	8%
Urethral	258	4%

Table 10: Characteristics of unique gonorrhea cases with reduced antimicrobial susceptibility, SURRG, King County, WA, 2017

	Total N=29	
	Number	Percent
Age		
<25 years	8	28%
25-34 years	14	48%
35-44 years	3	10%
>= years	4	14%
Gender		
Male	28	97%
Female	1	3%
Risk		
Men who have sex with men	24	83%
Men who have sex with women	4	14%
Women	1	3%
Elevated MIC*		
Azithromycin (MIC ≥ 2.0 µg/ml)	29	100%
Ceftriaxone (MIC ≥ 0.125 µg/ml)	0	0%
Cefixime (MIC ≥ 0.25 µg/ml)	0	0%

*Minimum Inhibitory Concentration

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Table 11: Percentage of persons with alert values to azithromycin or cefixime among persons tested for anti-microbial resistant *Neisseria gonorrhoeae*, King County 2017

	Azithromycin MIC≥1 µg/ml N (%)	Azithromycin MIC≥2 µg/ml N (%)	Cefixime MIC≥0.25µg/ml N (%)	Ceftriaxone MIC ≥ 0.125µg/ml N (%)
Men who have sex with women (n=101)	12 (11.9%)	4 (4.0%)	0	0
Men who have sex with men (n=378)	52 (13.8%)	24 (6.3%)	0	0
Women (n=16)	5 (31.3%)	1 (6.3%)	0	0
Total (n=495)	69 (13.9%)	29 (5.9%)	0	0

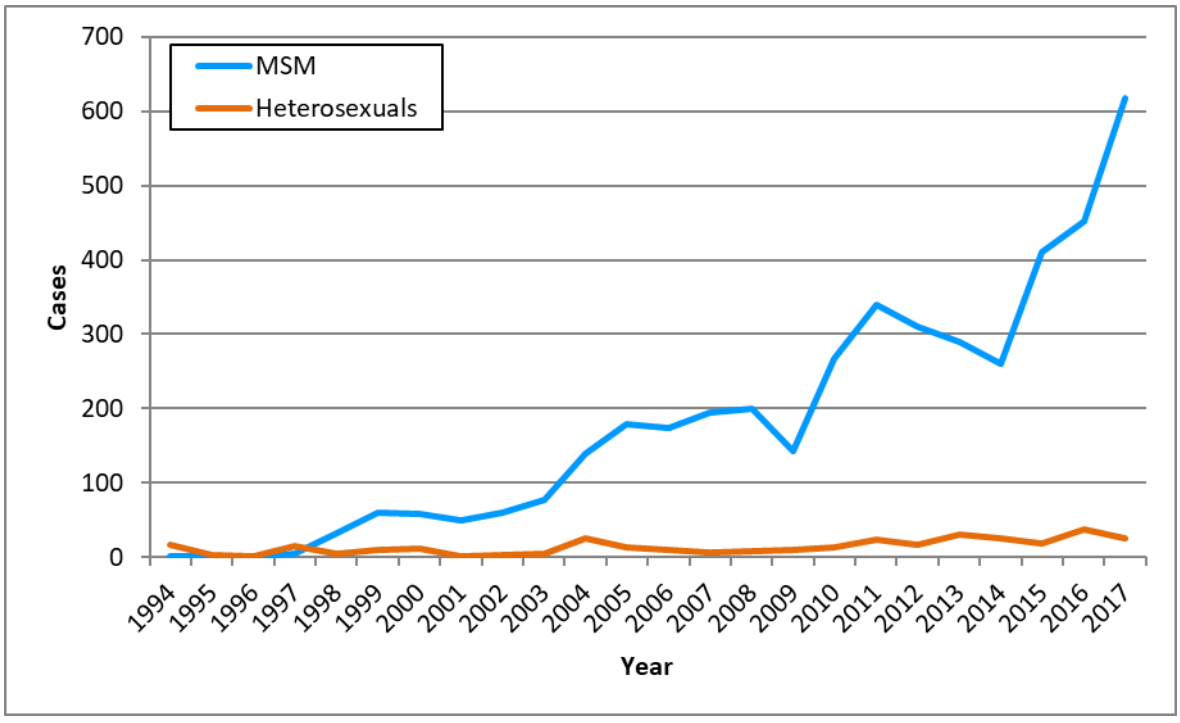
*Minimum Inhibitory Concentration

Syphilis

Overview

King County has experienced a growing epidemic of syphilis among MSM since 1997 (Figure 20). In 2017, the total number of early syphilis (primary, secondary, and early latent) cases reported in King County reached its highest level since data became available, with 668 cases and an overall incidence of 32 cases per 100,000 persons (Table 12). Of the early syphilis cases, approximately half were diagnosed as primary or secondary syphilis (n=327) and the other half were diagnosed as early latent (n=341) infection (Figure 21). Over 98% of early syphilis cases in 2017 occurred in men, mostly among MSM, with only seven cases diagnosed in women. However, most cases of syphilis in women were diagnosed as late latent infections or infections of unknown duration (89%); the incidence of syphilis of all stages among women has varied substantially from year to year, but is now at its highest level in over a decade (5.8 per 100,000) (Figure 22).

Figure 20: Early Syphilis – Reported Cases by Sexual Orientation* King County, WA, 1994-2017



**Men were missing sexual orientation data in the following years (numbers missing are included in parentheses): 1992 (42), 1993 (9), 1998 (2), 1999 (1), 2000 (1), 2002 (1), 2005 (1), 2006 (1), 2009 (7), 2010 (15), 2011 (8), 2012 (20), 2013 (12), 2014 (9), 2015(17), 2016 (26), 2017 (23).

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Table 12: Early Syphilis – Number of Reported Cases and Incidence among Men and Women, King County, WA, 1992-2017*

	Women		Men		Total	
Year	Cases	Incidence per 100,000 population	Cases	Incidence per 100,000 population	Cases	Incidence per 100,000 population
1992	26	3.3	42	5.4	68	4.3
1993	21	2.6	15	1.9	36	2.2
1994	6	0.7	12	1.5	18	1.1
1995	1	0.1	4	0.5	5	0.3
1996	0	0.0	2	0.2	2	0.1
1997	10	1.2	10	1.2	20	1.2
1998	1	0.1	37	4.4	38	2.2
1999	3	0.3	67	7.8	70	4.1
2000	4	0.5	67	7.8	71	4.1
2001	1	0.1	51	5.8	52	3.0
2002	0	0.0	64	7.2	64	3.6
2003	2	0.2	80	9.0	82	4.6
2004	7	0.8	159	17.7	166	9.2
2005	7	0.8	186	20.6	193	10.6
2006	2	0.2	183	19.9	185	10.0
2007	1	0.1	201	21.5	202	10.8
2008	5	0.5	202	21.4	207	10.9
2009	6	0.6	153	16.1	159	8.3
2010	4	0.4	291	30.2	295	15.3
2011	7	0.7	364	37.6	371	19.1
2012	6	0.6	341	35.0	347	17.7
2013	11	1.1	321	32.5	332	16.8
2014	13	1.3	281	27.4	294	14.6
2015	7	0.7	439	42.8	446	21.7
2016	17	1.6	495	47.1	512	23.8
2017	7	0.6	659	61.2	668	31.7

*In 2017, two cases had unknown sex/gender.

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Figure 21: Early Syphilis – Reported Cases of Primary and Secondary (P & S) vs. Early Latent Syphilis King County, WA, 1992-2017

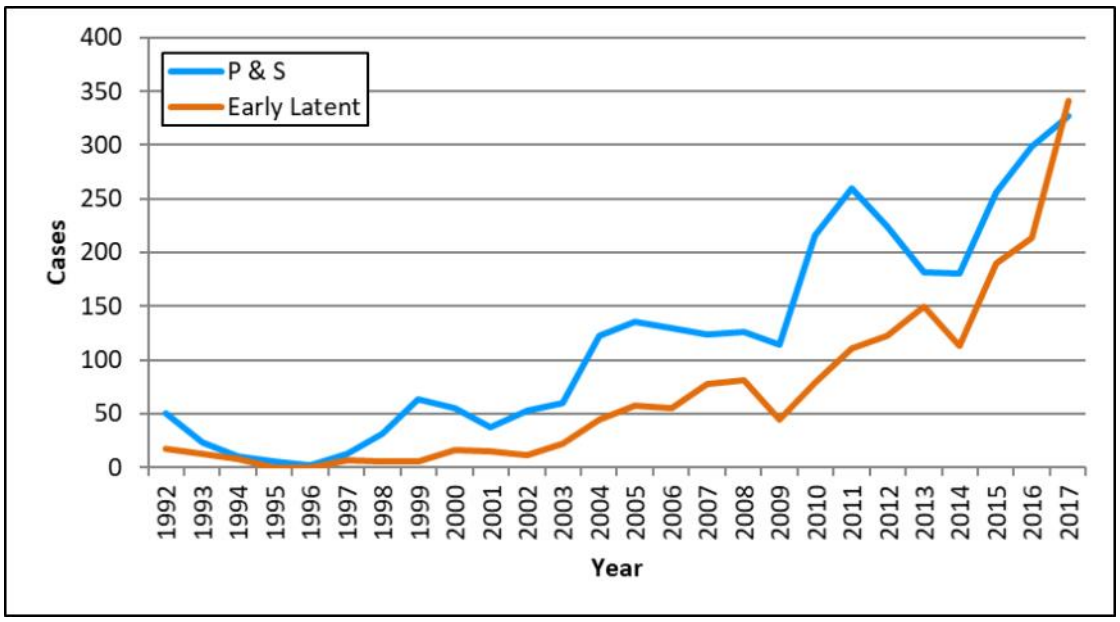
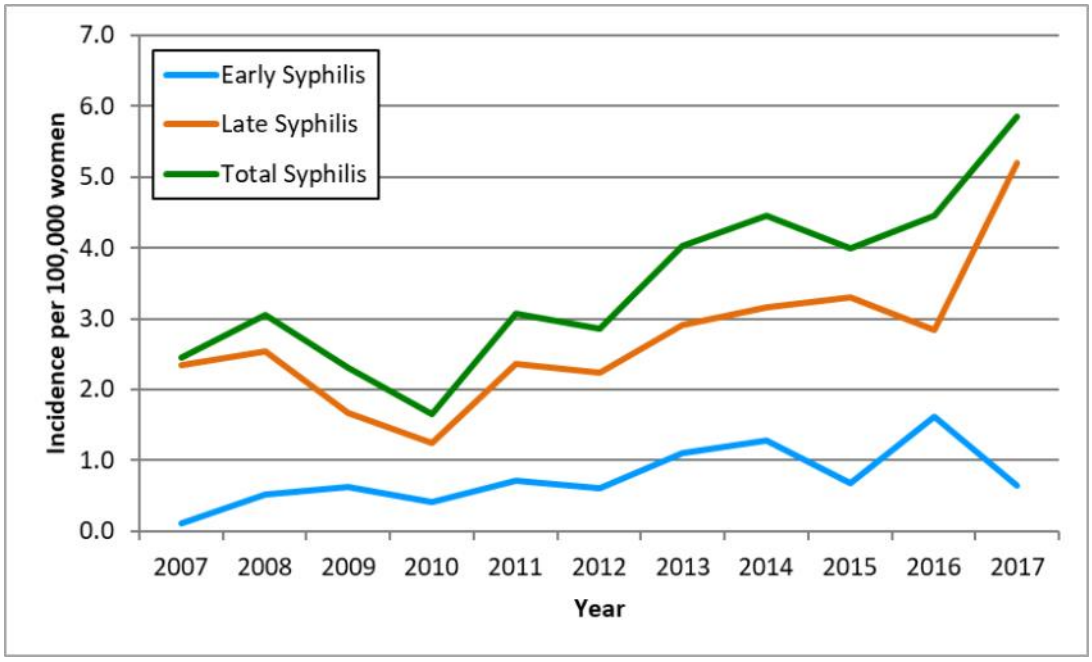


Figure 22: Syphilis - Incidence among Women, King County, WA, 2007-2017



MSM

Of all 2017 early syphilis cases, 92% (617) occurred in MSM. The incidence of early syphilis among MSM (1,057 per 100,000) in 2017 was 460 times the rate among MSW (2.3 per 100,000) (Table 13). Cases of syphilis among MSM have been increasing since 1997, but the pattern of increase has been somewhat inconsistent, with

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interspersed periods of rapid increase, plateauing of rates and declines (Figure 20). Since 2014, the rate of early syphilis in MSM has dramatically increased and in 2017 the rate reached a new historical high. The recent rise in syphilis among MSM appears to reflect a combination of increased ascertainment of asymptomatic infections, perhaps resulting from increased screening, and an increase in syphilis rates associated with an extension of the epidemic into populations of MSM who have traditionally been at lower risk for infection. In 2017, the rate of early latent syphilis exceeded the rate of primary and secondary syphilis for the first time since the start of the current syphilis epidemic.

Table 13: Early Syphilis – Number of Reported Cases and Incidence among men who have sex with men (MSM) and men who have sex with women (MSW), King County, WA, 1992-2017

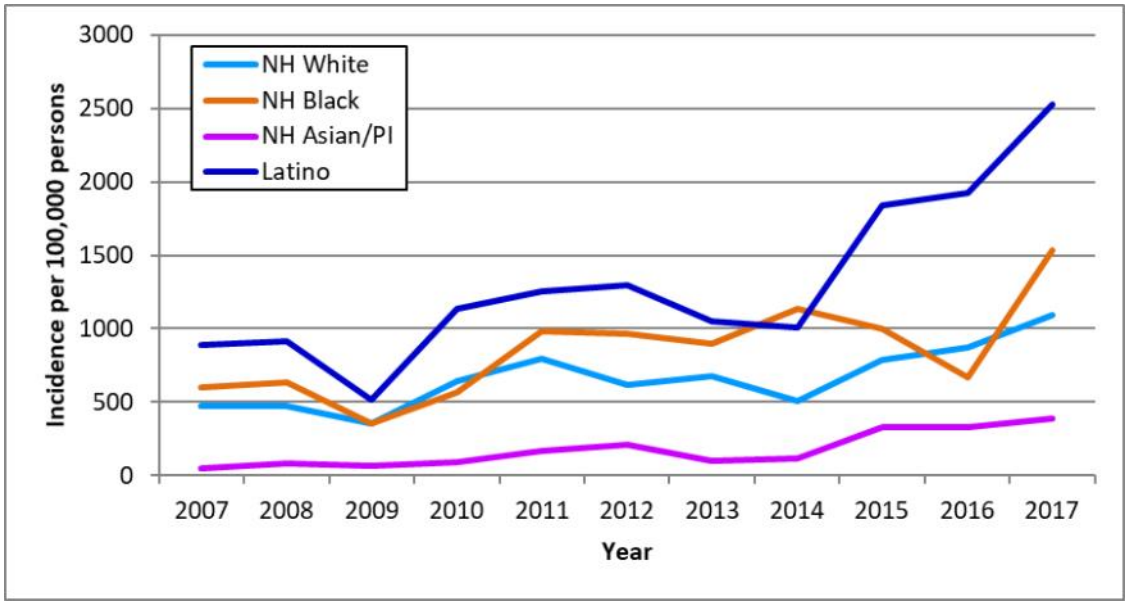
	MSM		MSW	
Year	Cases	Incidence per 100,000 population	Cases	Incidence per 100,000 population
1992	0	0	0	0.0
1993	1	3	5	0.8
1994	2	5	10	1.7
1995	2	5	2	0.3
1996	1	3	1	0.2
1997	5	13	5	0.8
1998	32	83	3	0.5
1999	60	153	6	0.9
2000	58	146	8	1.2
2001	50	124	1	0.2
2002	60	147	3	0.4
2003	77	187	3	0.4
2004	140	337	19	2.8
2005	179	426	6	0.9
2006	174	407	8	1.1
2007	195	449	6	0.8
2008	199	453	3	0.4
2009	142	320	4	0.5
2010	267	596	9	1.2
2011	339	751	17	2.3
2012	310	682	11	1.5
2013	290	629	19	2.5
2014	261	511	12	1.6
2015	411	776	11	1.4
2016	451	816	20	2.5
2017	617	1057	19	2.3

Men were missing sexual orientation data in the following years (numbers missing are included in parentheses): 1992 (42), 1993 (9), 1998 (2), 1999 (1), 2000 (1), and 2002 (1), 2005 (1), 2006 (1), 2007 (0), 2008 (0), 2009 (7), 2010 (15), 2011 (8), 2012 (20), 2013 (12), 2014 (8), 2015 (17), 2016 (24), 2017 (23).

Syphilis

Racial and ethnic differences in early syphilis among MSM are similar to those observed with chlamydial infections and gonorrhea. In 2017, Latino MSM continued to experience the highest incidence of early syphilis (2,531 per 100,000) among all MSM, and experienced the steepest rise in the rate of infection (Figure 23). Black MSM had the second highest incidence in 2017 (1,535 per 100,000), followed by Whites and Asians/Pacific Islanders (1,095 and 391 per 100,000, respectively). The incidence among Latino MSM was over double the incidence among White MSM in 2017.

Figure 23: Incidence of Early Syphilis among men who have sex with men (MSM) by Race and Ethnicity*, King County, WA, 2007-2017



NH = Non-Hispanic, PI = Pacific Islander
*Cases with unknown race and ethnicity were distributed according to annual race and ethnicity distributions among cases with known race and ethnicity and included in race/ethnicity-specific incidences.

The incidence of early syphilis among MSM varies by age group. In 2017, the incidence was highest among persons 25 to 29 years and 30 to 34 years, 1,709 per 100,000 and 1,699 per 100,000, respectively. These two age groups were followed closely by the 35 to 44 years age group with an incidence of 1,551 per 100,000 in 2017 (Figure 24).

Throughout the ongoing epidemic, syphilis has disproportionately affected HIV-positive MSM (Figure 25). In 2017, the estimated incidence of early syphilis among HIV-positive MSM was 8 times higher than in HIV-negative MSM (4,886 vs. 639 per 100,000). However, in recent years, syphilis has increasingly affected the larger population of HIV-negative MSM, and in 2017, 55% of early syphilis cases occurred in HIV-uninfected MSM (Figure 26).

Syphilis

Figure 24: Incidence of Early Syphilis among men who have sex with men (MSM) by Age*, King County, WA, 2007-2017

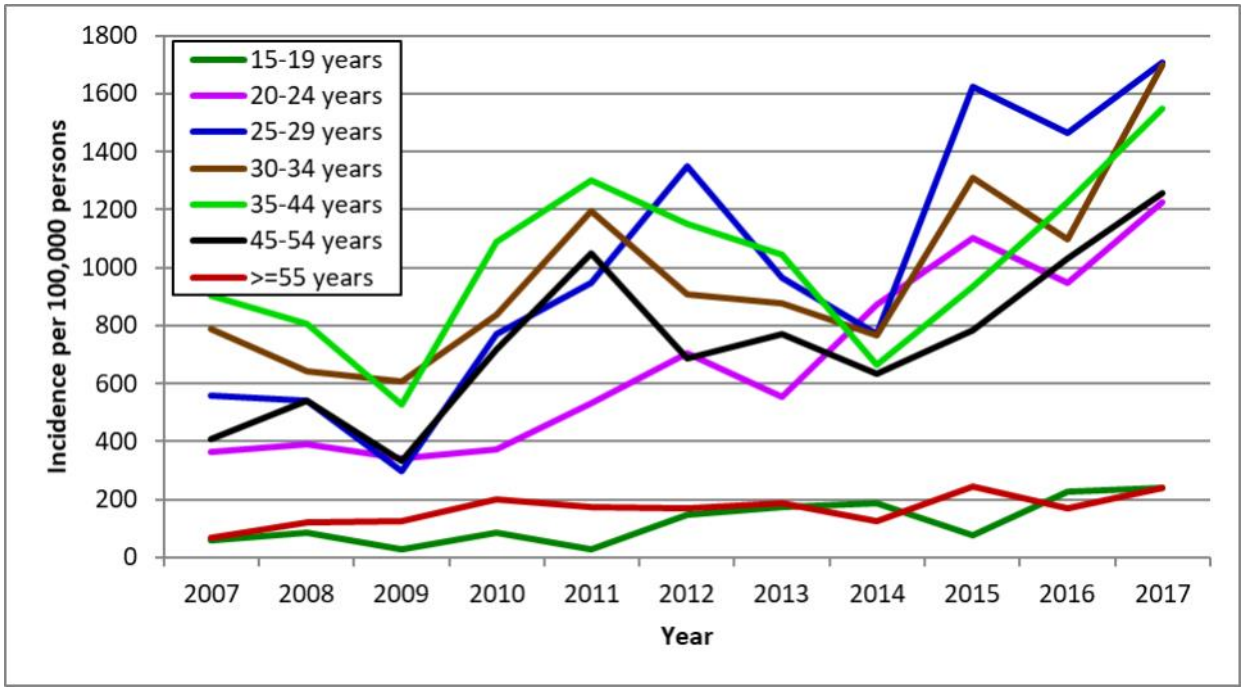
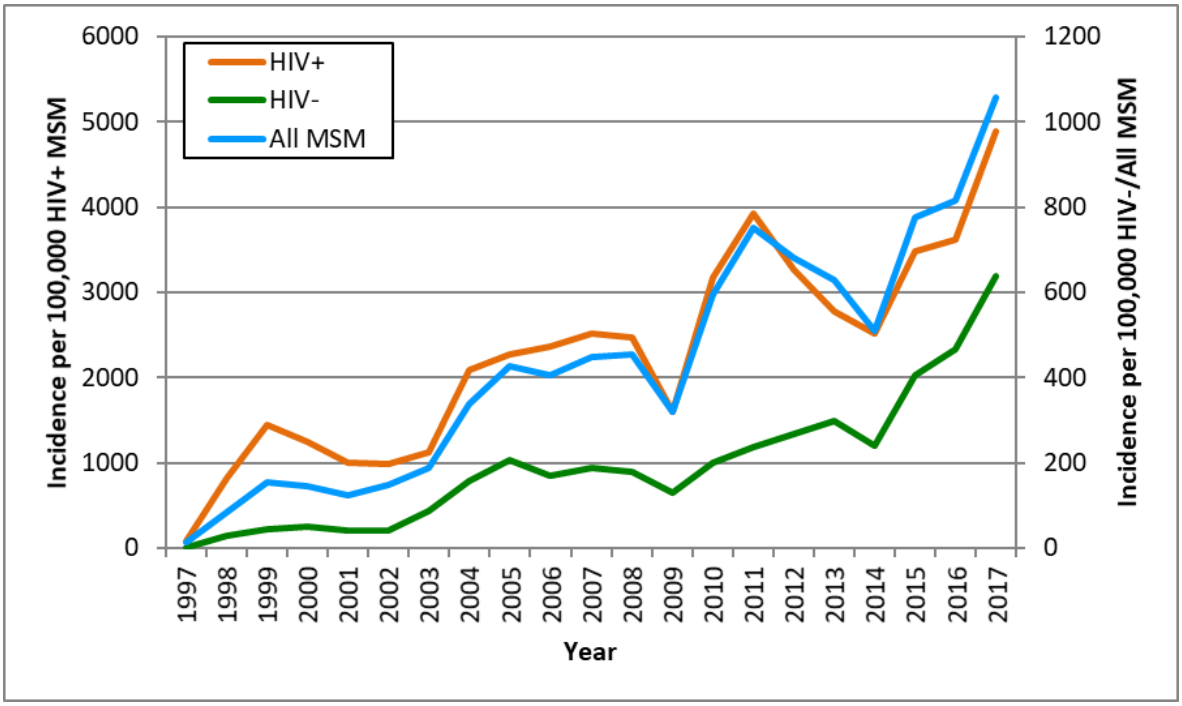


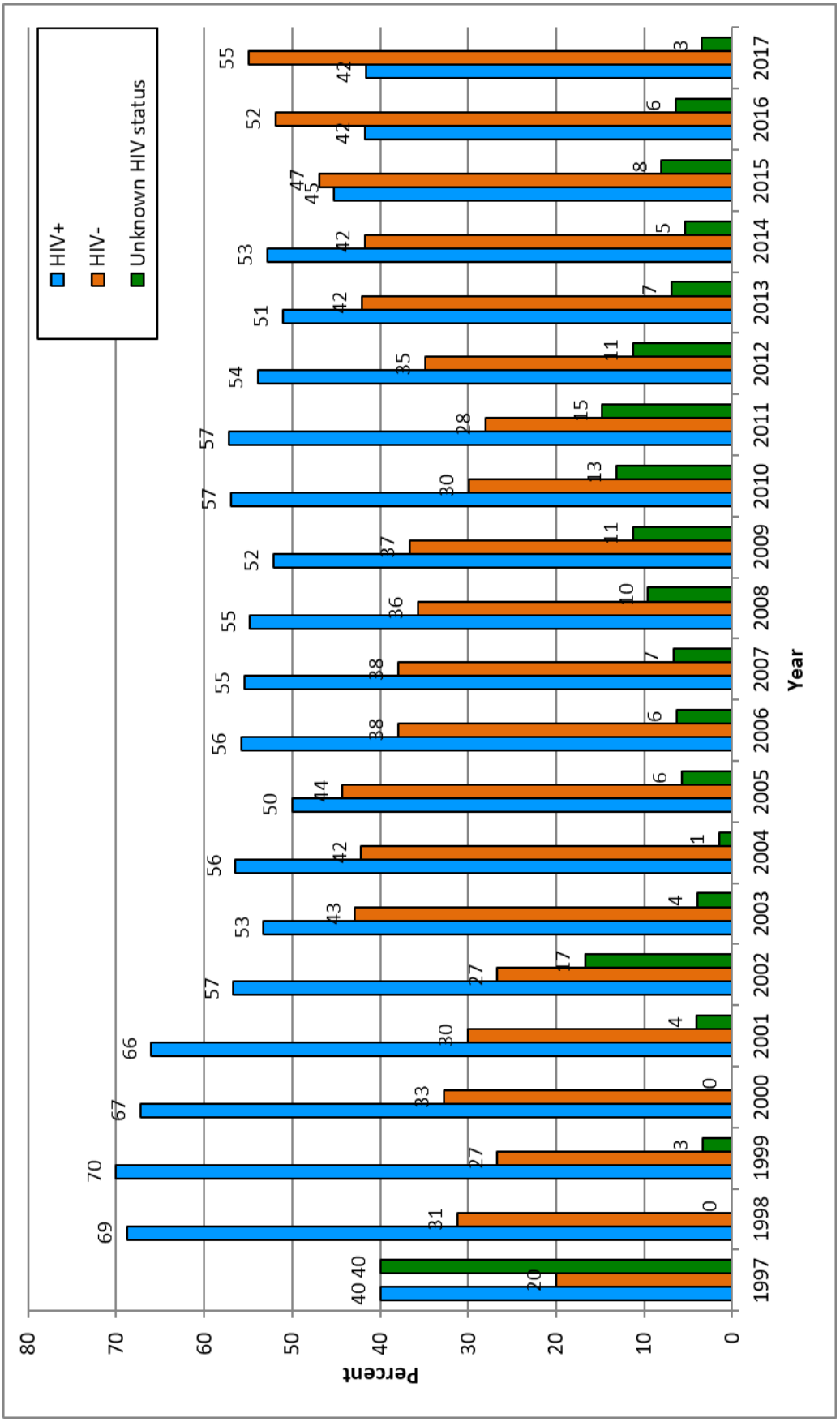
Figure 25: Early Syphilis – Incidence among men who have sex with men (MSM) by HIV Status King County, WA, 1997-2017



*Cases with unknown age were distributed according to annual age distributions among cases with known age and included in age-specific incidences.

Syphilis

Figure 26: Early Syphilis – Percent of Reported Cases among men who have sex with men (MSM) by HIV Status King County, WA, 1997-2017



Syphilis

Heterosexuals and congenital syphilis

Early syphilis incidence among heterosexuals remained very low in 2017. Only 26 of 668 cases occurred among MSW (19 cases) and women (7 cases) (Tables 12-14). Four of the early syphilis cases reported among women and MSW reported with syphilis in 2017 were known to be HIV-infected.

Although the incidence of early syphilis among women has remained relatively stable, the incidence of total syphilis (early and late stages) increased 87% from 2008 and 29% since 2016 (Table 14, Figure 22). Most of this trend reflects an increase in the number of diagnoses of late latent syphilis and syphilis of unknown duration among women, from 30 cases in 2016 to 56 cases in 2017. Similar to chlamydia and gonorrhea, rates of syphilis varied by racial and ethnic group. Black women had the highest rate (27.1 cases per 100,000) of syphilis in 2017, followed by Latino women (11.1 cases per 100,000). The rates among Black women and Latino women were eight and three times higher than the rate among White women (3.3 cases per 100,000), respectively (Figure 27). Women aged 20-24 years had the highest incidence of syphilis in 2017 (15.6 cases per 100,000), followed by women in the 25-29 years age group (13.6 cases per 100,000). MSW had also experienced an increase in total syphilis, from 5.4 cases per 100,000 in 2016 to 6.1 cases per 100,000 in 2017, a 13% percent increase (Table 14).

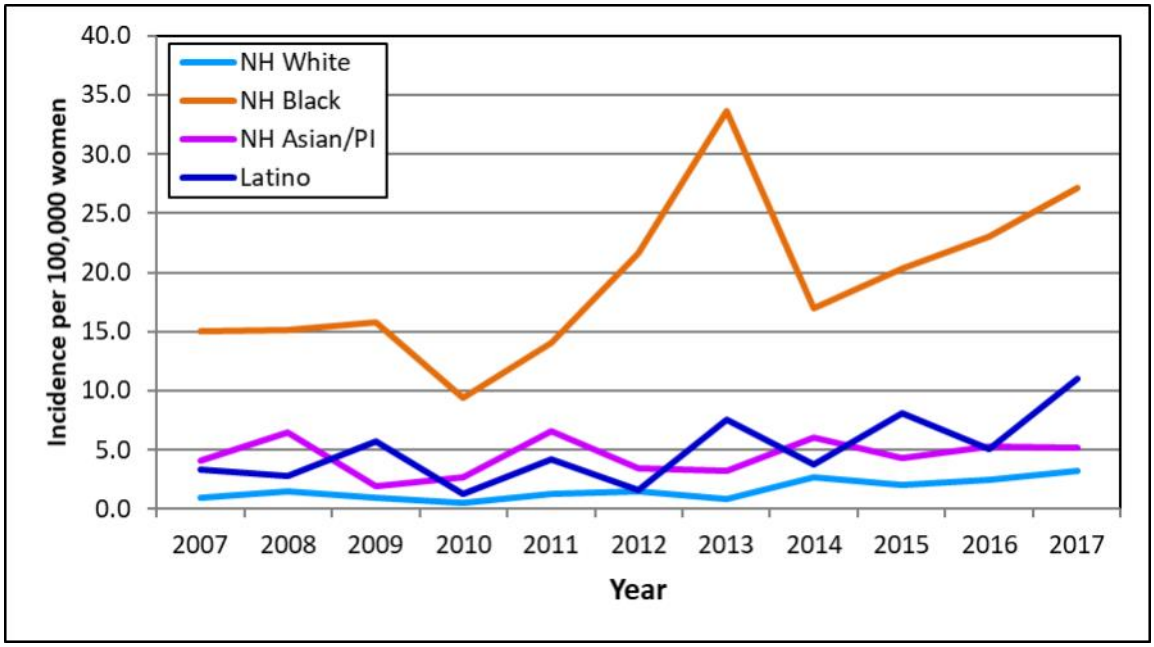
Table 14: Syphilis – Number of Reported Cases and Incidence among Women and Men who have sex with women (MSW) 15 years and older, King County, WA, 2007-2017

	Women		MSW	
Year	Cases	Incidence per 100,000 population	Cases	Incidence per 100,000 population
2007	23	2.5	17	2.4
2008	29	3.1	21	2.9
2009	22	2.3	14	1.9
2010	16	1.7	19	2.6
2011	30	3.1	30	4.0
2012	28	2.9	20	2.7
2013	40	4.0	33	4.3
2014	45	4.5	22	2.8
2015	41	4.0	31	3.9
2016	47	4.5	44	5.4
2017	63	5.8	50	6.1

Syphilis

No cases of congenital syphilis were diagnosed in King County in 2017. However, six cases were diagnosed in WA State[7], and the increase in syphilis among women suggests that some pregnant women in the county may be at risk for syphilis during pregnancy and for transmitting the infection to their unborn children. Medical providers caring for pregnant women should routinely test women when they establish prenatal care, and should retest women in the third trimester if they use illegal drugs, are living homeless, if they exchange sex or if they have a male sex partner who has sex with men. Public Health prioritizes pregnant women for outreach and partner services to ensure that these cases receive adequate and appropriate treatment. In 2017, 14 of the syphilis cases among King County women were pregnant at the time of diagnosis. All of these women received treatment for syphilis, which may represent 14 cases of congenital syphilis averted due to public health interventions.

Figure 27: Syphilis - Incidence among Women by Race and Ethnicity*, King County, WA 2007-2017



NH = Non-Hispanic, PI = Pacific Islander
*Cases with unknown race and ethnicity were distributed according to annual race and ethnicity distributions among cases with known race and ethnicity and included in race/ethnicity-specific incidences.

Stage of infection and reason for diagnosis

In 2017, 48% of all early syphilis cases in MSM were staged as primary or secondary and 41% sought medical care because of symptoms (Table 15, Figure 28). While the majority of early syphilis cases in King County have traditionally sought medical care because of symptoms of primary or secondary infection, the percentage of persons diagnosed through routine testing has increased over the last several years. In 2017, the percentage of

[7] WA DOH DCHS ID Assessment Unit and STD Services. https://www.doh.wa.gov/YouandYourFamily/IllnessandDisease/

Syphilis

Table 15: Syphilis – Stage of Infection, Race/ethnicity, HIV Status, and Reason for Testing by Sexual Orientation, King County, WA, 2017

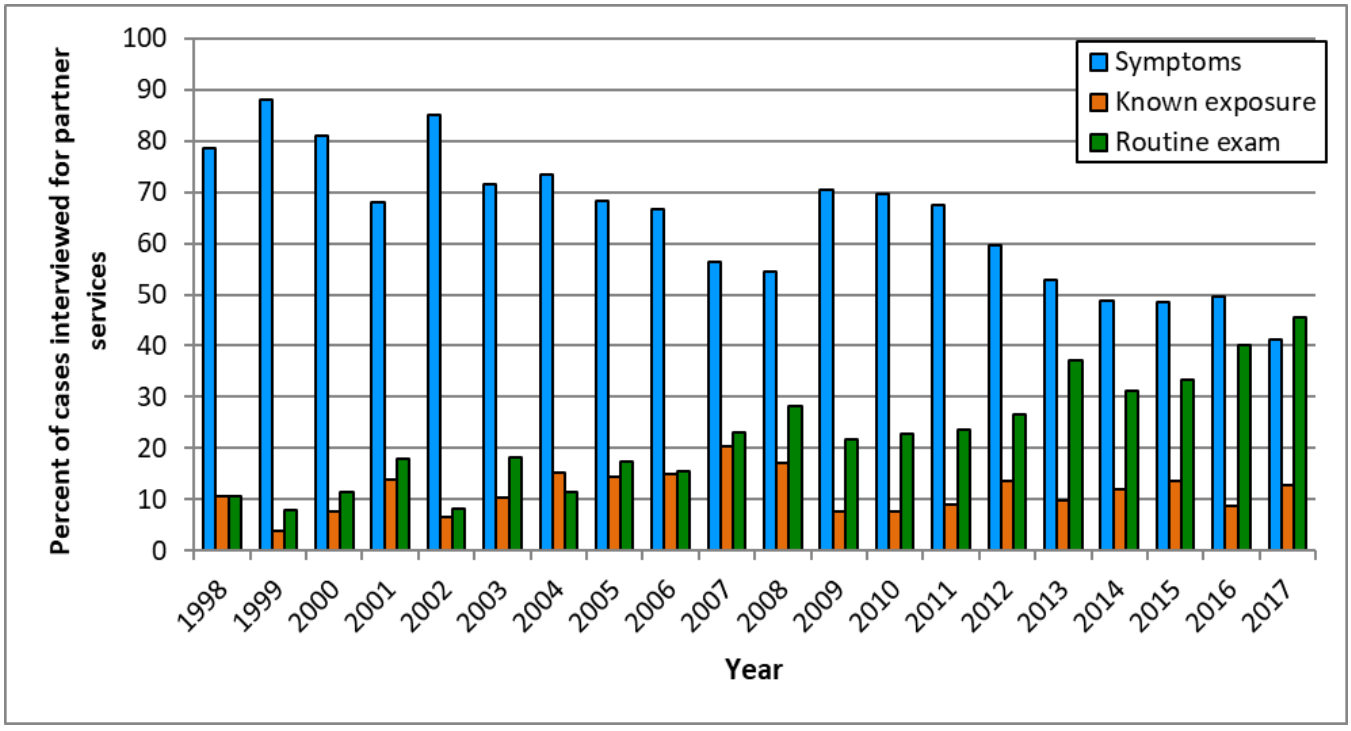
	Early Syphilis				Late Latent Syphilis			
	MSM* (N=617)		Heterosexual Men and Women (N=26)		MSM* (N=103)		Heterosexual Men and Women (N=87)	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Stage of Infection								
Primary	128	21%	7	27%				
Secondary	166	27%	13	50%				
Early latent	323	52%	6	23%				
Late latent					103	100%	87	100%
Race/ethnicity								
White, Non-Hispanic	338	55%	10	38%	44	43%	24	28%
Black, Non-Hispanic	54	9%	7	27%	13	13%	31	36%
Nat Am, Non-Hispanic	2	0%	0	0%	1	1%	0	0%
Asian/PI, Non-Hispanic	36	6%	3	12%	9	9%	8	9%
Hispanic	133	22%	0	0%	0	0%	1	1%
Other	7	1%	0	0%	1	1%	1	1%
Multiple	21	3%	0	0%	7	7%	10	11%
Unknown	26	4%	6	23%	28	27%	12	14%
HIV Status								
Positive	257	42%	4	15%	36	35%	3	3%
Negative	339	55%	20	77%	54	52%	65	75%
Unknown	21	3%	2	8%	13	13%	19	22%
Reason for Visit								
Routine exam	281	46%	4	15%	73	71%	75	86%
Symptoms	254	41%	17	65%	15	15%	8	9%
Known exposure	79	13%	5	19%	13	13%	3	3%
None/other	3	0%	0	0%	2	2%	1	1%
Neurosyphilis								
Reported Neurosyphilis Symptoms	25	4%	3	12%	4	4%	3	3%
Neurosyphilis Diagnosis	15	2%	4	15%	5	5%	2	2%

*MSM: all men who acknowledged sex with a man. These data exclude 49 men for whom gender of sex partners is unknown
Nat Am = Native American, PI = Pacific Islander

Syphilis

cases diagnosed through asymptomatic screening surpassed the percentage diagnosed due to symptomatic infection. Of the cases among MSM, 46% were diagnosed through asymptomatic screening and 13% because of a sex partner's syphilis diagnosis. Among heterosexual cases, 65% tested due to symptoms. These data suggest that increased testing and ascertainment of asymptomatic infections may be an important factor contributing to the overall increase in the syphilis rate among MSM; the extent to which these cases reflect identification of cases prior to the development of secondary syphilis vs. infections in persons who have already passed through the period of secondary infection is unknown. Additionally, some evidence suggests that the increase in asymptomatic infections may reflect a change in the natural history of syphilis as persons with a history of syphilis experience recurrent infections that may be less overtly symptomatic. Although a rising percentage of cases of syphilis now occur in persons without symptoms, the number of symptomatic cases diagnosed among MSM is also increasing. In 2017, clinicians in King County diagnosed 254 symptomatic MSM with early syphilis, an increase from 224 such diagnoses in 2016. Public Health recommends that MSM at elevated risk for syphilis test for STIs, including syphilis, every three months and that medical providers test HIV-positive MSM for syphilis each time they draw their blood. (Such testing is not needed in men who are not sexually active or who are in long-term mutually monogamous relationships.)

Figure 28: Early Syphilis – Reason for Visit among men who have sex with men (MSM)*, King County, WA, 1998-2017

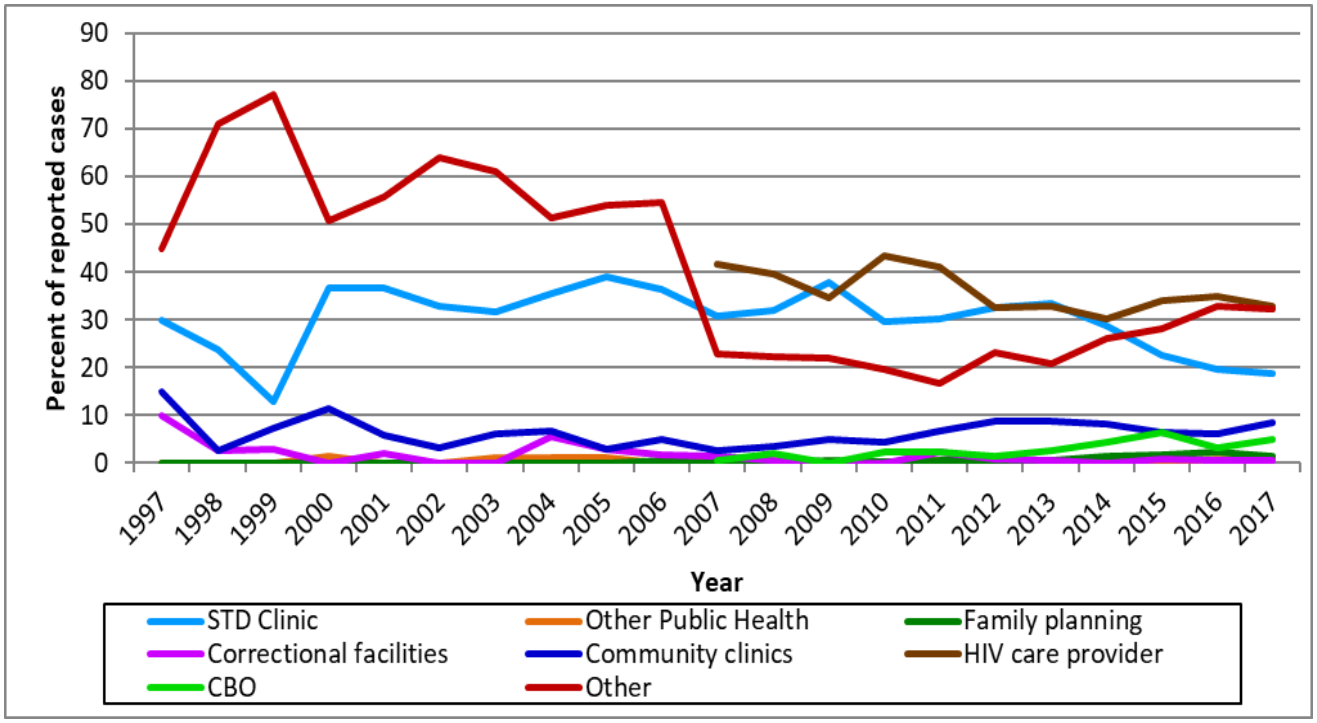


*Exclude MSM not interviewed for partner services and those who did not report a reason for visit.

Syphilis

Many types of providers in King County are diagnosing early syphilis (Figure 29). In 2017, as in past years, the Public Health STD Clinic was the largest single source of diagnosis for persons with early syphilis, accounting for 19% of all diagnoses. As a group, HIV care providers reported 33% in 2017. Family planning clinics, community clinics, county jails, community-based organizations, and other public health clinics combined to account for 16% of cases, while other (typically private practices and large healthcare organizations) providers diagnosed 32% of cases in 2017.

Figure 29: Early Syphilis – Reporting Providers King County, WA, 1997-2017



CBO = Community based organization

PHSKC STD Clinic

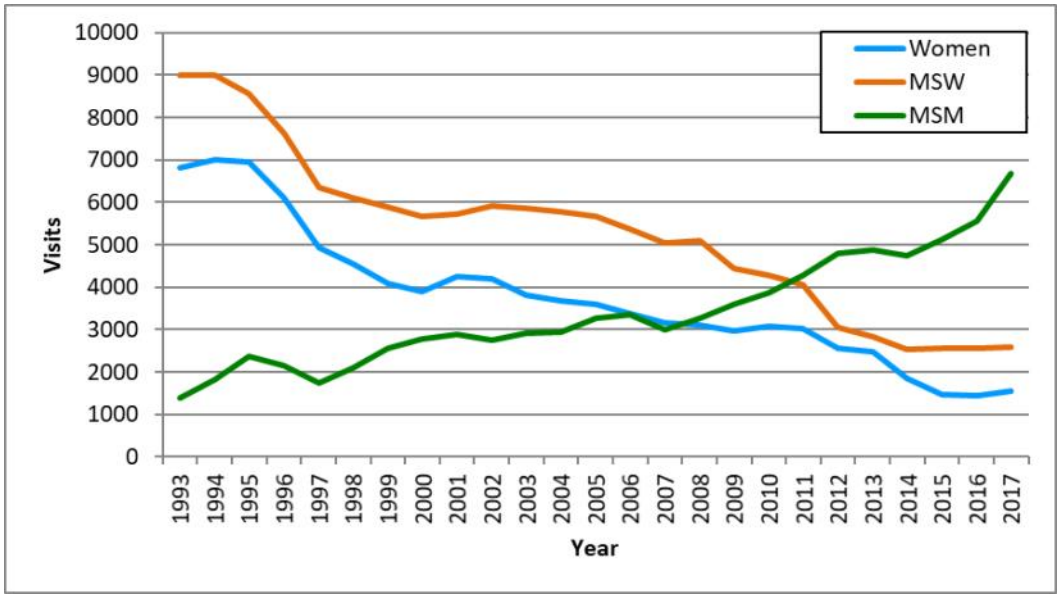
In 2017, the Public Health – Seattle & King County STD Clinic (STD Clinic) provided care to 5,944 patients during 10,807 visits (Table 16). This reflects a 18% increase in the number of patient visits to the clinic compared to 2015, the year in which visits was lowest, and a 13% increase from 2016. In 2017, MSM accounted for 62% of the visits among patients seeking STD Clinic services, while MSW and women accounted for 24% and 14% of these visits, respectively (Table 17). The number of visits made by MSM to the clinic continued to increase in 2017, while the number of visits by MSW and women remained relatively stable (Figure 30). This reflects continuation of the long-term trends in the population served by the clinic, with the number of MSM visits and patients consistently rising (Figure 31). In 2017, the clinic provided services to 3,139 unique MSM patients during 6,672 visits, which is the highest number of visits and the second highest number of MSM patients in the clinic's history (Tables 17 & 18). On intake forms patients are asked about current gender identity and in 2017 approximately 2% of patients identified as transgender, non-binary, or genderqueer (Table 16).

Table 16: Number of Public Health – Seattle King County STD Clinic Visits and Patients by Gender*, 2017

	Female	Male	Trans Men	Trans Women	Non-Binary/ Genderqueer	Total
Visits	1,503	9,147	10	43	104	10,807
Patients (unduplicated visits)	1,038	4,805	8	28	65	5,944

*Current gender is reported by patients on STD Clinic intake form.

Figure 30: Number of Visits, Public Health - Seattle King County (PHSKC) STD Clinics, 1993-2017



This figure excludes men with missing sexual orientation data and HIV testing visits provided through the HIV/AIDS Program. PHSKC's satellite Broadway STD Clinic was in operation from 1993-1998.

PHSKC STD Clinic

**Table 17: Number of Public Health – Seattle King County (PHSKC)
STD Clinic Visits, 1993-2017**

	Women	MSW^	MSM^	Men with Unknown Sexual Orientation	HIV Test Only Visits	Total
1993	6,826	9,003	1,386	514		17,729
1994	7,017	8,986	1,829	578		18,410
1995	6,951	8,567	2,377	509		18,404
1996	6,117	7,635	2,152	292		16,196
1997*	4,929	6,340	1,753	333		13,355
1998	4,541	6,111	2,106	248		13,006
1999**	4,085	5,879	2,550	189		12,703
2000	3,904	5,671	2,769	218		12,562
2001	4,244	5,725	2,878	299		13,146
2002	4,208	5,909	2,752	325		13,194
2003	3,812	5,874	2,906	257		12,849
2004	3,681	5,781	2,949	316		12,727
2005	3,603	5,670	3,274	295		12,842
2006	3,388	5,366	3,347	297	1,726	14,124
2007	3,172	5,046	2,989	260	1,388	12,855
2008	3,108	5,112	3,262	193	1,137	12,812
2009	2,981	4,449	3,605	213	1,036	12,284
2010	3,070	4,282	3,861	345	769	12,327
2011	3,039	4,058	4,268	415	492	12,272
2012	2,564	3,053	4,797	134	714	11,262
2013	2,492	2,845	4,891	47	519	10,794
2014	1,862	2,531	4,755	80	391	9,619
2015	1,473	2,561	5,135	1		9,170
2016	1,449	2,567	5,567	5		9,588
2017	1,556	2,577	6,672	2		10,807

^MSM includes Men who have sex with men are men who acknowledged sex with men during any clinic visit and MSW includes men who reported sex with women only.
*In 1997, the PHSKC STD Clinic eliminated its Saturday and evening clinic hours.
**PHSKC's satellite Broadway STD Clinic was in operation from 1993-1998.

PHSKC STD Clinic

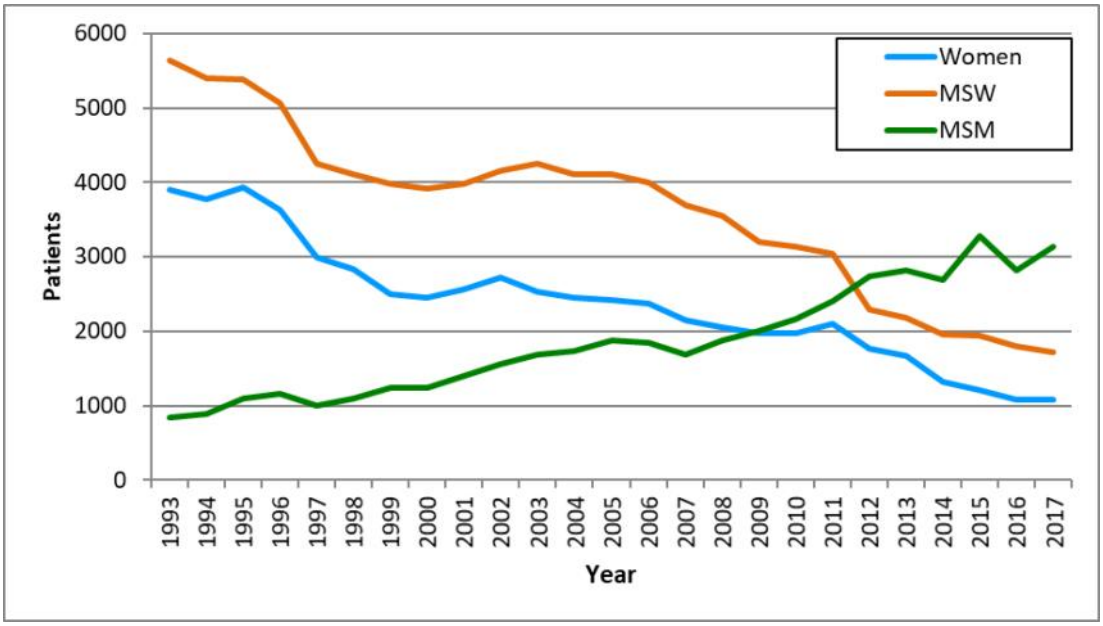
Table 18: Number of Public Health – Seattle King County (PHSKC) STD Clinic Patients (Unduplicated Visits per Year), 1993-2017

	Women	MSW^	MSM^	Men with Unknown Sexual Orientation	HIV Test Only Patients	Total
1993	3,902	5,639	843	443		10,827
1994	3,770	5,406	891	398		10,465
1995	3,935	5,383	1,102	305		10,725
1996	3,629	5,067	1,161	184		10,041
1997*	3,000	4,252	993	222		8,467
1998	2,830	4,101	1,099	198		8,228
1999**	2,503	3,986	1,236	150		7,875
2000	2,446	3,918	1,243	169		7,776
2001	2,561	3,987	1,401	230		8,179
2002	2,728	4,156	1,562	248		8,694
2003	2,534	4,256	1,686	200		8,676
2004	2,451	4,112	1,726	193		8,482
2005	2,422	4,110	1,875	173		8,580
2006	2,365	3,993	1,845	199	1,028	9,430
2007	2,144	3,689	1,690	172	889	8,584
2008	2,054	3,543	1,871	155	659	8,282
2009	1,977	3,207	2,003	161	601	7,949
2010	1,974	3,132	2,170	185	457	7,918
2011	2,098	3,033	2,398	242	285	8,056
2012	1,772	2,294	2,736	115	613	7,530
2013	1,667	2,183	2,810	37	443	6,933
2014	1,323	1,955	2,693	64	330	6,205
2015	1,207	1,948	3,279	1		6,435
2016	1,078	1,795	2,815	5		5,693
2017	1,080	1,723	3,139	2		5,944

^MSM includes men who have sex with men are men who acknowledged sex with men during any clinic visit and MSW includes men who reported sex with women only.
*In 1997, the PHSKC STD Clinic eliminated its Saturday and evening clinic hours.
**PHSKC's satellite Broadway STD Clinic was in operation from 1993-1998.

PHSKC STD Clinic

Figure 31: Number of Patients (Unduplicated Visits), Public Health - Seattle King County (PHSKC) STD Clinics, 1993-2017



This figure excludes men with missing sexual orientation data and HIV testing visits provided through the HIV/AIDS Program. PHSKC's satellite Broadway STD Clinic was in operation from 1993-1998.

Whites accounted for highest number of patients among MSM, MSW, and women. Among MSW and women, Blacks accounted for the second highest number of patients, however Latinos accounted for the second highest number of patients among MSM (Table 19). Overall, 15% of all clinic patients, including 22% of MSW and women patients, were Black. Only 6% of all King County residents are Black.

The Public Health STD Clinic continued to play an important role in diagnosing reportable STIs in King County. In 2017, the clinic diagnosed 19% (126 of 668) of all cases of early syphilis, 16% (686 of 4,284) of all cases of gonorrhea, 14% (22 of 161) of all cases of HIV, and 6% (606 of 9,955) of all cases of chlamydial infection. In addition to cases diagnosed among King County residents, the STD Clinic serves many patients living in neighboring counties. Clinic diagnoses described below include all patients diagnosed at the STD Clinic, regardless of county of residence.

PHSKC STD Clinic

Table 19: Age and Race of Public Health – Seattle King County (PHSKC) STD Clinic Patients, 2017

	Women		MSW*		MSM*^		Total^	
	Number	(%)	Number	(%)	Number	(%)	Number	(%)
Race								
White	490	(45.4)	885	(51.4)	1861	(59.3)	3236	(54.4)
Black	237	(21.9)	387	(22.5)	289	(9.2)	914	(15.4)
Native American	29	(2.7)	16	(0.9)	21	(0.7)	66	(1.1)
Asian & Pacific Islander	135	(12.5)	172	(10.0)	294	(9.4)	601	(10.1)
Latino	76	(7.0)	135	(7.8)	473	(15.1)	685	(11.5)
Multiple Race	37	(3.4)	22	(1.3)	62	(2.0)	121	(2.0)
Unknown	76	(7.0)	106	(6.2)	139	(4.4)	321	(5.4)
Age								
10-14 years	1	(0.1)	3	(0.2)	0	(0.0)	4	(0.1)
15-19 years	52	(4.8)	32	(1.9)	65	(2.1)	149	(2.5)
20-24 years	196	(18.1)	221	(12.8)	439	(14.0)	856	(14.4)
25-29 years	253	(23.4)	364	(21.1)	731	(23.3)	1348	(22.7)
30-34 years	190	(17.6)	291	(16.9)	566	(18.0)	1047	(17.6)
35-44 years	230	(21.3)	395	(22.9)	652	(20.8)	1277	(21.5)
45-54 years	115	(10.6)	235	(13.6)	460	(14.7)	812	(13.7)
>=55 years	43	(4.0)	182	(10.6)	226	(7.2)	451	(7.6)
Unknown	0	(0.0)	0	(0.0)	0	(0.0)	0	(0.0)

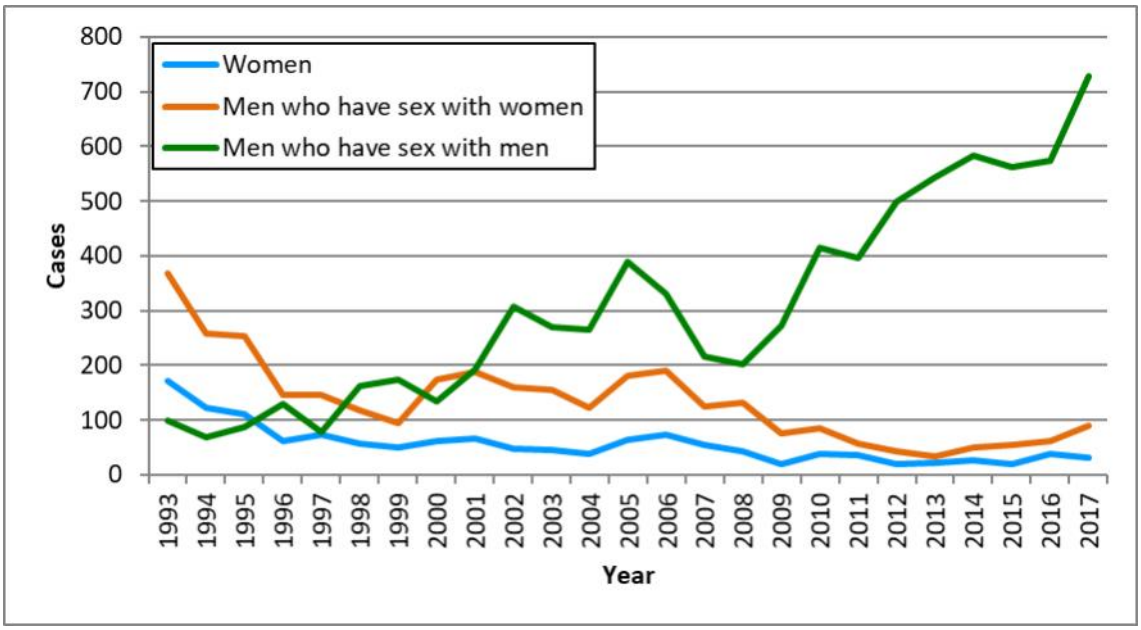
*MSM includes Men who have sex with men are men who acknowledged sex with men during any clinic visit and MSW includes men who reported sex with women only.
^2 men with unknown sexual orientation are excluded from the race/age distributions for MSW and MSM, but are included in total race and age distributions

Gonorrhea

In 2017, clinicians in the STD clinic diagnosed 850 cases of gonorrhea, continuing a trend of increasing of gonorrhea diagnoses (Figure 32). This trend is largely due to continued increases in gonorrhea diagnoses among MSM, though diagnoses among MSW have also increased. The observed increase in gonorrhea among MSM reflects a combination of increased screening and identification of asymptomatic rectal and pharyngeal gonorrhea, and increases in the number of infections diagnosed in men with symptomatic gonococcal urethritis (Figures 33 and 34).

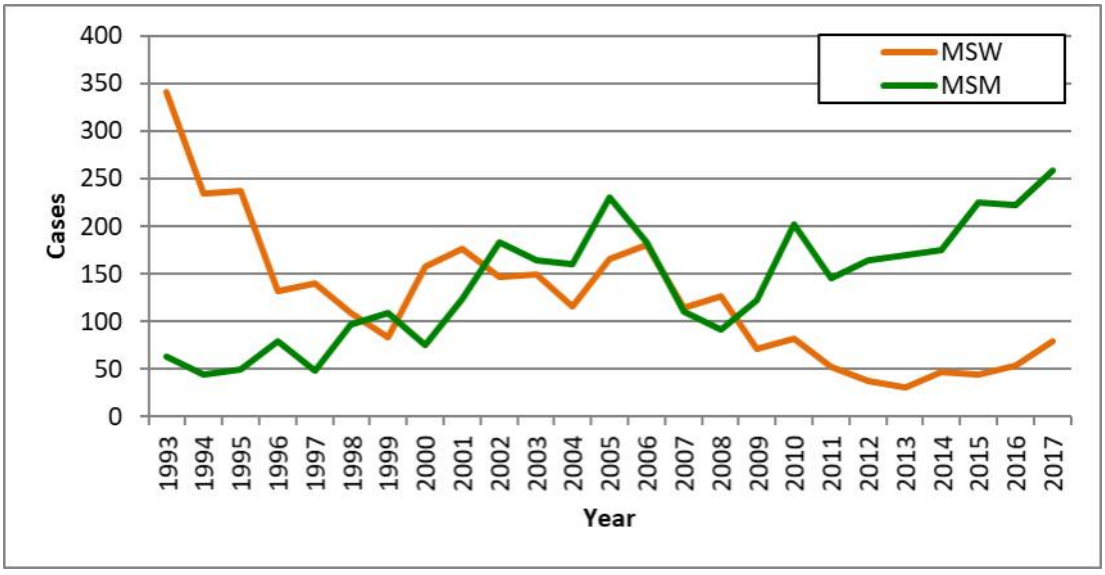
PHSKC STD Clinic

Figure 32: Gonorrhea – Number of Diagnoses by Sexual Orientation, Public Health - Seattle King County STD Clinic, 1993-2017*



*These data exclude 114 cases of gonorrhea among men who were missing sexual orientation information across all years. Increased screening for rectal and pharyngeal gonorrhea among MSM was implemented in the late 1990s. More sensitive NAATs for extragenital gonorrhea screening were adopted in November 2010.

Figure 33: Gonorrhea – Symptomatic Gonococcal Urethritis among MSM and MSW Public Health - Seattle King County STD Clinic, 1993-2017*



*MSM includes men who have sex with men are men who acknowledged sex with men during any clinic visit and MSW includes men who reported sex with women only. These data exclude 62 cases of symptomatic urethral gonorrhea among men who were missing sexual orientation information across all years.

PHSKC STD Clinic

Figure 34: Gonorrhea – Rectal and Pharyngeal Infections among men who have sex with men Public Health – Seattle King County STD Clinic, 1993-2017

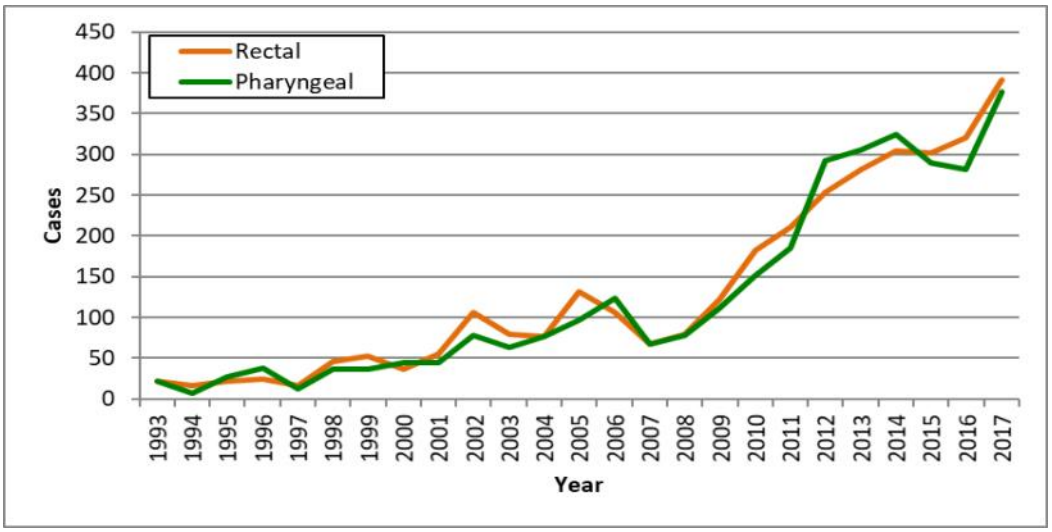
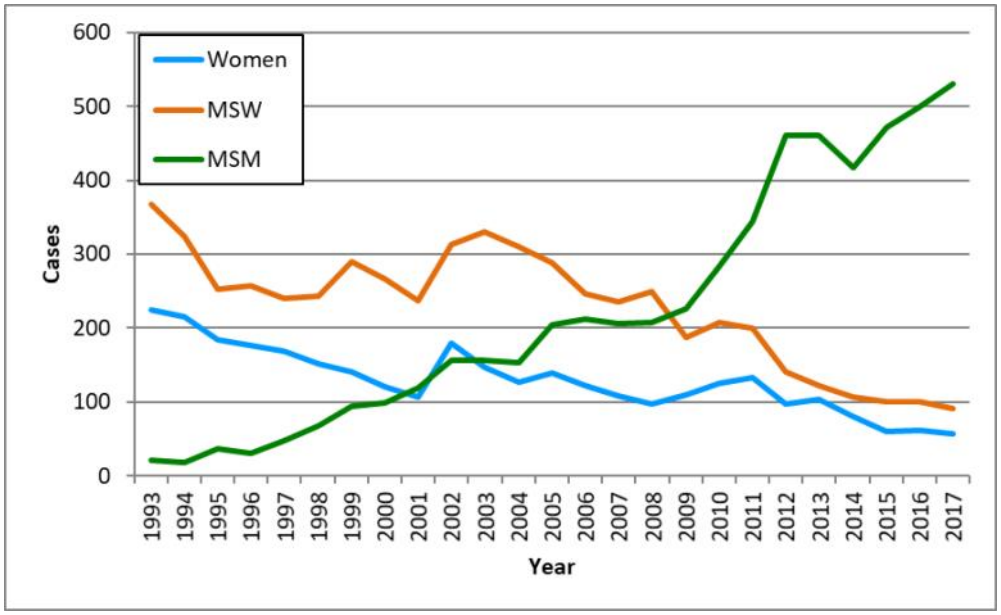


Figure 35: Chlamydial Infection – Number of Diagnoses by Sex and Sexual Orientation Public Health – Seattle King County STD Clinic, 1993-2017*



*MSM includes men who have sex with men are men who acknowledged sex with men during any clinic visit and MSW includes men who reported sex with women only. These data exclude 213 cases of chlamydial infection among men who were missing sexual orientation information across all years. More sensitive NAATs for extragenital chlamydia screening were adopted in November 2010.

Chlamydial infection

In 2017, the STD Clinic diagnosed 680 cases of chlamydial infection, reflecting a rise in chlamydial infection among MSM after a plateau in the number of chlamydial infections among MSM from 2012 to 2014 (Figure 35).

PHSKC STD Clinic

The clinic initiated routine rectal and pharyngeal screening of MSM using NAATs in late 2010, which contributed to the increase in chlamydial diagnoses among MSM. However, the number of MSM with symptomatic chlamydial urethritis, which is not affected by changes in screening practices, has also increased since 2014 (Figure 36). The number of chlamydial diagnoses occurring among women and MSW in the clinic remained relatively stable 2017, though was well below numbers from the first decade of the 21st century, reflecting the long-term decline in the number of women and MSW seen in the clinic. The prevalence of chlamydial infection among asymptomatic women ages 15-29 has varied over the years, peaking at 10.5% in 2015. Although the 9% prevalence in 2017 was lower than the high in 2015, it was higher than the 7% prevalence observed in 2016 and the 5% observed in 2008 (Figure 37).

Figure 36: Chlamydial Infection – Symptomatic Chlamydial Urethritis among MSM and MSW, Public Health – Seattle King County STD Clinic, 1993-2017*

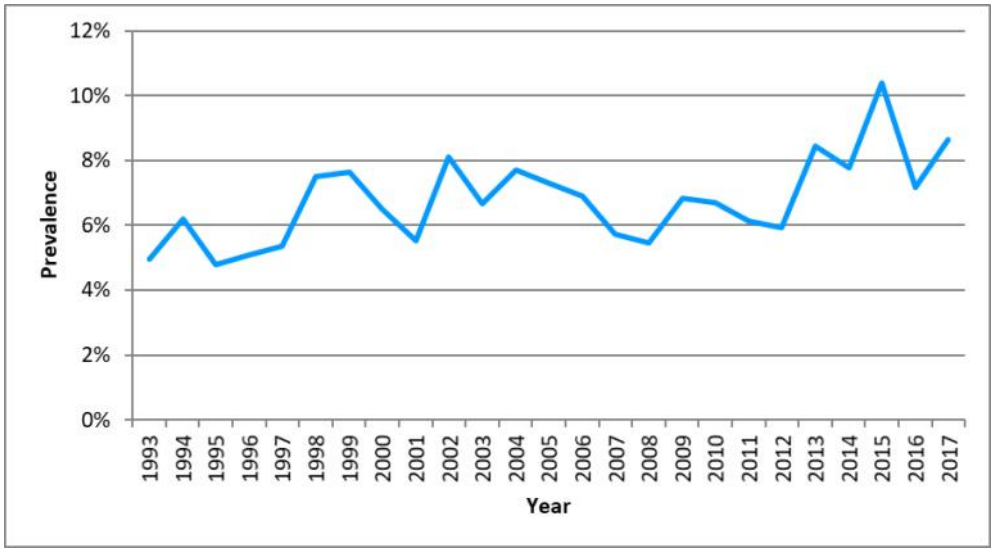
*MSM includes men who have sex with men are men who acknowledged sex with men during any clinic visit and MSW includes men who reported sex with women only.

Syphilis

In 2017, clinicians in the STD clinic diagnosed 122 early syphilis cases among King County residents for whom the gender of sex partners could be determined (Figure 38). Of these cases, 96% occurred among MSM. Overall, 164 early syphilis cases were diagnosed at the STD clinic in 2017, of which 95% were among MSM. In addition, 27 persons, including 16 MSM, 3 MSW and 8 women were diagnosed with late latent syphilis or syphilis of unknown duration. Nine cases of neurosyphilis were diagnosed in the STD clinic.

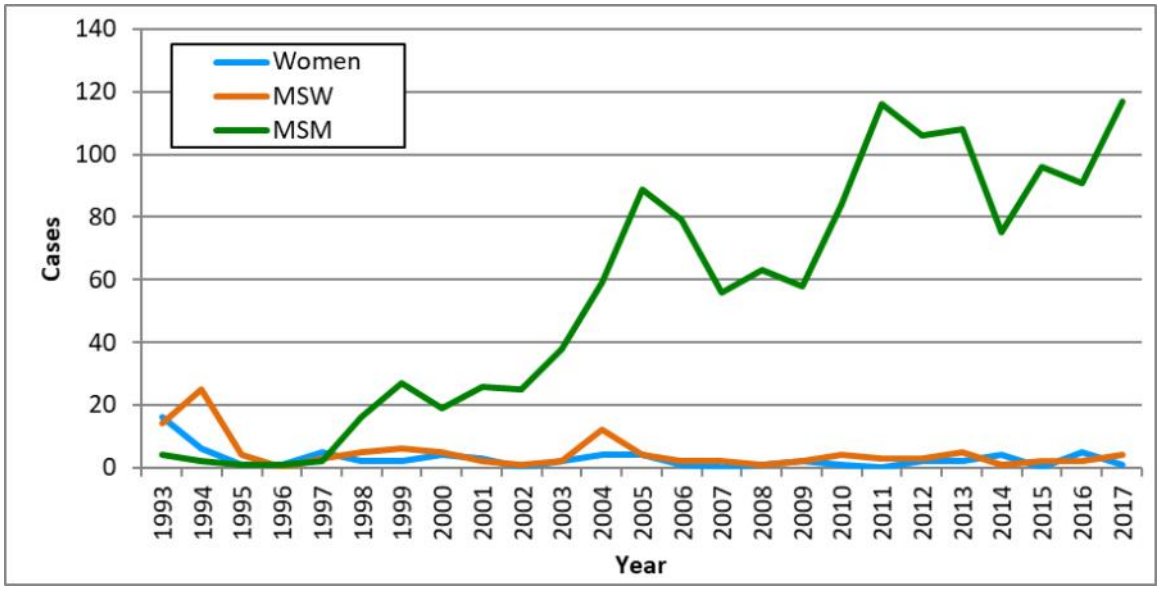
PHSKC STD Clinic

Figure 37: Chlamydial Infection – Prevalence among Asymptomatic Women Ages 15-29 Public Health – Seattle King County STD Clinic, 1993-2017



Chlamydia prevalence is defined as the number of cases divided by the total number of women tested.

Figure 38: Early Syphilis – Number of Diagnoses at Public Health – Seattle King County STD Clinic by Sex and Sexual Orientation among King County Residents, 1993-2017*



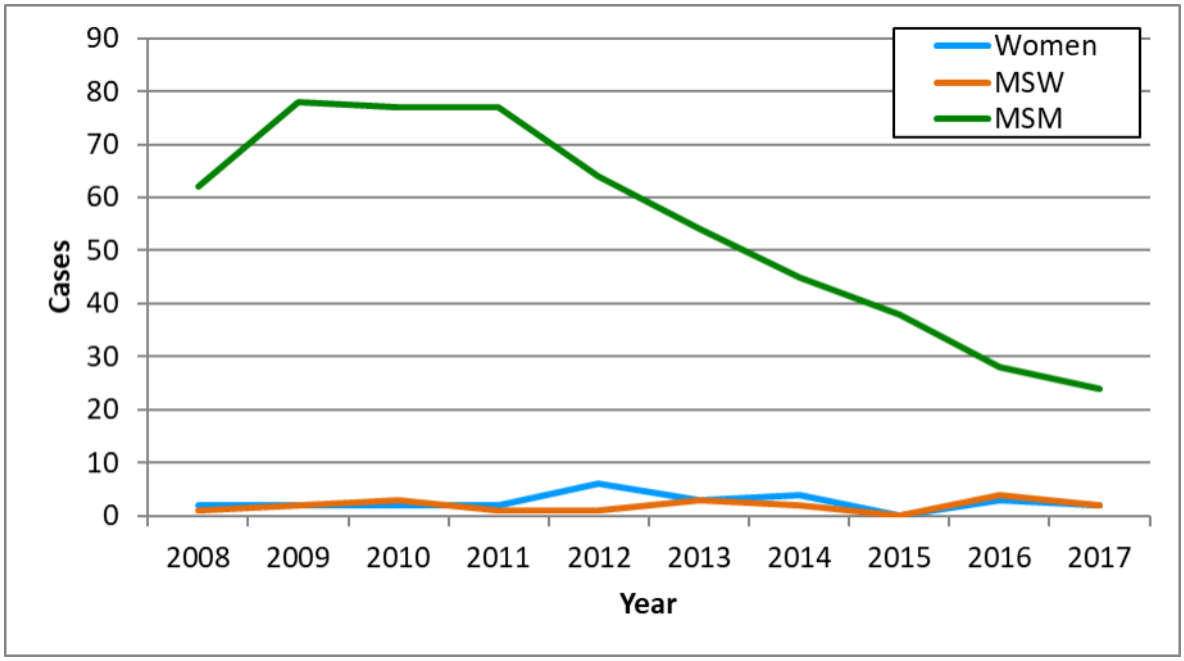
*Includes primary, secondary, and early latent syphilis. MSM includes men who have sex with men are men who acknowledged sex with men and MSW includes men who reported sex with women only. These data exclude 122 cases among men who were missing sexual orientation information across all years.

HIV

STD clinic clinicians diagnosed 28 new cases of HIV infection in 2017, similar to the 35 cases newly diagnosed in 2016, but dramatically lower than the 65 cases newly diagnosed in 2008 (Figure 39). MSM accounted for 86% of the cases diagnosed in the STD clinic.

PHSKC STD Clinic

Figure 39: HIV Infection – Diagnoses by Sex and Sexual Orientation*, Public Health – Seattle King County (PHSKC) STD Clinic, 2008-2017



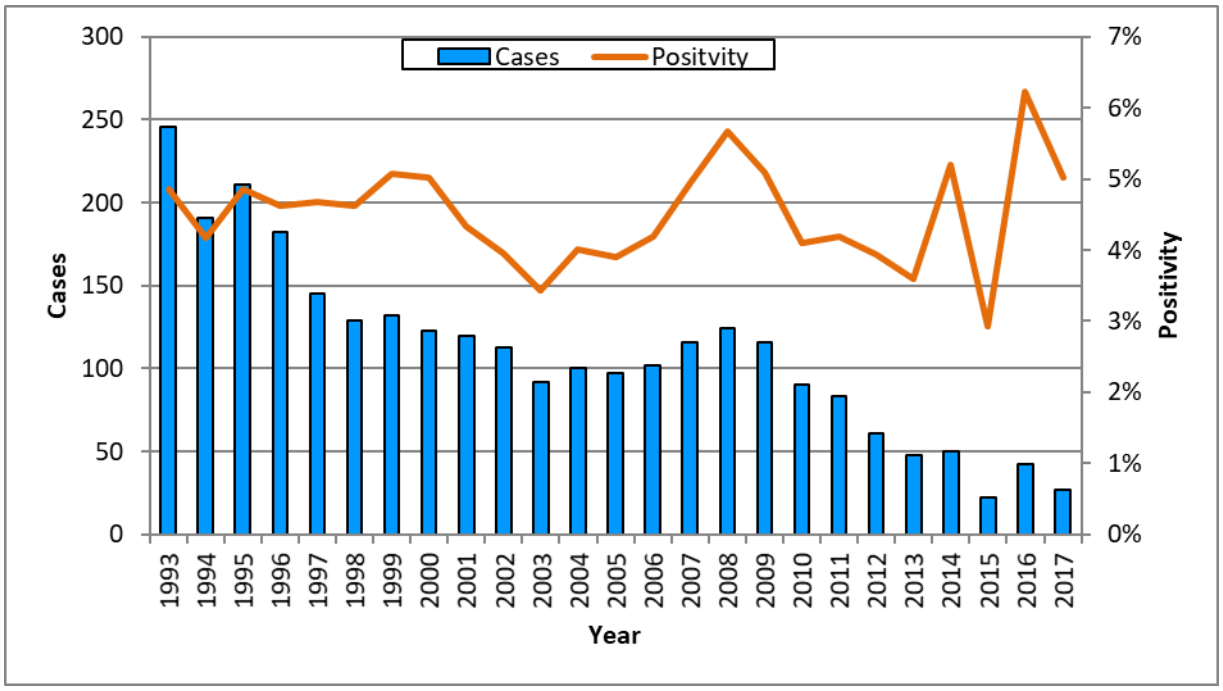
*MSM includes men who have sex with men are men who acknowledged sex with men and MSW includes men who reported sex with women only.

Trichomoniasis and Bacterial Vaginosis

The number of trichomoniasis cases diagnosed in the STD Clinic has continued to decrease, from 90 diagnoses in 2010 to 27 in 2017 (Figure 40). Trichomoniasis positivity, which is calculated as the total number of diagnoses divided by the number of women tested by culture, NAAT, and/or wet mount microscopy, was 5% among tested women in 2017. The number of women diagnosed with bacterial vaginosis has also declined from 796 in 2010 to 183 in 2017 (Figure 41). However, the prevalence of bacterial vaginosis among women in the clinic was similar to the prevalence observed in 2010 (43% compared to 37%). Bacterial vaginosis prevalence is calculated as the total number of bacterial vaginosis diagnoses divided by the number of women tested for vaginal PH and the presence of vaginal clue cells on wet preparations. These decreases in diagnoses of trichomoniasis and bacterial vaginosis without significant changes in prevalence appear to result from decreases in the number of women tested for these conditions, which mirrors a trend towards fewer visits to the clinic by women.

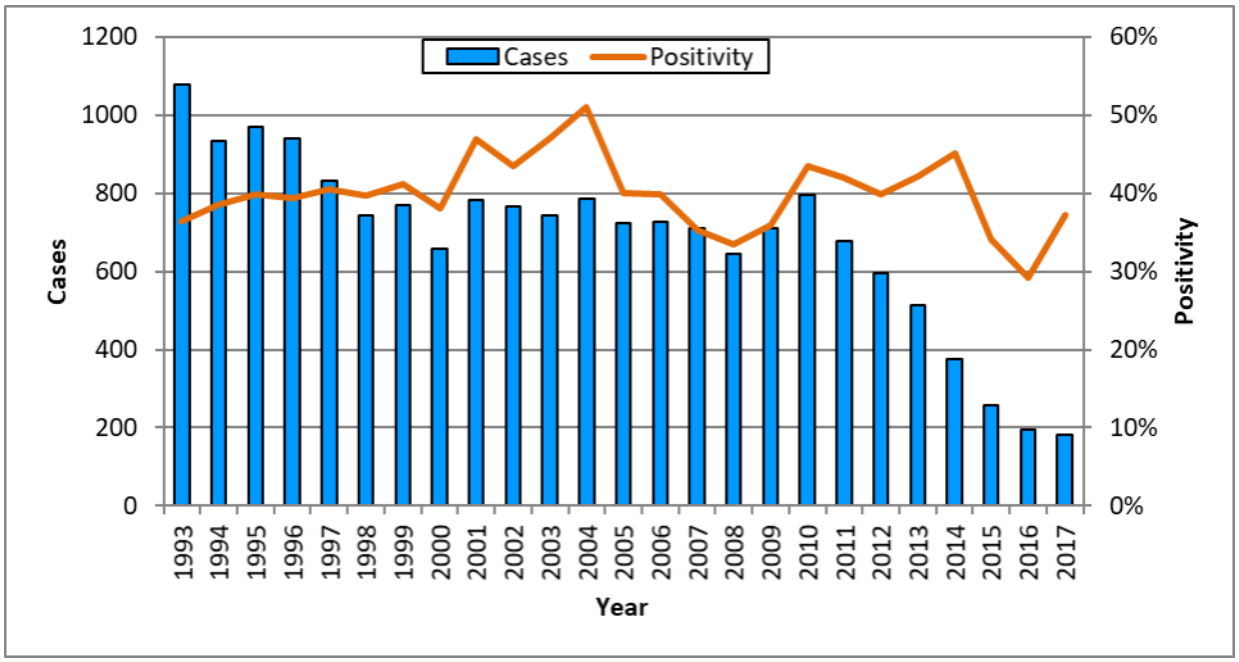
PHSKC STD Clinic

Figure 40: Trichomoniasis – Number of Diagnoses and Positivity among Female Patients
Public Health – Seattle King County STD Clinic, 1993-2017



Diagnoses are based on culture, NAAT, and/or wet mount tests. Positivity is calculated as total diagnoses divided by total annual tests (culture, NAAT and/or wet mount)

Figure 41: Bacterial Vaginosis – Number of Diagnoses and Positivity among Female Patients
Public Health – Seattle King County STD Clinic, 1993-2017



Positivity is calculated as total diagnoses divided by number of patients with tests for both vaginal PH and clue cells.

PHSKC STD Clinic

Human papillomavirus (HPV) Vaccination among MSM

The percentage of MSM patients aged 30 and younger reporting ever receiving a dose of the HPV vaccine increased from 33% in 2015 to 51% in 2017 (Table 20). However, the 24% of 2017 clinic patients who reported never receiving a dose of the vaccine and the 25% whose vaccine status was unknown represent a potential missed opportunity for intervention. Among those reporting ever receiving the HPV vaccine, the percentage of patients who reported completing the HPV vaccine series increased from 2015 to 2017 (63% to 67%). The percentage who reported receiving only one dose was around 8% for 2015, 2016, and 2017. The percentage receiving two doses increased slightly from 6.9% in 2015 to 8.4% in 2017. Among patients of all ages, 312 unique patients were vaccinated for HPV at the clinic in 2017, of which 208 were MSM, 56 were MSW, and 48 were women.

Table 20: Human papillomavirus (HPV) Vaccination among MSM* Public Health – Seattle King County STD Clinic Patients Ages 30 and under, 2015-2017

	2015		2016		2017	
	Number	(%)	Number	(%)	Number	(%)
Ever Received HPV Vaccine						
Yes	462	(33.3)	618	(49.9)	689	(50.5)
No	458	(33.0)	318	(25.7)	331	(24.2)
Unknown	466	(33.6)	302	(24.4)	345	(25.3)
Among Ever Received: HPV Vaccine Series Complete						
Yes	291	(63.0)	377	(61.0)	461	(66.9)
No	69	(14.9)	93	(15.0)	113	(16.4)
Unknown	102	(22.1)	148	(23.9)	115	(16.7)
Among Ever Received: Number of Doses Completed						
1	37	(8.0)	49	(7.9)	55	(8.0)
2	32	(6.9)	44	(7.1)	58	(8.4)
3	291	(63.0)	377	(61.0)	461	(66.9)
Unknown	102	(22.1)	148	(23.9)	115	(16.7)
Number of Vaccine Doses Given in Clinic	157		279		260	
Number of Unique Patients Vaccinated in Clinic	141		220		201	

*Men who have sex with men are men who acknowledged sex with men in any visit to the clinic

PHSKC STD Clinic - PrEP

PrEP

Clinicians in the STD clinic ask all MSM and transgender patients about their use and interest in PrEP. Clinicians recommend that MSM or transgender patients who have sex with men initiate PrEP if they meet the any of following criteria:

- A diagnosis of rectal gonorrhea or early syphilis in the previous 12 months
- Methamphetamine or popper use in the previous 12 months
- History of exchange sex for money or drugs in previous 12 months
- Patient has an HIV-positive partner who is not virally suppressed

Patients with any of the above risks, as well as all Black or Latinx MSM and transgender persons who have sex with men, are eligible to receive ongoing PrEP care through the STD clinic. STD clinic staff refer patients who want to initiate PrEP are not eligible to receive it through the STD clinic to PrEP medical providers in the community.

Patients receiving PrEP through the STD clinic are seen by a clinician at an initial visit and, in the absence of medical complaints, annually thereafter. Non-medical clinic staff follow-up with PrEP patients one month after starting medication and every three months thereafter. We consider PrEP patients to have stopped their medication if they notify clinic staff that they discontinued PrEP or if they fail to attend a three-month follow-up appointment. Patients who stop taking PrEP at the clinic must be seen for a restart visit before beginning PrEP again.

Between October 2014 and December 2017, 672 unique patients attended initial PrEP visits, among whom 86% filled an initial PrEP prescription (Table 21). As of the end of 2017, 391 PrEP STD clinic patients were receiving PrEP through the clinic and 513 had received PrEP through the clinic at some point during the year (Table 22). In 2017, 324 patients attended an initial PrEP, 86% of whom filled their first prescription (Table 23). Of these patients, 41% were White, 33% were Latino, and over half were between the ages of 20 and 29. There were 84 patients who had attended an initial visit but never started or who had previously taken PrEP but discontinued that attended restart PrEP visits in 2017 (Table 23). Of the restart patients, 73% filled their restart prescription. In 2017, 116 PrEP patients discontinued PrEP use and did not restart (Table 24). Over half (53%) of these patients were lost to follow-up. Transferring care (15%) and moving (14%) were the other top reasons for PrEP discontinuation at the STD clinic.

PHSKC STD Clinic - PrEP

Table 21: Public Health - Seattle King County STD Clinic Patients Attending Initial PrEP Visit, 2014-2017

	PrEP Patients (N=672)	
	Number	(%)
Race		
White	312	(46.4)
Black	64	(9.5)
Native American	11	(1.6)
Asian & Pacific Islander	81	(12.1)
Latino	189	(28.1)
Unknown	15	(2.2)
Age		
<15 years	1	(0.1)
15-19 years	29	(4.3)
20-24 years	148	(22.0)
25-29 years	205	(30.5)
30-34 years	127	(18.9)
35-44 years	98	(14.6)
45-54 years	53	(7.9)
>=55 years	11	(1.6)
Unknown	0	(0.0)
Gender		
Female	15	(2.2)
Male	638	(94.9)
Transgender	14	(2.1)
Non-binary/Genderqueer	5	(0.7)
Methamphetamine Use In Past year		
Yes	76	(11.3)
No	596	(88.7)
Filled First Prescription		
Yes	576	(85.7)
No	96	(14.3)

*Initial visit is the first clinic visit patients attend to begin PrEP

PHSKC STD Clinic - PrEP

Table 22: Public Health - Seattle King County STD Clinic PrEP Patients, 2017

	On PrEP at any point (N=513)*		On PrEP at Year End (N=391)**	
	Number	(%)	Number	(%)
Race				
White	228	(44.4)	180	(46.0)
Black	52	(10.1)	28	(7.2)
Native American	9	(1.8)	6	(1.5)
Asian & Pacific Islander	61	(11.9)	49	(12.5)
Latino	155	(30.2)	123	(31.5)
Unknown	8	(1.6)	5	(1.3)
Age				
<15 years	0	(0.0)	0	(0.0)
15-19 years	16	(3.1)	7	(1.8)
20-24 years	105	(20.5)	72	(18.4)
25-29 years	148	(28.8)	107	(27.4)
30-34 years	108	(21.1)	90	(23.0)
35-44 years	88	(17.2)	79	(20.2)
45-54 years	39	(7.6)	29	(7.4)
>=55 years	9	(1.8)	7	(1.8)
Unknown	0	(0.0)	0	(0.0)
Gender				
Female	10	(1.9)	6	(1.5)
Male	491	(95.7)	378	(96.7)
Transgender	7	(1.4)	3	(0.8)
Non-binary/Genderqueer	5	(1.0)	4	(1.0)
Methamphetamine Use in Past Year				
Yes	52	(10.1)	24	(6.1)
No	461	(89.9)	367	(93.9)

*Patients were classified as on PrEP at any point in 2017 if any of their 2017 visits were coded as on PrEP.
**Patients were classified as on PrEP at year-end if their last visit date in 2017 was coded as on PrEP.

PHSKC STD Clinic - PrEP

Table 23: Public Health - Seattle King County STD Clinic Patients Initial or Restart PrEP Visits, 2017

	Patients Attending Initial PrEP Visit (N=324)*		Patients Attending Restart PrEP Visit (N=84)**	
	Number	(%)	Number	(%)
Race				
White	133	(41.0)	36	(42.9)
Black	35	(10.8)	14	(16.7)
Native American	5	(1.5)	1	(1.2)
Asian & Pacific Islander	40	(12.3)	9	(10.7)
Latino	106	(32.7)	24	(28.6)
Unknown	5	(1.5)	0	(0.0)
Age				
<15 years	0	(0.0)	0	(0.0)
15-19 years	15	(4.6)	3	(3.6)
20-24 years	71	(21.9)	16	(19.0)
25-29 years	100	(30.9)	21	(25.0)
30-34 years	57	(17.6)	22	(26.2)
35-44 years	55	(17.0)	14	(16.7)
45-54 years	20	(6.2)	7	(8.3)
>=55 years	6	(1.9)	1	(1.2)
Unknown	0	(0.0)	0	(0.0)
Gender				
Female	7	(2.2)	1	(1.2)
Male	306	(94.4)	81	(96.4)
Transgender	6	(1.9)	2	(2.4)
Non-binary/Genderqueer	5	(1.5)	0	(0.0)
Filled Prescription				
Yes	279	(86.1)	61	(72.6)
No	45	(13.9)	23	(27.4)

*Initial visit is the first clinic visit patients attend to begin PrEP

**Restart visits include patients who started PrEP at the clinic and discontinued PrEP and patients who attended an initial visit but never started PrEP.

PHSKC STD Clinic - PrEP

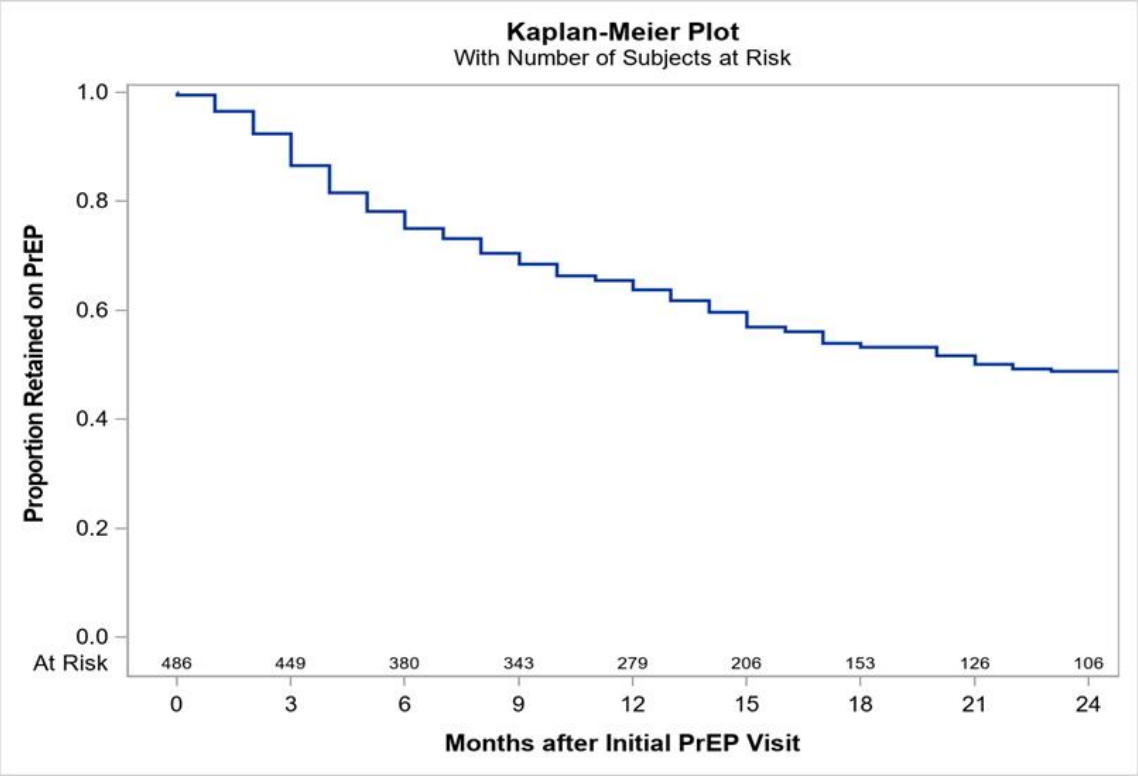
Table 24: Public Health - Seattle King County STD Clinic Patients Discontinuing PrEP After Filling at Least One Prescription, 2017

	Patients who Discontinued PrEP (N=116)	
	Number	(%)
Race		
White	53	(45.7)
Black	21	(18.1)
Native American	2	(1.7)
Asian & Pacific Islander	12	(10.3)
Latino	25	(21.6)
Unknown	3	(2.6)
Age		
<15 years	0	(0.0)
15-19 years	5	(4.3)
20-24 years	31	(26.7)
25-29 years	24	(20.7)
30-34 years	25	(21.6)
35-44 years	19	(16.4)
45-54 years	9	(7.8)
>=55 years	3	(2.6)
Unknown	0	(0.0)
Gender		
Female	6	(5.2)
Male	104	(89.7)
Transgender	5	(4.3)
Non-binary/Genderqueer	1	(0.9)
Reason for Discontinuation		
Jail/Incarceration	1	(0.9)
Lost to Follow-Up	62	(53.4)
Monogamous Relationship	8	(6.9)
Moved	16	(13.8)
No longer at risk for HIV (as determined by patient)	1	(0.9)
Side Effects	5	(4.3)
Tested HIV Positive	2	(1.7)
Transferred	17	(14.7)
Unknown	4	(3.4)

PHSKC STD Clinic - PrEP

We used Kaplan-Meier analysis to assess factors associated with PrEP discontinuation among patients who enrolled in the STD Clinic PrEP program from October 2014 to December 2017[8]. Of the 672 patients with initial visits for PrEP, 488 were included in the discontinuation analysis. Patients were excluded if their first prescription was not filled (n=96), if they moved or transferred care (n=86), or tested positive for HIV at their initial visit (n=2). Methamphetamine use was higher in the excluded population (16% vs 9%), but this was the only significant difference between the excluded and included populations. Observation time for each patient was calculated as the time from initial visit to either first PrEP stop date or September 30, 2018. The median observation time was 13 months (interquartile range, 7-22 months). After starting, 231 patients (47%) stopped using PrEP. In the months after the initial PrEP visit, the proportion of patients on PrEP declined steadily with approximately 64% retained on PrEP by 12 months (Figure 42).

Figure 42: Timing of PrEP Discontinuation among Patients Filling First Prescription
Public Health – Seattle King County STD Clinic, 2014-2017



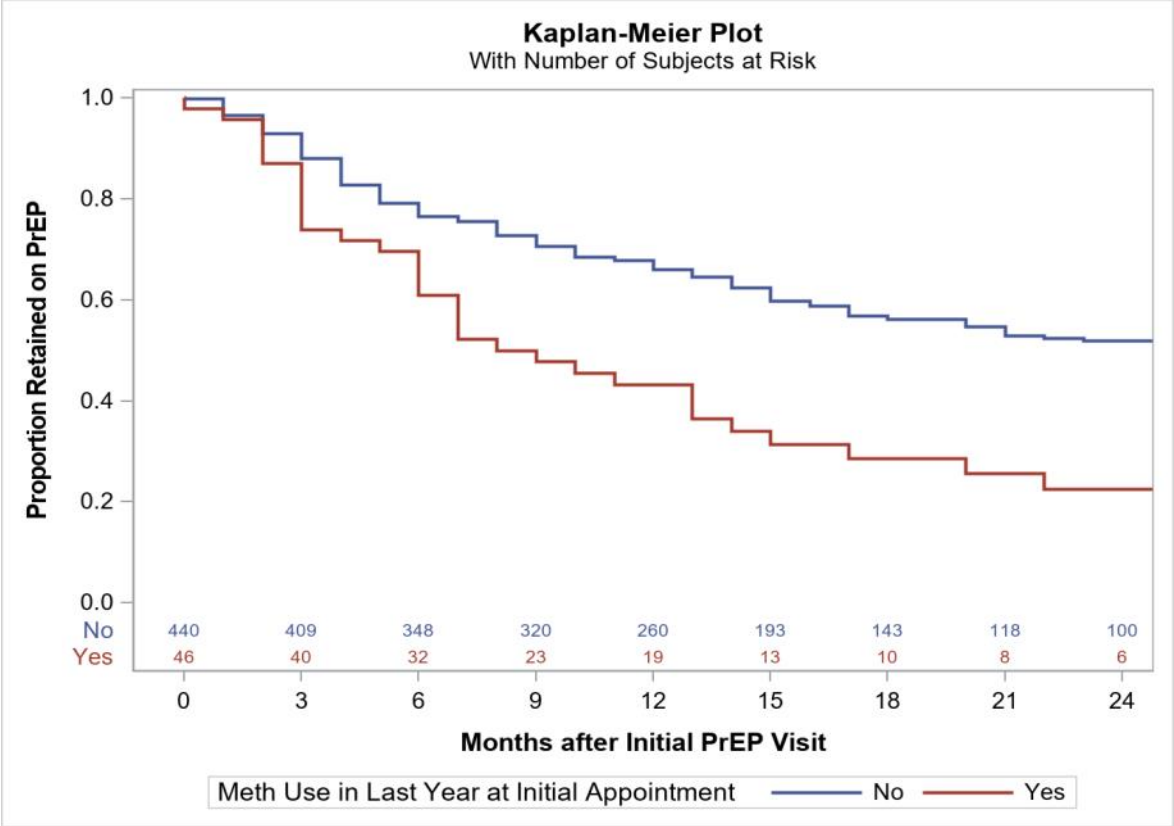
Timing of discontinuation was not associated with age, but was associated with Black race and methamphetamine use in the prior year as ascertained at the time of PrEP initiation. Only 43% of methamphetamine using men continued on PrEP at 12 months compared to 66% of non-methamphetamine users (Figure 43). Black patients had lower PrEP retention at 12 months (38%) compared to Hispanic (69%),

[8]Dombrowski JC, Golden MR, Barbee, LA, et al. Patient disengagement from an HIV preexposure prophylaxis program in a sexually transmitted disease clinic. Sex Transm Dis 2018; 45(9): e62–e64.

PHSKC STD Clinic - PrEP

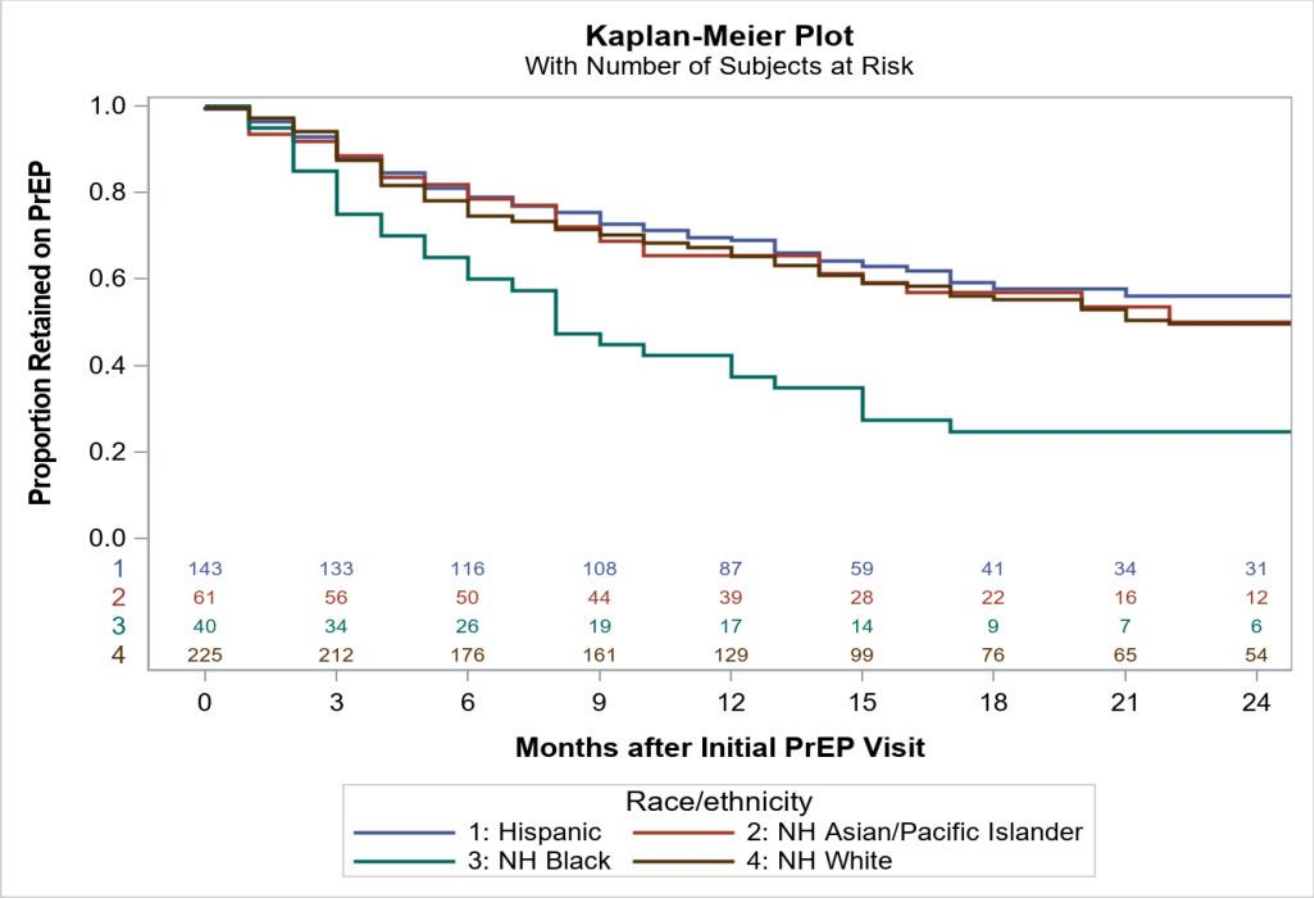
Asian/Pacific Islander (65%), and White (65%) PrEP patients (Figure 44). Due to small numbers, the comparisons by race and ethnicity excluded Native Americans and persons of unknown race. Understanding the reasons for PrEP discontinuation is difficult as 68% (n=157) of the patients were lost to follow-up and for an additional 5% (n=12) the reason was unknown. Of the 62 patients with a known reason, 44% (n=27) discontinued because they were in a monogamous relationship with an HIV-seronegative partner, 31% (n=19) due to side effects, and 19% (n=12) determined they were no longer at risk for HIV.

Figure 43: Timing of PrEP Discontinuation among Patients Filling First Prescription by Methamphetamine Use Public Health – Seattle King County STD Clinic, 2014-2017



PHSKC STD Clinic - PrEP

Figure 44: Timing of PrEP Discontinuation among Patients Filling First Prescription by Race/Ethnicity Public Health – Seattle King County STD Clinic, 2014-2017



NH = Non-Hispanic

PHSKC Partner Services

Overview

Public Health plays a critical role in controlling STDs in King County by offering partners services to individuals who are infected with STDs and their partners. Historically, partner services focused on identifying and locating sexual contacts of infected persons and referring them for testing and treatment. In recent years, the intervention has evolved to include a broad array of activities designed to assist persons infected with STDs and advance public health prevention objectives. These services include, but are not limited to, notifying sex and needle sharing partners of potential exposure to HIV or STDs, providing testing and treatment to partners, providing patients with expedited partner therapy (EPT) to give to their partners, referring out-of-care HIV positive persons for care, referring eligible persons to PrEP, and providing education about STD prevention. In King County, disease intervention specialists (DIS) are responsible for offering partner services to eligible index cases. Due to resource limitations, Public Health cannot provide partner services to all persons with reportable STIs and medical providers diagnosing patients with STIs should advise their patients to notify their sex partners of their diagnosis and encourage their partners to seek medical care. In 2017, Public Health provided partner services to the following populations:

- Persons with newly diagnosed HIV infection
- Persons with early syphilis[9]
- Women with syphilis regardless of stage
- Persons with gonorrhea
- Heterosexuals with untreated chlamydia

Syphilis

In 2017, 668 early syphilis cases and 216 late/unknown duration cases were diagnosed among residents of King County (Table 25). DIS initiated investigations of 788 cases, of whom 571 (72%) were interviewed for partner services, while 46 (6%) refused partner services and 158 (20%) were not located or did not respond to contact attempts. Of the index cases interviewed by DIS, 239 cases (42%) named at least one notifiable partner with 595 total partners named (Figure 45). Over two-thirds of the notifiable partners (n=406) were notified of their potential exposure and DIS confirmed that nearly half (n=292) tested for syphilis. Among the tested partners, 64 cases of syphilis were newly diagnosed, which reflects nearly 11% of the notifiable partners and nearly 22% of partners tested being identified as new syphilis cases. Additional partners likely had incubating syphilis, meaning they were infected but had not yet developed a positive syphilis blood test. All of the partners with a new syphilis diagnosis received treatment and an additional 232 uninfected partners were treated for syphilis

[9]As of 2018, PHSKC does not routinely provide partner services to HIV positive MSM with early syphilis if they are known to have an undetectable HIV viral load.

PHSKC Partner Services

based on known contact to an infected person. In order to estimate the impact of public health partner services, we categorized the timing of testing, diagnosis, and treatment as occurring before and after DIS interviews with index patients (persons diagnosed with syphilis); partner notification or treatment occurring before DIS interview could not plausibly be a consequence of DIS-mediated partner services. DIS notified 192 partners of their potential exposure. After the partner services interview, 200 partners tested for syphilis, 26 were newly diagnosed, 23 were treated for their infection, and 170 partners were epi treated for syphilis (i.e. treated for possible incubating syphilis). Partner services outcomes were similar between MSM and heterosexuals (Table 26).

Gonorrhea

In 2017, DIS initiated investigations of 3,994 gonorrhea index cases for partner services. MSM accounted for 2,285 of these cases and heterosexuals accounted for 1,709 (Tables 27 and 28). Among MSM, 1,355 cases were interviewed, 266 refused interview, and 550 were not located or did not respond to contact attempts. Among the heterosexual cases, 756 were interviewed, 232 refused interview, and 554 were not located or did not respond to contact attempts. The overall contact index among interviewed clients (partners named per index case) was 0.55 and did not vary substantially between MSM and heterosexuals. A total of 943 partners tested for gonorrhea and chlamydial infection, of whom 183 (19%) tested positive for gonorrhea or chlamydial infection. However, only 51 partners were diagnosed with gonorrhea after a DIS interview, meaning that 27 index cases needed to receive partner services to ensure that one infected partner received treatment. Some index patients may have been prompted to notify additional partners because of partner services but have been unwilling to report the names of those partners, perhaps resulting in an underestimate of the impact of partner services.

Partner Services to Promote PrEP

Public Health DIS routinely offer persons receiving partner services referral to receive PrEP. In accordance with local PrEP implementation guidelines, this effort focuses primarily on MSM and transgender persons who have sex with men. Of the 1,865 interviewed cases of syphilis and gonorrhea among MSM, 501 (27%) were HIV positive, 676 (36%) were already taking PrEP, and 668 (37%) were eligible for PrEP. The majority of the cases (70%) were eligible to receive PrEP at the STD Clinic and of those offered a referral 68% accepted. DIS offered to refer the remaining 30% of patients to other PrEP providers; 81% of patients accepted such a referral (Figure 46). Overall, partner services resulted in 344 persons accepting PrEP referrals, 246 (72%) who were infected with gonorrhea and 98 (28%) who were infected with syphilis.

PHSKC Partner Services

Table 25: Partner Services Outcomes among Early, Late, and Total Syphilis Cases, King County, WA, 2017

	Early Syphilis (N=668)		Late Syphilis (N=216)		Total Syphilis (N=884)	
	Number (%)	Index	Number (%)	Index	Number (%)	Index
Index Cases Diagnosed	668		216		884	
Index Cases Initiated	665 (99)		123 (57)		788 (89)	
Index Cases Interviewed	483 (73)		88 (72)		571 (72)	
Median Days from Treatment to Interview (Interquartile Range)	6 (0-18)		1 (0-12)		6 (0-17)	
Interviewed >7 days	210 (43)		28 (32)		238 (42)	
Interviewed >14 days	147 (30)		18 (20)		165 (29)	
Index Cases Naming ≥1 Contact	204 (42)		35 (40)		239 (42)	
Number of Partners Named	518		77		595	
Contact Index		1.07		0.88		1.04
Notified	368 (71)		38 (49)		406 (68)	
Notified by DIS	173 (33)		19 (25)		192 (32)	
Notification Index (DIS)		0.36		0.22		0.34
Tested for Syphilis	263 (51)		29 (38)		292 (49)	
Testing Index		0.54		0.33		0.51
Before Interview	83 (16)		9 (12)		92 (15)	
After Interview	180 (35)		20 (26)		200 (34)	
Testing Index (DIS)		0.37		0.23		0.35
Newly Diagnosed with Syphilis	56 (11)		8 (10)		64 (11)	
Before Interview	34 (7)		4 (5)		38 (6)	
After Interview	22 (4)		4 (5)		26 (4)	
Case Finding Index (DIS)		0.05		0.05		0.05
Treated	56 (11)		8 (10)		64 (11)	
Brought to Treatment Index		0.12		0.09		0.11
Before Interview	37 (7)		4 (5)		41 (7)	
After Interview	19 (4)		4 (5)		23 (4)	
Brought to Treatment Index (DIS)		0.04		0.05		0.04
Partners Epi Treated	213 (45)		19 (25)		232 (39)	
Epi Index		0.44		0.22		0.41
Before Interview	59 (11)		3 (4)		62 (10)	
After Interview	154 (29)		16 (21)		170 (29)	
Epi Index (DIS)		0.32		0.18		0.30

DIS = disease intervention specialist

Indices noted as (DIS) include the number of partners after the interview in the numerator. Indices were calculated as follows:
Contact index = partners contacted per index case interviewed
Notification index = partners notified of exposure per index case interviewed
Testing index = partners tested per index case interviewed
Case finding index = partners identified as new syphilis cases per index case interviewed
Brought to treatment index = partners treated for new syphilis infection per index case interviewed
Epi index = partners receiving preventive syphilis treatment per index case interviewed

PHSKC Partner Services

Table 26: Partner Services Outcomes among Syphilis Cases by Sexual Orientation*, King County, WA, 2017

	Men who have sex with men				Heterosexuals			
	Early Syphilis		Late Syphilis		Early Syphilis		Late Syphilis	
	Number (%)	Index	Number (%)	Index	Number (%)	Index	Number (%)	Index
Index Cases Diagnosed	617		103		26		87	
Index Cases Initiated	617 (100)		71 (69)		26 (100)		46 (53)	
Index Cases Interviewed	455 (74)		55 (77)		23 (88)		33 (72)	
Median Days from Treatment to Interview (Interquartile Range)	7 (0-18)		3 (0-16)		3 (0-15)		0 (0-6)	
Interviewed >7 days	199 (44)		22 (40)		9 (39)		6 (18)	
Interviewed >14 days	139 (31)		14 (25)		7 (30)		4 (12)	
Index Cases Naming ≥1 Contact	190 (42)		16 (29)		12 (52)		19 (58)	
Number of Partners Named	496		34		17		43	
Contact Index		1.09		0.62		0.74		1.30
Notified	349 (70)		23 (68)		15 (88)		15 (35)	
Notified by DIS	168 (34)		12 (35)		3 (18)		7 (16)	
Notification Index (DIS)		0.37		0.22		0.13		0.21
Tested for Syphilis	249 (50)		16 (47)		11 (65)		13 (30)	
Testing Index		0.55		0.29		0.48		0.39
Before Interview	75 (15)		7 (21)		5 (29)		2 (5)	
After Interview	174 (35)		9 (26)		6 (35)		11 (26)	
Testing Index (DIS)		0.38		0.16		0.26		0.33
Newly Diagnosed with Syphilis	50 (10)		3 (9)		5 (29)		5 (12)	
Before Interview	30 (6)		3 (9)		4 (24)		1 (2)	
After Interview	20 (4)		0 (0)		1 (6)		4 (9)	
Case Finding Index (DIS)		0.04		0.00		0.04		0.12
Treated for Syphilis	50 (10)		3 (9)		5 (29)		5 (12)	
Brought to Treatment Index		0.11		0.05		0.22		0.15
Before Interview	32 (6)		3 (9)		4 (24)		1 (2)	
After Interview	18 (4)		0 (0)		1 (6)		4 (9)	
Brought to Treatment Index (DIS)		0.04		0.00		0.04		0.12
Partners Epi Treated:	202 (41)		12 (35)		9 (53)		7 (16)	
Epi Index		0.44		0.22		0.39		0.21
Before Interview	54 (11)		3 (9)		3 (18)		0 (0)	
After Interview	148 (30)		9 (26)		6 (35)		7 (16)	
Epi Index (DIS)		0.33		0.16		0.26		0.21

*Excludes 51 cases among men missing sexual orientation information.
DIS = disease intervention specialist
Indices noted as (DIS) include the number of partners after the interview in the numerator. Indices were calculated as follows:
Contact index = partners contacted per index case interviewed
Notification index = partners notified of exposure per index case interviewed
Testing index = partners tested per index case interviewed
Case finding index = partners identified as new syphilis cases per index case interviewed
Brought to treatment index = partners treated for new syphilis infection per index case interviewed
Epi index = partners receiving preventive syphilis treatment per index case interviewed

PHSKC Partner Services

Table 27: Partner Services Outcomes among MSM* Gonorrhea Cases, King County, WA, 2017

	Number (%)	Index
Index Cases Diagnosed	2,285	
Index Cases Interviewed	1,355 (59)	
Index Cases Naming ≥1 Contact	409 (30)	
Median Days from Assigned to Interview (Interquartile Range)	1 (0-5)	
Interviewed >7 days	135 (10)	
Interviewed >14 days	66 (5)	
Number of Partners Named	739	
Contact Index		0.55
Notified	530 (72)	
Notified by DIS	156 (21)	
Notification Index		0.12
Tested for Chlamydia/Gonorrhea	625 (85)	
Testing Index		0.46
Newly Diagnosed with Chlamydia and/or Gonorrhea	114 (15)	
Before Interview	73 (10)	
After Interview	35 (5)	
Case Finding Index (DIS)		0.03
Treated for Chlamydia and/or Gonorrhea	111 (15)	
Brought to Treatment Index		0.08
Treatment Verified	48 (6)	
Before Interview	76 (10)	
After Interview	35 (5)	
Brought to Treatment Index (DIS)		0.03

*MSM = men who have sex with men
DIS = Disease intervention specialist
Indices noted as (DIS) include the number of partners after the interview in the numerator. Indices were calculated as follows:
Contact index = partners contacted per index case interviewed
Notification index = partners notified of exposure per index case interviewed
Testing index = partners tested per index case interviewed
Case finding index = partners identified as new chlamydia and/or gonorrhea cases per index case interviewed
Brought to treatment index = partners treated for new chlamydia and/or gonorrhea infection per index case interviewed

PHSKC Partner Services

Table 28: Partner Services Outcomes among Heterosexual Gonorrhea Cases, King County, WA, 2017

	Number (%)	Index
Number of Index Cases Assigned	1,709	
Number of Index Cases Interviewed	756 (44)	
Number of Index Cases Naming ≥1 Contact	311 (41)	
Median Days from Assigned to Interview (Interquartile Range)	1 (0-7)	
Interviewed >7 days	130 (17)	
Interviewed >14 days	60 (8)	
Number of Interviewed Index Cases:	756	
With any untreated partners	143 (19)	
Accepting EPT from DIS	9 (1)	
Accepting EPT from Provider	35 (5)	
Accepting DIS Partner Notification Assistance	36 (5)	
Number of Partners Named	396	
Contact Index		0.52
Index Case Requested DIS/Staff Contact	56 (14)	
Notified by DIS	11 (3)	
Notification Index (DIS)		0.01
Accepting EPT from DIS	9 (2)	
Tested for Chlamydia and/or Gonorrhea	318 (80)	
Testing Index		0.42
Newly Diagnosed with Chlamydia or Gonorrhea	69 (17)	
Before Interview	53 (13)	
After Interview	16 (4)	
Case Finding Index (DIS)		0.02
Treated for Chlamydia or Gonorrhea	66 (17)	
Brought to Treatment Index		0.09
Treatment Verified	28 (7)	
Before Interview	53 (13)	
After Interview	13 (3)	
Brought to Treatment Index (DIS)		0.02

DIS = Disease intervention specialist; EPT = Expedited partner therapy

Indices noted as (DIS) include the number of partners after the interview in the numerator. Indices were calculated as follows:

Contact index = partners contacted per index case interviewed

Notification index = partners notified of exposure per index case interviewed

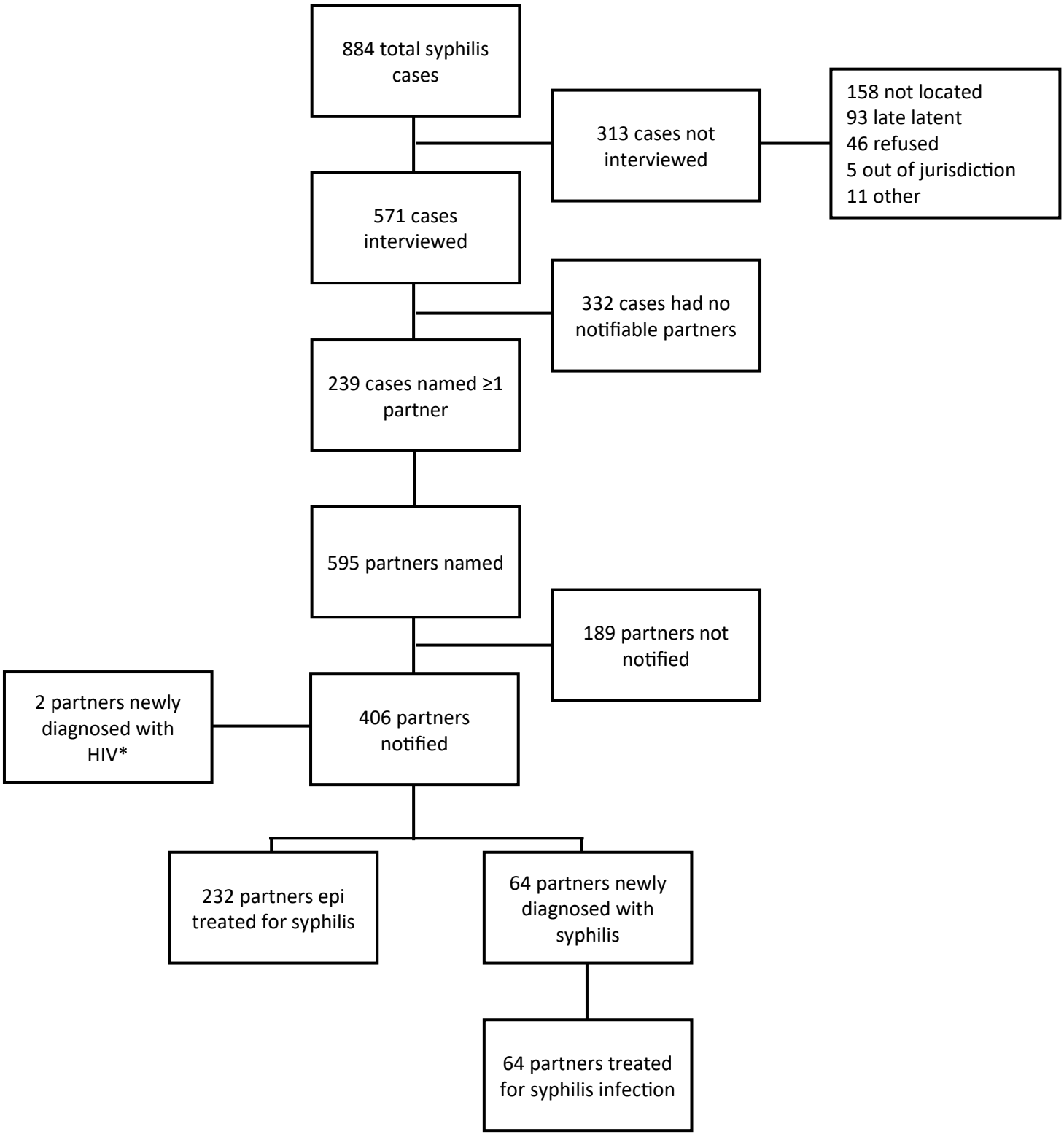
Testing index = partners tested per index case interviewed

Case finding index = partners identified as new chlamydia and/or gonorrhea cases per index case interviewed

Brought to treatment index = partners treated for new chlamydia and/or gonorrhea infection per index case interviewed

PHSKC Partner Services

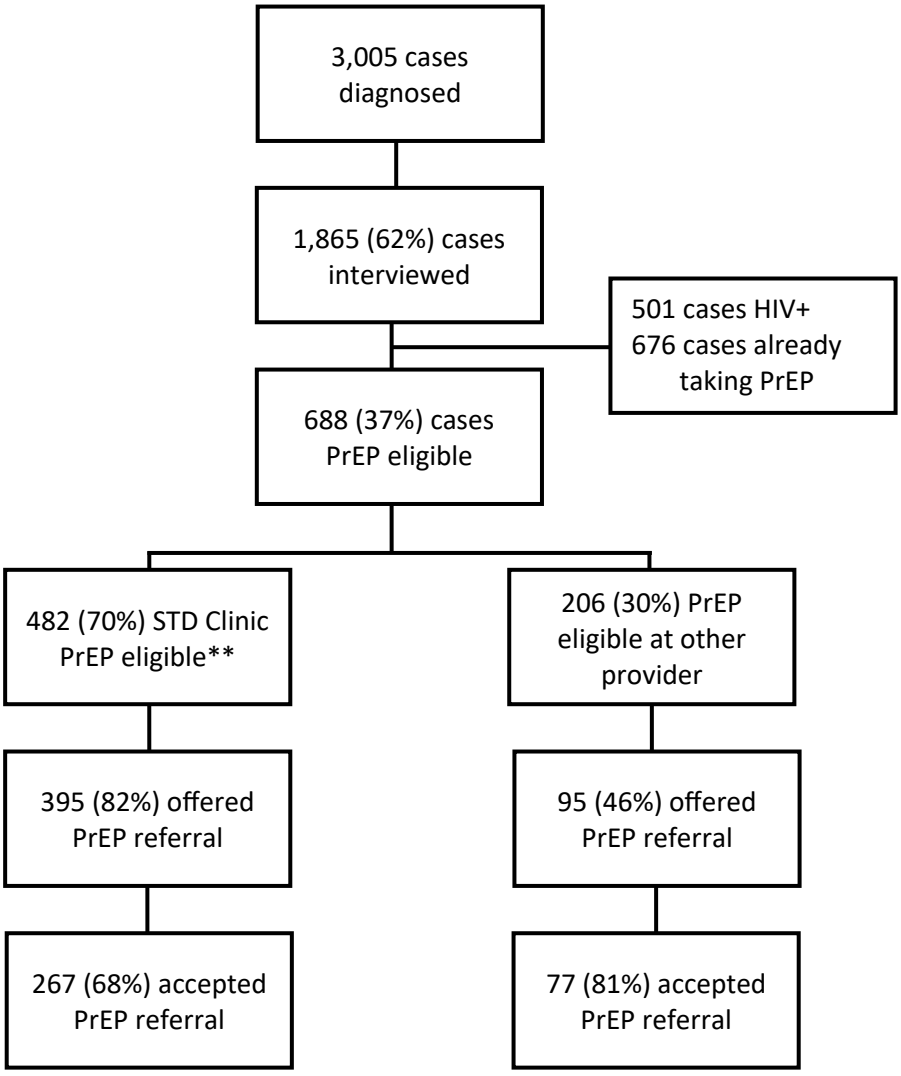
Figure 45: Flowchart of Partner Services Outcomes among Syphilis Cases, King County, WA 2017



*Not excluded from partners epi treated or newly diagnosed

PHSKC Partner Services

Figure 46: PrEP among MSM* Syphilis and Gonorrhea Cases, King County, WA 2017



*MSM = men who have sex with men

**PrEP eligibility at STD Clinic includes MSM or transgender patients who have sex with men with any of the following in the previous 12 months: diagnosis of rectal gonorrhea or early syphilis, methamphetamine or popper use, or exchange sex for money or drugs. All Black or Latino MSM are also eligible for PrEP at the STD Clinic.